Hillstone Networks

StoneOS WebUI Guide - E series

Version 5.5R10

TechDocs | docs.hillstonenet.com

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About this Guide:

This guide gives you comprehensive configuration instructions of Hillstone Networks StoneOS .

For more information, refer to the documentation site: https://docs.hillstonenet.com

To provide feedback on the documentation, please write to us at: TechDocs@hillstonenet.com

Hillstone Networks

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Welcome

Thanks for choosing Hillstone products!

This part introduces how you get user guides of Hillstone products.

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Cookbook (recipes):

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OS Operation Guides:

- StoneOS Command Line Interface User Guide (Download PDF)
- StoneOS WebUI User Guide (Download PDF)
- StoneOS Log Messages Reference Guide (Download PDF)
- StoneOS SNMP Private MIB Reference Guide (Download PDF)
- StoneOS Addendum Book for P Releases (Download PDF)

Hardware Installation Guides:

- Hardware Reference Guide of all series platforms (Download PDF)
- Expansion Modules Reference Guide of all modules (Download PDF)

Other Support Links:

- Webiste: https://www.hillstonenet.com
- Download Documentations:https://docs.hillstonenet.com
- Technical Support: 1-800-889-9860

Conventions

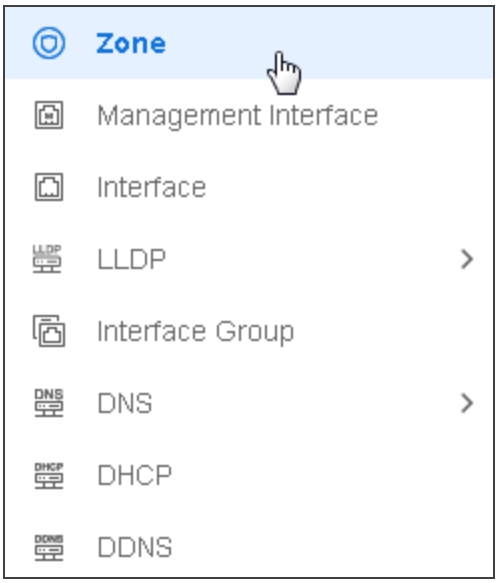
Know the operate method of WebUI common controls, can complete the configuration of most functions.

Note: All the configurations should be in UTF-8 code if not particularly indicated.

The common controls and effect of operating as follows:

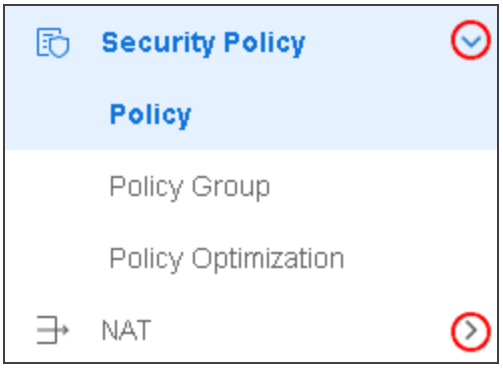
- Switching between the function category : Select the tab (at the top of page).

- Switching between the function : Click specific function node in level-2 navigation pane.



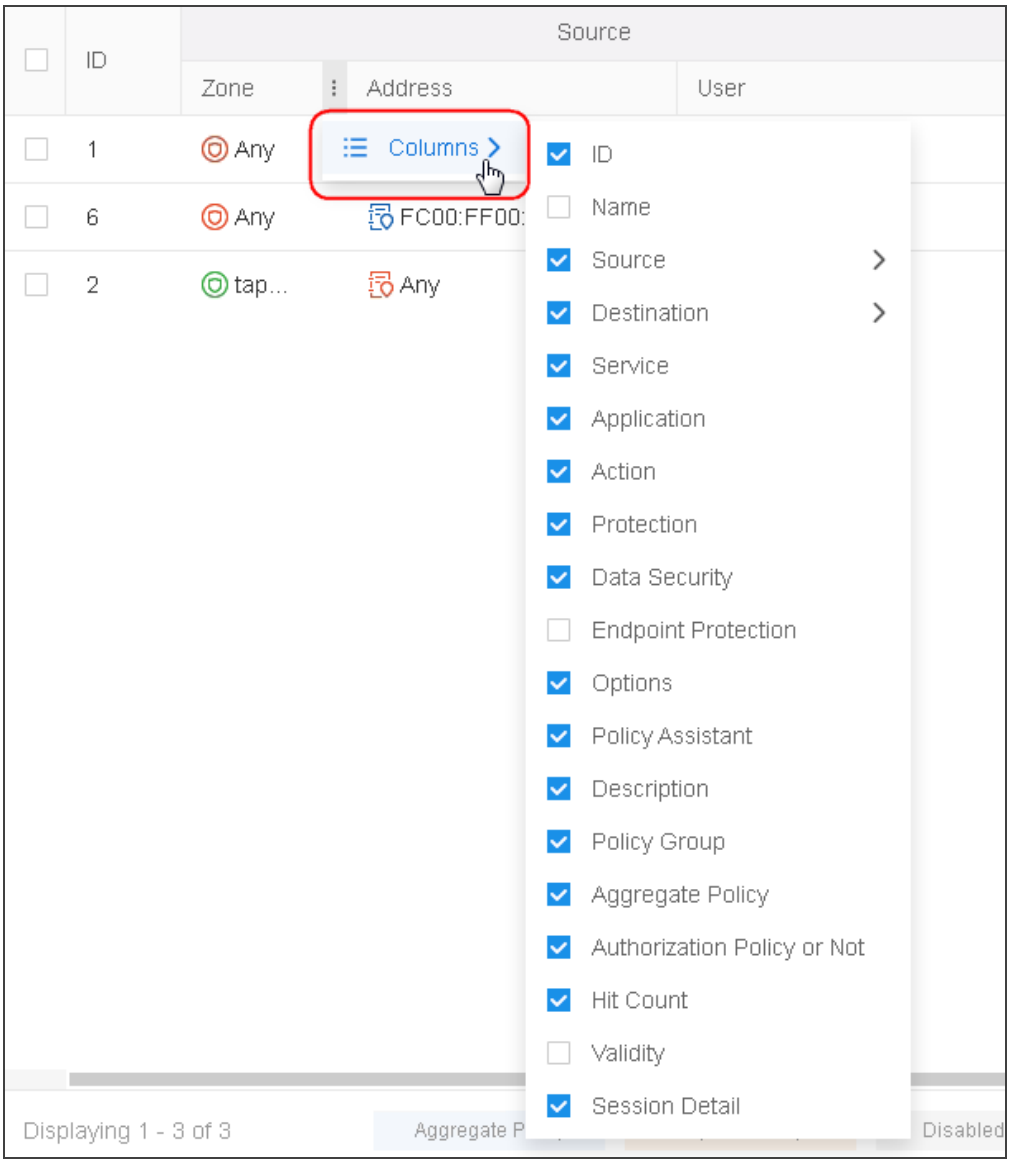
- Open the function list: Click ›in the level-2 navigation pane;

  Close the function list: Click ⌄ in the level-2 navigation pane.

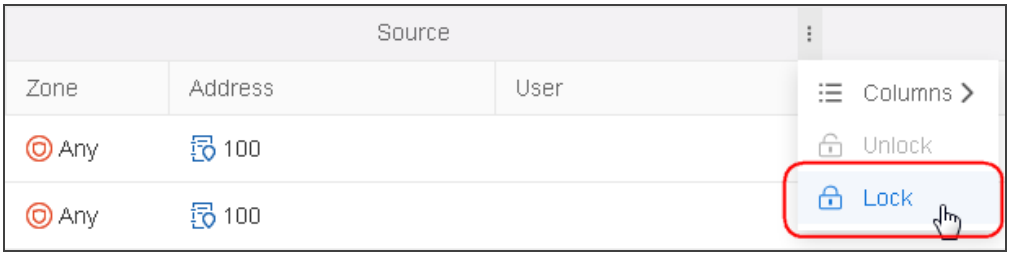


- Viewing the specified column: Click › icon, click "Column" in the drop-down list, select the specified list.The system support for the list status memory function, the system will display

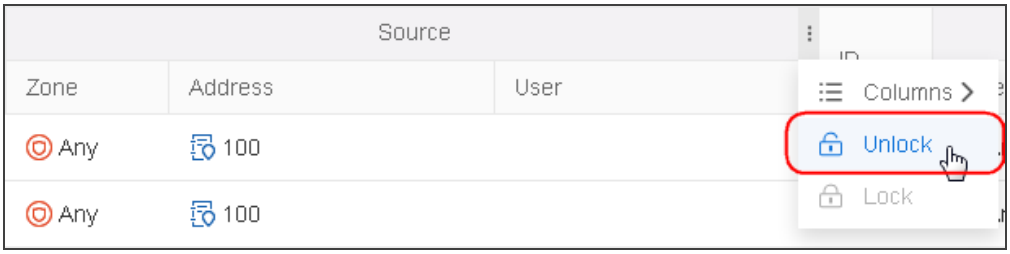
the last configuration of the list status when logging in to the device.



- To lock the column: Click ⋮ icon, click "Lock" in the drop-down list, the locked column will be always showing at the right of the list.

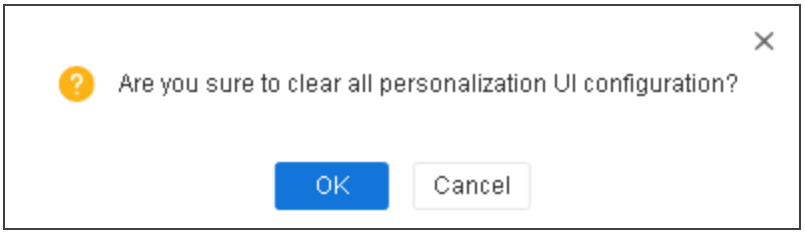


- To unlock the list: Click ⋮ icon, click "Unlock".



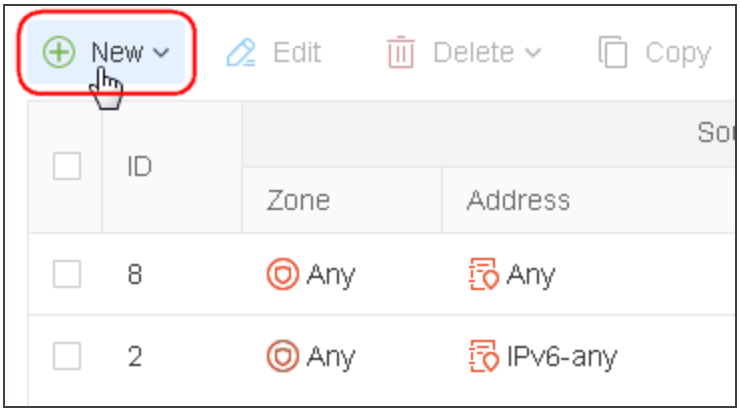
- To restore the initial state of the list: double-click the list header and click "OK" in the dialog box.

- To restore the initial state of all the list: Click › button of the user name in the top right corner of the page and click "OK" in the dialog box.

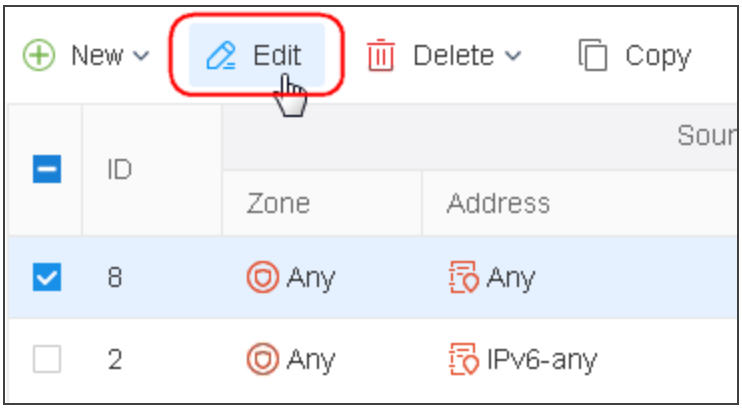


- To view the specified items by setting up filters: click Filter button, select filter conditions from the **Filter** drop-down list, and then select filter conditions as needed. To delete a filter condition, hover your mouse on that condition and then click the × icon. To delete all filter conditions, click the ×Remove All icon on the right side of the row.

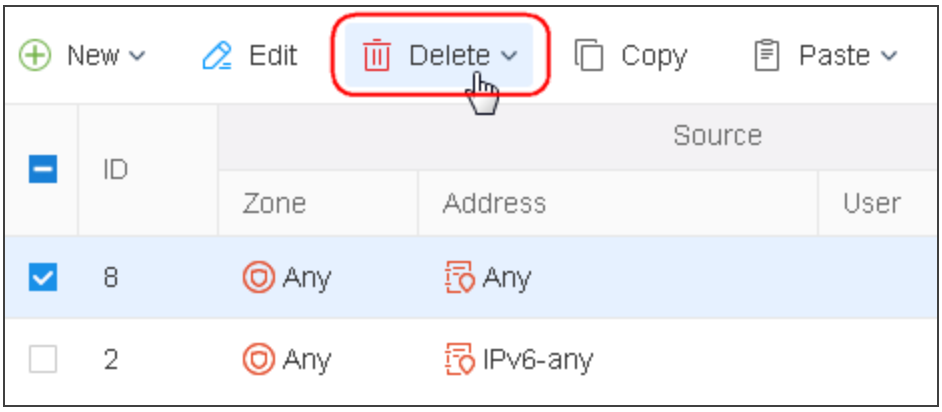
- To create a item, click **New**.



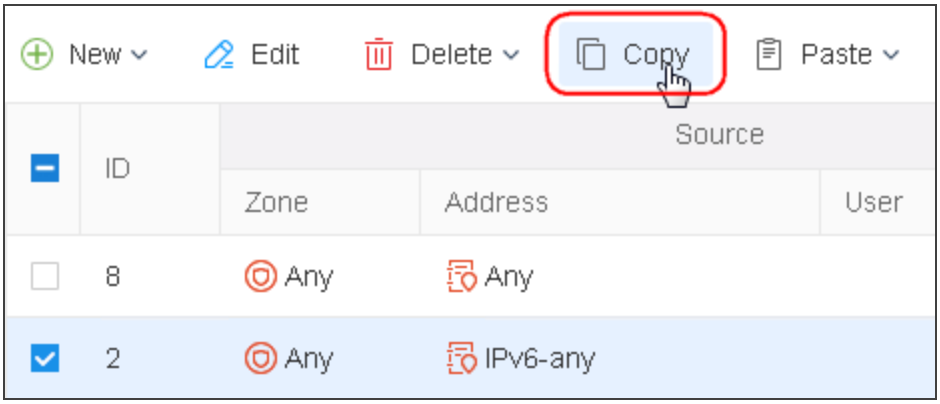
- To edit a item, select the check box and click **Edit**.



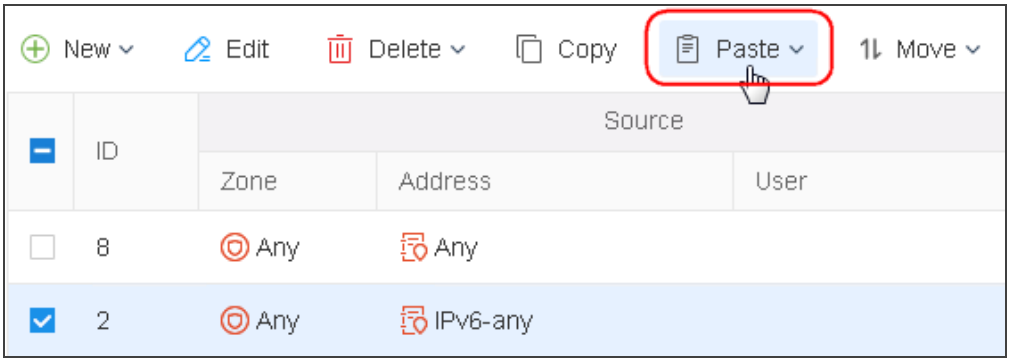
- To delete the items, select the check box and click **Delete**.



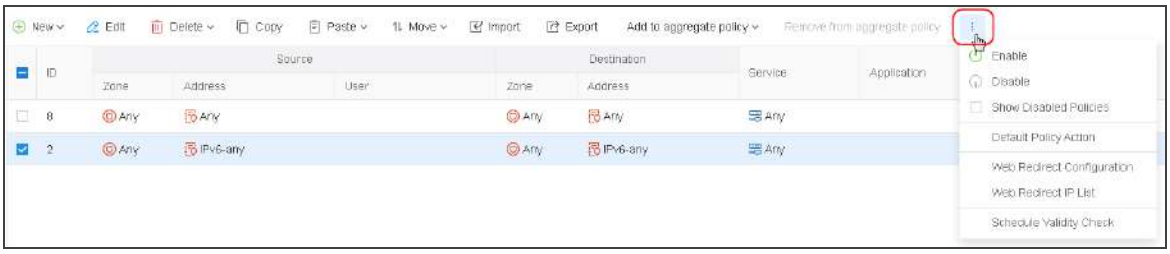
- To copy a item, select the check box and click **Copy**.



- To paste a item, select the check box and click **Paste**.



- To dispaly the hidden controls , click ⋮.



- To update the data displayed on the current page, click **refresh**.

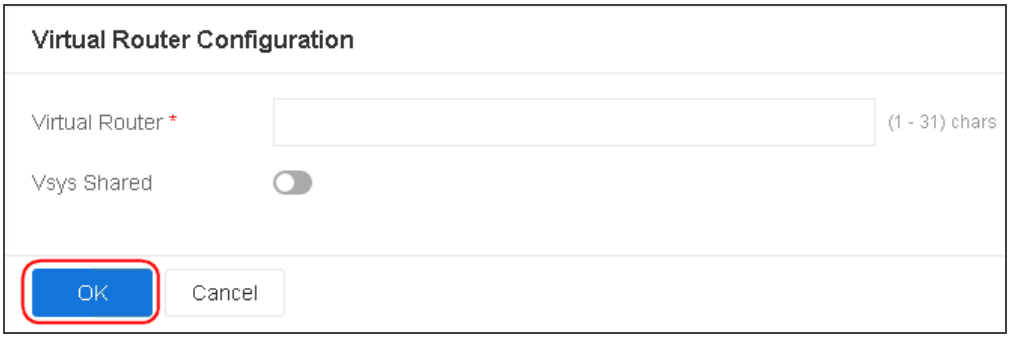
- To search according one condition , click **Filter**. In the pop-up line, click **+Filter** to add a new filter condition. Then select a filter condition from the drop-down menu and enter a value. And then press **Enter** to start searching.

- To search according multiple conditions, click 

to add another filter condition, Then select a filter condition from the drop-down menu and enter a value. And then press **Enter** to start searching.

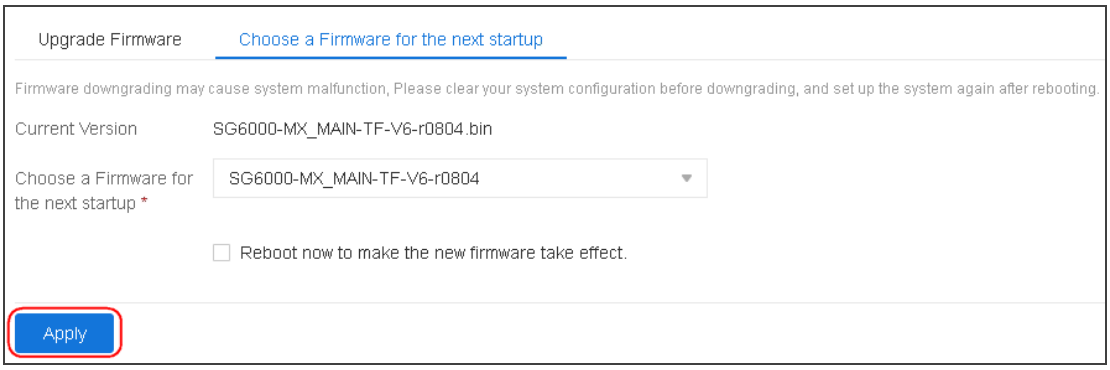
- To close the dialog, click 'X' at the top right corner of dialog.

- To save the current configuration, click **OK**.



- To cancel the current operation, click **Cancel**.

- Click **Apply**, the modification will be took effect.



- Click next page buttons to jump to previous page , next page , dashboard or last page. Enter the page number, jump to the corresponding page.

Explorer Compatibility

The following browsers have passed compatibility tests:

- IE11
- Chrome

Chapter 1 Getting Started Guide

This guide helps you go through the initial configuration and the basic set-up of your Hillstone device.

This guide is based on StoneOS 5.5R10. With system updates, the user interface is subject to change, and WebUI layout may vary depending on hardware platforms. This guide may not comply with every detail on your WebUI, please check your WebUI. The actual web pages take precedence.

1. "Log in to WebUI" on Page 15
2. "Startup Wizard" on Page 1824
3. "Preparing the StoneOS System" on Page 25, including:
    - Configuring the System Time
    - Installing Licenses
    - Creating a System Administrator
    - Adding Trust Hosts
    - Upgrading StoneOS Firmware
    - Configuring the DNS Server
    - Updating Signature Database
    - Connecting to the Internet
        - Connecting to the Internet Under Routing Mode
        - Connecting to the Internet Under Transparent Mode
        - Connecting to the Internet via mobile 3G/4G
4. "Restoring Factory Settings" on Page 65

5. "General Features" on Page 68

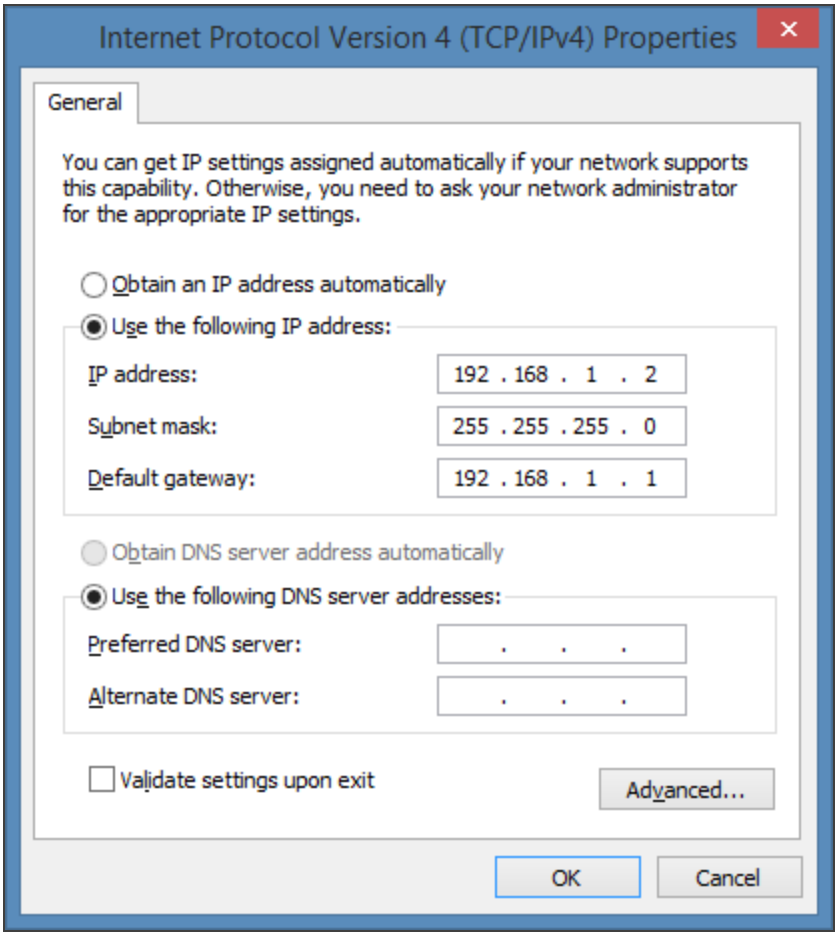
    - Device Management
    - Threat Prevention
    - High Availability (HA)
    - Exporting Logs

Log in to WebUI

Interface ethernet0/0 is set with the default IP address 192.168.1.1/24. Meanwhile, the management services of SSH, PING, SNMP, and HTTP are all enabled for this interface (except for some custom versions). You can access the WebUI of the device through this interface at your initial visit to the device.

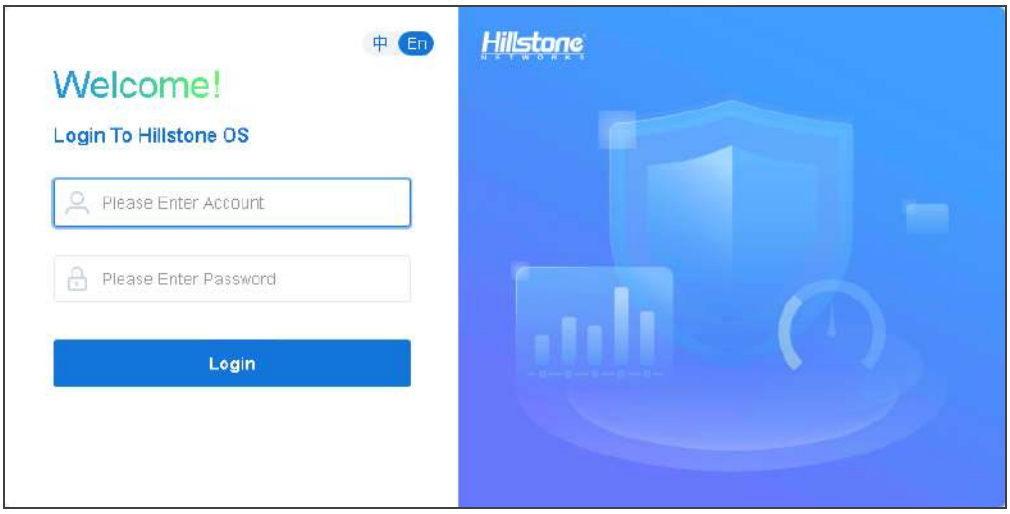
To visit the WebUI for the first time, take the following steps:

1. Go to your computer's Ethernet properties and set the IPv4 protocol as below.



2. Connect your computer to interface ethernet0/0 with an RJ-45 Ethernet cable.

3. In your browser's address bar, type "https://192.168.1.1" and press **Enter**.



4. On the login page, type the default username and password: hillstone/hillstone.
5. An EULA (end-user license agreements) is made available to you when you first log in to the WebUI. You need to read and accept EULA. Click **EULA** to view its details.
6. Click **Login**, follow the prompts to change the default password, and then log in again with the new password.

Startup Wizard

After logging in to the firewall and changing the password via WebUI, you will be presented with a Startup Wizard. You can follow the steps to complete initial configuration of the firewall, including the host name, system time and license, routing mode deployment, and security policy configuration. You can also skip the Startup Wizard and configure the firewall.

Notes:

Under any of the following conditions, the Startup Wizard will not be prompted when the administrator logs in the WebUI:

- The firewall is deployed in HA mode;
- The login address does not point to the WebUI homepage, such as "http://x.x.x.x/#icenter";
- Logging in to the firewall WebUI on the HSM device;
- Logging in to the firewall WebUI via SSO on the cloud platform.

Skipping the Startup Wizard

To skip the Startup Wizard, take the following steps:

1. On the Startup Wizard welcome page, Click **Skip**.
2. The Skip page will be displayed, asking "Are you sure to skip the startup wizard?". You can select the **Do not display next-time login** check box as required. If this check box is not selected, the Startup Wizard will be displayed at your next login.
3. Click **OK** to close the Startup Wizard.

Starting the Startup Wizard

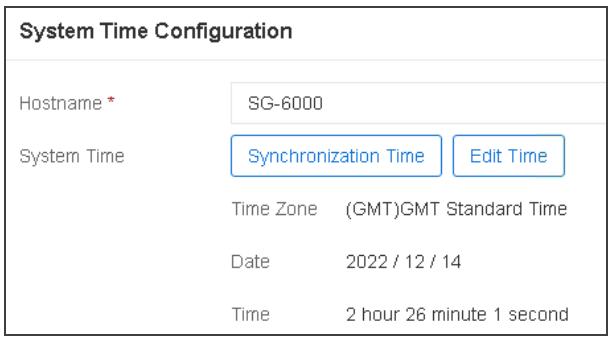
If the Startup Wizard is skipped, you can restart it again as follows:

1. Select **System** > **Device Management** > **Startup Wizard**.
2. On the Startup Wizard page, configure whether to restore the device to factory defaults as required:
    a. If **Restore to Factory Defaults** is enabled, the system will erase all system configuration after you start the Startup Wizard.

b. If **Restore to Factory Defaults** is disabled, the security policies created in the Startup Wizard have a higher priority than the policies (if any) previously configured in the Policy module. Other configuration, except policies, will be updated to the one configured in the Startup Wizard. By default, **Restore to Factory Defaults** is disabled.

3. Click **Open** to go to the Startup Wizard.

4. Click **Start Wizard** to start the Startup Wizard and enter the **System Time Configuration** page.

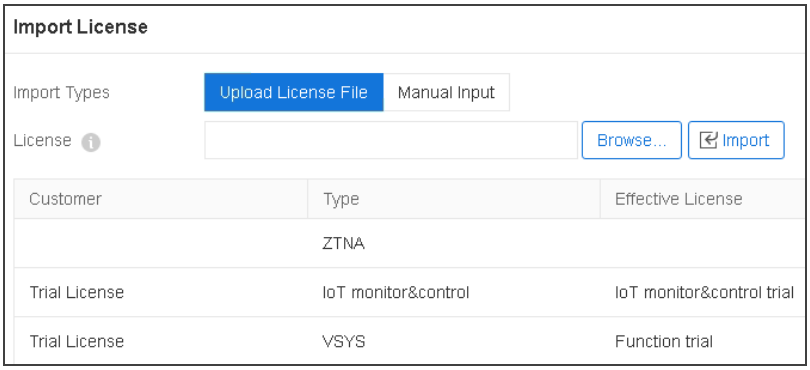


Configure the hostname and system time

Option	Description
Hostname	Type the hostname. The value length is from 1 to 63 characters. The default value is SG-6000. Click **Next** to deploy the configuration.
System Time	Set the system time in either of the following ways: • Click **Synchronization Time** and the corresponding panel appears, where you can view your current timezone. Click **OK**. • Click **Edit Time,** and the corresponding panel appears, where you can set the timezone, date and

Option	Description
	time and then click **OK**.

5. Click **Next** to go to the **Import License** page.



Import the license

Option	Description
Import Types	Specifies the method to import licenses. When licenses are imported, they are listed on the current page. Note that some licenses take effect only after a system restart. Please restart the system when Startup Wizard is fully configured. There are two ways of importing the licenses: • **Upload License File**: Click **Browse**, select the license that needs to be imported and then click **Import**. • **Manual Input**: Type the license content in the **License** text box and then click **Import**.

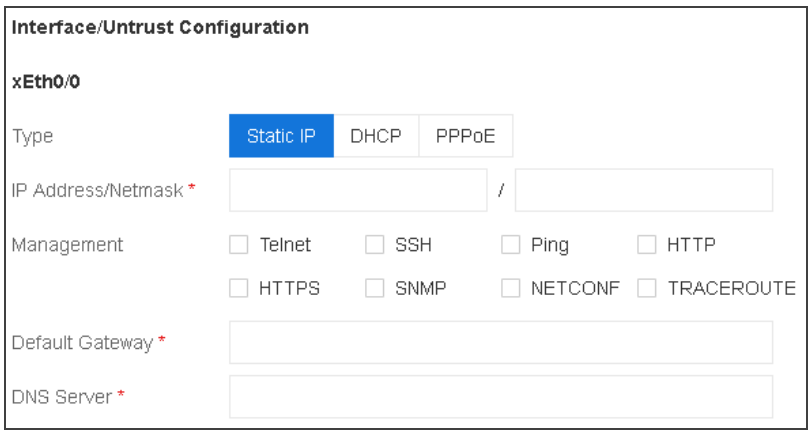
6. Click **Next** to go to the **Network Configuration** page. Network configuration will be deployed when the Startup Wizard is fully configured. In the Network Configuration section, in addition to the configuration that you can manually add in the Startup Wizard, the system automatically configures an SNAT rule that enables the Sticky function, translating

the Intranet IP to the IP address of the Intranet exit IP.

Select the Intranet Interface and the Internet Interface.

Option	Description
Untrust	Select the Internet interface and add it to the untrust zone.
Trust	Select the Intranet interface and add it to the trust zone.

7. Click **Next** and configure the Internet interface.



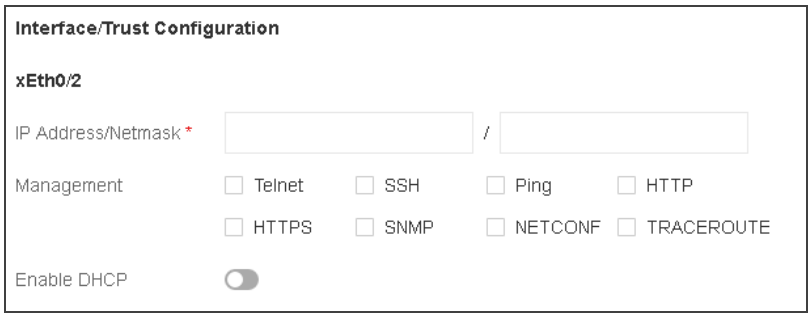
Configure the Internet (untrust) interface

Option	Description
Type	Select the method of obtaining IP addresses for the Internet interface.
Static IP	Specifies the IP address and netmask for the interface when **Static IP** is selected.

Option	Description
DHCP	When DHCP is selected, the interface will automatically obtain IP addresses using DHCP.
PPPoE	When PPPoE is selected, configure the following parameters: • User: Specifies the PPPoE user name. The value length is from 1 to 31 characters. • Password: Specifies the password of the PPPoE user. The value length is from 1 to 31 characters. • Confirm Password: Type the password again. • Idle Interval: Specifies the idle interval. The uint is in minutes. The value range from is 0 to 10,000 minutes. When the idle time of the PPPoE interface reaches the specified value, the system will terminate the connection. By default, the value is 0, meaning the connection will not be terminated by the system. • Reconnect Interval: Specifies the interval after which the system will automatically reconnect after a disconnection The unit is in seconds. The value range is from 1 to 10,000 seconds.
Management	Specifies the interface management method, including Telnet, SSH, Ping, HTTP, HTTPS, SNMP, NETCONF and TRACEROUTE.

Option	Description
Default Gate-way	Specifies the default gateway address.
DNS Server	Specifies the DNS server address.

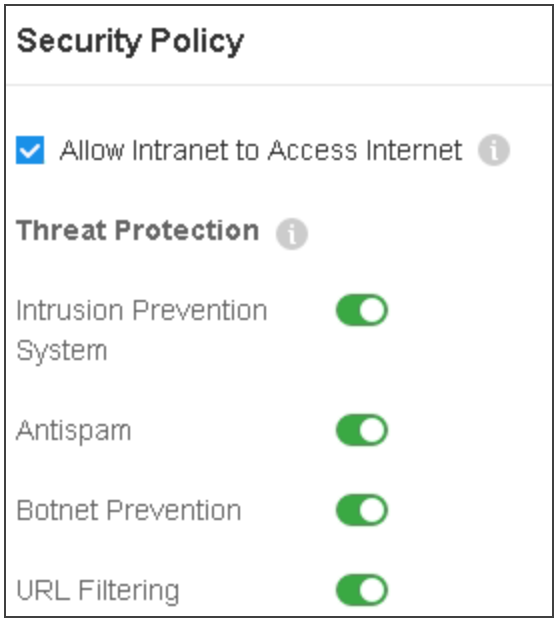
8. Click **Next** to configure the Intranet interface.



Configure the Intranet (trust) interface

Option	Description
IP Address/Net-mask	Specifies the IP address and netmask of the interface.
Management	Specifies the interface management method, includ-ing Telnet, SSH, Ping, HTTP, HTTPS, SNMP, NETCONF and TRACEROUTE.
Enable DHCP	After DHCP service is enabled, the interface will be configured as a DHCP server.
DHCP lease range	Specifies the address pool range. After the interface is configured as a DHCP server, the system will assign IP addresses from the address pool to the hosts, attempting to connect the interface.

9. Click **Next** to go to the **Security Policy** page. Security policy configuration will be deployed when the Startup Wizard is fully configured.



Configure the security policy

Option	Description
Allow Intranet to Access Internet	Select this check box to configure a security policy from the source zone (trust) to the destination zone (untrust), which will allow Intranet users to access the Internet. If this check box is not selected, the security policy will not be created.
Threat Protection	After **Allow Intranet to Access Internet** is selected, enable threat prevention functions as required. The threat prevention functions take effect only after corresponding licenses are imported. Initially, enabled threat prevention functions apply their default profile. To configure specific profiles, nav-

Option	Description
	igate to related modules after the Startup Wizard is fully configured. Note that some licenses take effect after a system reboot.

10. Click **Next** to go to the **Connecting to Hillstone Cloud Service Platform** page. Select the **Join the User Experience Program** check box to connect the system to the default Hillstone Cloud Platform account. This way, the system obtains broader threat intelligence so as to improve its protection capability.

11. Click **Next** to go to the **Options** page. You can view all configurations configured via the Startup Wizard.

12. Make sure the configurations are correct. Click **OK** to deploy network configuration and security policy configuration.

Preparing the StoneOS System

After logging in to the firewall through WebUI for the first time, you can configure the StoneOS system by customizing the following initial configuration.

- Configuring the System Time
- Installing Licenses
- Creating a System Administrator
- Adding Trust Hosts
- Upgrading StoneOS Firmware
- Configuring the DNS Server
- Updating Signature Database
- Connecting to the Internet

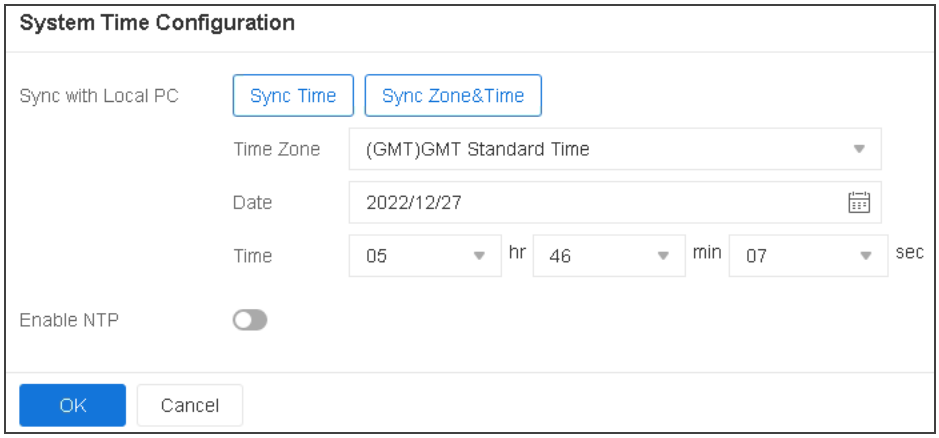
Configuring the System Time

System time affects many functional modules, such as the establishment of VPN tunnel, the functioning of schedule, and log time. Therefore, it is important to ensure the accuracy of the system time. You can configure the current system time manually, or synchronize the system time with the NTP server time via NTP protocol.

Configuring the System Time Manually

To configure the system time manually, take the following steps:

1. Select **System** > **Device Management** > **System Time**.
2. Configure the following options in the System Time Configuration section.



Option	Description
Sync with Local PC	Specifies the method of synchronizing with local PC. You can select **Sync Time** or **Sync Zone&Time**. • Sync Time: Synchronize the system time with local PC. • Sync Zone&Time: Synchronize the system zone&-time with local PC.
-	Configure parameters of the system time. • Time Zone: Select the time zone from the drop-down list. • Date: Specifies the date. • Time: Specifies the time.

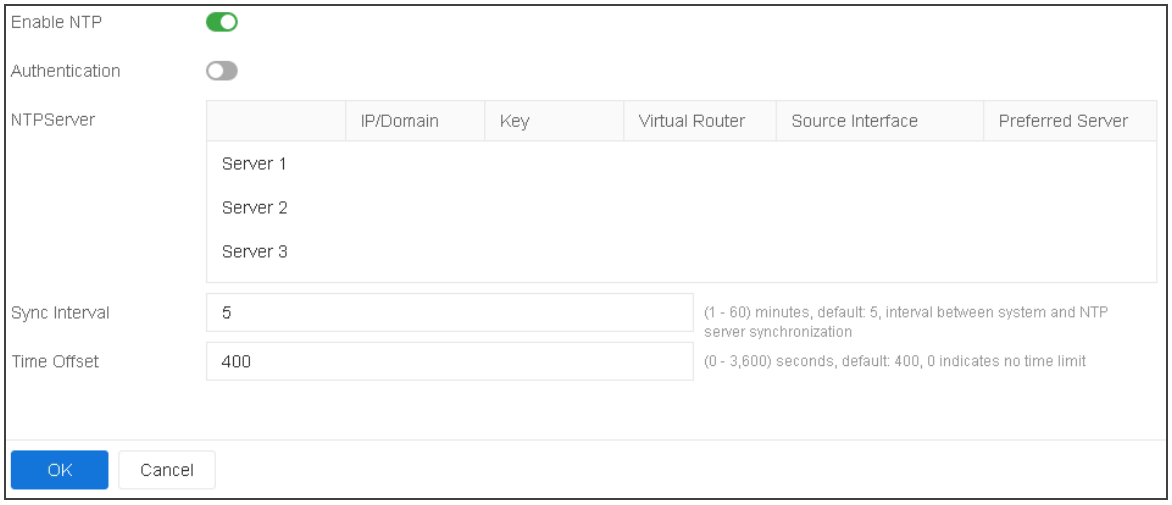
3. Click **OK**.

Configuring NTP

To configure NTP, take the following steps:

1. Select **System** > **Device Management** > **System Time**.

2. Configure the following options in the Enable NTP section.



Option	Description
Enable NTP	Click the button to enable the NTP function. By default, the NTP function is disabled.
Authentication	Click the button to enable the NTP Authentication function.
NTP Server	Specifies the NTP server that the device needs to synchronize with. You can specify at most 3 servers. • IP/Domain: Type IP address or domain of the server . • Key: Specifies the key that can be authenticated by this server. If you enable the NTP Authentication function, you must specify a key. • Virtual Router: Specifies the Virtual Router of interface for NTP communication.

Option	Description
	• Source Interface: Specifies an interface for sending and receiving NTP packets. • Preferred Server: Click the **Preferred Server** check box to set the server as the preferred server. The system will synchronize with the preferred server first.
Sync Interval	Type the interval value. The device will synchronize the system time with the NTP server at the interval you specified to ensure the system time is accurate.
Time Offset	Type the time value. If the time difference between the system time and the NTP server's time is within the max adjustment value you specified, the synchronization will succeed. Otherwise, it will fail.

3. Click **OK**.

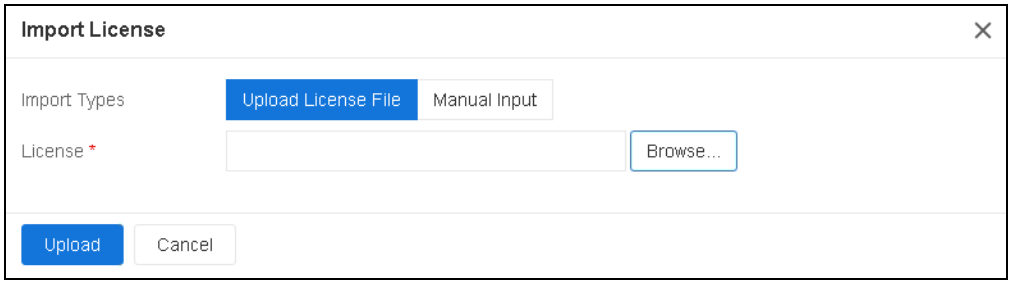
Installing Licenses

Licenses control features and performance.

Before installing any license, you must purchase a license code.

To install a license, take the following steps:

1. Go to **System > License**.
2. Click Import to open Import License page. Choose one of the three ways to import a license:



- **Upload License File:** Select the radio button, click **Browse**, and select the license file (a .txt file).
- **Manual Input**: Select the radio button, and paste the license code into the text box.

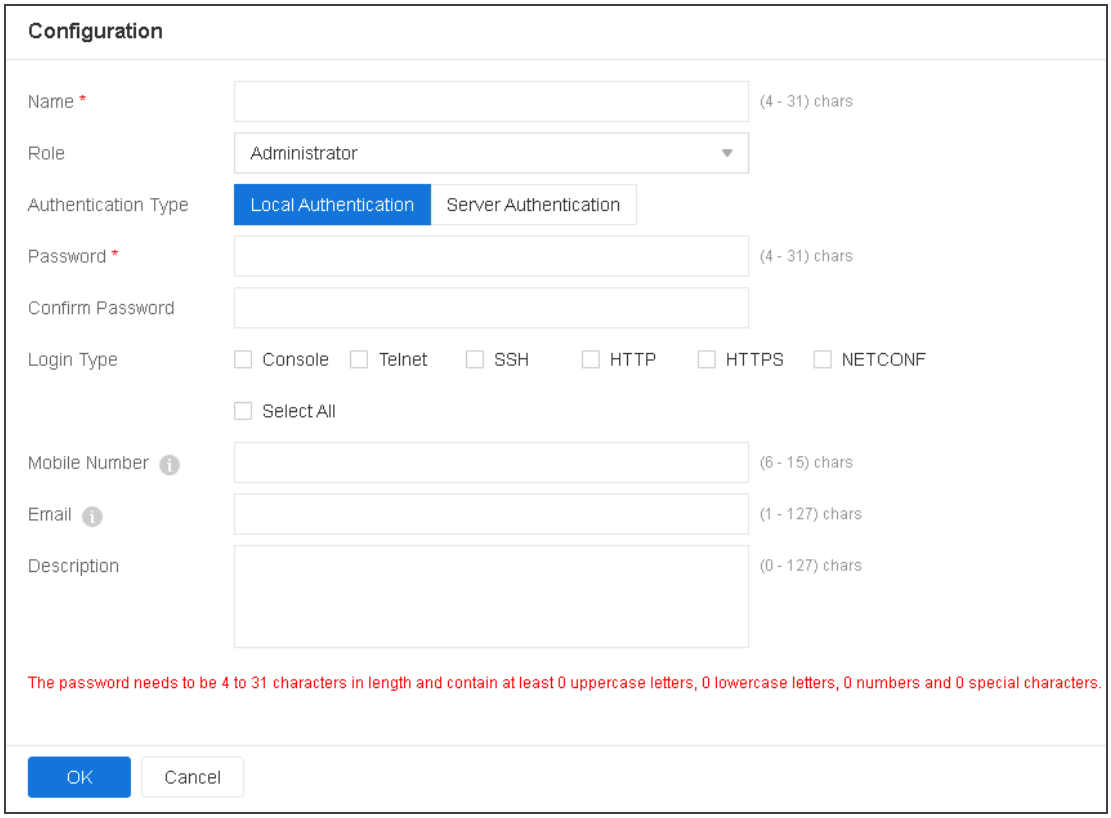
3. Click **OK**.
4. To make the license take effect, reboot the system. Go to **System > Device Management > Options**, and click **Reboot**.

Creating a System Administrator

System administrator has the authority to read, write and execute all the features in the system.

To create a system administrator, take the following steps:

1. Go to **System > Device Management > Administrator**.
2. Click **New**.



Configure the following options.

Option	Description
Name	Type a name for the system administrator account.
Role	From the **Role** drop-down list, select a role for the administrator account. Different roles have different privileges. • Administrator: Permission for reading, executing and writing. This role has the authority over all features. • Operator: This role has the authority over all fea-

Option	Description
	tures except modifying the Administrator's configurations, and has no permission to check the log information • Auditor: You can only operate on the log information, including the view, export and clear. • Administrator-read-only: Permission for reading and executing. You can view the current or historical configuration information.
Authentication Type	Select the authentication type, including: • Local Authentication: When an administrator accesses StoneOS, the administrator is authenticated based on the administrator information (including the account and password) configured in StoneOS. • Server Authentication: When an administrator accesses StoneOS, the administrator is authenticated based on the administrator information (including the account and password) configured on the authentication server.
Authentication Server	If **Authentication Type** is set to **Server Authentication**, you need to select an authentication server from the drop-down list or click ⊕ button to create an authentication server. For details, see AAA Server. The fol-

Option	Description
	lowing servers are supported: • Radius Server • Active Directory Server • LDAP Server • TACACS+ Server
Retry Local	After this function is enabled, local password verification will be performed if the server is unreachable. If the server returns a password error, this function is invalid. By default, the function is disabled.
Password	Type a login password for the admin into the **Password** box. The password should meet the requirements of Password Strategy.
Confirm Password	Re-type the password into the **Confirm Password** box.
Login Type	Select the access method(s) for the admin, including Console, Telnet, SSH, HTTP, HTTPS and NETCONF. If you need all access methods, select **Select All**.
Description	Enter descriptions for the administrator account.

3. Click **OK**.

Notes: The system has a default administrator "hillstone". You can modify the setting of hillstone.

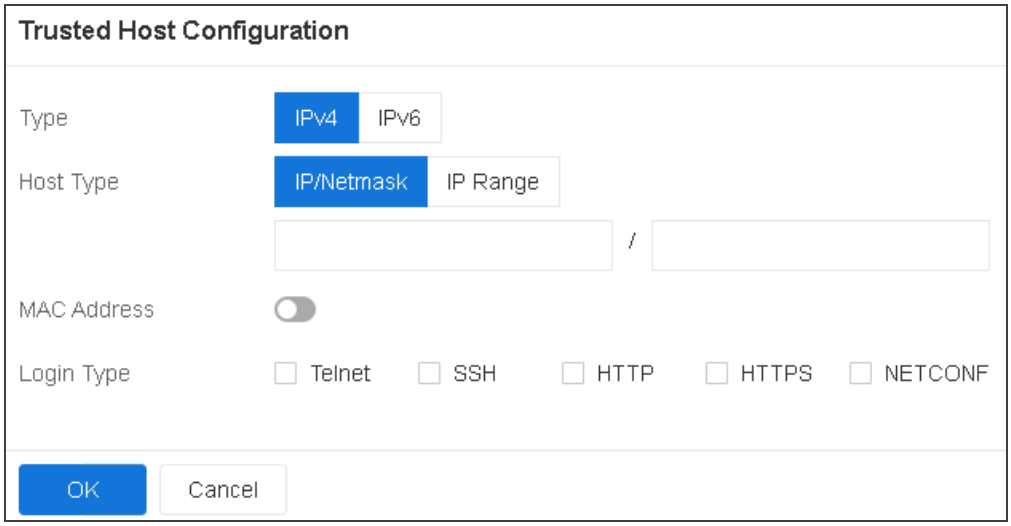
Adding Trusted Hosts

The trusted host is used to further ensure system security. An administrator can specify a trusted host by specifying the IP range or MAC address/MAC range. That's to say, hosts within the specified range are trusted hosts. Only computers included in the trust hosts can manage the system.

Notes: After adding the trust host, delete the default trust host range "0.0.0.0/0". "0.0.0.0/0" indicates that all hosts are trust hosts.

To add a trust host, take the following steps:

1. Select **System** > **Device Management** > **Trusted Host**.
2. Click **New**.
3. In the Trusted Host Configuration dialog box, configure these values.



Configure the following options.

Option	Description
When the system is IPv4 version, configure the following options:	
Match	Select the address type to match the trusted host.

Option	Description
Address Type	• When "IPv4" is selected, you need to specify the IP range, and only the hosts in the IP range can be the trust hosts; • When "IPv4&MAC" is selected, you need to specify the IP range or MAC address/range, and only the hosts in the specified IP range and MAC range can be the trusted hosts.
IP Type	Specifies the IP range of the trusted hosts: • IP/Netmask: Type the IP address and netmask of the trusted hosts. • IP Range: Type the start IP and end IP of the trusted hosts.
MAC Type	Specifies the MAC address or MAC range of the trusted hosts: • MAC Address: Type the MAC address of the trusted hosts. • MAC Range: Type the start MAC address and end MAC address of the trusted hosts.
Login Type	Select the access methods for the trusted host, including "Telnet", "SSH", "HTTP", "HTTPS", and "NETCONF".
When the system is IPv6 version, configure the following options:	
Type	Select the address type to match the trusted host: "IPv4"

Option	Description
	or "IPv6".
Host Type	Configure the IPv6 trusted host or the IPv4 trusted host. • If the user chooses "IPv4" type, specifies the IP address or the IP range of the IPv4 trusted host: • IP/Netmask: Type the IP address and net-mask of the trusted hosts. • IP Range: Type the start IP and end IP of the trusted hosts. • If the user chooses "IPv6" type, specifies the IPv6 address or the IPv6 range of the IPv6 trusted host: • IPv6/Prefix: Type the IPv6 address and pre-fix of the trusted hosts. • IPv6 Range: Type the start IPv6 address and end IPv6 addressof the trusted hosts.
MAC Type	Click the **Enable** button to use the MAC address or the MAC range to match the trusted host. By default, this but-ton is disabled.
MAC Address	Specifies the MAC address or the MAC range of the trusted host. • MAC address: Type the MAC address of the trus-ted hosts. • MAC range: Type the start MAC address and end

Option	Description
	MAC address of the trusted hosts.
Login Type	Select the access methods for the trust host, including "Telnet", "SSH", "HTTP", "HTTPS", and "NETCONF".

4. Click **OK**.

Upgrading StoneOS Firmware

Notes: Back up your configuration files before upgrading your system.

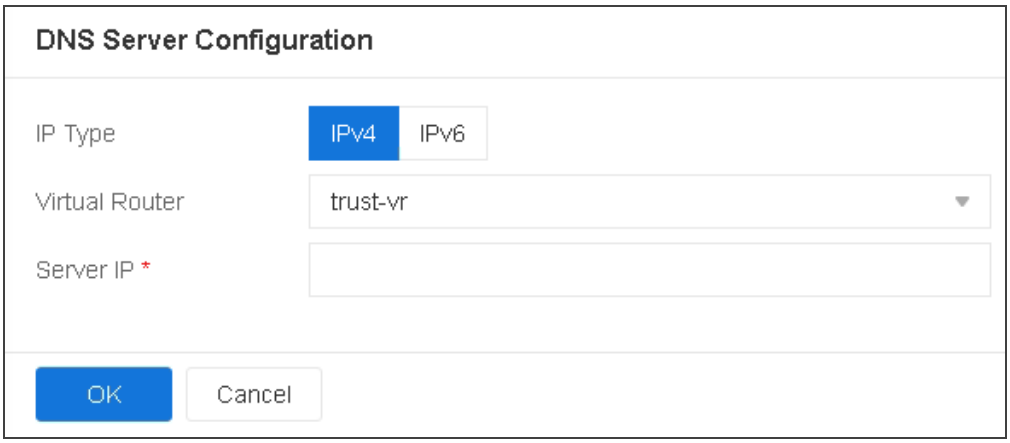
To upgrade your system firmware, take the following steps:

1. Go to **System > Upgrade Management**.
2. Select **Browse** and choose the new image from your local computer.
3. Click **Reboot to make new firmware take effect**, then click **Apply**.
4. System will automatically reboot when it finishes installing the new firmware.

Configuring a DNS Server

You can configure a DNS server for system to implement DNS resolution. To create a DNS server, take the following steps:

1. Select **Network > DNS > DNS Server**.
2. Click **New** in the DNS Server section.



3. Select the IP address type, including IPv4 or IPv6.
4. Select a VRouter from the VR drop-down list. The default VRouter is trust-vr.
5. Type the IP address for the DNS server into the Server IP box.
6. Click **OK**.

Updating Signature Database

By default, the system will automatically update the databases every day.

Notes:

- Features that require constant updates of signature are license controlled. You must purchase the license in order to be able to update the signature libraries.
- To ensure that the device connects to the default update server, configure the DNS server before the update.

To update a database, take the following steps:

1. Select **System > Upgrade Management** > **Signature Database Update**.

2. **Find your intended database, and choose one of the following two ways to upgrade.**

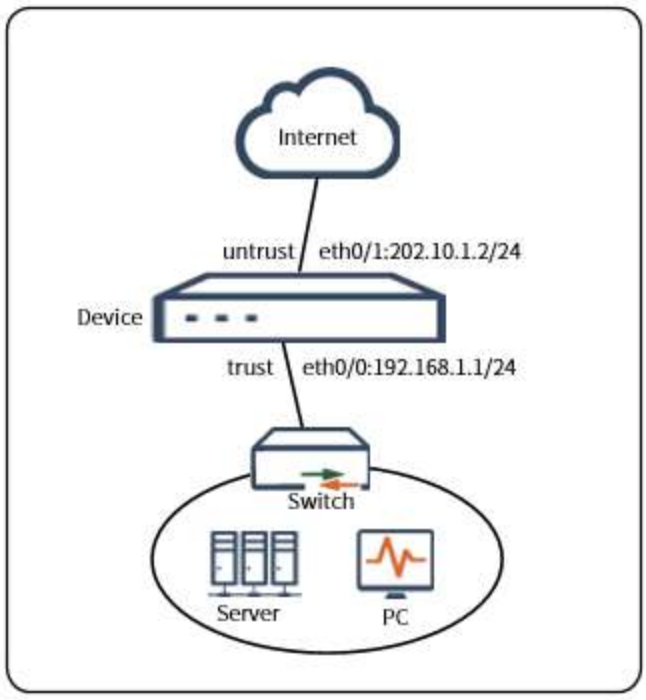
    - **Remote Update**: Click **OK And Online Update** to immediately update the signature database. Or, enable **Auto Update** and specify the auto update time. The system will automatically update the signature database according to the configured update time. It is recommended to set the auto update time to the period of low service traffic.

    - **Local Update**: Select **Browse** to open the file explorer, and select your local signature file to import it into the system.

Connecting to the Internet

Connecting to the Internet Under Routing Mode

The routing mode often works with NAT. Therefore, the routing mode is also known as the NAT mode. In the routing mode, the device works as a gateway and router between two networks. This section shows how to connect and configure a new Hillstone device in the routing mode to securely connect the Intranet to the Internet.



To get your Intranet access to the Internet through a Hillstone device, take the following steps:

Step 1: Connecting to the device

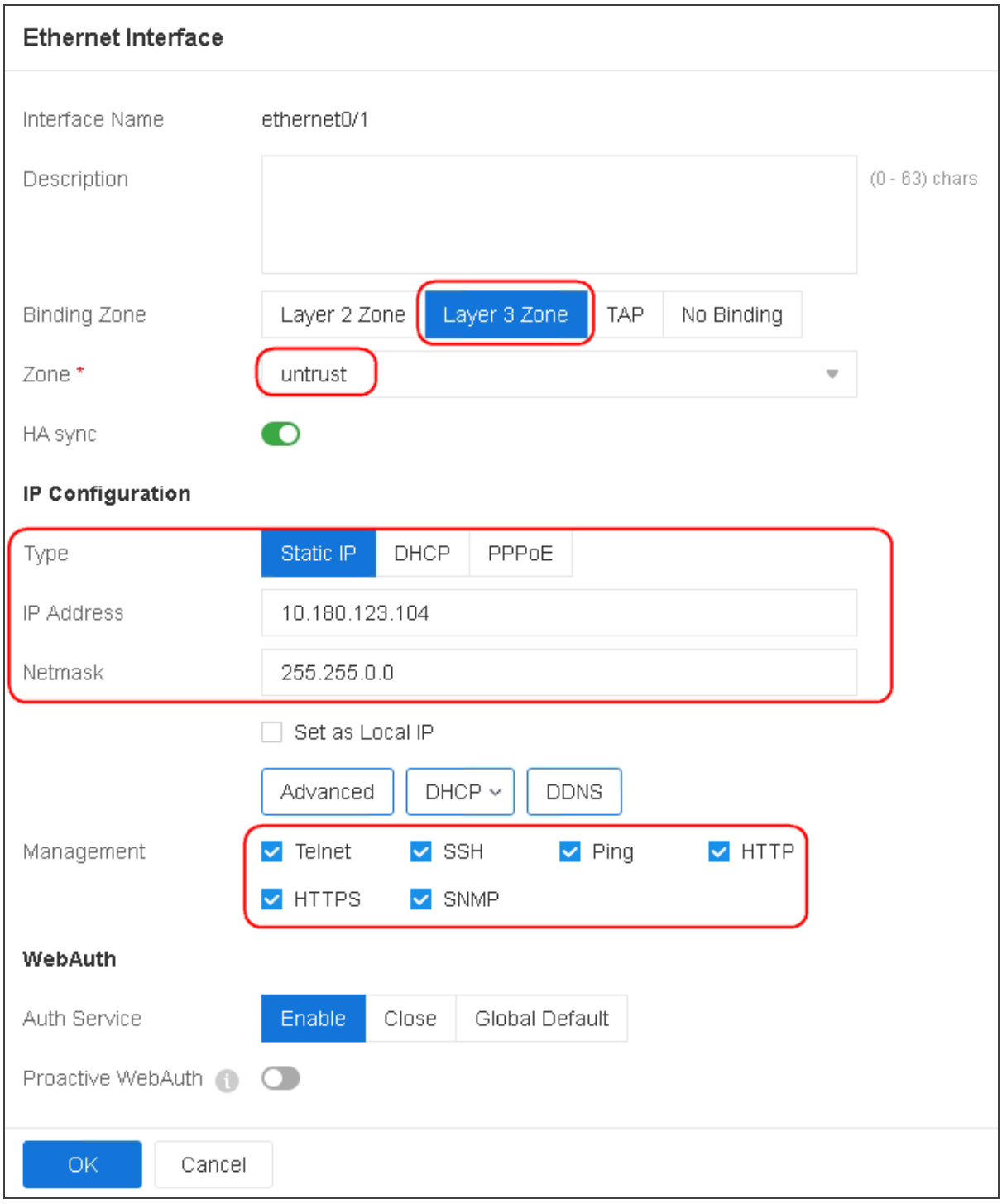
1. Connect one port (e.g. ethernet0/1) of Hillstone device to your ISP network. In this way, "ethernet0/1" is in the untrust zone. Connect the Intranet to another Ethernet interfaces (e.g. ethernet0/0) of the device. This means "ethernet0/0" is connected to the trust zone.
2. Power on the Hillstone device and your PCs.

3. Access the system WebUI through the Intranet interface. For more information, refer to Log in to Web Interface.

Step 2: Configuring interfaces

1. Go to **Network > Interface**.

2. Double click **ethernet0/1**.



On the Ethernet Interface page, enter values

Option	Value
Binding Zone	L3-zone
Zone	untrust
IP Configuration	
Type	Static IP
IP Address	202.10.1.2 (public IP address provided by your ISP)
Netmask	255.255.255.0
Management	Select protocols that you want to use to access the device.
Interface Properties	
MTU	1500
ARP timeout	1200

Notes: Besides **Static IP**, you can also select the following types as needed in the **IP Configuration** section.

- DHCP: With DHCP selected, the interface automatically obtains an IP address through DHCP.
- PPPoE: With PPPoE selected, the interface obtains an IP address through PPPoE. In this case, you also need to configure the user name, password and confirm the password.

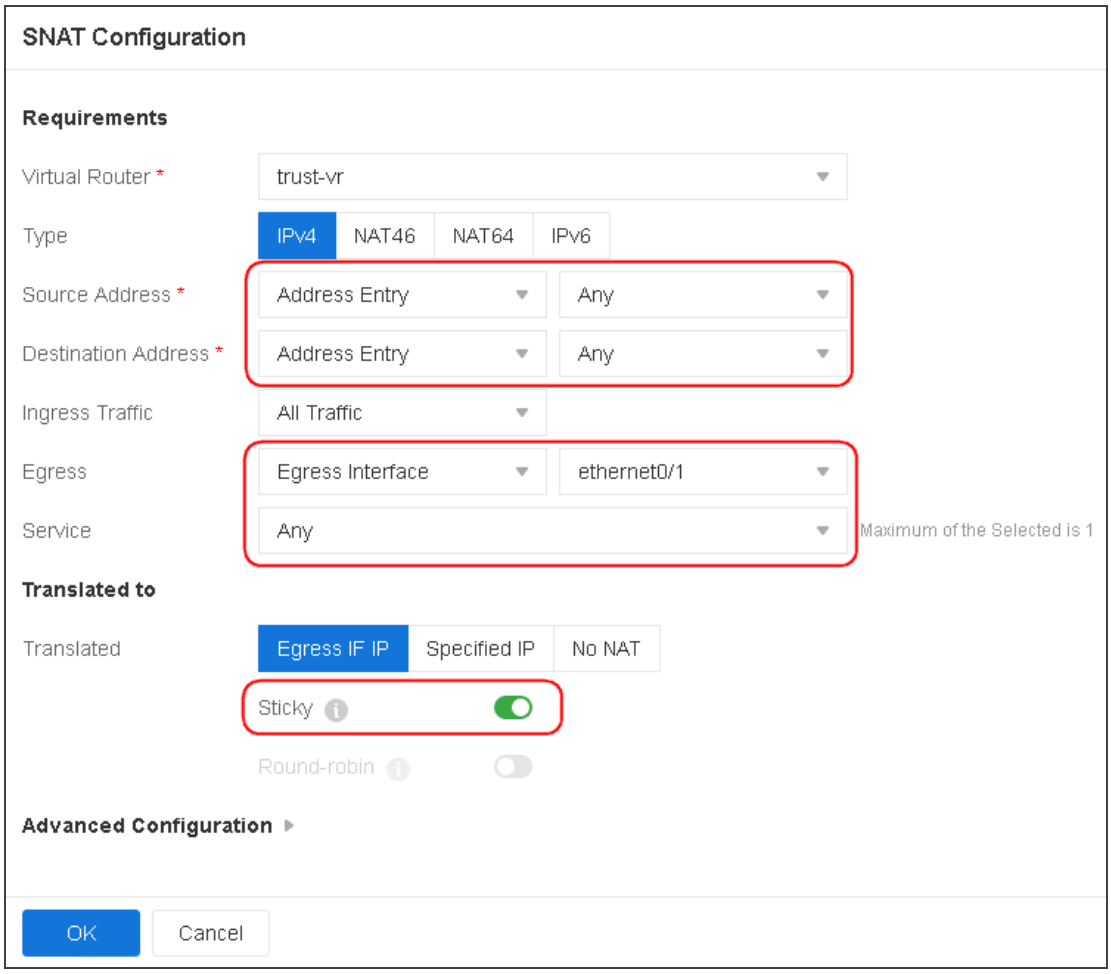
3. Click **OK**.

4. By default, ethernet0/0 belongs to the "trust" zone and is configured with 192.168.1.1/24. Therefore, there is no need to make further configuration.

Step 3: Creating a NAT rule to translate Intranet IP to public IP

1. Go to **Policy > NAT > SNAT**.

2. Click **New**



On the SNAT Configuration page, enter values

Option	Value
Requirements	

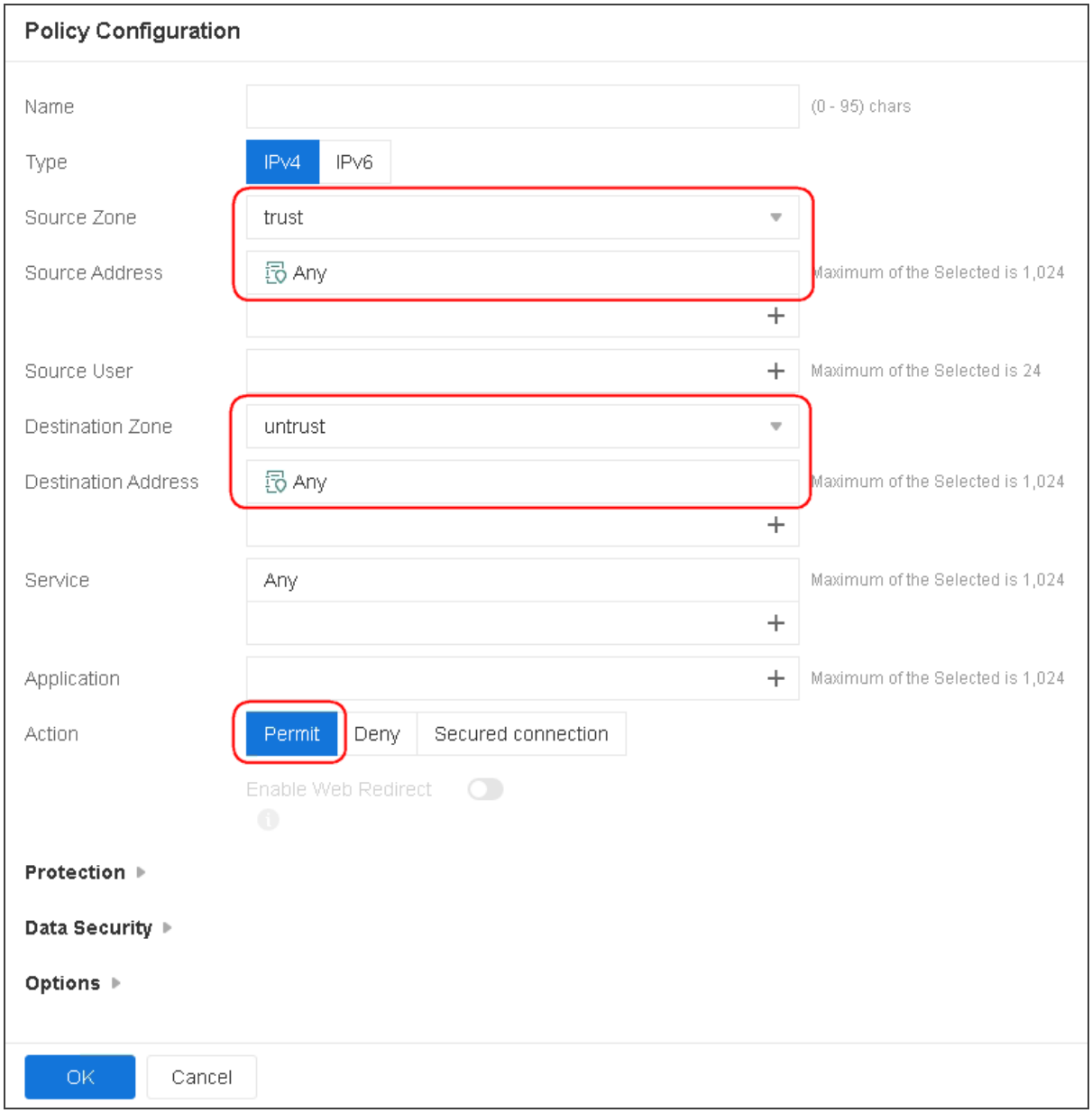
Option	Value
Virtual Router	trust-vr
Source Address	Address Entry, Any
Destination Address	Address Entry, Any
Egress	Egress interface, ethernet 0/1
Translated to	
Translated	Egress IP
Advanced Configuration	
ID	Automatically assign

Notes: The egress interface should be specified as the Internet interface.

3. Click **OK**.

Step 4: Creating a security policy to allow internal users to access the Internet.

1. Go to **Policy > Security Policy> Policy**.
2. Click **New** and select **Policy** from the drop-down list.



On the Policy Configuration page, enter values.

Option	Value
Source Zone	trust
Source Address	Any

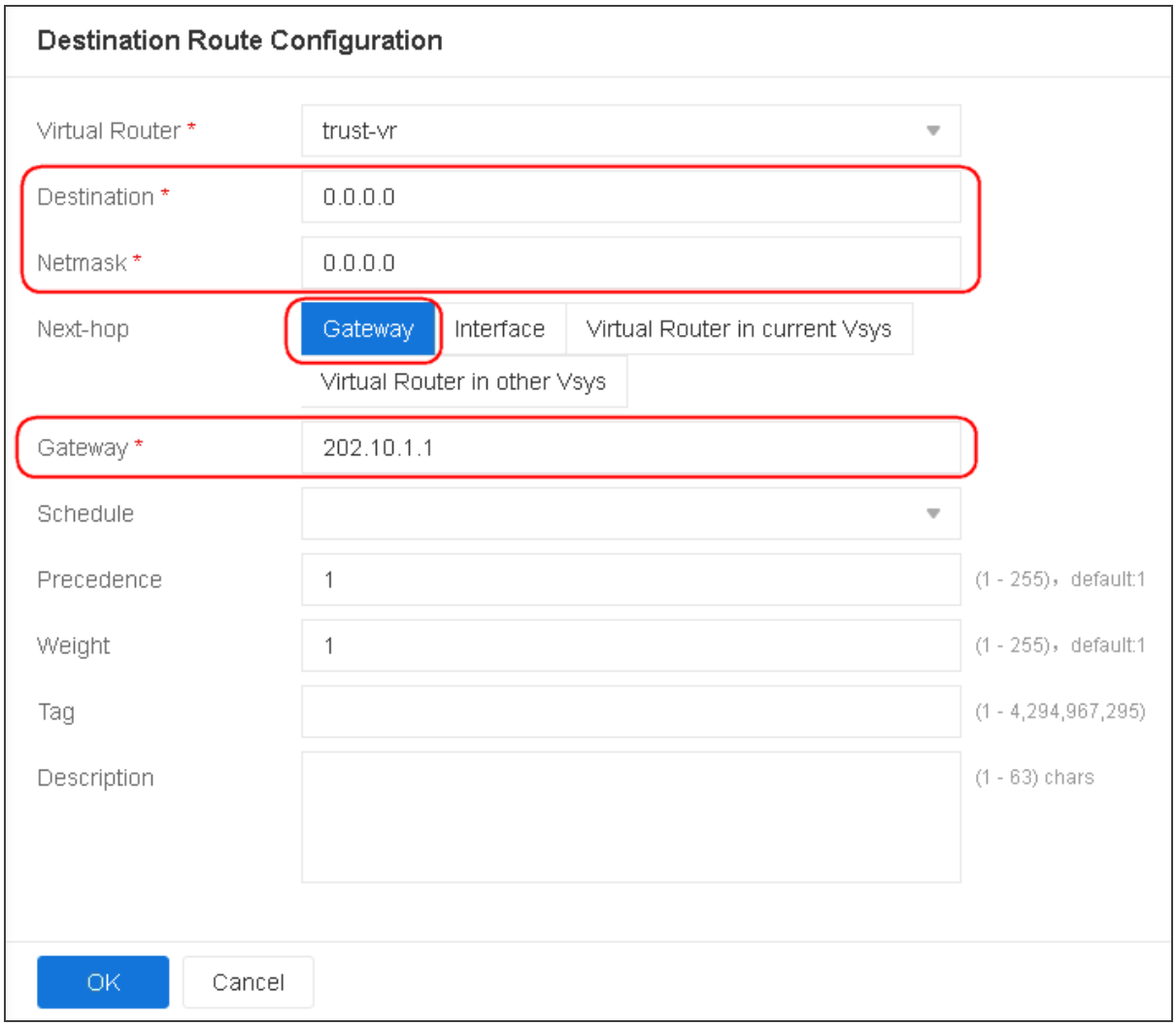
Destination Zone	untrust
Destination Address	Any
Service/Service Group	Any
APP/APP Group	-----
Action	Permit

3. Click **OK**.

Step 5: Configuring a default route

1. Go to **Network >Routing > Destination Route**.

2. Click **New**.



On the Destination Route Configuration page, enter values.

Option	Value
Virtual Router	trust-vr
Destination	0.0.0.0 (means all network)
NetMask	0.0.0.0 (means all subnets)

Option	Value
Gateway	202.10.1.1 (gateway provided by your ISP)

3. Click **OK**.

Connecting to the Internet Under Transparent Mode

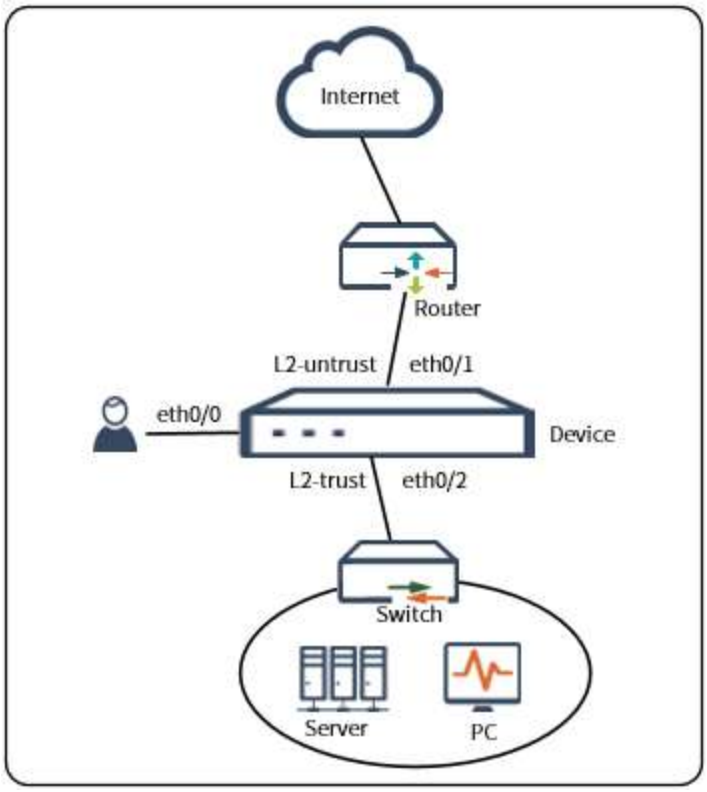
Transparent mode is also known as the bridge mode or transparent bridging mode. Transparent mode is used when the IT administrator does not wish to change the existing network layout. Normally, the existing network has already set up routers and switches. The firewall will be used as a security device.

Transparent mode has the following advantages:

- No need to change IP addresses
- No need to set up NAT rule

Under normal circumstances, the firewall in transparent mode is deployed between the router and the switch of the protected network, or it is installed between the Internet and a company's router. The Intranet uses its old router to access the Internet, and the firewall only provides security control features.

This section introduces a configuration example of a firewall deployed between a router and a switch. In this example, the administrator uses ethernet0/0 to manage firewall. The firewall's ethernet0/1 is connected to router (which is connecting to the Internet) and ethernet0/2 is connected to a switch (which is connecting to the Intranet).



Step 1: Connecting to the device

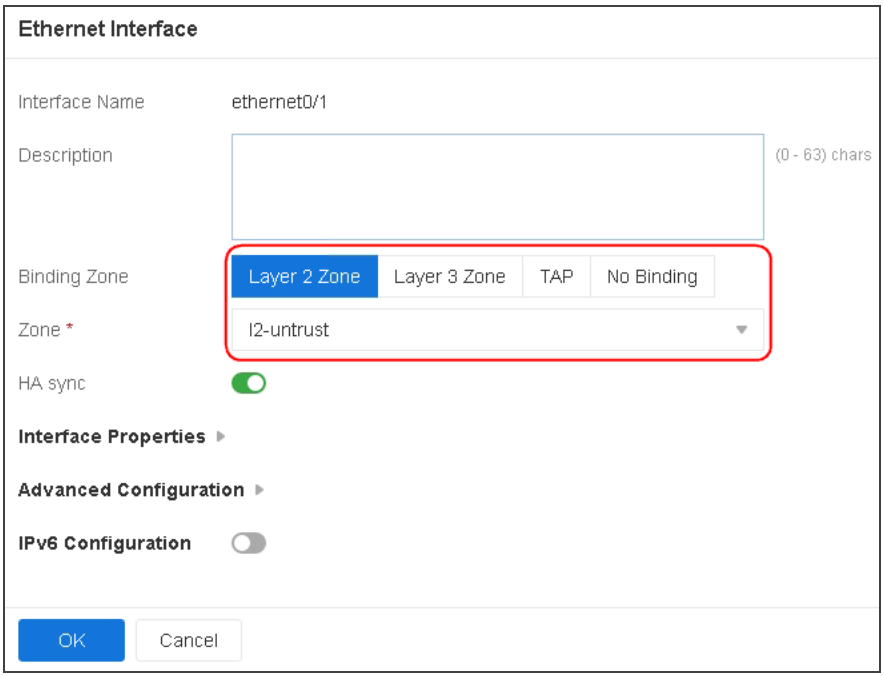
1. Connect one port (e.g. ethernet0/1) of Hillstone device to your ISP network. In this way, "ethernet0/1" is in the l2-untrust zone. Connect your Intranet to another Ethernet interfaces (e.g. ethernet0/2) of the device. This means "ethernet0/2" is connected to the l2-trust zone.
2. Power on the Hillstone device and your PCs.
3. Access the system WebUI through the Intranet interface. For more information, refer to Log in to Web Interface.

Step 2: Configuring interfaces

- Configure ethernet0/1 as an Internet connected interface.

1. Go to **Network > Interface**.

2. Double click **ethernet0/1**.



On the Ethernet Interface page, enter values

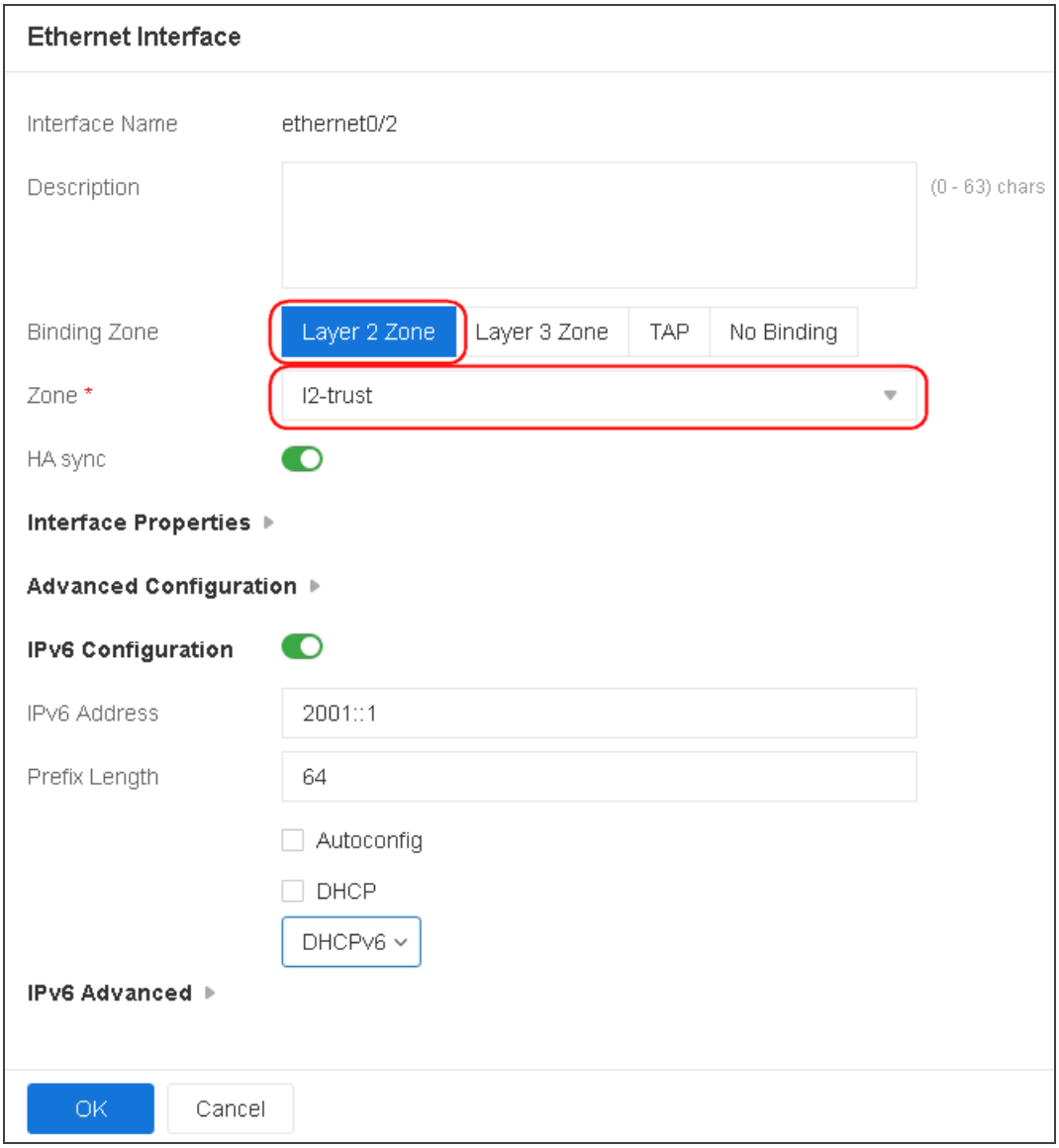
Option	Value
Binding Zone	L2-zone
Zone	l2-untrust

3. Click **OK**.

- Configure ethernet0/2 as an Intranet connected interface.

    1. Select **Network > Interface**.

    2. Double click **etherneternet0/2**.



    On the Ethernet Interface page, enter values

Option	Value
Binding Zone	L2-zone
Zone	l2-trust

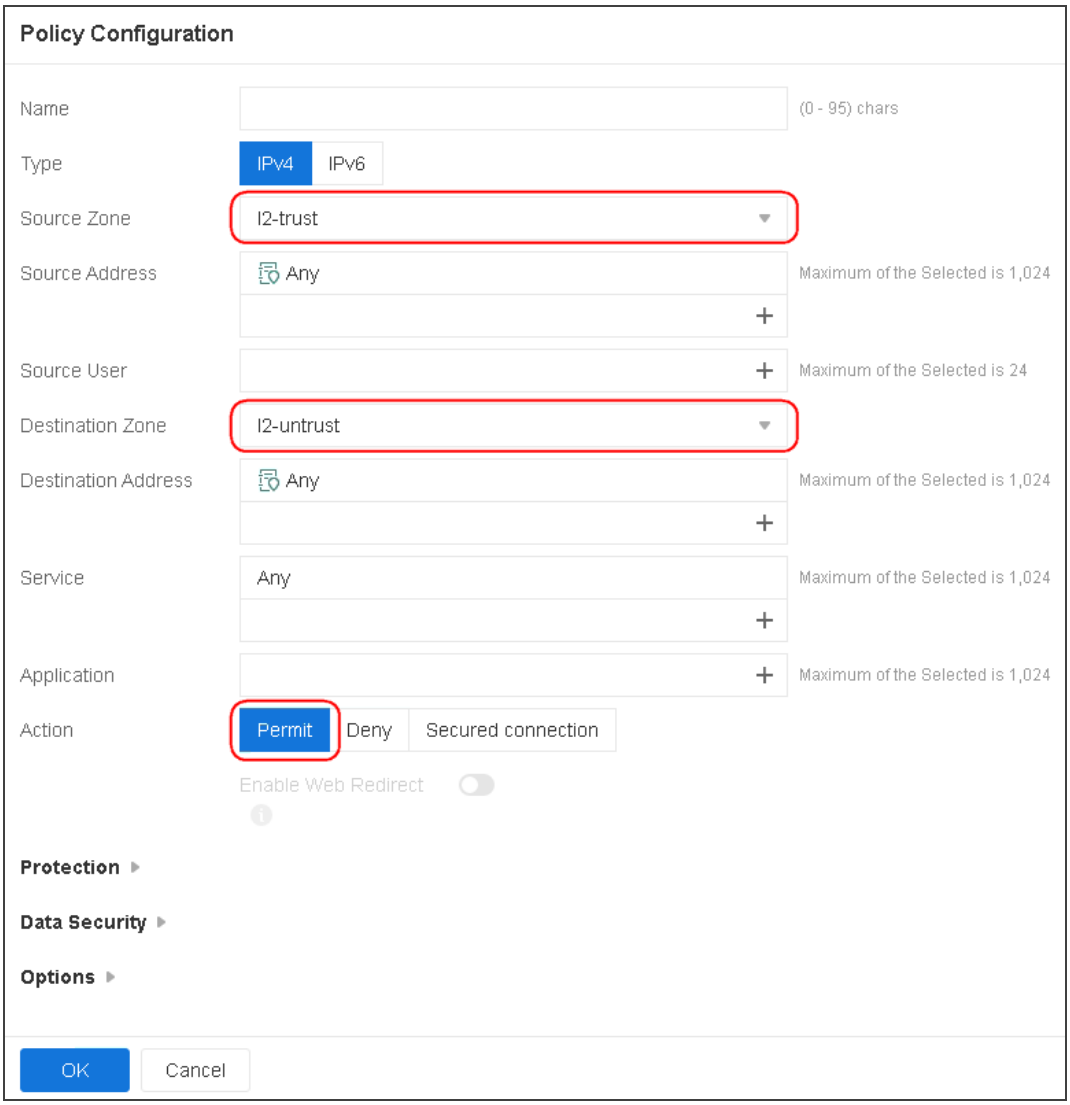
3. Click **OK**.

Step 3: Configuring policies

- Create a policy to allow internal users to visit the Internet.

1. Select **Policy > Security Policy>Policy**.

2. Click **New**,select Policy from the drop-down list.



On the Policy Configuration page, enter values.

Option	Value
Source Zone	l2-trust
Source Address	Any

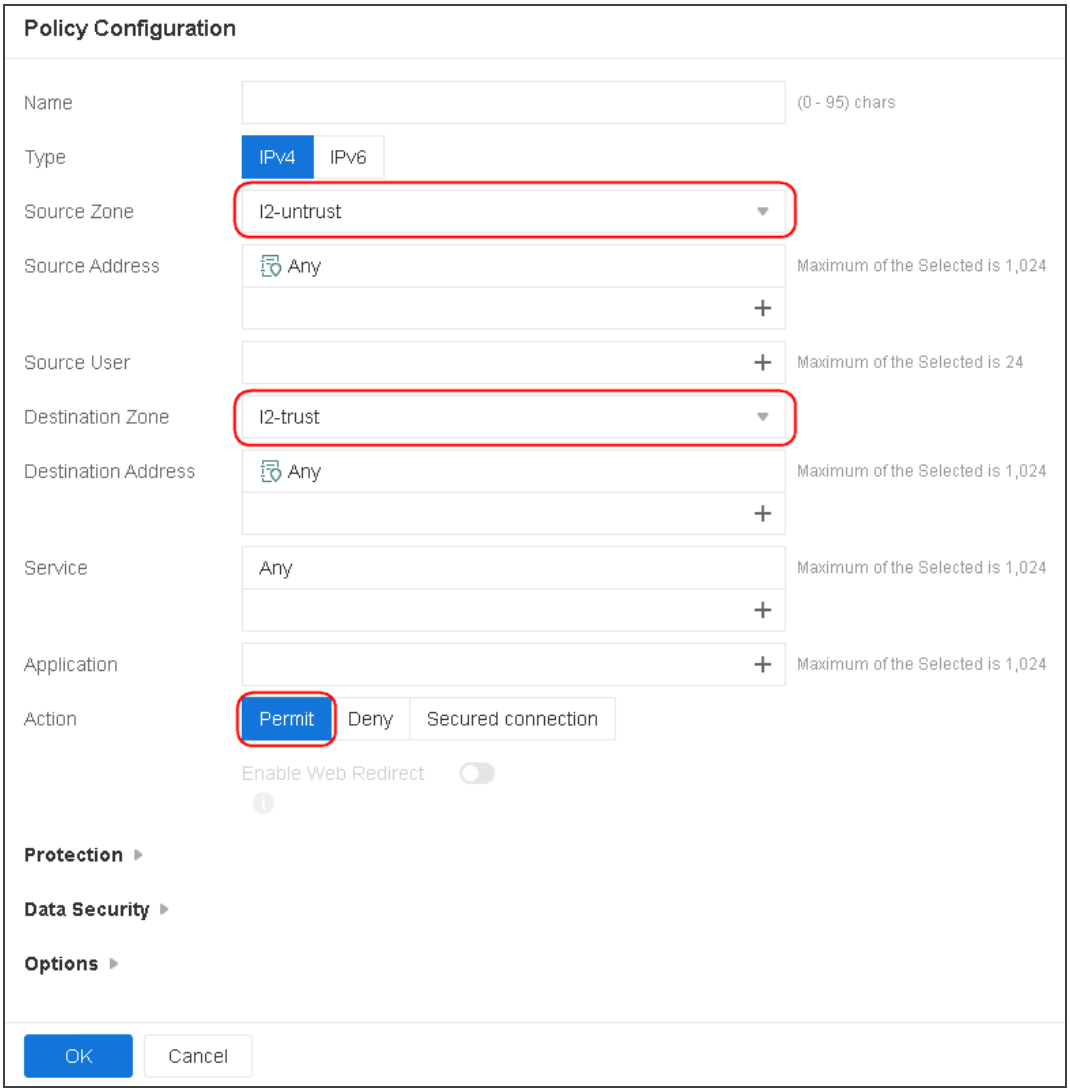
Destination Zone	l2-untrust
Destination Address	Any
Service/Service Group	Any
APP/APP Group	-----
Action	Permit

3. Click **OK**.

- Create a policy to allow the Internet to visit the Intranet.

1. Select **Policy > Security Policy**.

2. Click **New**.



On the Policy Configuration page, enter values.

Option	Value
Source Zone	ll2-untrust

Source Address	Any
Destination Zone	l2-trust
Destination Address	Any
Service/Service Group	Any
APP/APP Group	-----
Action	Permit

3. Click **OK**.

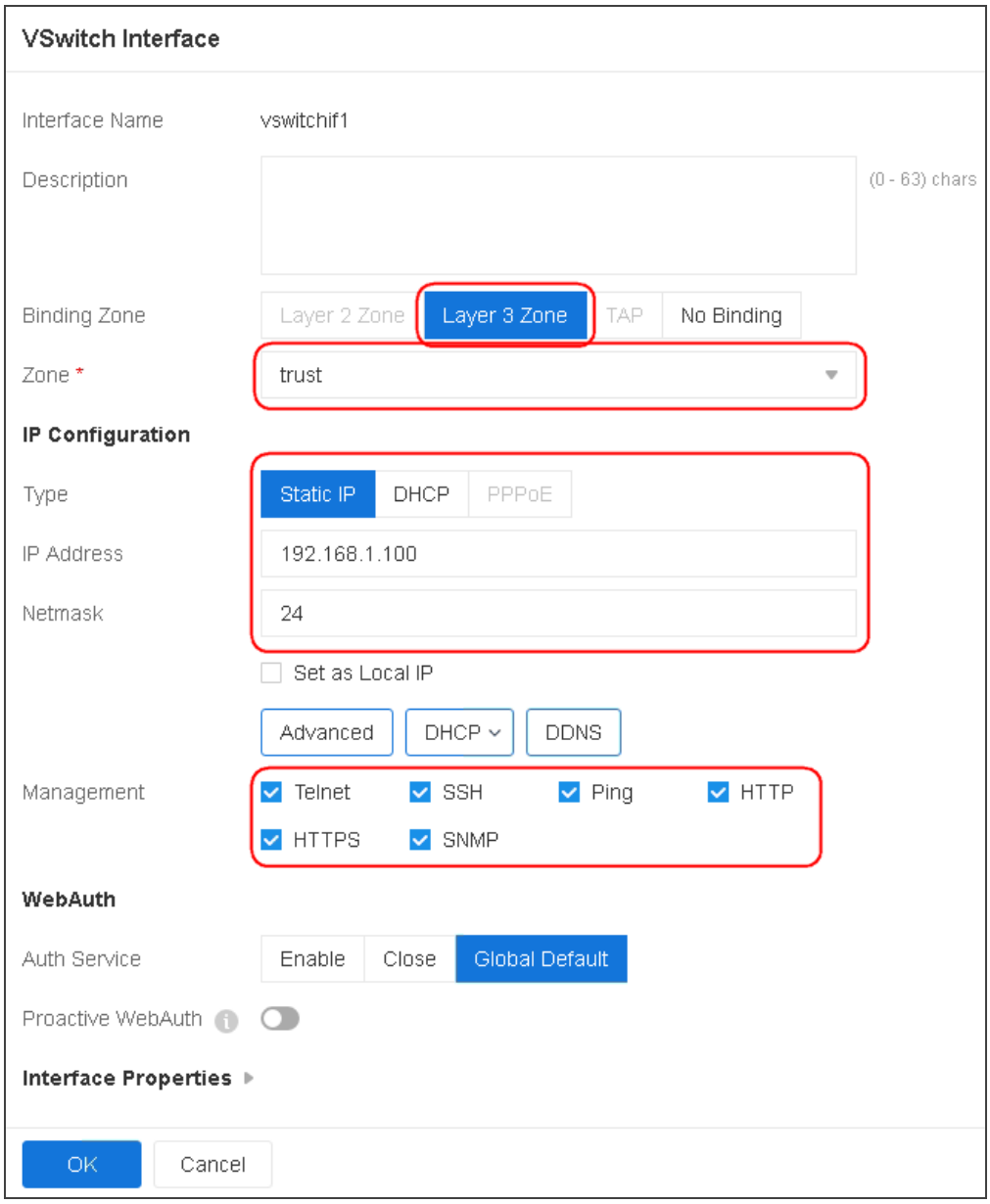
- The two policies above ensure communication between an Intranet and the Internet. If you want to set up more details, e.g. to limit P2P download, you can add more policies and place the new policies before the old ones. The match sequence of policies is determined by their position in the policy list, not their ID numbers.

(Optional) Step 4: Configuring VSwitch Interface for managing the firewall

If you want any PC in the Intranet to visit and configure the firewall, you can configure a VSwitch interface as a management interface.

1. Select **Network > Interface**.

2. Double click **vswtichif1**.



On the VSwitch Interface page, enter values.

Option	Value
Binding	Layer 3 Zone

Option	Value
Zone	
Zone	trust
IP Address	192.168.1.100
Netmask	24
Management	Select SSH, Ping, and HTTPS

Notes: When configuring **IP Configuration**, set an IP address in the same subnet of the Intranet.

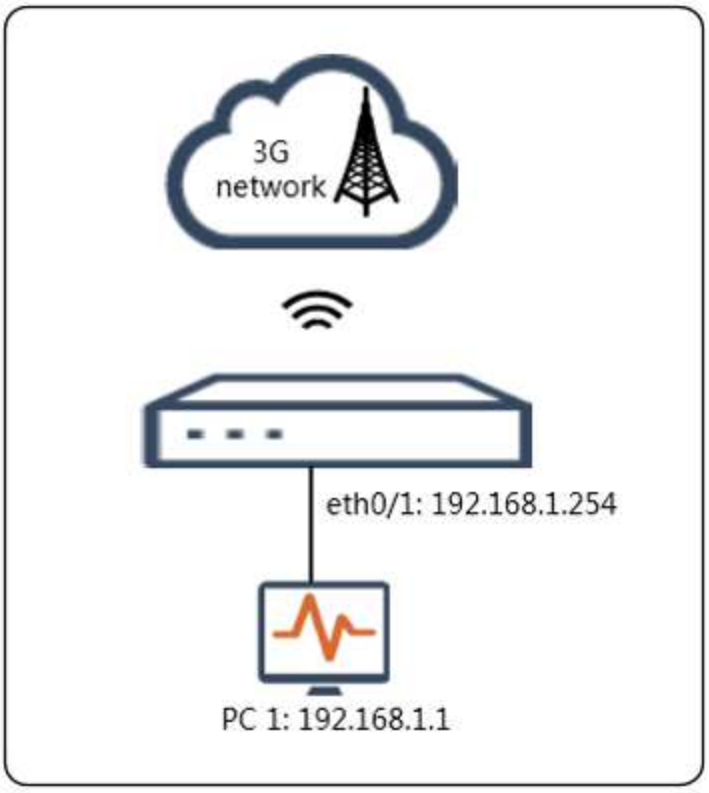
3. Click **OK**.
4. With any PC in the Intranet, enter the IP address of vswitchif1, and you will visit the firewall login WebUI.

Connecting to the Internet via mobile 3G/4G

When a device is equipped with 3G/4G data card and works in the routing mode, it can access the network through 3G/4G dial-up. Connecting to the Internet via 3G dial-up is similar to the one via 4G dial-up. Therefore, this sections takes 3G dial-up as an example.

Notes: Obtain the following 3G parameters from IPS: access point, username, password, dial-up string.

The example introduced in this section is based on the following topology.

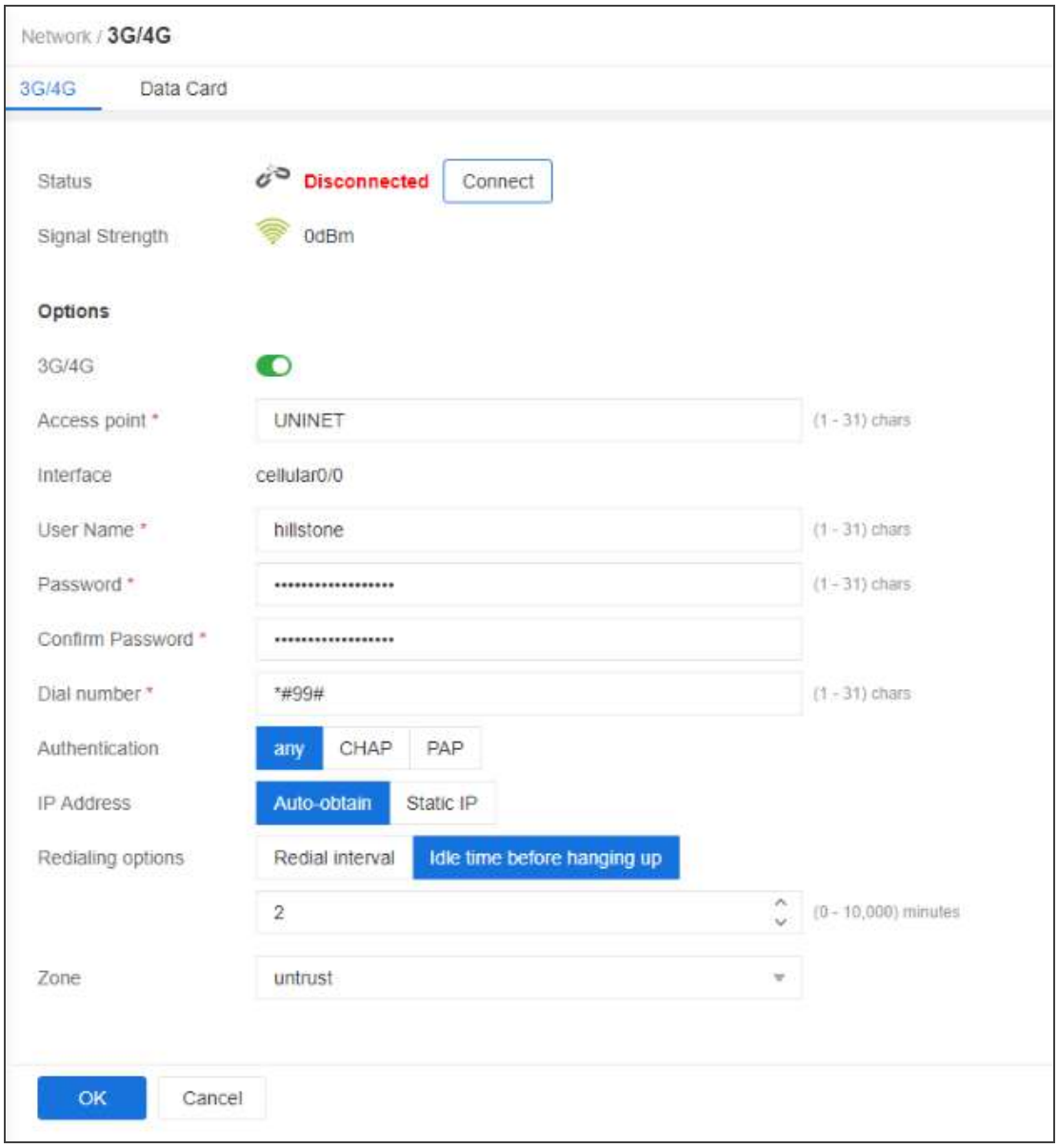


Step 1: Inserting the 3G Data card

Insert the 3G data card into the SIM card slot of the device.

Setp 2: Configuring 3G Parameters

1. Select **Network** > **3G/4G**



On the 3G/4G tab, enter values.

Option	Value
3G/4G	Click the button to enable the 3G
Access point	UNINET (WCDMA)

Option	Value
User name	hillstone
Password	123321
Confirm Password	123321
Dial number	*99#
Authentication	any
IP Address	Auto-obtain
Redialing options	Idle time before hanging up
Zone	untrust

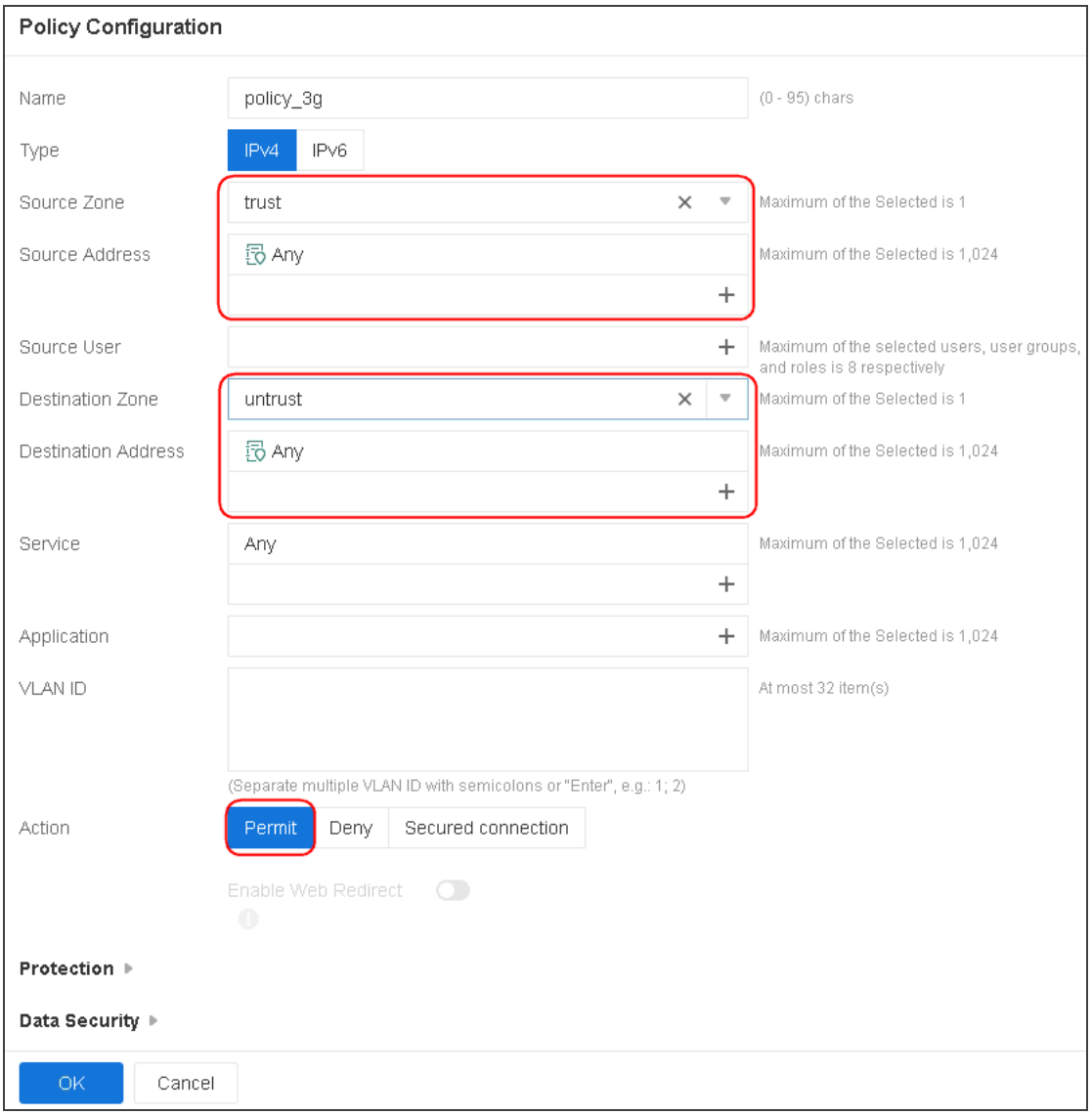
Step 3: Connecting 3G Network

On the 3G/4G tab, you can view the 3G/4G connection status in the Status section. Click **Connect** to connect to the 3G network.

Step 4: Configuring policies

1. Go to **Policy** > **Security Policy**> **Policy**.

2. Click **New** and select **Policy** from the drop-down list.



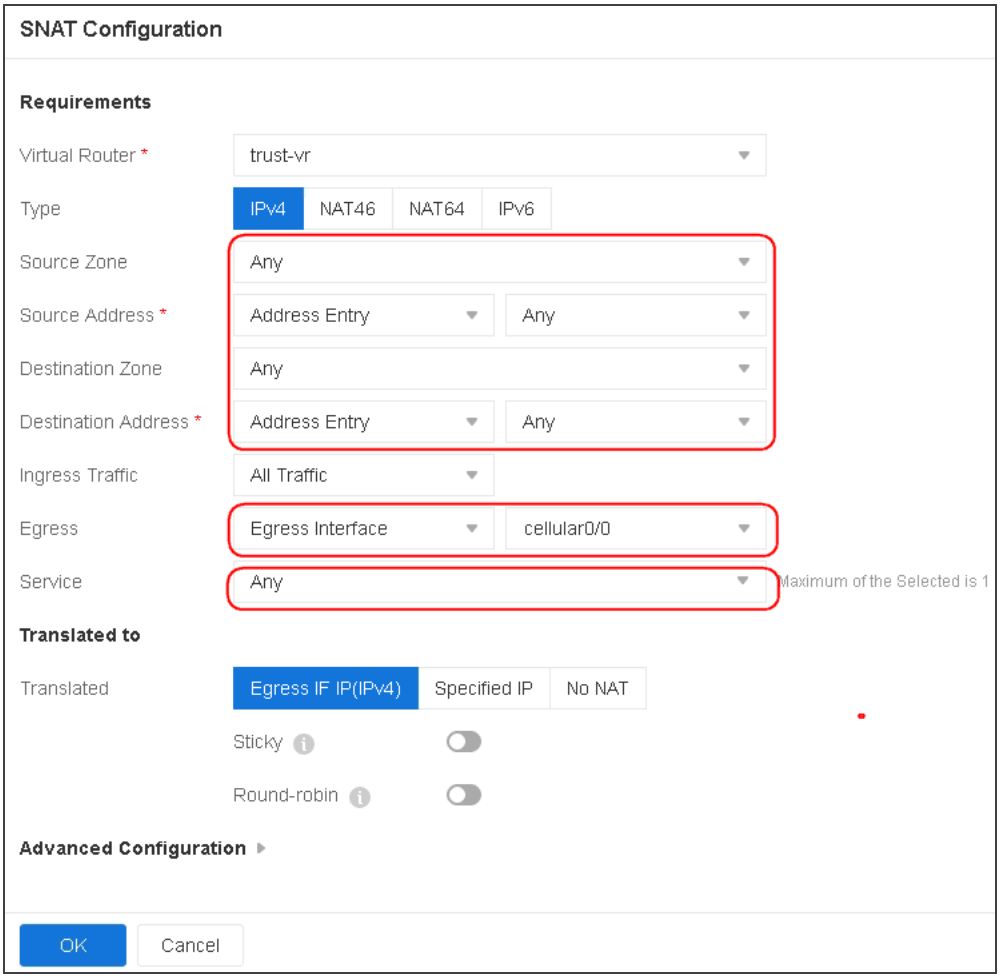
On the Policy Configuration page, enter values.

Option	Value
Source Zone	trust
Source Address	Any

Option	Value
Destination Zone	untrust
Destination Address	Any
Service/Service Group	Any
APP/APP Group	-----
Action	Permit

Step 5: Configuring the SNAT Rule

1. Go to **Policy > NAT > SNAT**.
2. Click **New**.



On the SNAT Configuration page, enter values.

Option	Value
Requirements	
Virtual Router	trust-vr
Source Address	Address Entry, Any
Destination Address	Address Entry, Any
Egress	Egress interface, cellular0/0
Translated to	
Translated	Egress IP
Advanced Configuration	
ID	Automatically assign

Notes: The egress interface should be specified as the Internet interface.

3. Click **OK**.

Step 6: Configuring the IP Address, Gateway, and DNS of Your PC (The IP address must be in the same network segment as ethernet0/1, and the DNS must be specified as the public DNS)

Restoring Factory Settings

Notes: Resetting your device will erase all configurations, including the settings that have been saved. Please be cautious!

To restore the device to the factory default settings, use one of the following ways:

- "Restoring via the CLR Button" on Page 65
- "Restoring via WebUI" on Page 66

Restoring via the CLR Button

To restore the device to the factory default settings via the CLR button, take the following steps:

Model	Step
SG-6000- E5960、SG-6000-E5760、SG-6000-E5660、SG-6000-E2800、SG-6000-E2800-GM、SG-6000-E2300、E2300-GM、SG-6000-E1700、SG-6000-E1700-GM、SG-6000-E1606、SG-6000-E1605、SG-6000-E1600、SG-6000-E1600-GM、SG-6000-E1500、SG-6000-E1100	Method 1: 1. Power off the device. 2. Use a pin to press the CLR button in the pinhole; keep pressing and power on the device. 3. Keep pressing the CLR button until the STA and ALM LEDs turn solid red. In this case, the system will start to reset itself. 4. When the restoring is complete, the system will reboot automatically. Method 2: 1. Make sure the device is powered on.

Model	Step
	2. With the STA LED blinking, use a pin to press the CLR button in the pinhole for 2 minutes. 3. Keep pressing the CLR button until the STA and ALM LEDs turn solid red. In this case, the system will start to reset itself. 4. When the restoring is complete, the system will reboot automatically.
SG-6000- E6368、SG-6000-E6360、SG-6000-E6168、SG-6000-E6160、SG-6000-E5960-GM、SG-6000-E5568、SG-6000-E5560、SG-6000-E5268、SG-6000-E5260、SG-6000-E5168、SG-6000-E3968、SG-6000-E3965、SG-6000-E3960、SG-6000-E3960-GM、SG-6000-E3668、SG-6000-E3662、SG-6000-E3660、SG-6000-E3660-GM、SG-6000-E2868、SG-6000-E2860	1. When the device is working, use a pin to press the CLR button in the pinhole and the device will restart. 2. After the device restarts, the CON port prints the information of CLR button pressed and the STA and ALM LEDs turn solid red. After the LEDs turn off, the device will restart again.

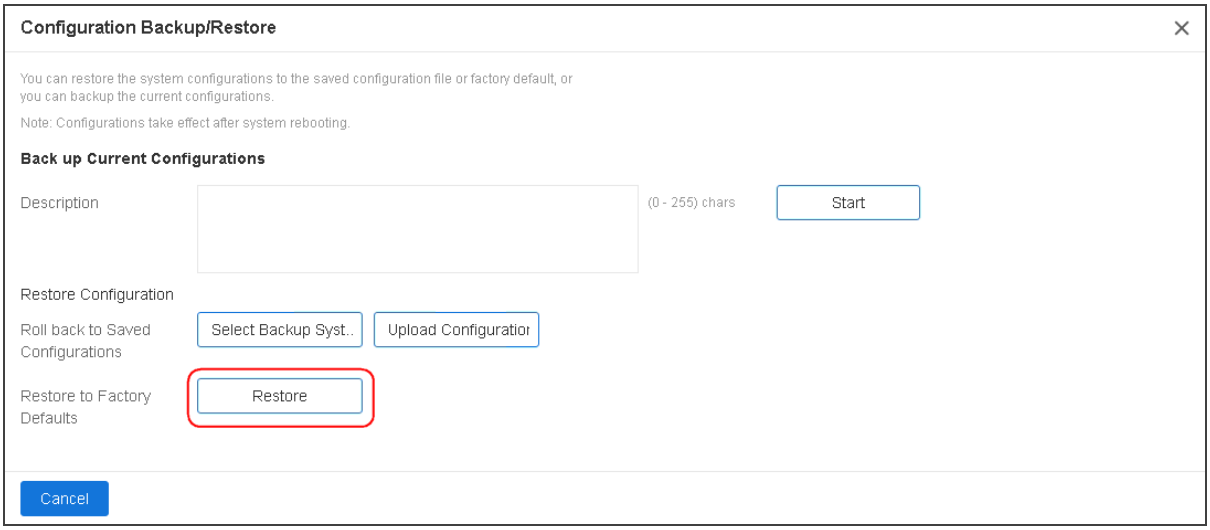
Restoring via WebUI

To restore the device to factory default settings via WebUI, take the following steps:

1. Go to **System > Configuration File Management>Configuration File List.**

2. Click **Backup Restore.**

3. In the prompt, click **Restore.**



4. Click **OK.**

5. The device will automatically reboot and is restored to factory settings.

General Features

This section introduces the following features:

- Device Management: introduces how to configure password policies, how to back up and restore system configuration, and how to export system debug information.
- Threat Prevention: introduces how to quickly enable threat protections.
- High Availability (HA): introduces how to configure HA.
- Exporting Logs: introduces how to export logs to the log server.

Device Management

This section mainly includes the following aspects:

- Configuring Password Policies: introduces how to configure password policies to enhance system security.
- Backing up and Restoring System Configuration: introduces how to back up the current system configuration and how to restore the system to the backed-up configuration.
- Exporting System Debug Information: introduces how to export system debug information to your local PC.

Configuring Password Policies

You can configure password policies to enhance system security.

Application Scenario

An enterprise firewall device has several administrator accounts. To enhance system security, the enterprise wants to modify the password policy of these administrator accounts. Specific requirements are as follows.

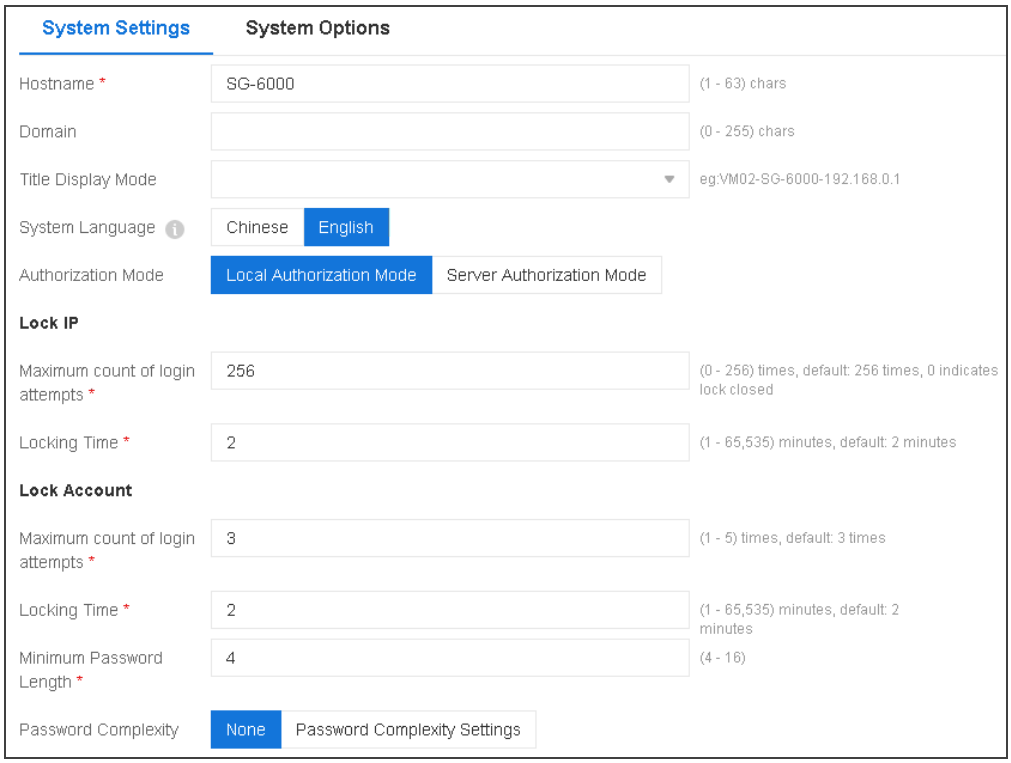
- When an administrator account is created or the password of an existing administrator account is modified, the new password should contain at least 8 characters, including uppercase and lowercase letters, numeric and special characters.
- If the administrator enters the wrong password for three consecutive times at login, this administrator account will be locked out for 60 minutes, during which the account is unable to be logged in.
- The password valid period is 30 days. The account password expires every 30 days. If the password remains unchanged for 30 days, the account will be unable to be logged in.

Configuration Steps:

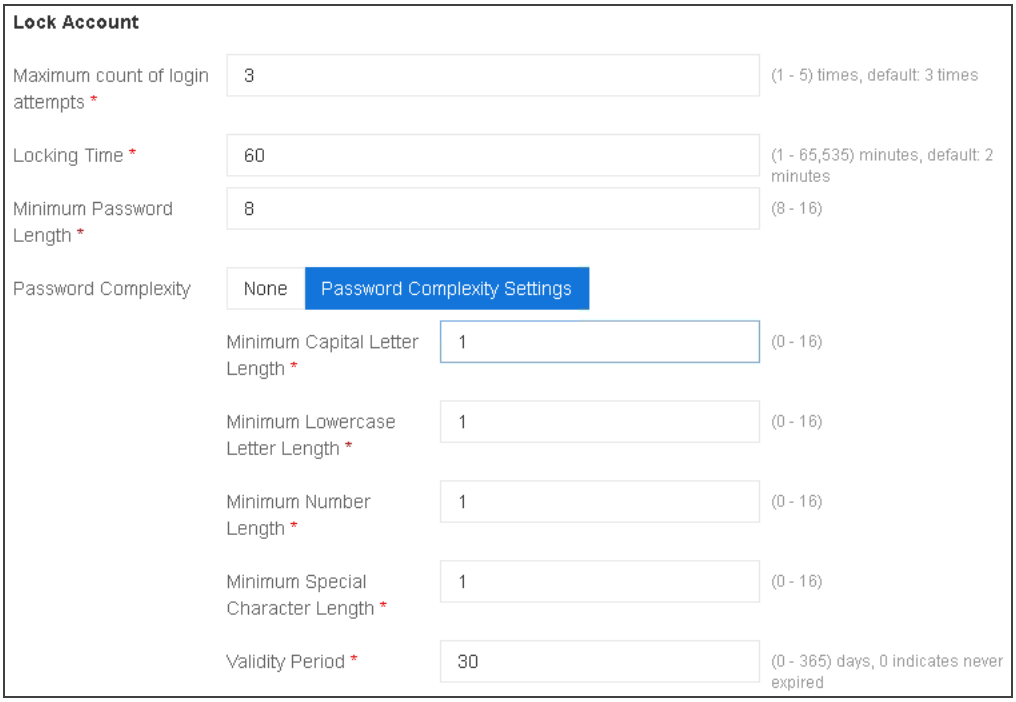
Step 1: Modifying the Password Policy

1. Select **System** > **Device Management** > **Settings & Options**.

2. On the **System Settings** tab, view the current password policy in the **Lock Account** section.



3. Modify the password policy.



In the Lock Account section, configure the new password policy.

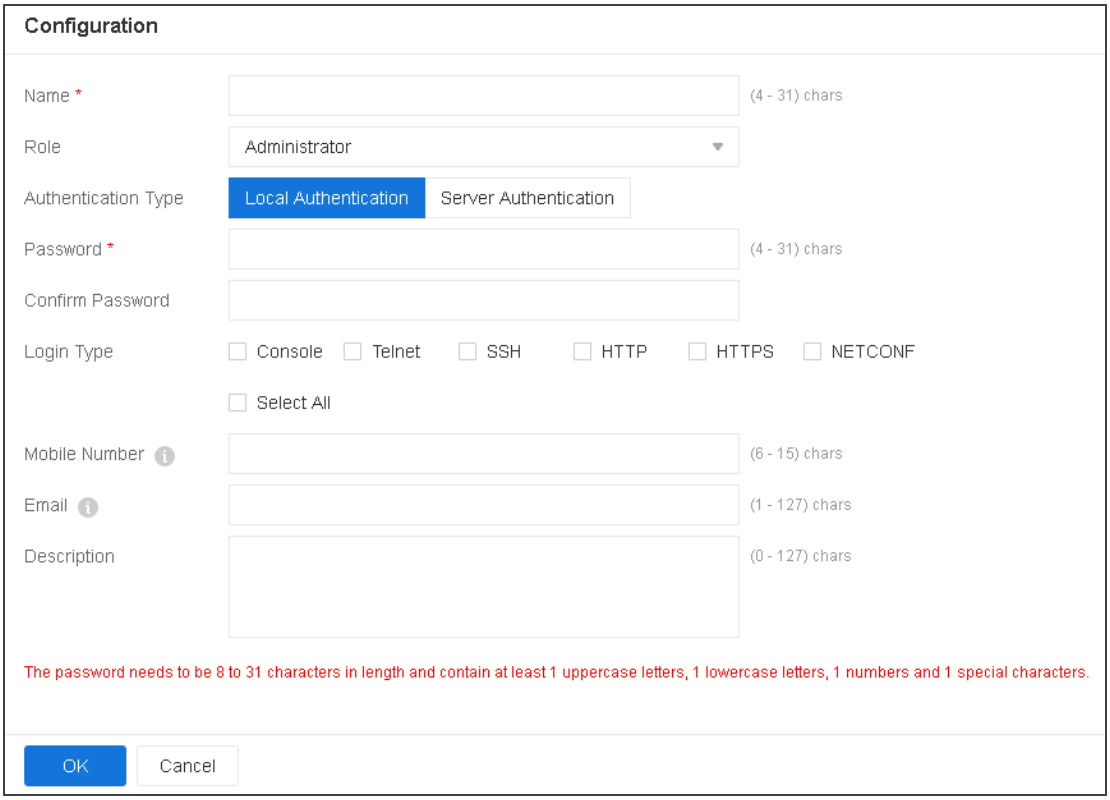
Option	Value
Maximum count of login attempts	3 times
Locking Time	60 minutes
Minimum Password Length	8 characters
Password Complexity	Select **Password Complexity Settings**.
Minimum Capital Letter Length	1 character
Minimum Lowercase Letter Length	1 character
Minimum Number	1 character

Option	Value
Length	
Minimum Special Character Length	1 character
Valid Period	30 days

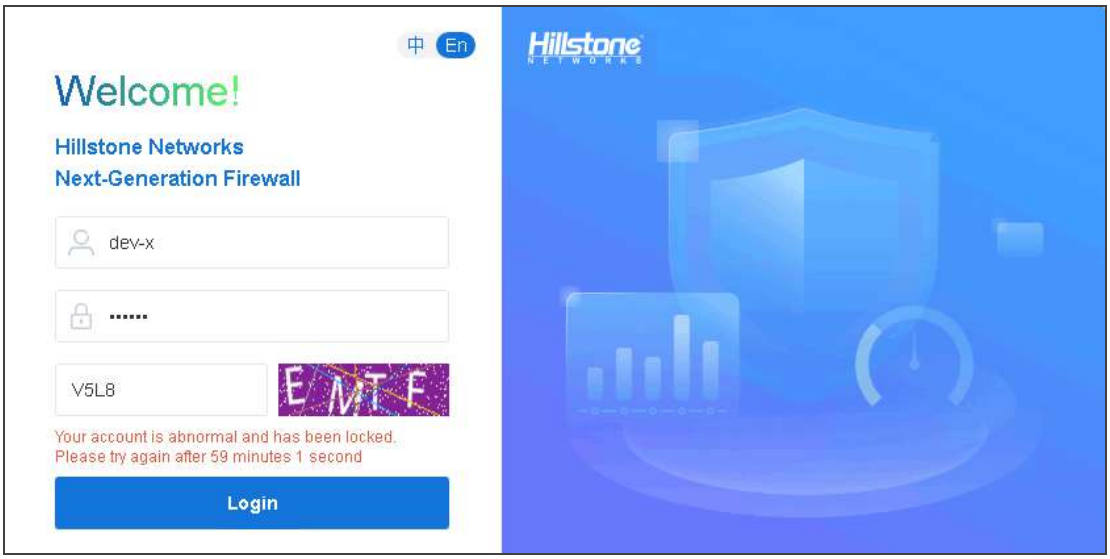
4. Click **OK**.

Step 2: Verifying the Password Policy

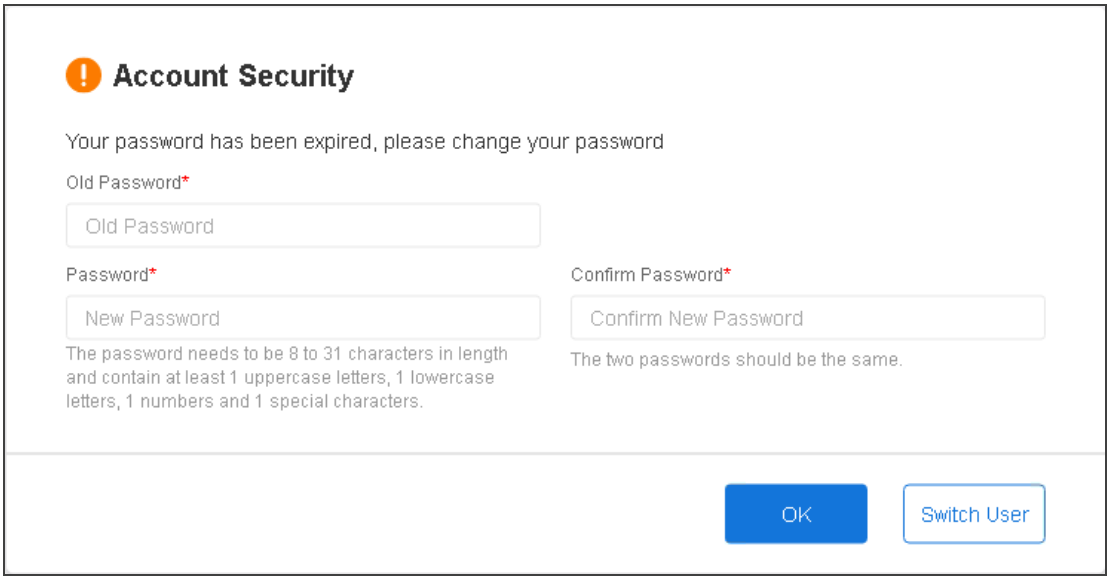
- Select **System** > **Device Management** > **Administrators**. Click **New** or select an existing account and click **Edit**. On the **Configuration** page, new password policy is displayed. When an administrator account is created or the password of an existing administrator account is modified, the new password should meet the new password policy.



- If the administrator enters the wrong password for three consecutive times at login, this administrator account will be locked out. A message will be displayed on the login page, indicating that the account is abnormal and has been locked.



- When the password expires, the system prompts an account security message, indicating that the password has expired and needs to be changed.



Backing up and Restoring System Configuration

You can back up the current system configuration and restore the system to the backed-up configuration.

Application Scenario

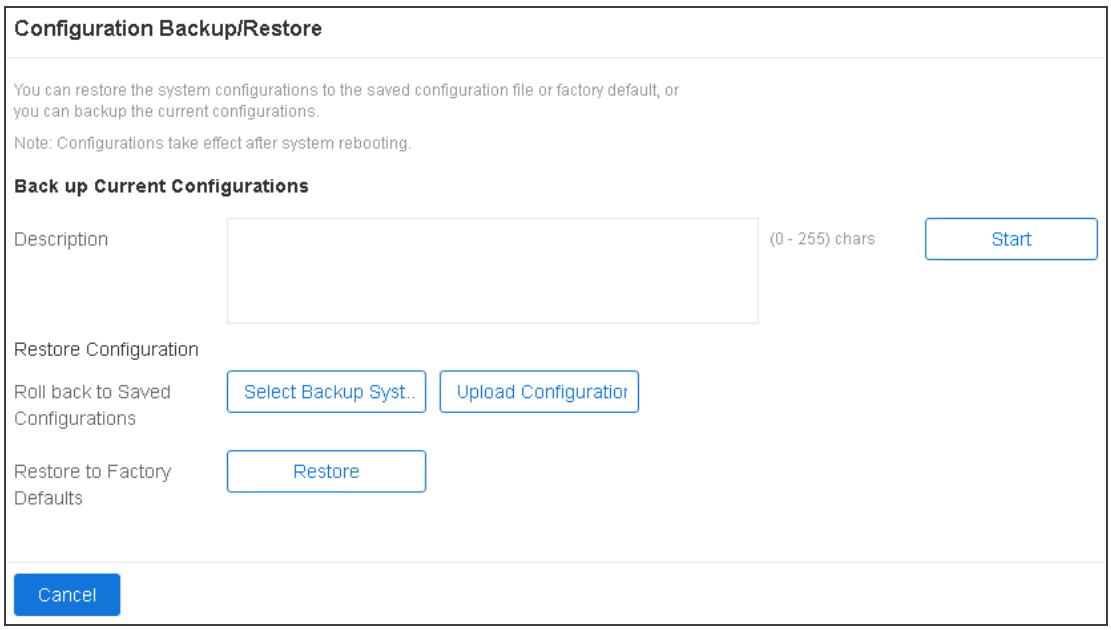
A user needs to upgrade the system version of the firewall. After the upgrade, the user wants to restore the system configuration to the one saved before the upgrade.

Configuration Steps

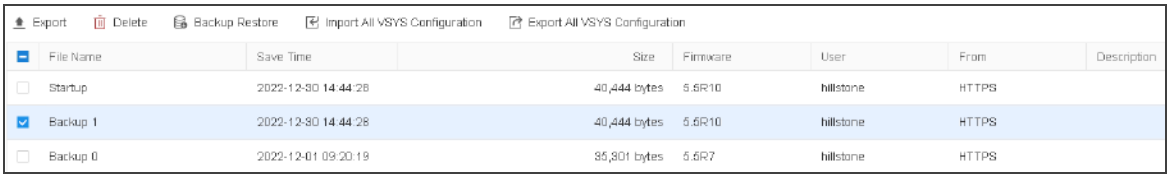
Step 1: Backing Up Current Configuration

Before upgrading the system version, back up the current configuration.

1. Select **System** > **Configuration File Management** > **Configuration File List**.
2. On the **Configuration File List** page, click **Backup Restore** to go to the **Configuration Backup/Restore** panel.
3. Click **Start** and the system will start to save current configuration to the configuration file.



4. When the backup process is finished, the configuration file list is displayed, where the new **Backup 1** configuration file is added.

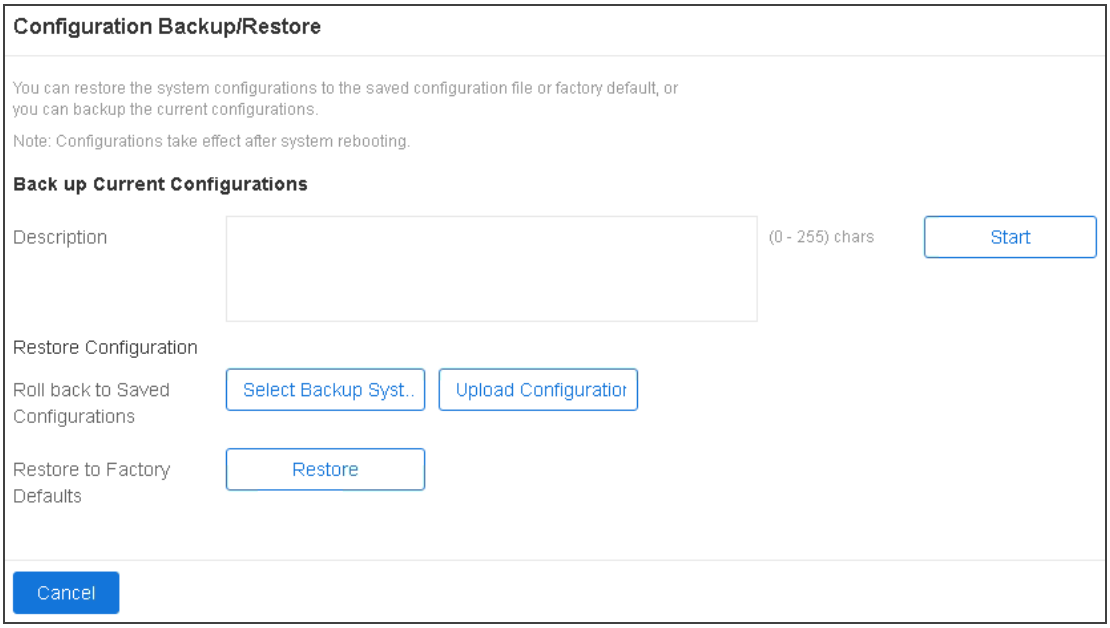


5. (Optional) If needed, select the check box before **Backup 1** and then click **Export** to save the configuration file to your local PC.

Step 2: Restoring to the Configuration Saved Before the Upgrade

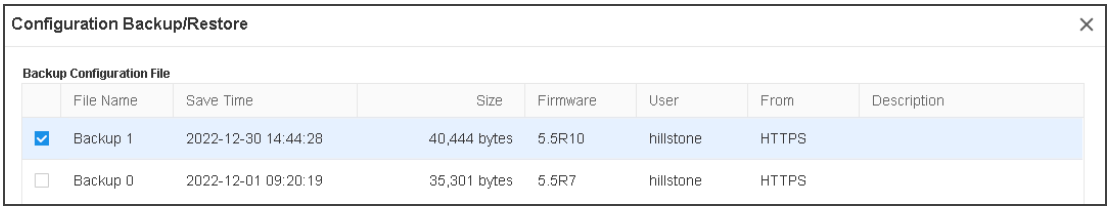
After upgrading the system version, restore the system to the configuration backed up before the upgrade.

1. Select **System** > **Configuration File Management** > **Configuration File List**.
2. On the **Configuration File List** page, click **Backup Restore** to go to the **Configuration Backup/Restore** panel.



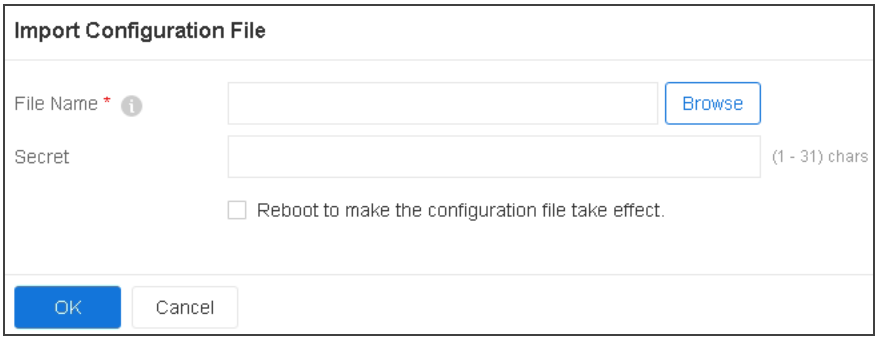
3. Select either of the following methods to restore the system configuration:

- Select the configuration file from the backup configuration file list: Click **Backup System Configuration File** and select **Backup 1**. Click **OK**.



On the reboot prompt, click **OK**. After the device is restarted, the system is restored to the configuration backed up before the upgrade.

- Upload the configuration file: Click **Upload Configuration File**. On the **Import Configuration File** panel, click **Browse** and select the configuration file that needs to be uploaded. To make the configuration take effect immediately, select the check box of **Reboot to make the configuration file take effect**. Click **OK**.



Exporting System Debug Information

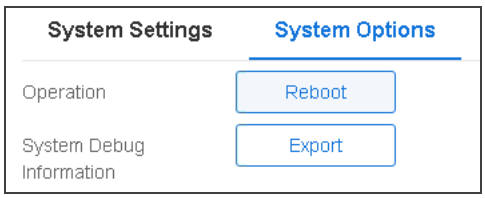
When the device fails, you can export the system debug information to a local PC or forward it to the technical support team to identify the problem.

Application Scenario

A customer's firewall device fails, so the customer wants to export the system debugging file to the technical support team for troubleshooting.

Configuration Steps:

1. Select **System > Device Management> Settings & Options**.
2. Click the **System Options** tab.
3. Click Export to export the tech-support file to your local PC.



4. Open the tech-support file, which contains files such as the coredump file and system logs.
5. Forward the tech-support file to the technical support team to identify the problem.

Threat Prevention

Threat prevention means that the device can detect and block network threats. By configuring the threat prevention function, Hillstone devices can defend network attacks and reduce losses of the Intranet.

Threat protections include:

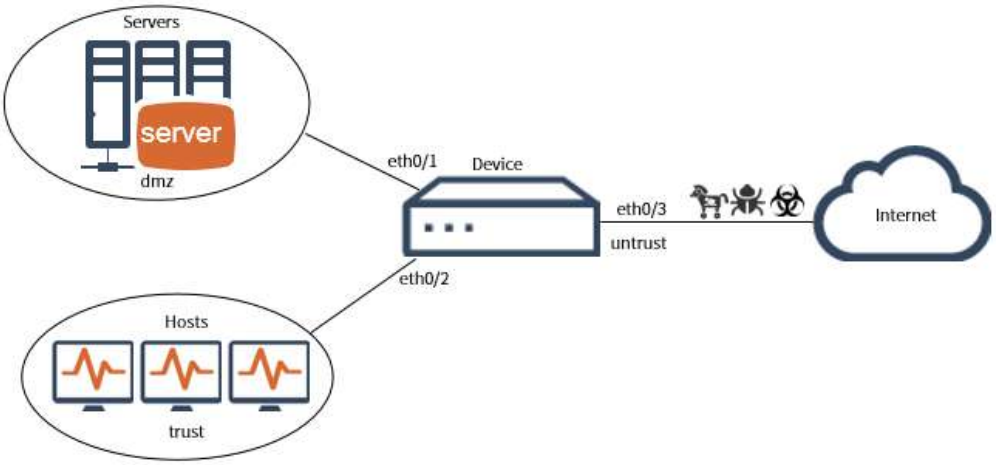
- Anti Virus: It can detect common file types and protocol types which are most likely to carry the virus, and protect the network from them. Hillstone devices can detect protocol types of HTTP, SMTP, POP3, IMAP4, FTP, and SMB and the file types of archives (including GZIP, BZIP2, TAR, ZIP and RAR-compressed archives), PE, HTML, MAIL, RIFF, ELF, PDF, MS OFFICE, Raw Data, and Others. **Others** means scanning other files, including GIF, BMP, PNG, JPEG, FWS, CWS, RTF, MPEG, Ogg, MP3, wma, WMV, ASF, RM, etc.
- Intrusion Prevention: It can detect and protect mainstream application layer protocols (DNS, FTP, HTTP, POP3, SMTP, TELNET, MYSQL, MSSQL, ORACLE, NETBIOS, etc.) against intrusion attacks, web-based attacks, and common Trojan attacks.
- Attack Defense: It can detect various types of network attacks and take appropriate actions to protect the Intranet against malicious attacks, thus assuring the normal operation of the Intranet and systems.
- Sandbox Protection: It can executes suspicious files in the virtual environment, collect dynamic behaviors of suspicious files, analyze these dynamic behaviors, and determine the validity of files based on the analysis results.
- Botnet Prevention: It can detect botnet host in the Intranet timely, and locate and take corresponding actions according to the configuration, so as to avoid further threat attacks.

The threat prevention function may vary in different platforms. Please refer to the system's actual page.

Application Scenario

This section uses anti-virus, IPS, attack defense, and botnet prevention as the example to introduce how to quickly enable these common threat prevention functions, detect threats against the traffic passing through the firewall, and block attacks, thus protecting enterprise information systems and networks from attacks.

The networking environment is shown in the following picture. The device is deployed at the Intranet exit. Interface ethernet0/1 belongs to dmz zone and is connected to the Intranet server farm. Interface ethernet0/2 belongs to the trust zone and is connected to Intranet employees. Interface ethernet0/3 belongs to the untrust zone and is connected to the Internet.

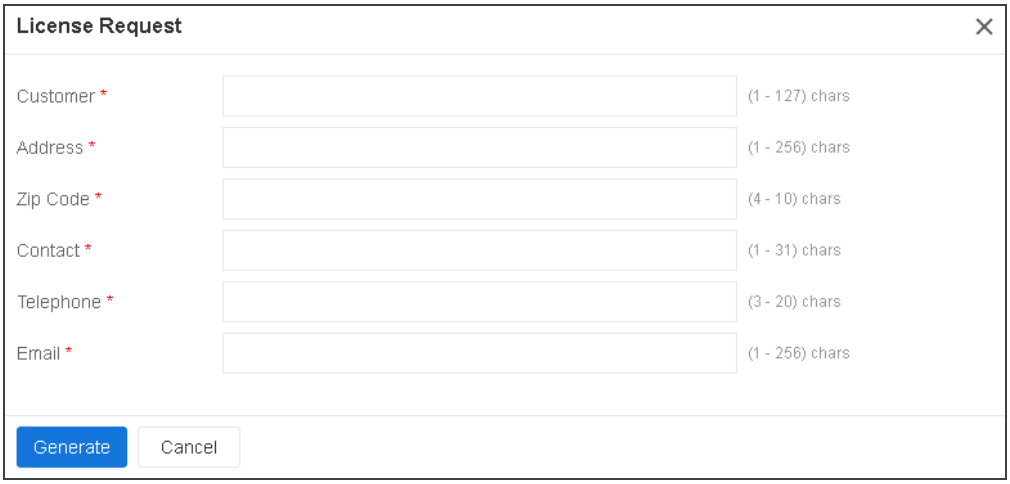


Configuration Steps

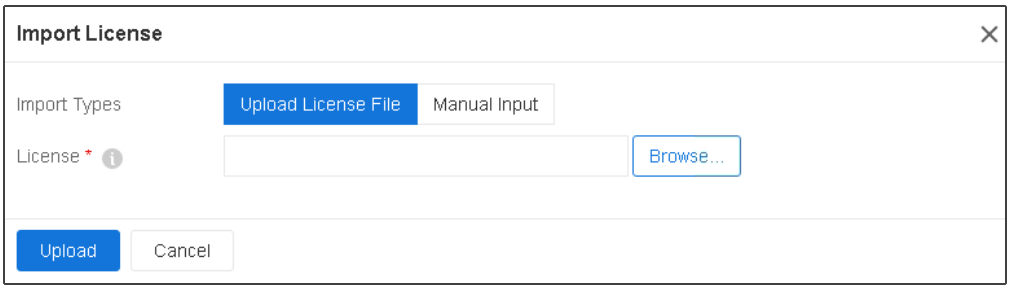
Step 1: Installing Licenses

Anti-virus, IPS, and botnet prevention are controlled by licenses. To use these functions, apply and install corresponding licenses.

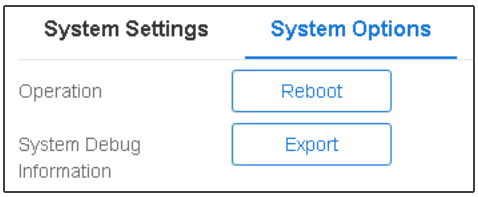
1. Select **System** > **License**. Click **Apply For**. On the **License Request** panel, fill in the application information. Click **Generate**, and then a bunch of code appears. Send the to your sales contact. The sales person will issue the license and send the license code back to you.



2. Select **System** > **License** , and click **Import**. On the **Import License** page, Select **Upload License File** and click **Browse** to select the license file and then click **OK** . Repeat this step to upload anti-virus (AV) license, IPS license, and botnet prevention license.



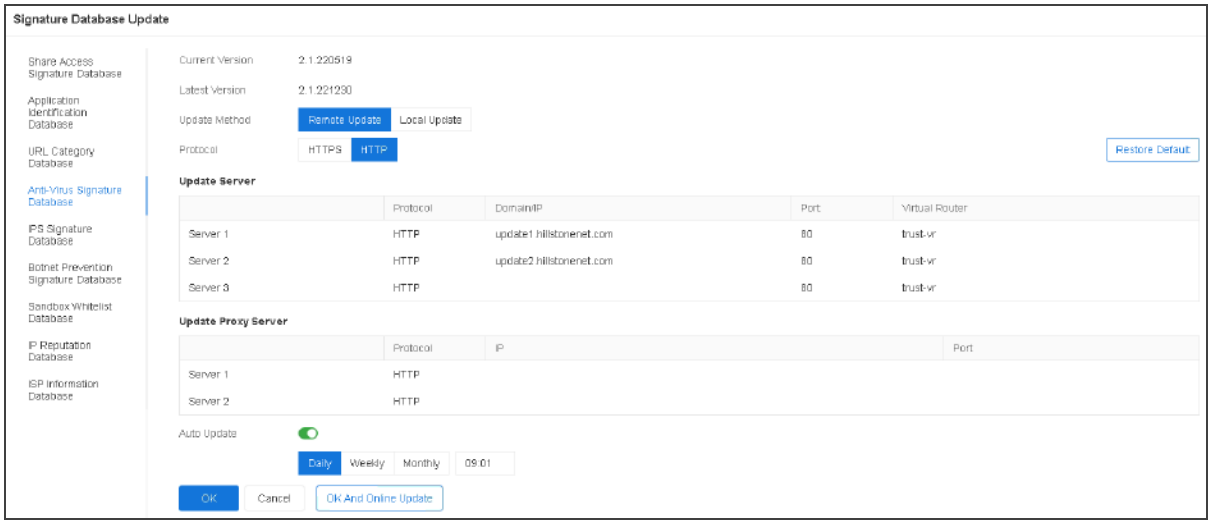
3. Select System > Device Management > Settings & Options. On the System Options tab, click **Reboot**, and select **Yes** in the prompt. Installed license(s) will take effect after the system restarts.



Step 2: Upgrading the Signature Database

If you use the anti-virus, IPS, botnet prevention for the first time, update the signature databases corresponding to each function - the AV signature database, IPS signature database, and botnet prevention signature database.

Select **System** > **Upgrade Management** > **Signature Database Update**. In the Anti-Virus Signature Database section, click **OK and Online Update** to update the AV signature database right now. Repeat this step to update IPS signature database and botnet prevention signature database.



Notes: To ensure that the device can connect to the default update server, configure the DNS server for the device before the update.

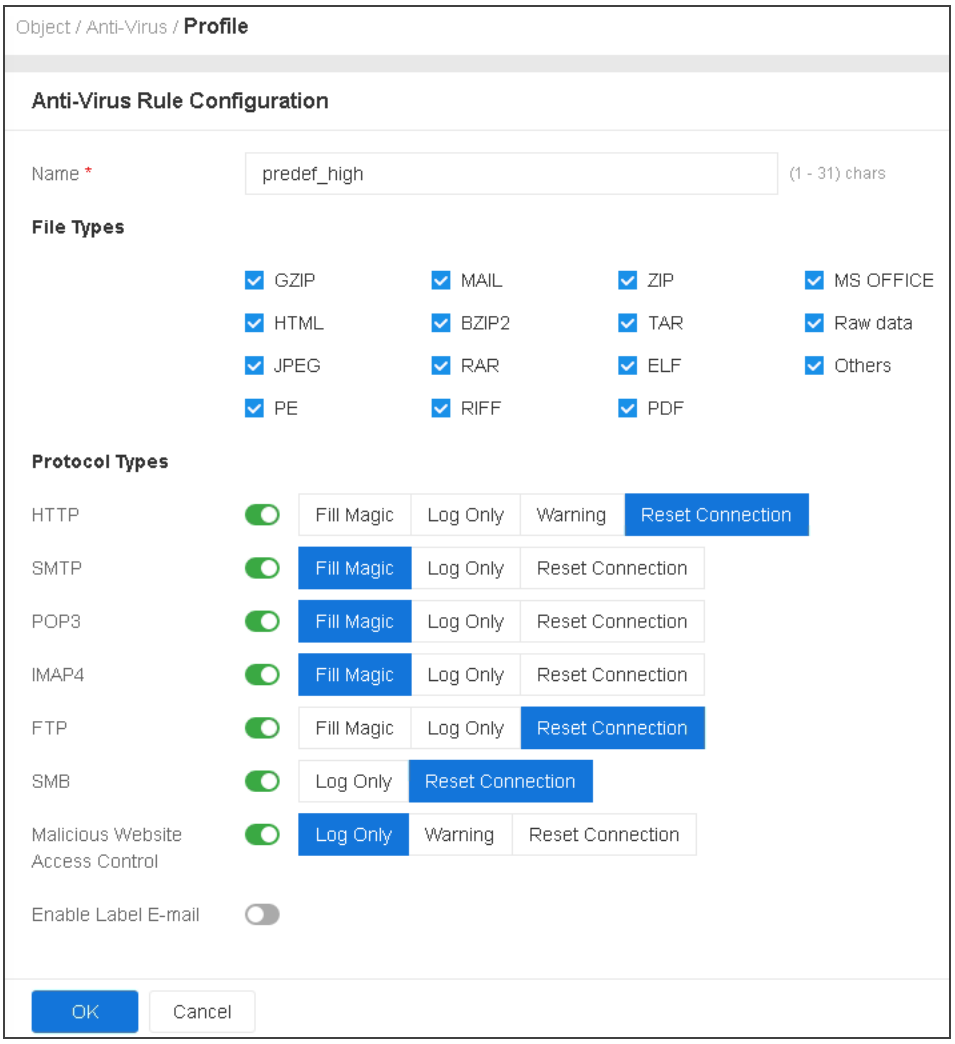
Step 3: Creating a Threat Prevention Rules

- Creating an Anti-Virus Rule

  You can use the predefined anti-virus rule or create customized rules. Select **Object** > **Anti-Virus** > **Profile**. Click **New** to customize an AV rule.

  This example uses the predefined " predef_high" AV rule. The rule is the strictest with all file types and protocol types scanned. The protection action for mail transfer protocols is **Fill**

Magic. The protection action for other protocols is **Reset Connection**.

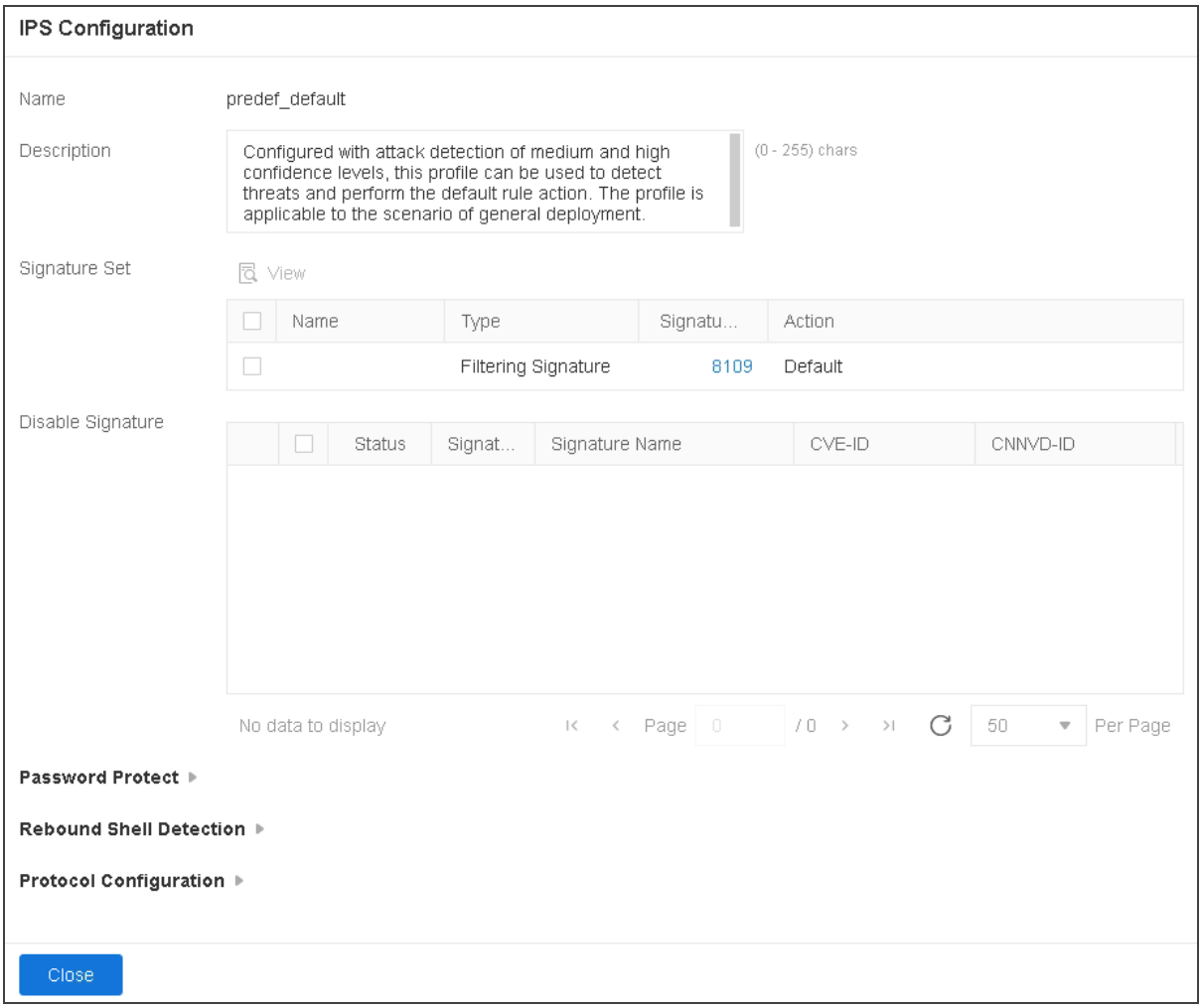


- Creating an IPS Rule

  You can use the predefined IPS rule or create customized rules. Select **Object** > **Intrusion Prevention System**> **Profile**. Click **New** to customize an IPS rule.

  This example uses the predefined "predef_default" IPS rule, where attack detections of medium and high confidence levels are included. This rule profile can be used to detect

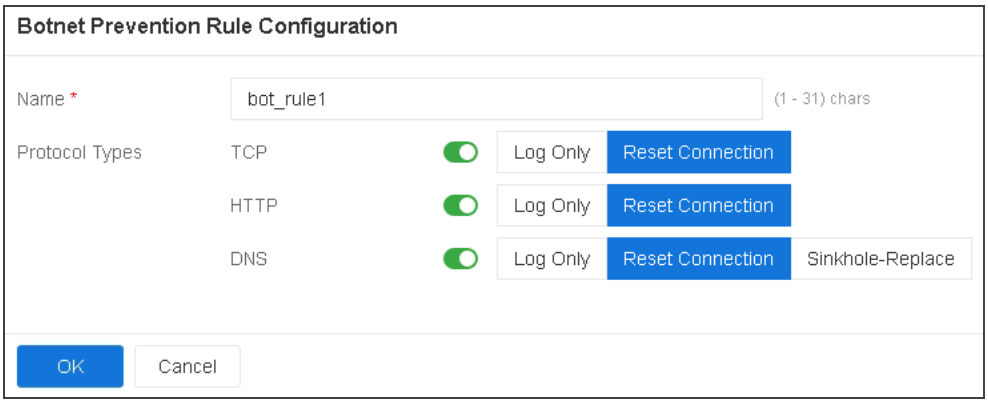
threats and perform the default rule action.



- Creating a Botnet Prevention Rule

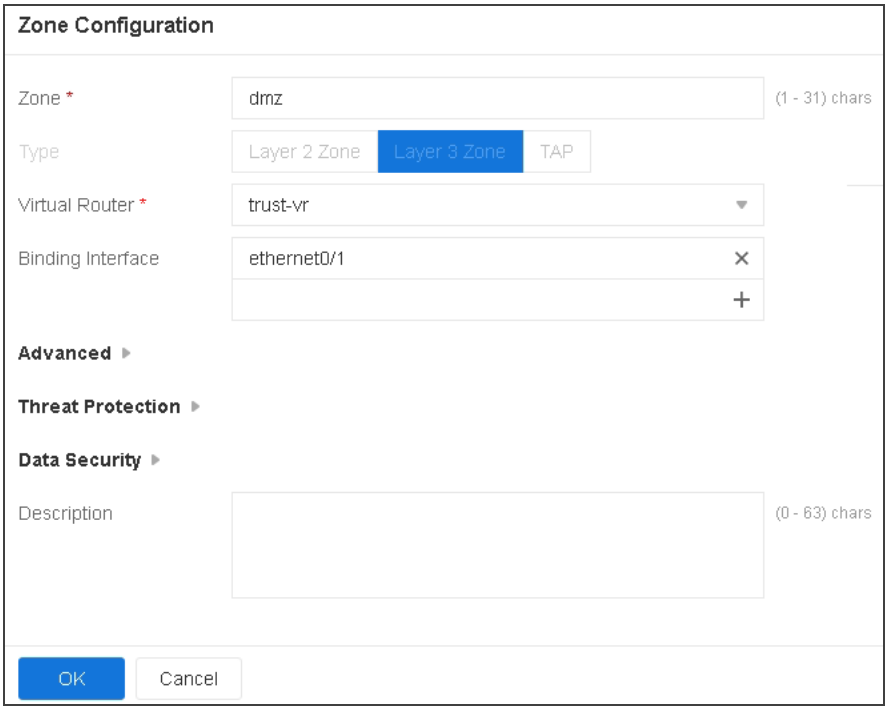
  Select **Object** > **Botnet Prevention**> **Profile**. Click **New** to create a botnet prevention profile named bot_rule1. In this profile, the protocol types are TCP, HTTP, and DNS and the pro-

tection action for these protocols is **Reset Connection**.



Step 4: Binding Intranet and Internet Interfaces to Corresponding Zones

1. Bind the Intranet interface ethernet0/1 to Zone "dmz". Select **Network** > **Zone**. Select **dmz** and click **Edit**. On the **Zone Configuration** page, select ethernet0/1 from the **Binding Interface** drop-down list.



2. Use the same method to bind Intranet interface ethernet0/2 to Zone "trust".

3. Use the same method to bind Internet interface ethernet0/3 to Zone "untrust".

Step 5: Enabling the Attack Defense

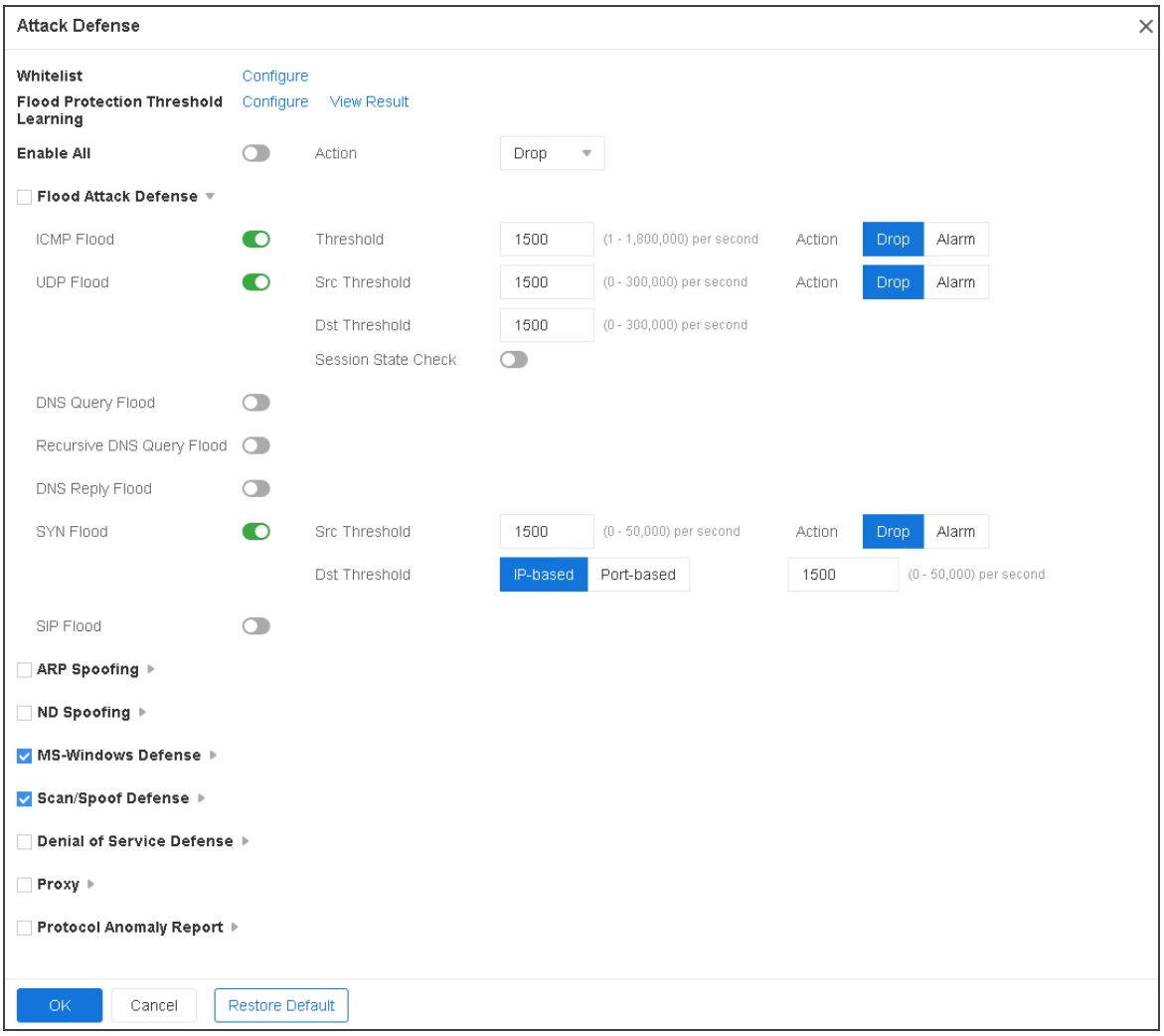
The system supports zone-based attack defense function.

1. Select **Network** > **Zone** and double click "untrust".

2. Expand the **Threat Protection** section and click the button to enable the zone-based attack defense(AD) function.

You can use the default AD configuration or click **Configure** to set customized configuration. In this example, the default attack defense configuration is used, that is, ICMP flood attack defense, UDP flood attack defense, SYN flood attack defense, MS-Windows

defense, and scan/spoof defense are all enabled and the action is **Drop**.

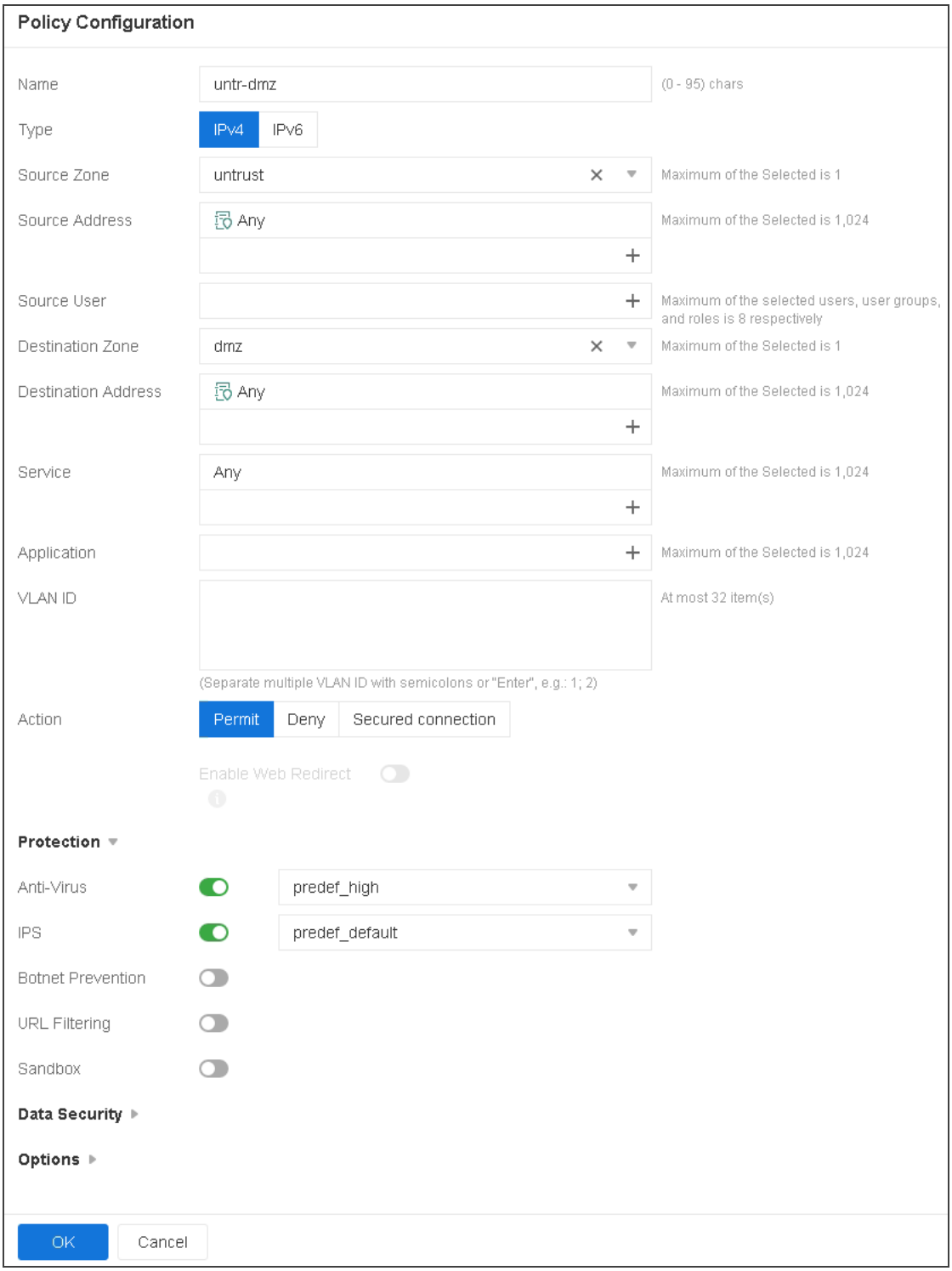


Step 6: Creating a Policy and Enabling Anti-Virus, IPS, and Botnet Prevention

To allow the Internet to access enterprise server farm, configure the untrust-dmz policy, and enable anti-virus and IPS, take the following steps:

1. Select **Policy** > **Security Policy** > **Policy**.

2. Click **New** and select **Policy** from the drop-down list.



On the Policy Configuration page, enter values.

Option	Value
Source Zone	untrust
Source Address	Any
Destination Zone	dmz
Destination Address	Any
Service/Service Group	Any
APP/APP Group	-----
Action	Permit

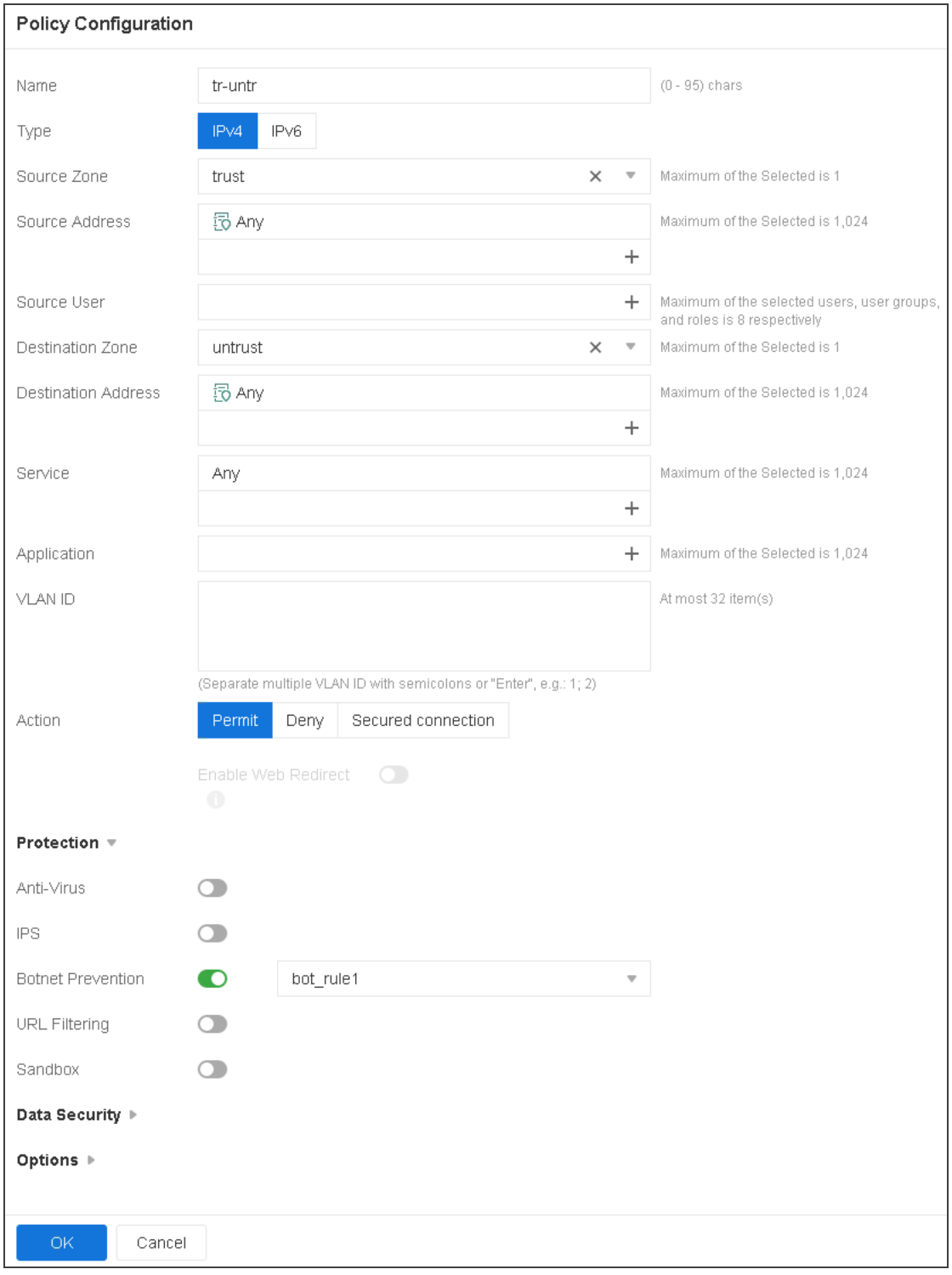
Expand the Protection section and configure the following options.

Option	Value
Anti-Virus	Click the button to enable the anti-virus function and select predef_high from the drop-down list.
IPS	Click the button to enable the IPS function and select predef_default from the drop-down list.

3. Click **OK**.

To allow enterprise offices to access the Internet, configure the trust-untrust policy, and enable botnet prevention, take the following steps:

1. Select **Policy** > **Security Policy** > **Policy**.
2. Click **New** and select **Policy** from the drop-down list.



On the Policy Configuration page, enter values.

Option	Value
Source Zone	trust
Source Address	Any
Destination Zone	untrust
Destination Address	Any
Service/Service Group	Any
APP/APP Group	-----
Action	Permit

Expand the Protection section and configure the following options.

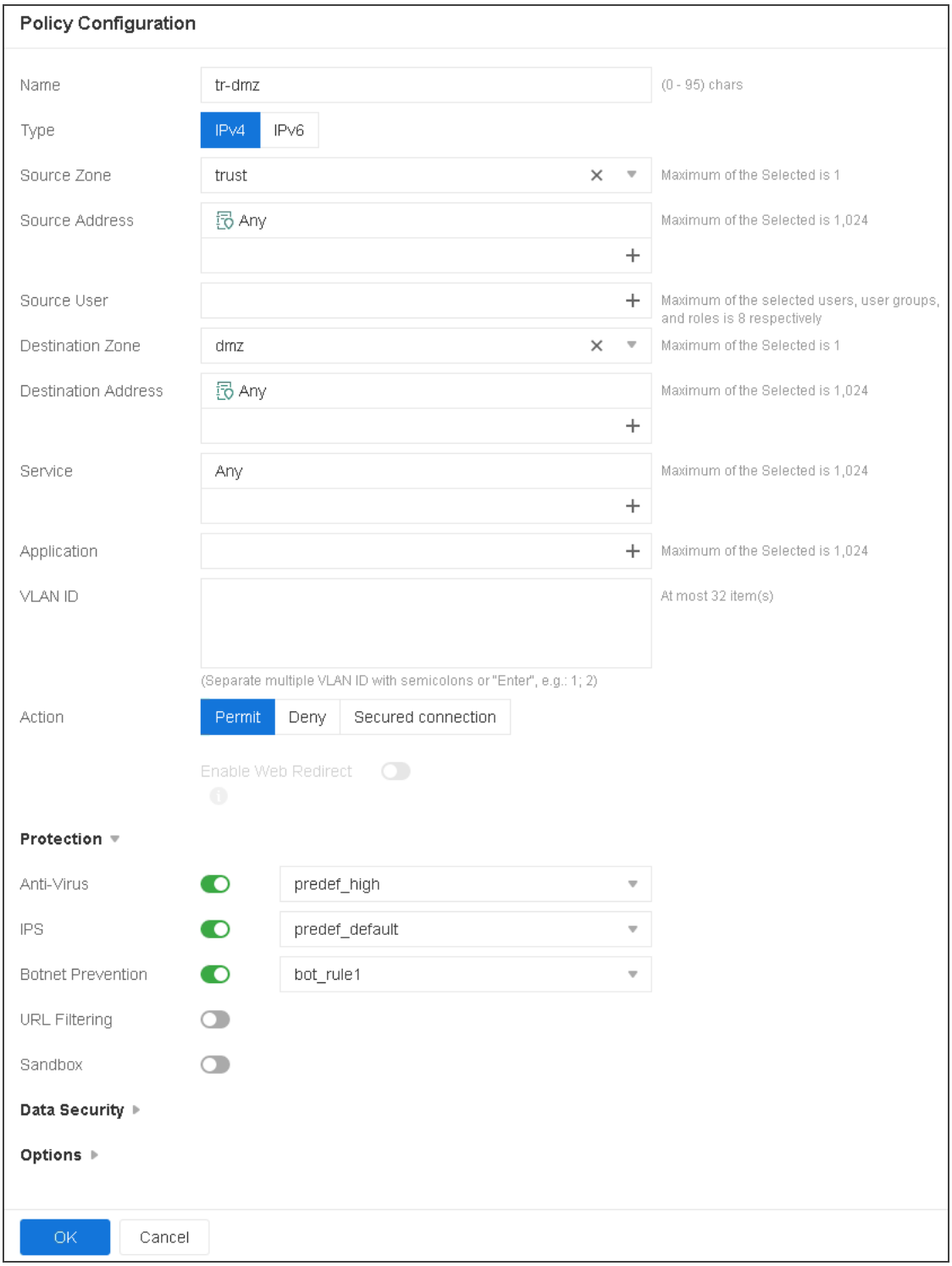
Option	Value
Botnet Prevention	Click the button to enable the IPS function and select bot_rule1 from the drop-down list.

3. Click **OK**.

To allow enterprise offices to access the enterprise server farm, configure the trust-dmz policy, and enable anti-virus, IPS, and botnet prevention, take the following steps:

1. Select **Policy** > **Security Policy** > **Policy**.

2. Click **New** and select **Policy** from the drop-down list.



On the Policy Configuration page, enter values.

Option	Value
Source Zone	trust
Source Address	Any
Destination Zone	dmz
Destination Address	Any
Service/Service Group	Any
APP/APP Group	-----
Action	Permit

Expand the Protection section and configure the following options.

Option	Value
Anti-Virus	Click the button to enable anti-virus and select predef_ high from the drop-down list.
IPS	Click the button to enable the IPS function and select predef_default from the drop-down list.
Botnet Pre-vention	Click the button to enable the IPS function and select bot_rule1 from the drop-down list.

3. Click **OK**.

Step 7: Viewing Detection Results

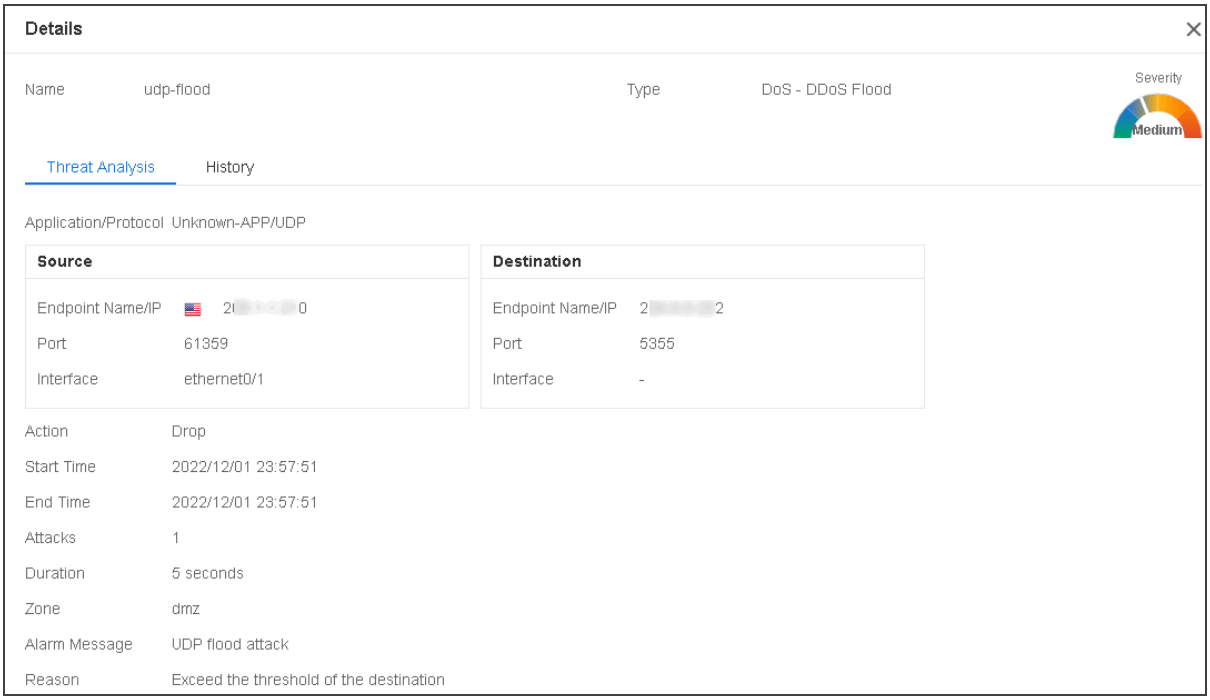
The following example introduces how to view the detection results of attack defense.

View iCenter:

1. Select **iCenter** > **Threat**. Click **Filter** to add filtering conditions.

    - Detection Engine: Attack Defense

2. After adding the filtering condition, you will see threat event of Attack Defense. Click the threat name to view its details.

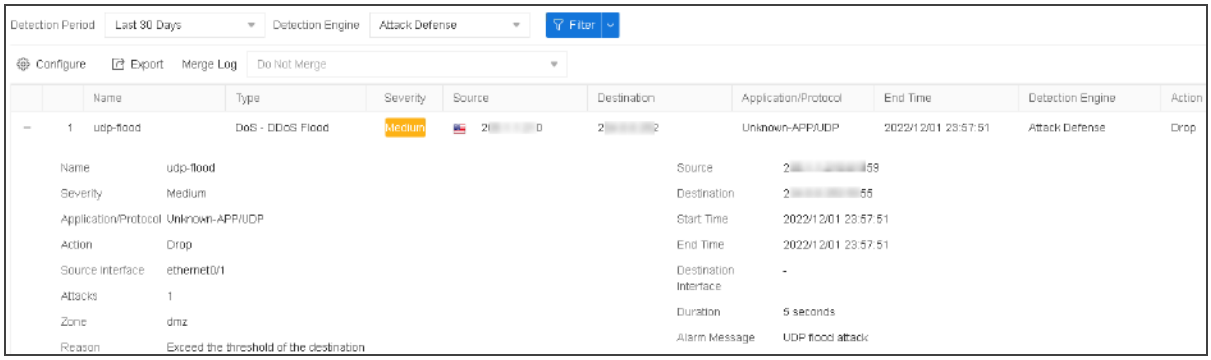


Viewing Threat Logs:

1. Select **Monitor** > **Log** > **Threat Log**. Click **Filter** to add filtering conditions.

    - Detection Engine: Attack Defense

2. After adding the filtering condition, you will see threat logs of Attack Defense. Click + before the threat name to view its details.



High Availability (HA)

HA, the abbreviation for High Availability, provides a fail-over solution for communications lines or device failure to ensure the smooth communication and effectively improve the reliability of the network. The system supports the following two HA modes:

- Active-Passive (A/P) mode: In the HA cluster, configure two devices to form an HA group, with one device acting as a primary device and the other acting as its backup device. The primary device is active, forwards packets, and meanwhile synchronizes all of its network and configuration information and current session information to the backup device. When the primary device fails, the backup device will be promoted to primary and takes over its work to forward packets. This A/P mode is redundant, and features a simple network structure for you to maintain and manage.
- Peer Active-Active (A/A) mode: the Peer A/A mode is an HA Active-Active mode. In the Peer A/A mode, two devices are both active, perform their own tasks simultaneously, and monitor the operation status of each other. When one device fails, the other will take over the work of the failure device and also run its own tasks simultaneously. In the Peer A/A mode, only the device at the active status can send/receive packets. The device at the disabled status can make two devices have the same configuration information but its interfaces do not send/receive any packets. The Peer A/A mode is more flexible and is suitable for the deployment in the asymmetric routing environment.

HA Peer Active-Active (A/A) mode may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

Requirements

HA, the abbreviation for High Availability, provides a fail-over solution for communications lines or device failure to ensure the smooth communication and effectively improve the reliability of the network.

To implement the HA function, you need to configure the two devices as HA clusters with identical settings for the following:

- Hardware platform
- Firmware version
- VSYS （enable VSYS on two devices that are installed with VSYS license or not use VSYS on both devices)
- Virtual Router (enable VR simultaneously on two devices or not use VR on both devices)

When one device is not available or cannot handle the request from the client properly, the request will be promptly directed to the other device that works normally, thus ensuring uninterrupted network communication and greatly improving the reliability of communications.

The configuration of HA clusters is not affected if certain functions, such as AV, are not consistent on the two HA devices. In this scenario, the system sends an alarm showing that certain settings on the two devices are not consistent. It indicates that when the master device fails, the backup device may have problems taking over its work. Settings that cause the above scenario include but are not limited to the below ones:

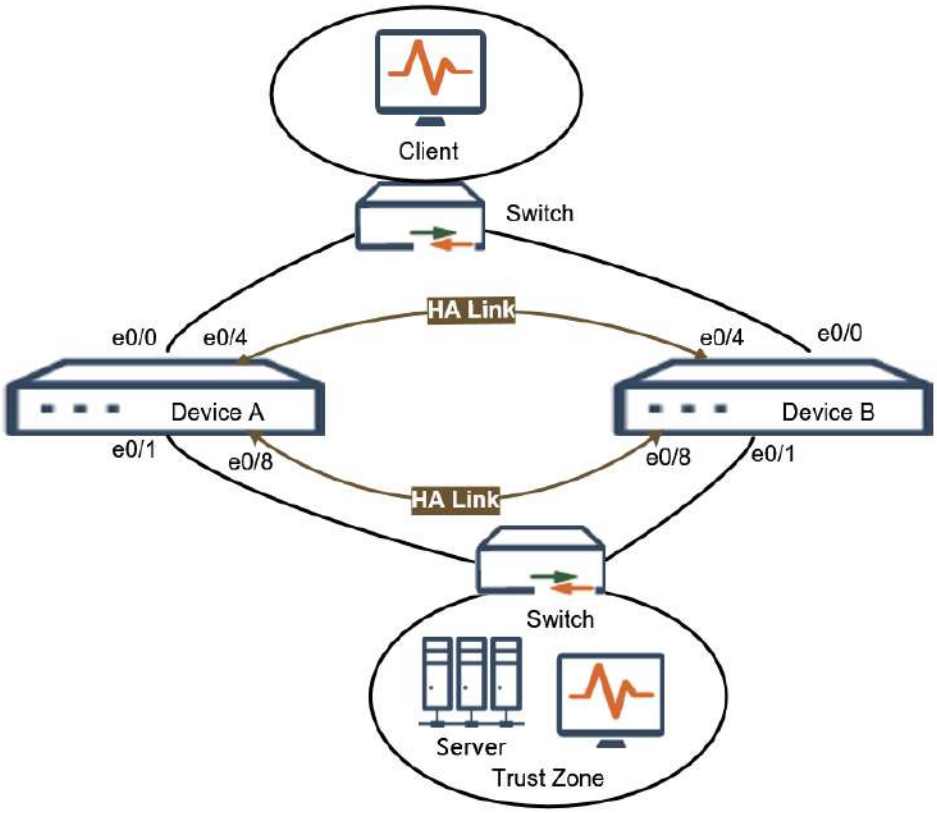
- enable or disable Antivirus, IPS, URL DB, Perimeter Traffic Filtering, Threat Prevention, Botnet C&C Prevention, Sandbox, IoT Monitor, and Antispam.
- install or not install licenses such as Antivirus License, IPS License, URL DB License, PTF License, Threat Prevention License, Antispam License, Botnet Prevention License, IoT Monitor License, Twin-mode License, Cloud Sandbox Prevention License, Signature Database Application License, and QoS/iQoS License.

It is suggested to concern on the alarms when the above functions are not consistent on the two HA devices.

Application Scenario

This example introduces how to configure two devices working under Active-Passive mode to provide high availability for the protected network.

As shown in the following tropology, the two devices in HA AP mode are Device A and Device B. After the configuration, Device A is selected as the master device to forward traffic. Device B is the backup device. Device A synchronizes its configuration and status to backup Device B. When the active Device A is faulty and cannot forward traffic, the backup Device B switches to the master device and continues to forward traffic without affecting user communication.



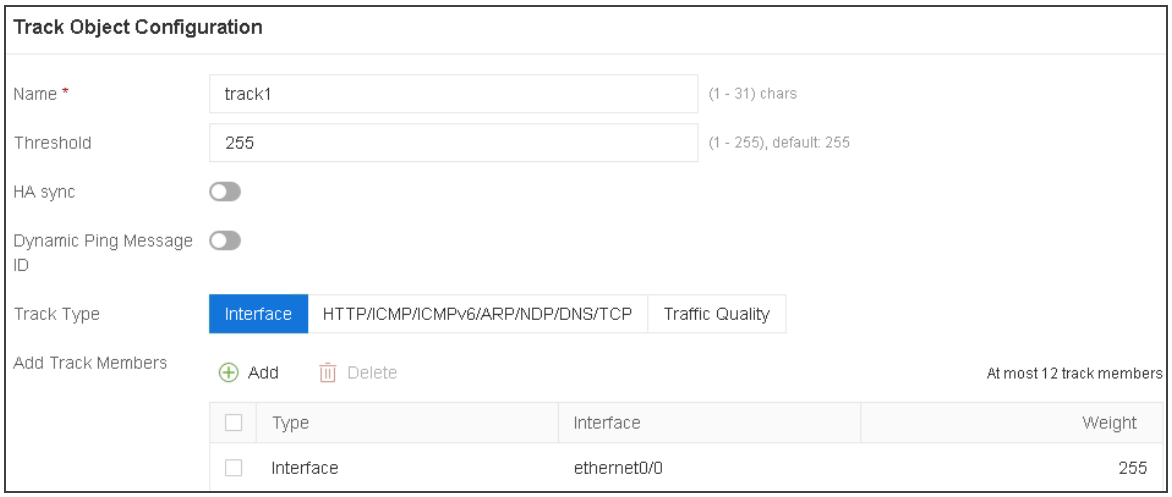
Configuration Steps

Step 1: Configuring the Track Object. Each device monitors eth0 respectively.

Device A

1. Select **Object** > **Track Object**.

2. Click **New**.



On the Track Object Configuration page, enter values.

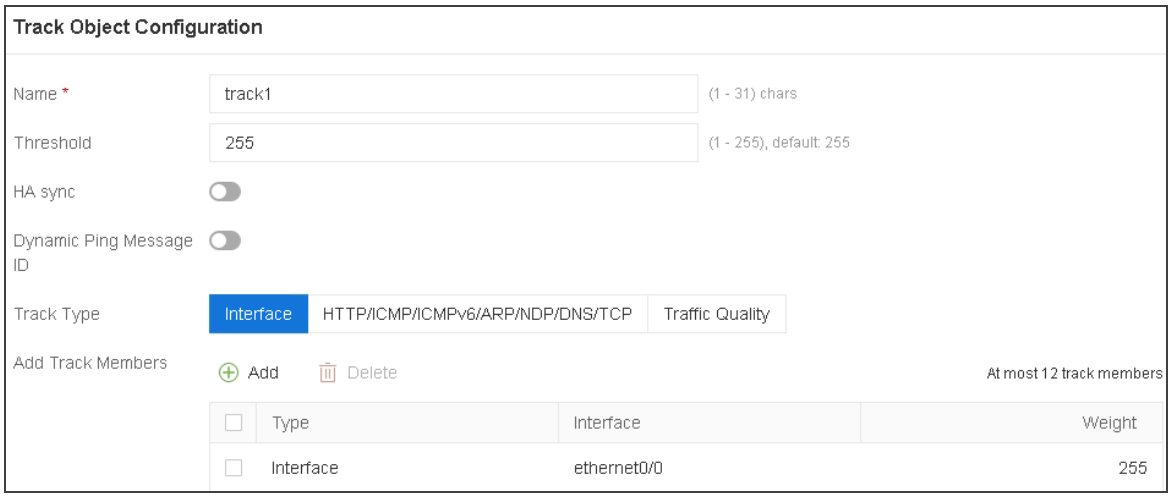
Option	Value
Name	track1
Threshold	255
HA sync	Disabled
Track Type	Select **Interface**, and click **Add**. In the prompt, select ethernet0/0, and specify weight as 255.

3. Click **OK**.

Device B

1. Select **Object** > **Track Object**.

2. Click **New**.



On the Track Object Configuration page, enter values.

Option	Value
Name	track1
Threshold	255
HA sync	Disabled
Track Type	Select **Interface**, and click **Add**. In the prompt, select ethernet0/0, and specify weight as 255.

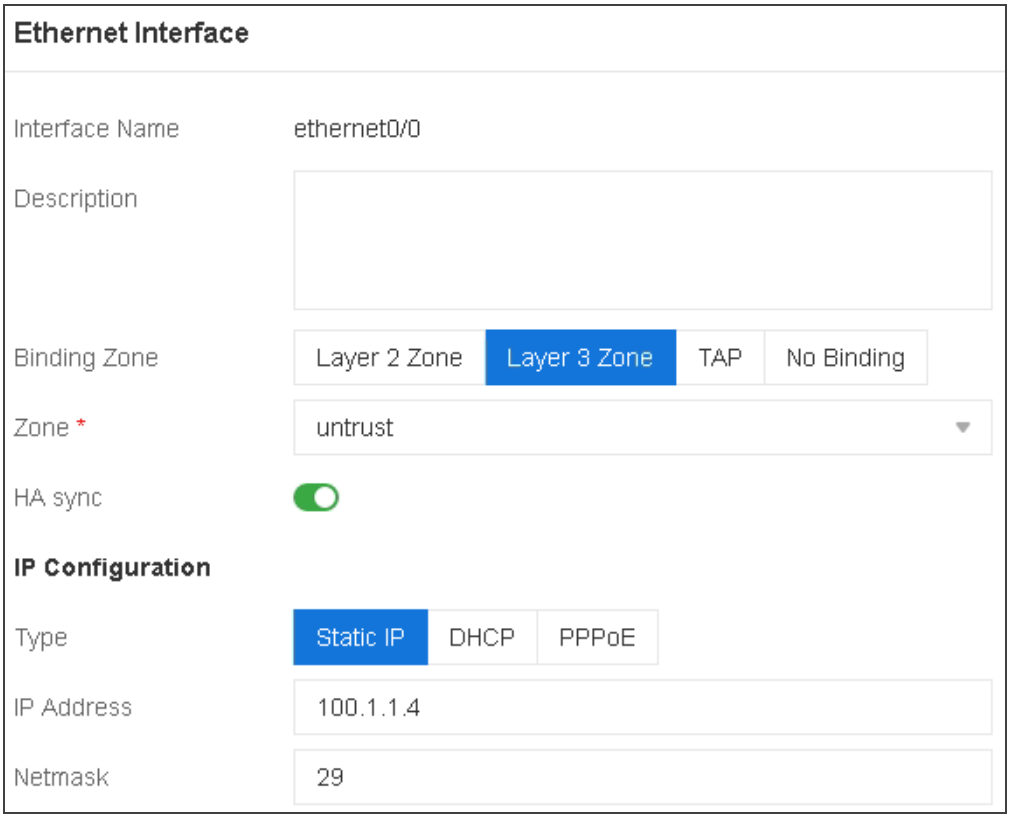
3. Click **OK**.

Step 2: Configuring Device A's Interface and Policy

- Configuring ethernet0/0

1. Select **Network > Interface**.

2. Double click "ethernet0/0".



On the Ethernet Interface page, enter values.

Option	Value
Binding Zone	Layer 3 Zone
Zone	untrust
HA sync	Enable
Type	Static IP

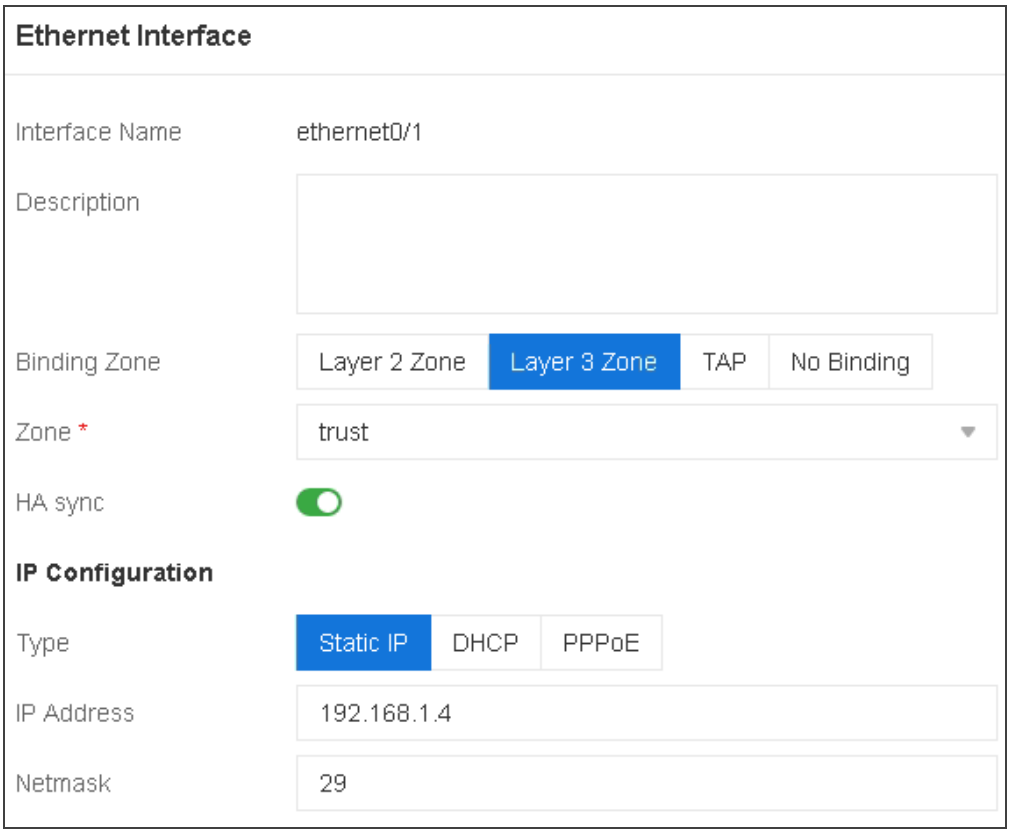
Option	Value
IP Address	100.1.1.4
Netmask	29

3. Click **OK**.

- Configuring ethernet0/1

1. Select **Network > Interface**.

2. Double click "ethernet0/1".



On the Ethernet Interface page, enter values.

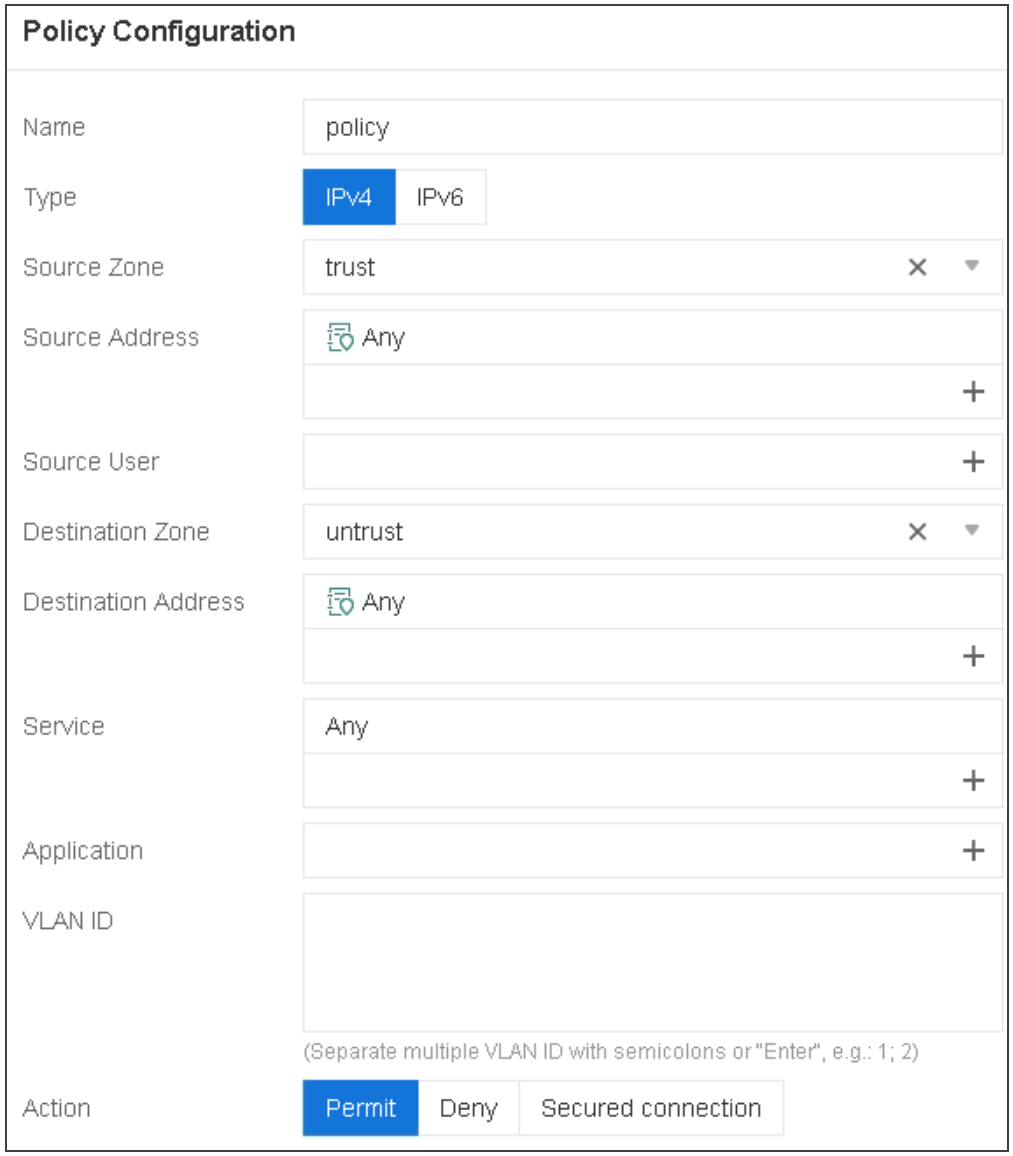
Option	Value
Binding Zone	Layer 3 Zone
Zone	trust
HA sync	Enable
Type	Static IP
IP Address	192.168.1.4
Netmask	29

3. Click **OK**.

- Configuring the Security Policy

1. Select **Policy > Security Policy > Policy**.

2. Click **New** and select **Policy** from the drop-down list.



On the Policy Configuration page, enter values.

Option	Value
Name	policy
Source Zone	trust
Source Address	Any
Destination Zone	untrust
Destination Address	Any
Service	Any
Action	Permit

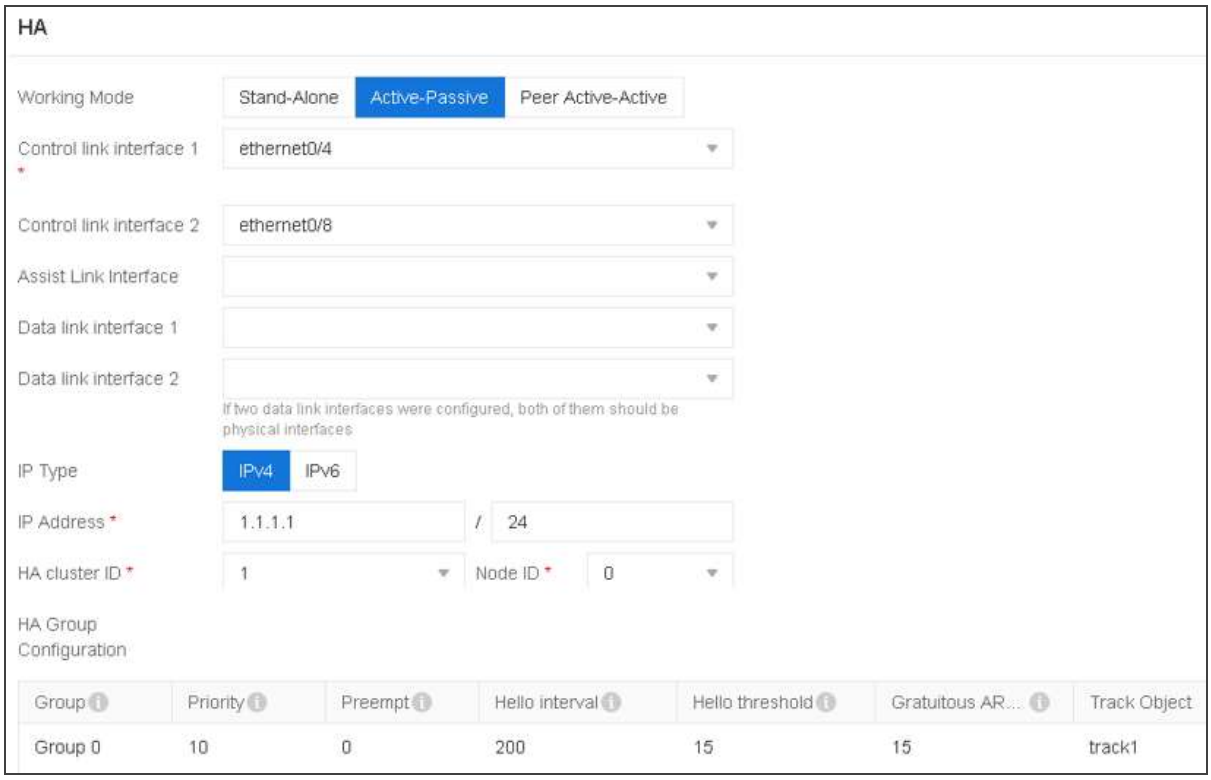
3. Click **OK**.

Step 3: Configuring HA function

Device A

1. Select **System > HA**.

2. For **Working Mode**, select **Active-Passive**.



Configure the following options.

Option	Value
Control link interface 1	ethernet0/4
Control link interface 2	ethernet0/8
IP Address	1.1.1.1/24
HA cluster ID	1

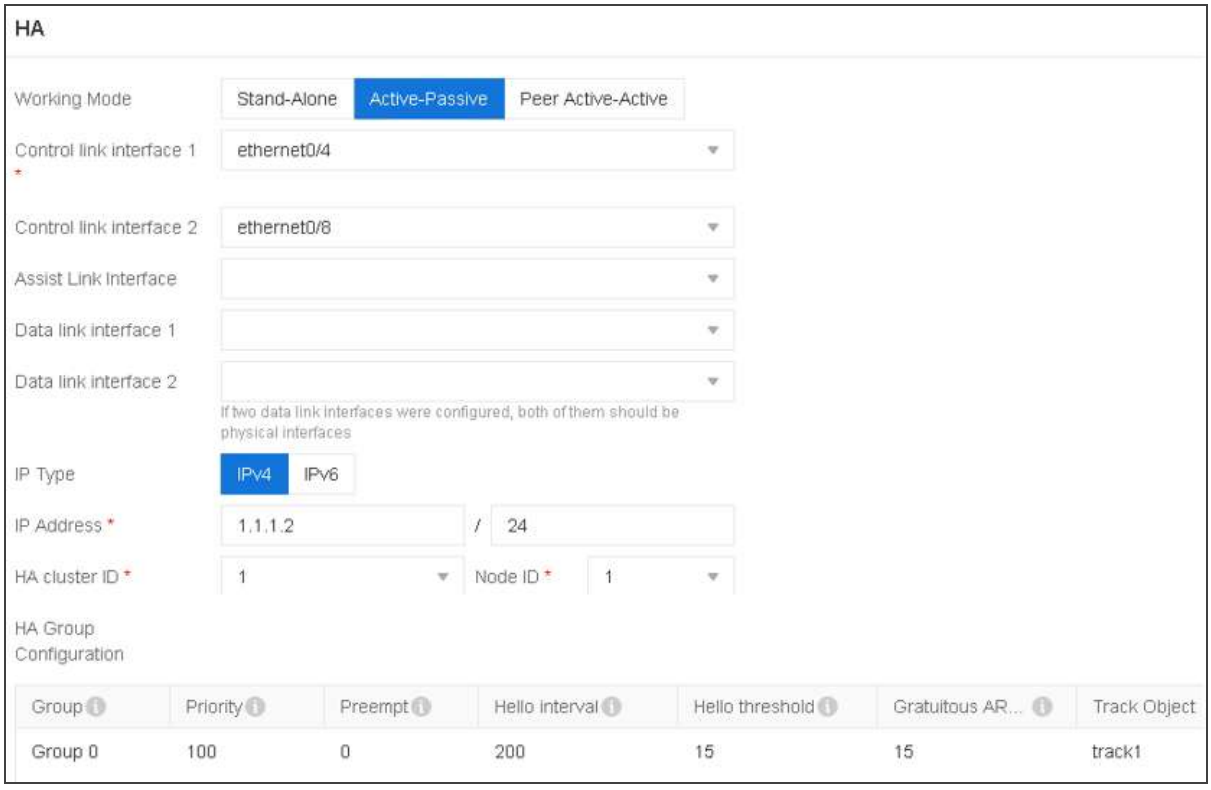
Option	Value
Node ID	0
HA Group Configuration	Enter 10 for **Priority** and select **track1** for **Track Object**.

3. Click **OK**.

Device B

1. Select **System > HA**.

2. For **Working Mode**, select **Active-Passive**.



Configure the following options.

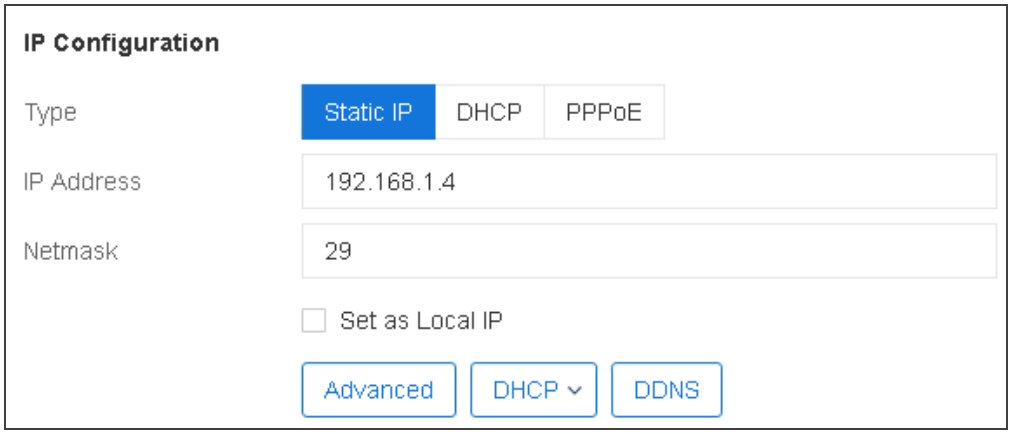
Option	Value
Control link interface 1	ethernet0/4
Control link interface 2	ethernet0/8
IP Address	1.1.1.2/24
HA cluster ID	1
Node ID	1
HA Group Configuration	Enter 100 for **Priority** and select **track1** for **Track Object**.

3. Click **OK**.

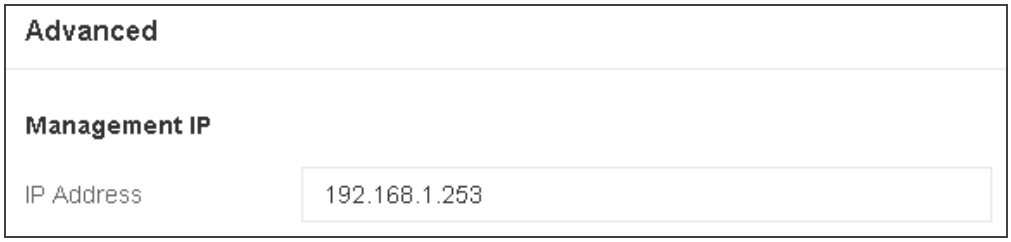
Step 4: Configuring the Management IP of Master and Backup Devices After Synchronization

Device A

1. Select **Network > Interface**.
2. Double click ethernet0/1.
3. On the **Ethernet Interface** page, click **Advanced** in the **IP Configuration** section.



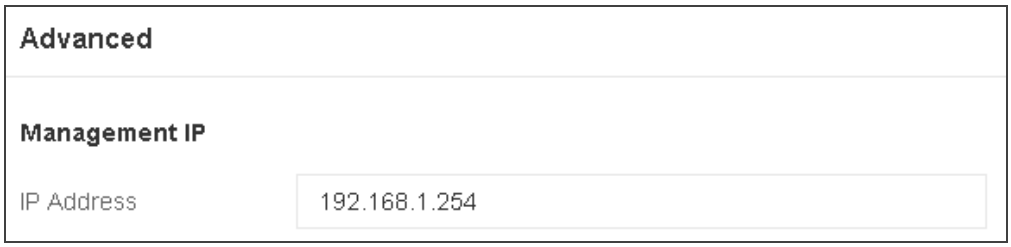
4. On the **Advanced** page, in the **Management IP** section, specify the **IP Address** as 192.168.1.253.



5. Click **OK**.

Device B

1. Select **Network > Interface**.
2. Double click ethernet0/1.
3. On the **Ethernet Interface** page, click **Advanced** in the **IP Configuration** section.
4. On the **Advanced** page, in the **Management IP** section, specify the **IP Address** as 192.168.1.254.



5. Click **OK**.

Step 5: Results

After configuration, select **System > System and Signature Database**. In the **System Information** Section, **HA State** shows the device's HA status.

Device A

- HA State: Master

Device B

- HA State: Backup

When Device A fails to forward traffic or its eth0/0 is disconnected, Device B will turn to Active and starts forwarding without interrupting protected network.

Select **System > System and Signature Database**. In the **System Information** Section, **HA State** shows the device's HA status.

Device A

- HA State: Monitor Failed

Device B

- HA State: Master

Exporting Logs

The system supports multiple log types and you can export logs to different destinations. You are allowed to export logs to the following destinations. You can specify the destination as needed.

- Console - Export logs to the Console.
- Terminal- Export logs to Telnet or SSH terminal。
- Cache - Export logs to cache.
- File - Export logs to a file.
- Log Server - Export logs to UNIX or Windows Syslog Server。
- Email Address- Export logs to the specified email address.
- Database - Export logs to the local database, which resides in storage devices, including SD memory cards and USB flash drives and expansion hard drives.
- SMS - Export logs to specified mobile phone as an SMS.

Application Scenario

A user needs to view the NAT logs of the firewall deployed at the Intranet exit and the NAT logs of the firewall should be exported to the log server in plaintext.

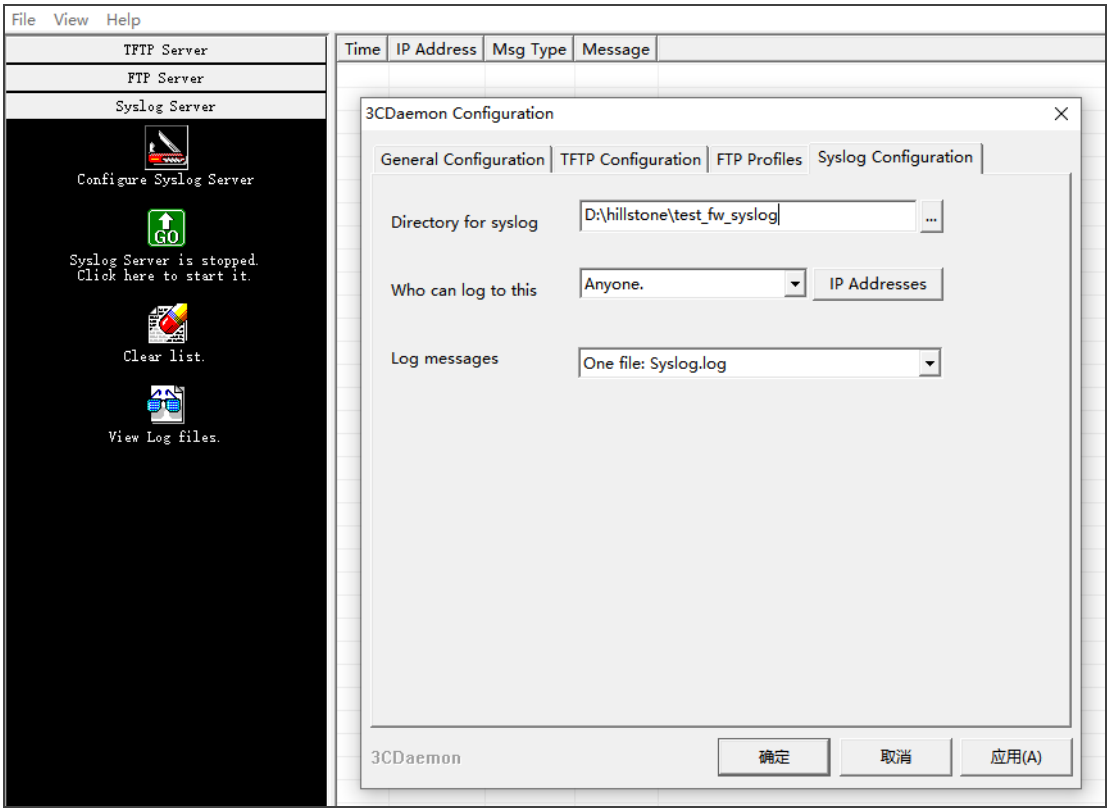
Configuration Steps

Step 1: Configuring the Log Server on PC

1. Install the log server software on the PC that needs to receive logs. Take 3CDaemon as an example.
2. When the installation is completed, open 3CDaemon.

3. Click **Syslog Server** and then click **Configure Syslog Server**.

4. In the **3CDaemon Configuration** dialogue box, configure the directory for storing the Syslog file, allowed log senders, and the log file name.



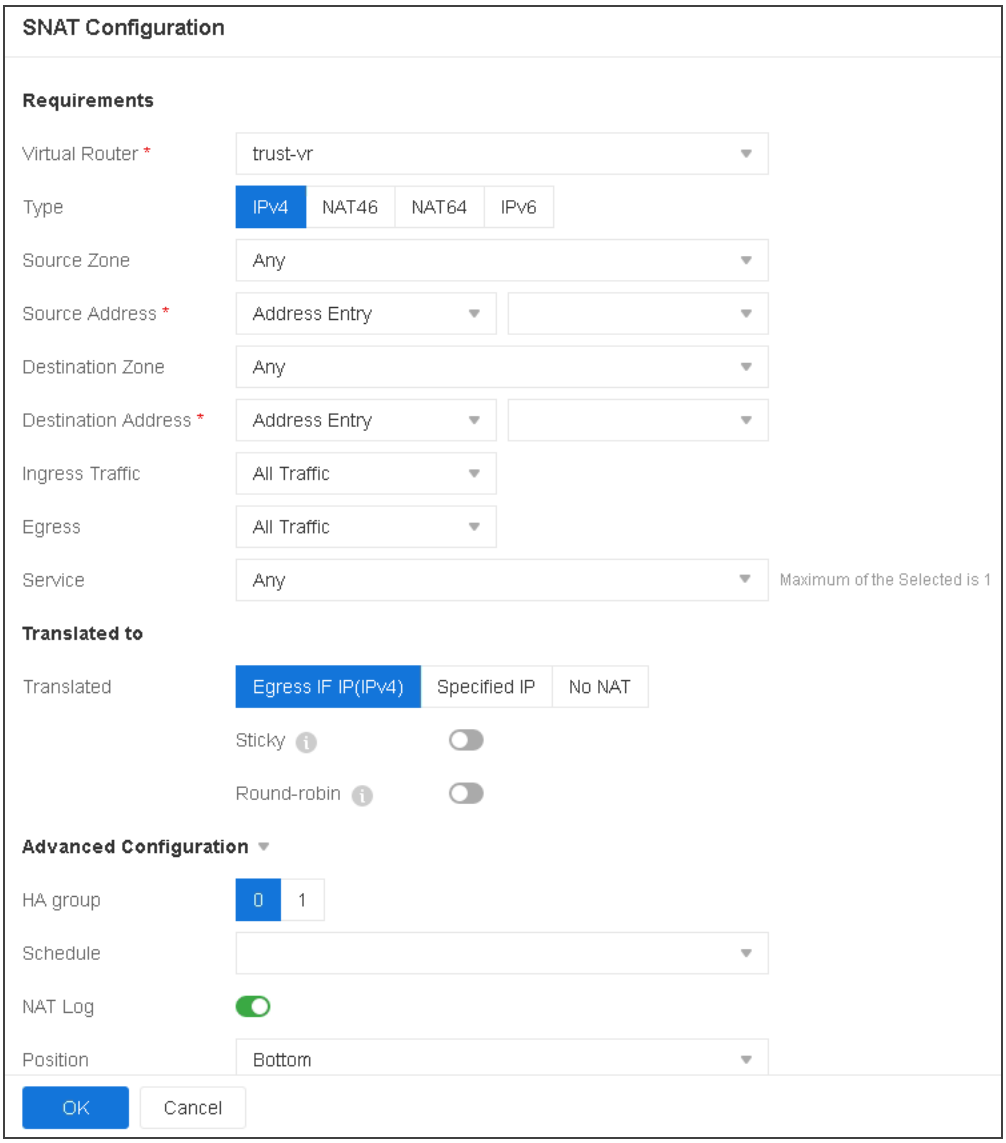
Step 2: Configuring the Export of NAT Logs

To enable the NAT log function of the NAT rule, take the following steps:

1. Select **Policy > NAT > SNAT/DNAT**。

2. Enable NAT Log for each NAT rule. Take the SNAT rule as an example. On the **SNAT Configuration** page, go to **Advanced Configuration** section, and click the enable button

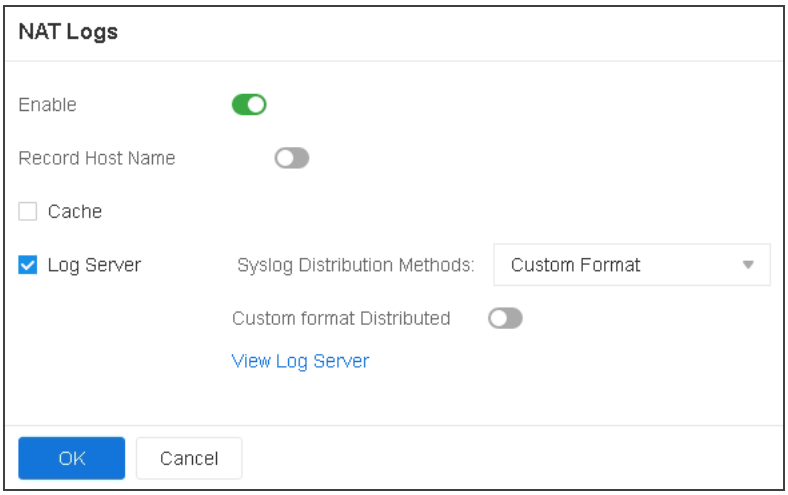
behind **NAT Log**.



To enable the NAT log function of the device, take the following steps:

1. Select **Monitor** > **Log** > **NAT Log**.

2. Click **Configure** to go to the **NAT Logs** panel.



On the NAT Logs Panel, configure the following options.

Option	Value
Enable	Click the button to enable the NAT log function.
Log Server	Click the check box of **Log Server** and select **Custom Format** from the **Syslog Distribution Methods** drop-down list.

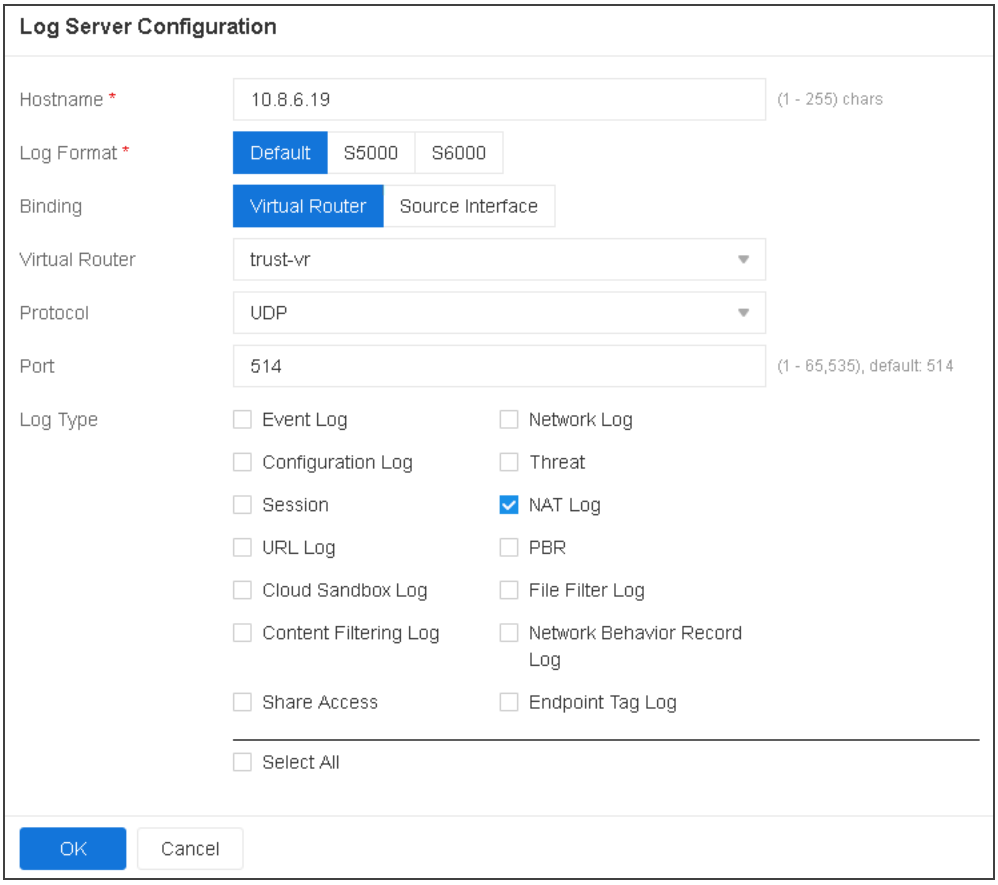
3. Click **OK**.

You can also go to Monitor > Log > Log Management. Click the button behind NAT Log and click to make corresponding configuration.

To configure the log server, take the following steps:

1. Select **Monitor** > **Log** > **Log Configuration** > **Log Server Configuration**.

2. On the **Log Server Configuration** tab, click **New**.



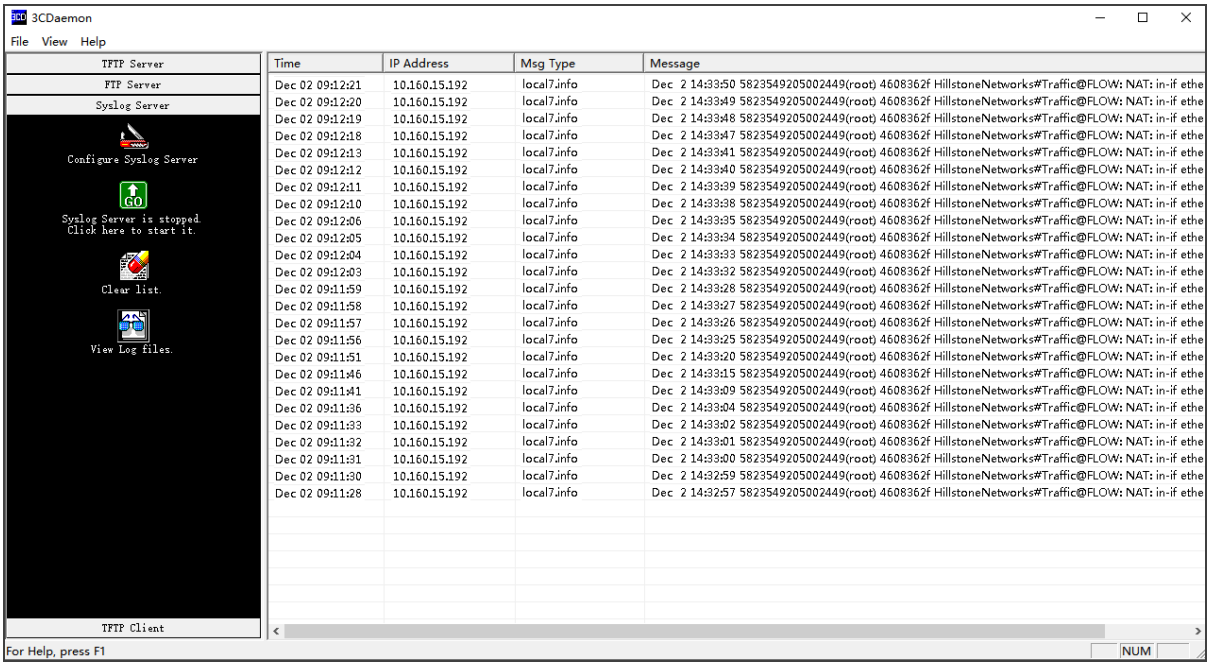
On the Log Server Configuration page, enter values.

Option	Value
Hostname	Enter the IP address of the PC where the log server is located.
Binding	Virtual Router
Protocol	UDP (the default syslog protocol)
Port	514 (the default syslog port)
Log Type	Select **NAT Log**.

3. Click **OK**.

Step 3: Viewing NAT Logs in the Log Server

- Access the log server. You can see that the log server has received NAT logs.



- Access the directory for saving log files and you can view the saved log files.

Chapter 2 Deploying Your Device

This chapter introduces how a firewall works and its most commonly used scenarios. Understanding the system structure, basic elements and flow chart will help you in better organizing your network and making the most of the firewall product.

- "How a Firewall Works" on Page 118

A firewall has more than one deployment scenario. Each scenario applies to one environment requirement. The usual deployment modes are:

- "Deploying Transparent Mode" on Page 127

  Transparent mode is a situation when the IT administrator does not wish to change his/her existing network settings. In transparent mode, the firewall is invisible to the network. Because no IP address configuration is needed, the firewall only provides security features.

- "Deploying Routing Mode" on Page 137

  Routing mode applies when the firewall offers both routing and NAT functions. In routing mode, the firewall connects two networks typically, an internal network and the Internet, and the firewall interfaces are configured with IP addresses.

- "Deploying Mix Mode" on Page 146

  If a firewall has Layer-2 interfaces and Layer-3 interfaces, it is in mix mode.

- "Deploying Tap Mode" on Page 147

  When an IT administrator only wants the monitor, IPS or statistic function of a firewall, while not a gateway device, using tap mode is the right choice. In tap mode, the firewall is not directly connected within the network.

How a Firewall Works

A firewall is a network security device. It protects a network by controlling the traffic that comes in and out of that network. The basic mechanism of how a firewall works is that allowing or denying the data packet by identifying whether it matches the policy rules or not. Besides security functions, a firewall can also works as a bridging device to connect a trust zone (internal network) and untrust zone (external network).

StoneOS System Architecture

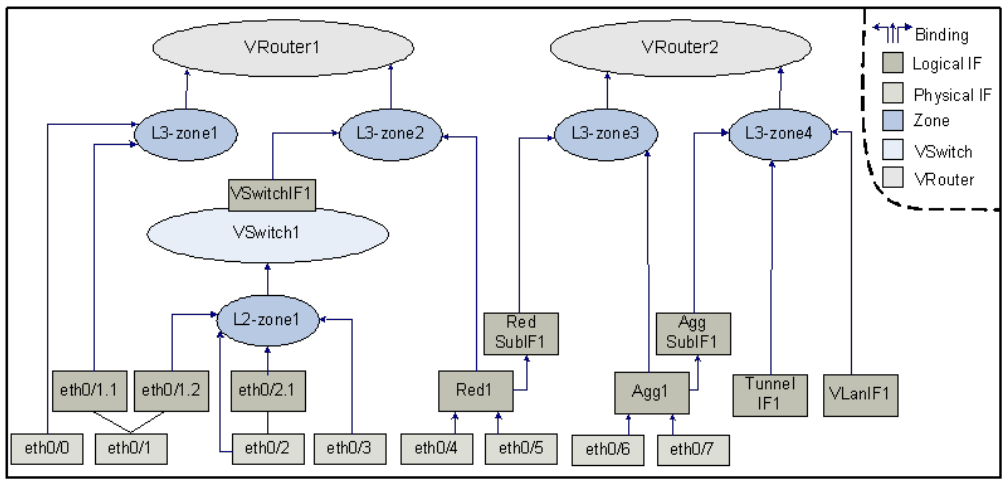
The elements that constitute StoneOS system architecture are:

- **Zone**: Zones divide network into multiple segments, for example, trust (usually refers to the trusted segments such as the Intranet), untrust (usually refers to the untrusted segments where security treats exist).
- **Interface**: Interface is the inlet and outlet for traffic going through security zones. An interface must be bound to a security zone so that traffic can flow into and from the security zone. Furthermore, for the Layer 3 security zone, an IP address should be configured for the interface and the corresponding policy rules should also be configured to allow traffic transmission between different security zones. Multiple interfaces can be bound to one security zone, but one interface cannot be bound to multiple security zones.
- **VSwitch**: VSwitch is short for Virtual Switch. A VSwitch functions as a switch in Layer 2. After binding a Layer 2 zone to a VSwitch, all the interfaces in the zone are also bound to the VSwitch. There is a default VSwitch named VSwitch1. By default, all Layer 2 zones will be bound to VSwitch1. You can create new VSwitches and bind Layer 2 zones to VSwitches. Each VSwitch is a Layer 2 forwarding zone with its own MAC address table which supports the Layer 2 traffic transmission for the device. Furthermore, the VSwitchIF helps the traffic to flow between Layer 2 and Layer 3.

- **VRouter**: VRouter is Virtual Router and also abbreviated as VR. A VRouter functions as a router with its own routing table. There is a default VR named trust-vr. By default, all the Layer 3 zones will be bound to trust-vr automatically. The system supports the multi-VR function and the max VR number varies from different platforms. Multiple VRs make the device work as multiple virtual routers, and each virtual router uses and maintains its own routing table.The multi-VR function allows a device to achieve the effects of the address isolating in different route zones and the address overlapping in different VRs, as well as avoiding leakage of route to some extent and enhancing route security of network.

- **Policy**: Policy is used to control the traffic flow in security zones/segments. By default Hillstone devices will deny all traffic in security zones/segments, while the policy can identify which flow in security zones or segments will be permitted, and which will be denied, which is specifically based on policy rules.

For the relationships among interface, security zone, VSwitch and VRouter, see the following diagram:



As shown above, the binding relationships among them are:

- Interfaces are bound to security zones. Interfaces bound to Layer 2 security zones and Layer 3 security zones are known as Layer 2 interfaces and Layer 3 interfaces respectively. One

interface can be only bound to one security zone; interface and its sub interface can belong to different security zones.

- Security zones are bound to a VSwitch or VRouter. Layer 2 security zones are bound to a VSwitch (by default the predefined Layer 2 security zone is bound to the default VSwitch1), and Layer 3 security zones are bound to a VRouter (by default the predefined Layer 3 security zone is bound to the default trust-vr), thus realizing the binding between the interfaces and VSwitch or VR. One security zone can be only bound to one VSwtich or VR.

General Rules of Security Policy

By default, all interfaces, even in the same zone, cannot communicate. Traffic in different zones are not allowed to be transferred either. In order to change the rule, you need to set up new policy rules to allow traffic forwarding.

Notes: To allow bidirectional traffic, you need to set up two policies: one is from source to destination, the other is from destination to source. If there is only one-direction initiative access, the responsive direction only need to respond to that visit, you will need to create only one-way policy (from source to destination).

This part explains what policy is needed to allow interfaces in different zones, VSwitches, or VRouters to communicate. The rules are:

- **Interfaces in the same zone**

  To allow interfaces in the same zone to communicate, you need to create a policy whose source and destination are both the zone which the interfaces belong to.

  For example, to allow eth0/0 and eth0/1 to communicate, you need to create an "allowing" policy with source L3-zone and destination L3-zone.

- **Zones of two interfaces are under the same VSwtich**

  To allow communication of interfaces in different zones under the same VSwitch, you need to create two policies: one policy is to allow traffic from a zone to another; the other policy is

to allow traffic in the opposite direction.

For example, to allow eth0/2 and eth0/3 to communicate, you should create a policy whose source is L2-zone1 and destination is L2-zone2, then create another policy to allow traffic from L2-zone2 to L2-zone1.

- **Zones of two interfaces are under different VSwitches**

  Each VSwtich has its VSwtich interface (VSwitchIF) which is bound to a Layer-3 zone. To allow interfaces in different zones under different VSwitches to communicate, you need to create an "allowing" policy where the source is the zone of one VSwitchIF and the destination is the zone of the other VSwitchIF. After that, create another policy of the opposite direction.

- **Zones of two L3 interfaces are under the same VRouter**

  To allow two L3 interfaces to communicate, you need to create a policy allowing one zone to the other zone.

  For example, to allow communication between eth0/0 and eth0/5, you should create a policy from L3-zone1 to L3-zone2, and then create an opposite direction policy.

- **Zones of two L3 interfaces are under different VRouters**

  To allow two L3 interfaces in two different zones of different VRouters, you need to create a policy with the source being one VRouter and the destination being the other VRouter. Then you create a policy of the opposite direction.

- **An L2 interface and an L3 interface under the same VRouter**

  To allow communication between an L2 interface and an L3 interface under the same VRouter, you will need to create a policy whose source is the zone which binds the VSwithIF of L2 interface and the destination is the zone of L3 interface. After that, create a policy of the opposite direction.

  For example, to allow eth0/0 and eth0/2 to communicate, create a policy from L3-zone1 to L2-zone1, and its opposite direction policy.

Packet Processing Rule

Forwarding Rule in Layer 2

Forwarding within Layer 2 means it is in one VSwitch. StoneOS system creates a MAC address table for a VSwitch by source address learning. Each VSwitch has its own MAC address table. The packets are forwarded according to the types of the packets, including IP packets, ARP packets, and non-IP-non-ARP packets.

The forwarding rules for IP packets are:

1. Receive a packet.
2. Learn the source address and update the MAC address table.
3. If the destination MAC address is a unicast address, the system will look up the egress interface according to the destination MAC address. And in this case, two situations may occur:
    - If the destination MAC address is the MAC address of the VSwitchIF with an IP configured, system will forward the packet according to the related routes; if the destination MAC address is the MAC address of the VSwitchIF with no IP configured, system will drop the packet.
    - Figure out the egress interface according to the destination MAC address. If the egress interface is the source interface of the packet, system will drop the packet. Otherwise, system will forward the packet from the egress interface.

If no egress interfaces (unknown unicast) is found in the MAC address table, jump to Step 6 directly.

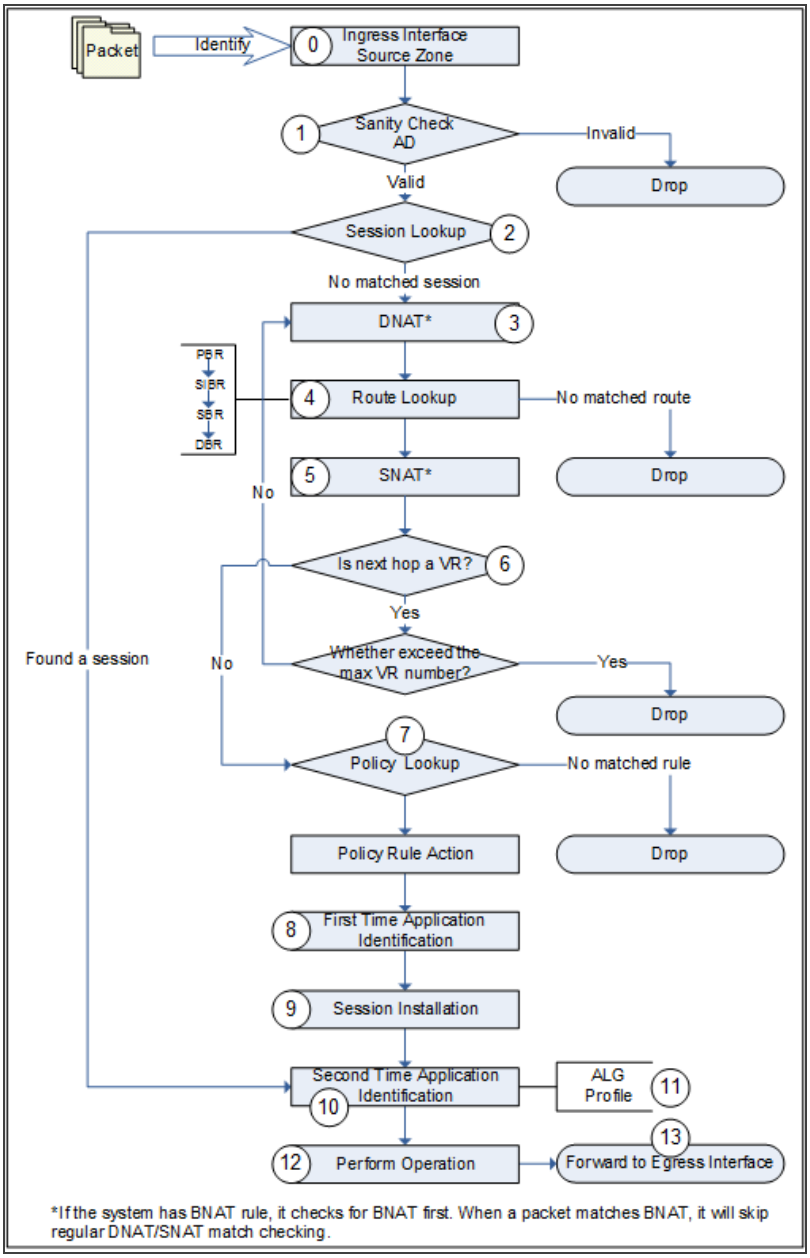
4. Figure out the source zone and destination zone according to the ingress and egress interfaces.

5. Look up the policy rules and forward or drop the packet according to the matched policy rules.

6. If no egress interface (unknown unicast) is found in the MAC address table, system will send the packet to all the other L2 interfaces. The sending procedure is: take each L2 interface as the egress interface and each L2 zone as the destination zone to look up the policy rules, and then forward or drop the packet according to the matched policy rule. In a word, forwarding of unknown unicast is the policy-controlled broadcasting. Process of broadcasting packets and multicasting packets is similar to the unknown unicast packets, and the only difference is the broadcast packets and multicast packets will be copied and handled in Layer 3 at the same time.

For the ARP packets, the broadcast packet and unknown unicast packet are forwarded to all the other interfaces in the VSwitch, and at the same time, system sends a copy of the broadcast packet and unknown unicast packet to the ARP module to handle.

Forwarding Rule in Layer 3



0. Identify the logical ingress interface of the packet to determine the source zone of the packet. The logical ingress interface may be a common interface or a sub-interface.

1. System performs sanity check to the packet. If the attack defense function is enabled on the source zone, system will perform AD check simultaneously.

2. Session lookup. If the packet belongs to an existing session, system will perform Step 11 directly.

3. DNAT operation. If a DNAT rule is matched, system will mark the packet. The DNAT translated address is needed in the step of route lookup.
   *Note: If the system has static 1-to-1 BNAT rule, BNAT rule is checked before other NAT rules. If a packet matches BNAT, it will be processed in accordance with this rule's configuration. It will skip the regular DNAT rule checking.

4. Route lookup. The route lookup order from high to low is: PBR > SIBR > SBR > DBR > ISP route.
   Until now, the system has known the logical egress and destination zone of the packet.

5. SNAT operation. If a SNAT rule is matched, system will mark the packet.
   *Note: If the system has static 1-to-1 BNAT rule, BNAT rule is checked before other NAT rules. If a packet matches BNAT, it will be processed in accordance with this rule's configuration. It will skip the regular SNAT rule checking.

6. VR next hop check. If the next hop is a VR, system will check whether it is beyond the maximum VR number (current version allows the packet traverse up to three VRs). If it is beyond the maximum number, system will drop the packet; if it is within the maximum number range, return to Step 4. If the next hop is not a VR, go on with policy lookup.

7. Policy lookup. System looks up the policy rules according to the packet’s source/destination zones, source/destination IP and port, and protocol. If no policy rule is matched, system will drop the packet; if any policy rule is matched, the system will deal with the packet as the rule specified. And the actions can be one of the followings:

- Permit: Forward the packet.
- Deny: Drop the packet.
- Tunnel: Forward the packet to the specified tunnel.
- Fromtunnel: Check whether the packet originates from the specified tunnel. System will forward the packet from the specified tunnel and drop other packets.
- WebAuth: Perform WebAuth on the specified user.

8. First time application identification. System tries to identify the type of the application according to the port number and service specified in the policy rule.
9. Establish the session.
10. If necessary, system will perform the second time application identification. It is a precise identification based on the packet contents and traffic action.
11. Application behavior control. After knowing the type of the application, system will deal with the packet according to the configured profiles and ALG.
12. Perform operations according to the records in the session, for example, the NAT mark.
13. Forward the packet to the egress interface.

Deploying Transparent Mode

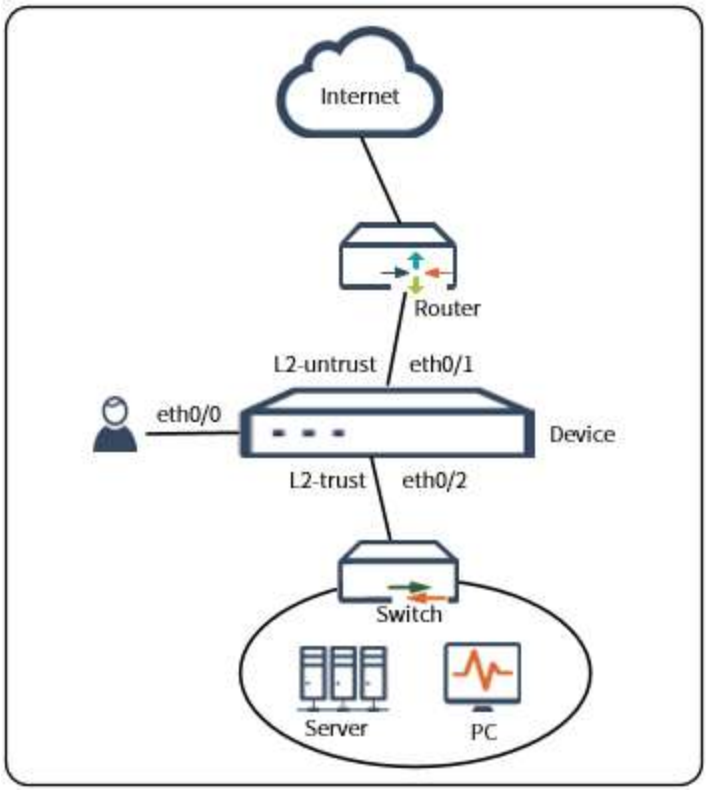
Transparent mode is also known as bridge mode or transparent bridging mode. Transparent mode is used when the IT administrator does not wish to change the existing network layout. Normally, the existing network has already set up routers and switches. The firewall will be used as a security device.

Transparent mode has the following advantages:

- No need to change IP addresses
- No need to set up NAT rule

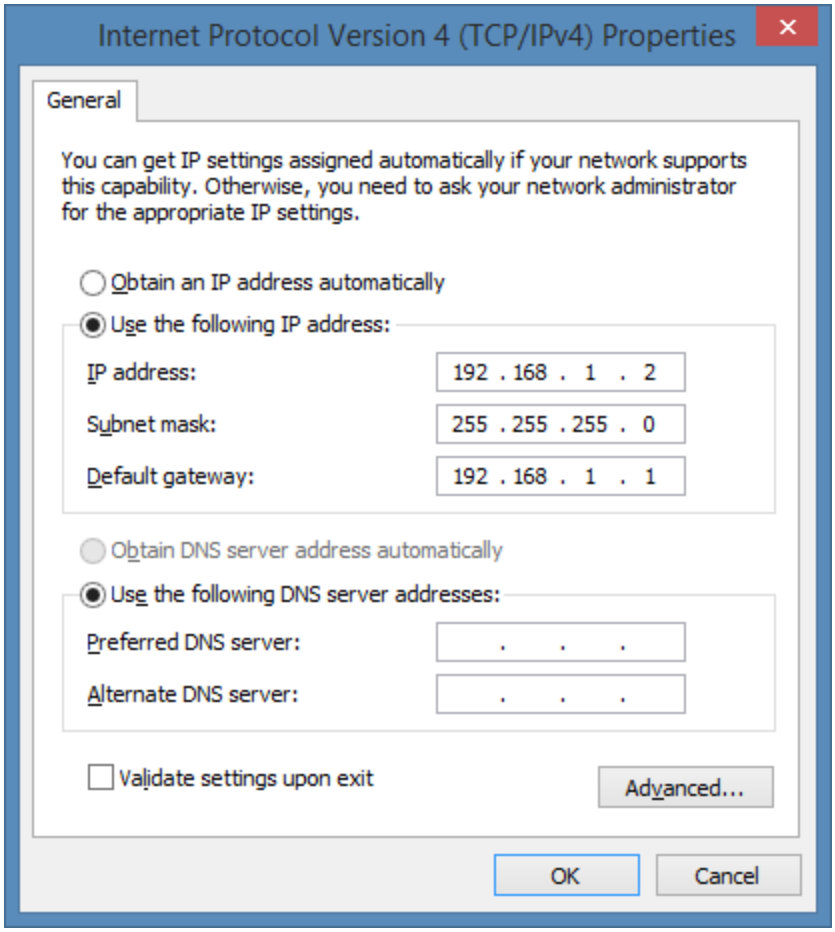
Under normal circumstances, the firewall in transparent mode is deployed between the router and the switch of the protected network, or it is installed between the Internet and a company's router. The internal network uses its old router to access the Internet, and the firewall only provides security control features.

This section introduces a configuration example of a firewall deployed between a router and a switch. In this example,the administrator uses eth0/0 to manage firewall. The firewall's eth0/1 is connected to router (which is connecting to the Internet) and eth0/2 is connected to a switch (which is connecting to internal network).



Step 1: Initial log in the firewall

1. In the administrator's Ethernet properties, set the IPv4 protocol as below.



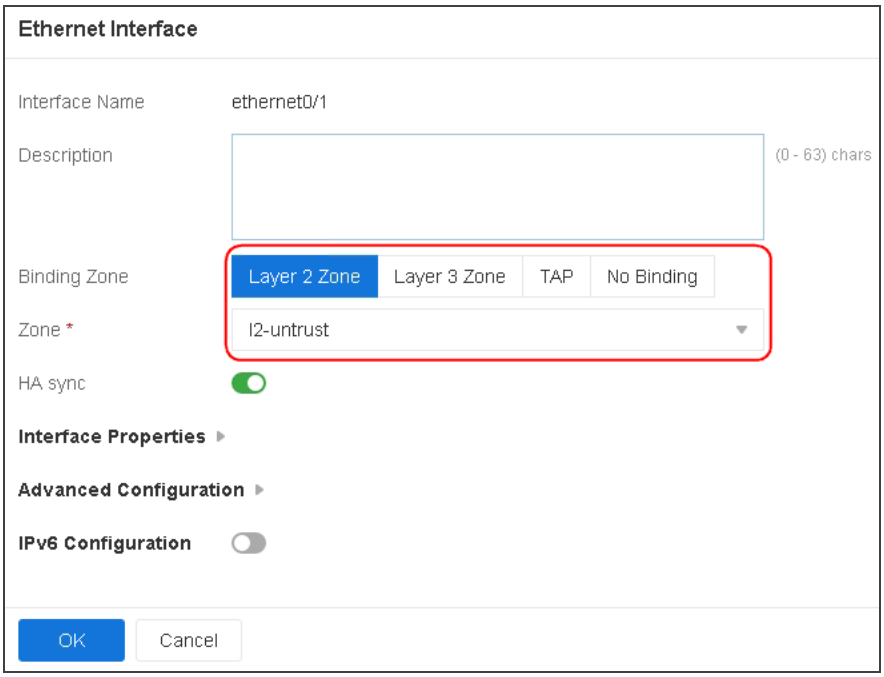
2. Connect an RJ-45 Ethernet cable from the computer to the eth0/0 of the device.
3. In the browser's address bar, type "https://192.168.1.1" and press **Enter**.
4. In the login interface, type the default username and password: hillstone/hillstone.
5. Click **Login**, follow the prompts to change the default password, and then log in again with the new password.

Step 2: Configure interface and zone

- Configure eth0/1 as an Internet connected interface.

1. Select **Network > Interface**.

2. Double click ethernet0/1, and configure in the prompt.

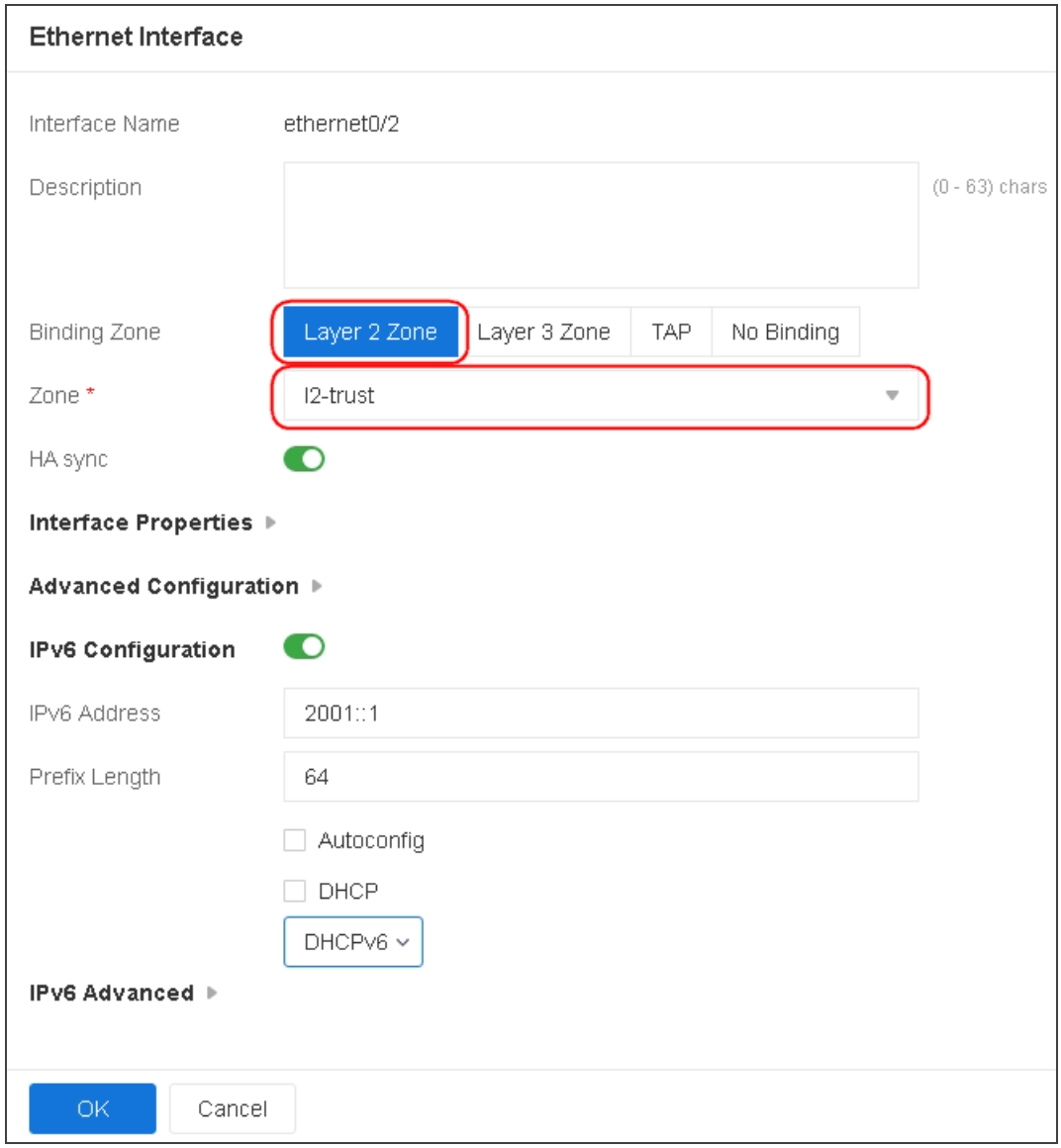


3. Click **OK**.

- Configure eth0/2 as a private network connected interface.

    1. Select **Network > Interface**.

    2. Double click ethernet0/2, and configure in the prompt.



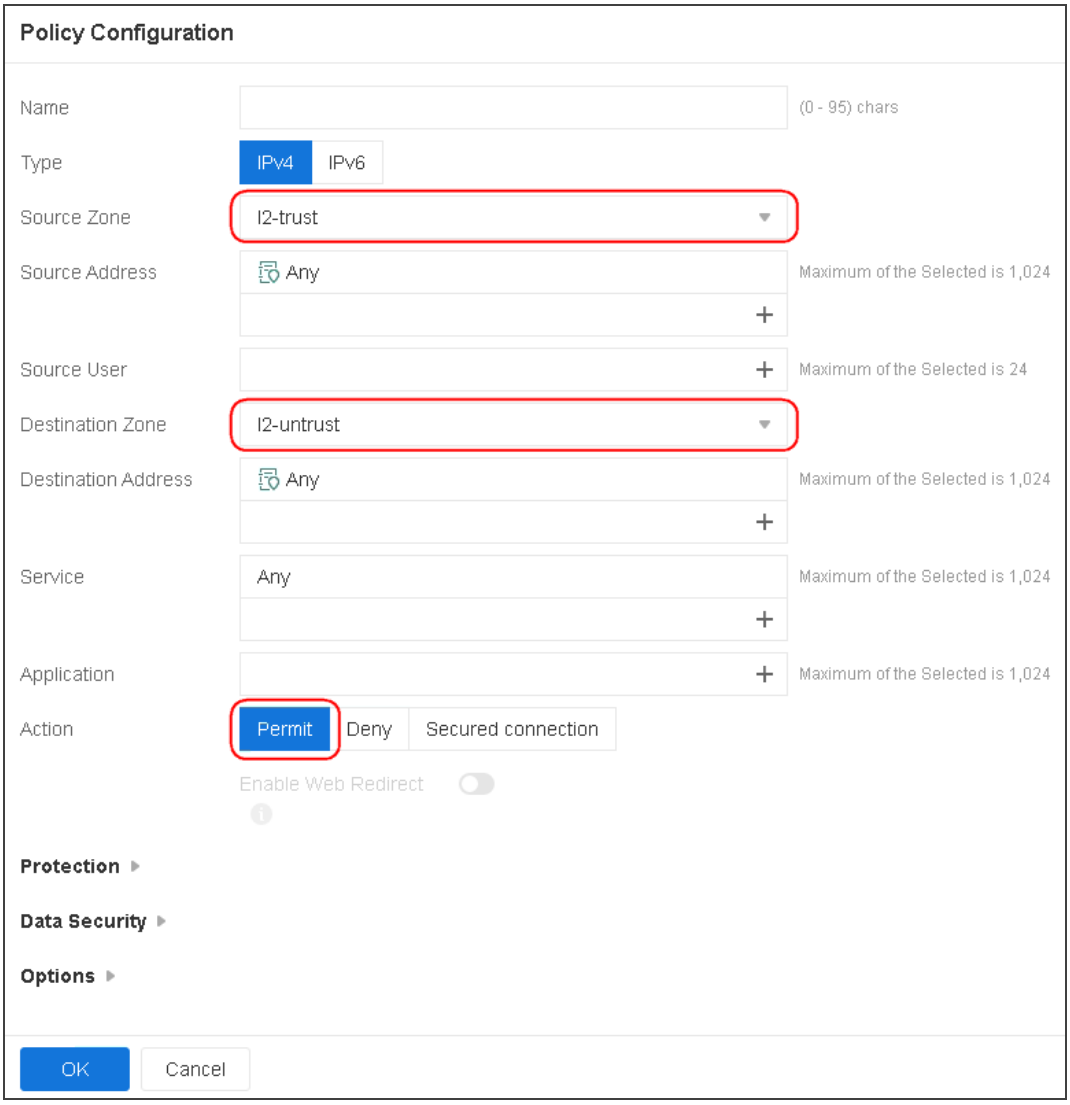
    3. Click **OK**.

Step 3: Configuring policies

- Create a policy to allow visiting the Internet.

1. Select **Policy > Security Policy>Policy**.

2. Click **New**,select Policy from the drop-down list.

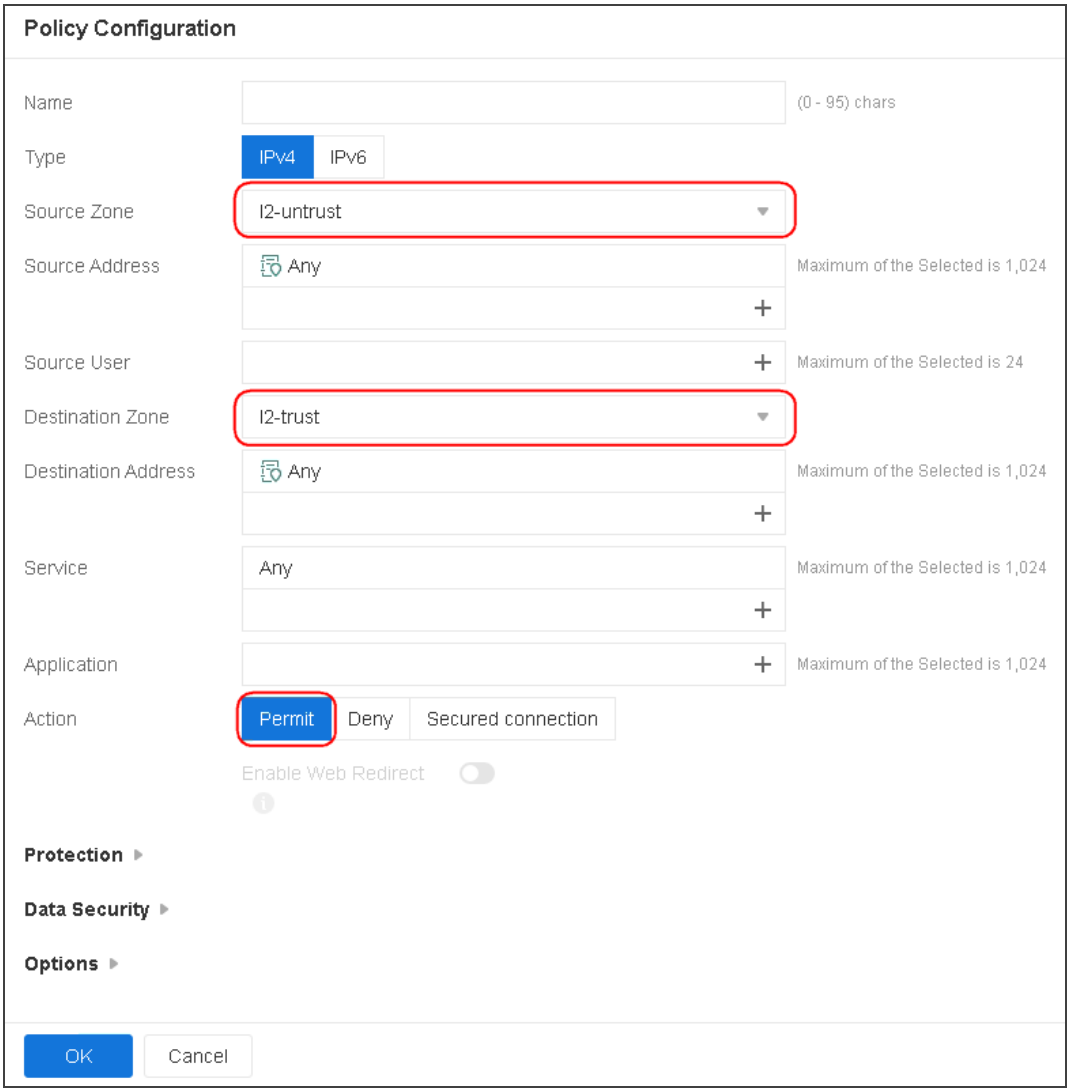


3. Click **OK**.

- Create a policy to allow the Internet to visit a private network.

    1. Select **Policy > Security Policy**.

    2. Click **New**.



    3. Click **OK**.

- The two policies above ensure communication between a private network and the Internet. If you want to set up more details, e.g. to limit P2P download, you can add more policies and

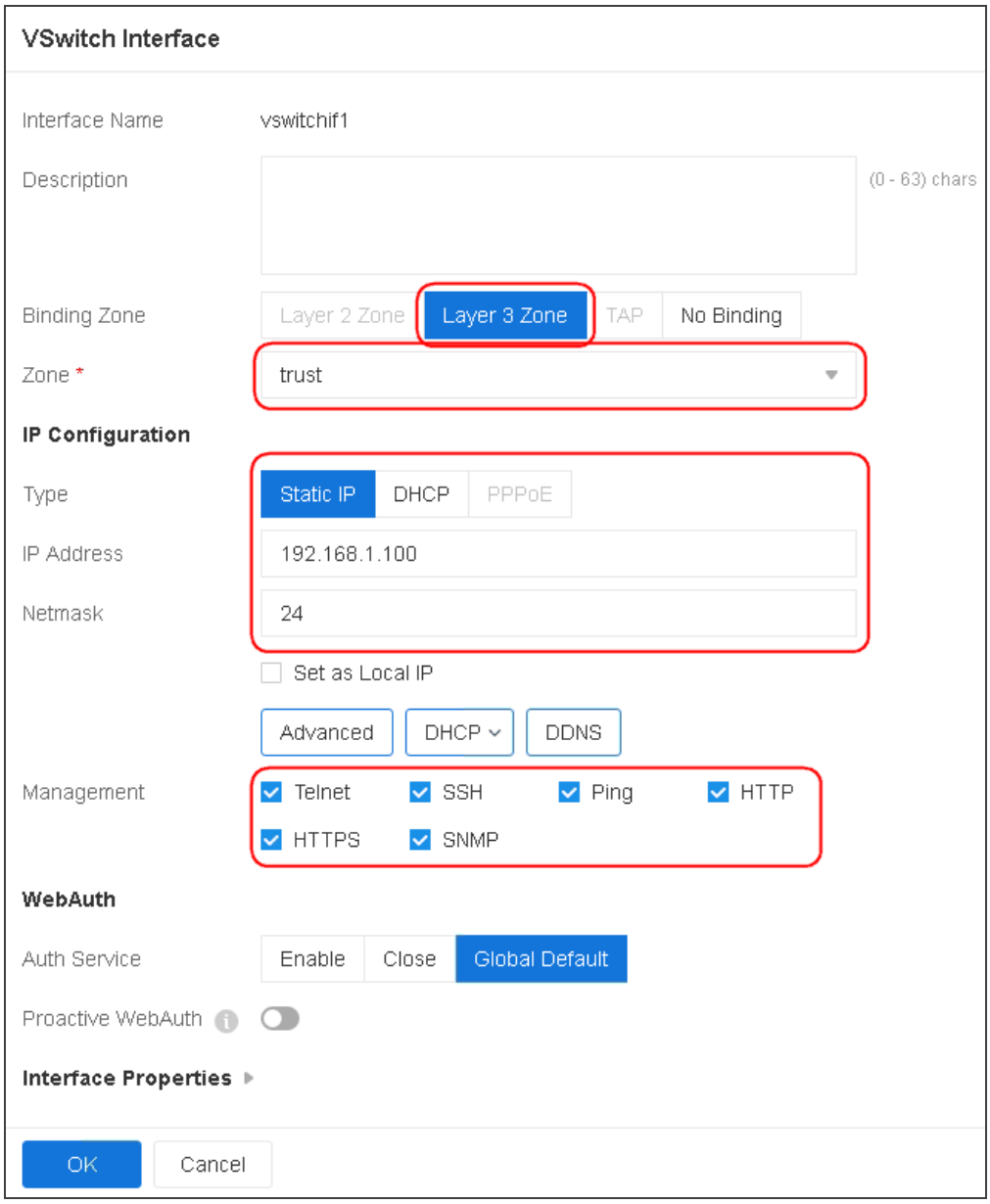
overlap the new policies with the old ones. The match sequence of policies is determined by their position in the policy list, not their ID numbers.

(Optional) Step 4: Configuring VSwitch Interface for managing the firewall.

If you want any PC in the private network to visit and configure the firewall, you can configure a VSwitch interface as a management interface.

1. Select **Network > Interface**.

2. Double click vswtichif1.



Notes: When configuring **IP Configuration**, set an IP address in the same subnet of the private network.

3. Click **OK**.

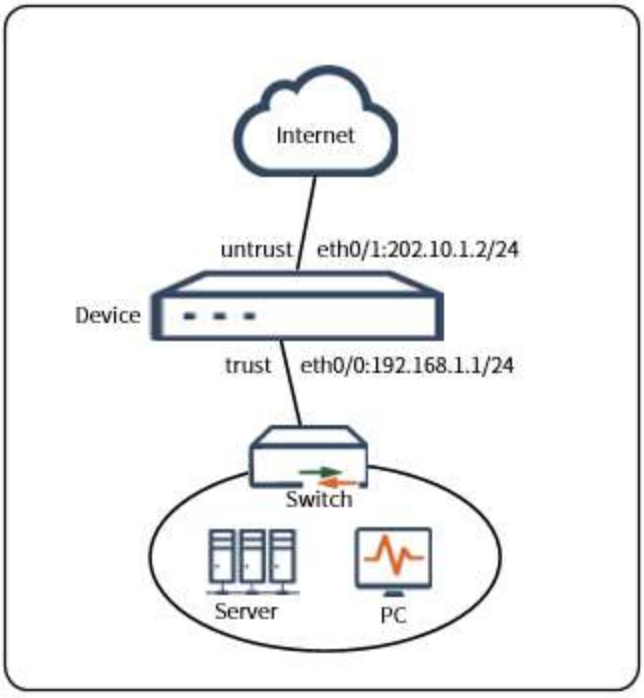
4. With any PC in the private network, enter the IP address of vswitchif1, and you will visit the firewall web user interface.

Deploying Routing Mode

Routing mode deployment often uses the NAT function, so it is also called NAT mode. In routing mode, each interface has its IP address which means interfaces are in the layer 3 zone. A firewall in routing mode can work as a router and a security devcie.

Routing mode is mostly used when the firewall is installed between an internal network and the Internet.

The example which is based on the below topology shows you how to connect and configure a new Hillstone device in routing mode. The device connects a private network to the Internet.



Step 1: Connecting to the device

1. Connect one port (e.g. eth0/1) of the Hillstone device to your ISP network. In this way, "eth0/1" is in the untrust zone.
2. Connect your internal network to another Ethernet interface (e.g. eth0/0) of the device. This means "eth0/0" is connected to the trust zone.

3. Power on the Hillstone device and your PCs.

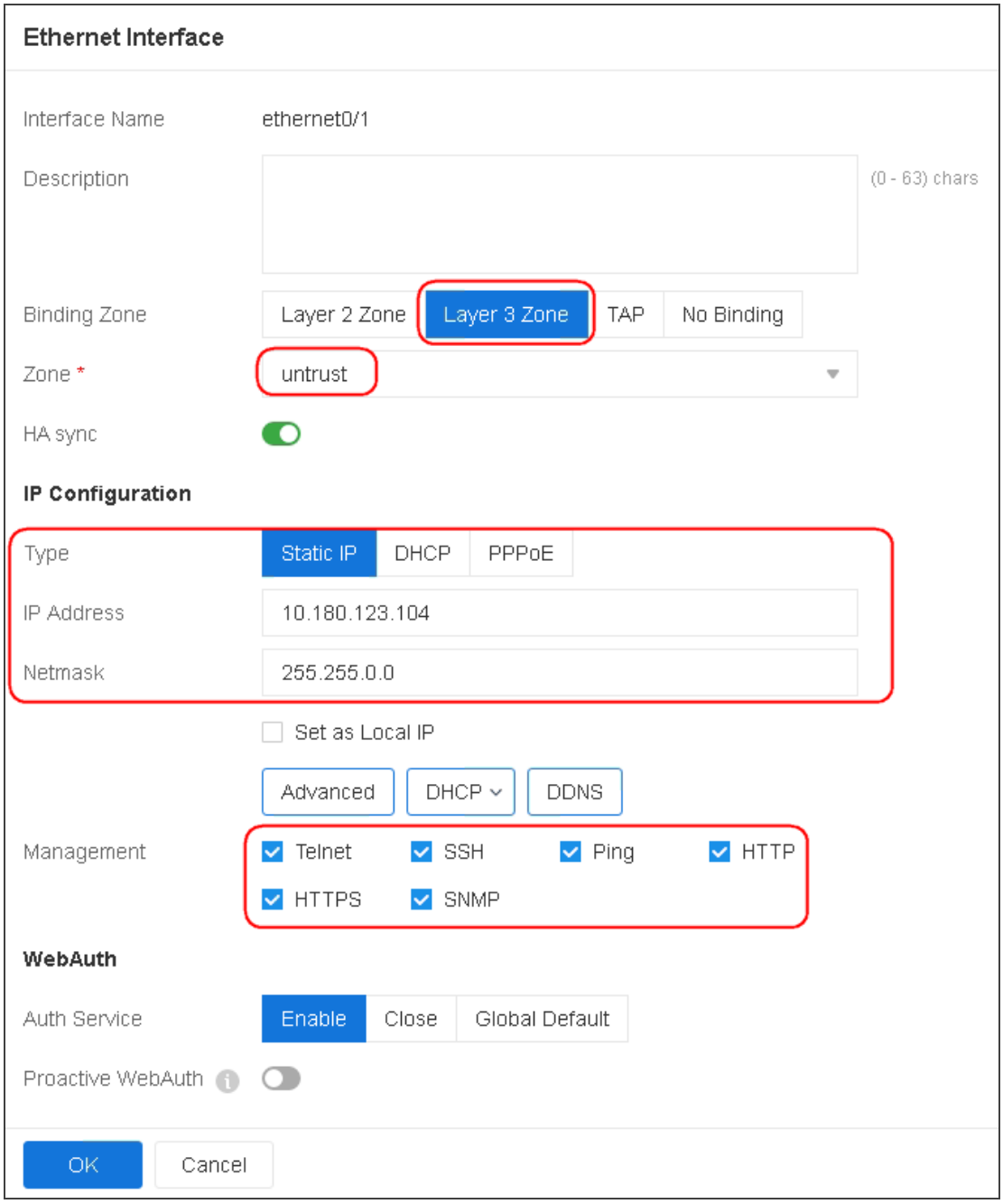
4. If one of the internal interfaces already has been configured with an IP address, use a browser to visit that address from one of your internal PCs.
   If it is a new device, use the methods in "Log in to WebUI" on Page 15 to visit.

5. Enter "hillstone" for both the username and the password.

Step 2: Configuring interfaces

1. Go to **Network > Interface**.

2. Double click **ethernet0/1**.



In the Ethernet Interface dialog box, enter values

Option	Value
Binding	L3-zone

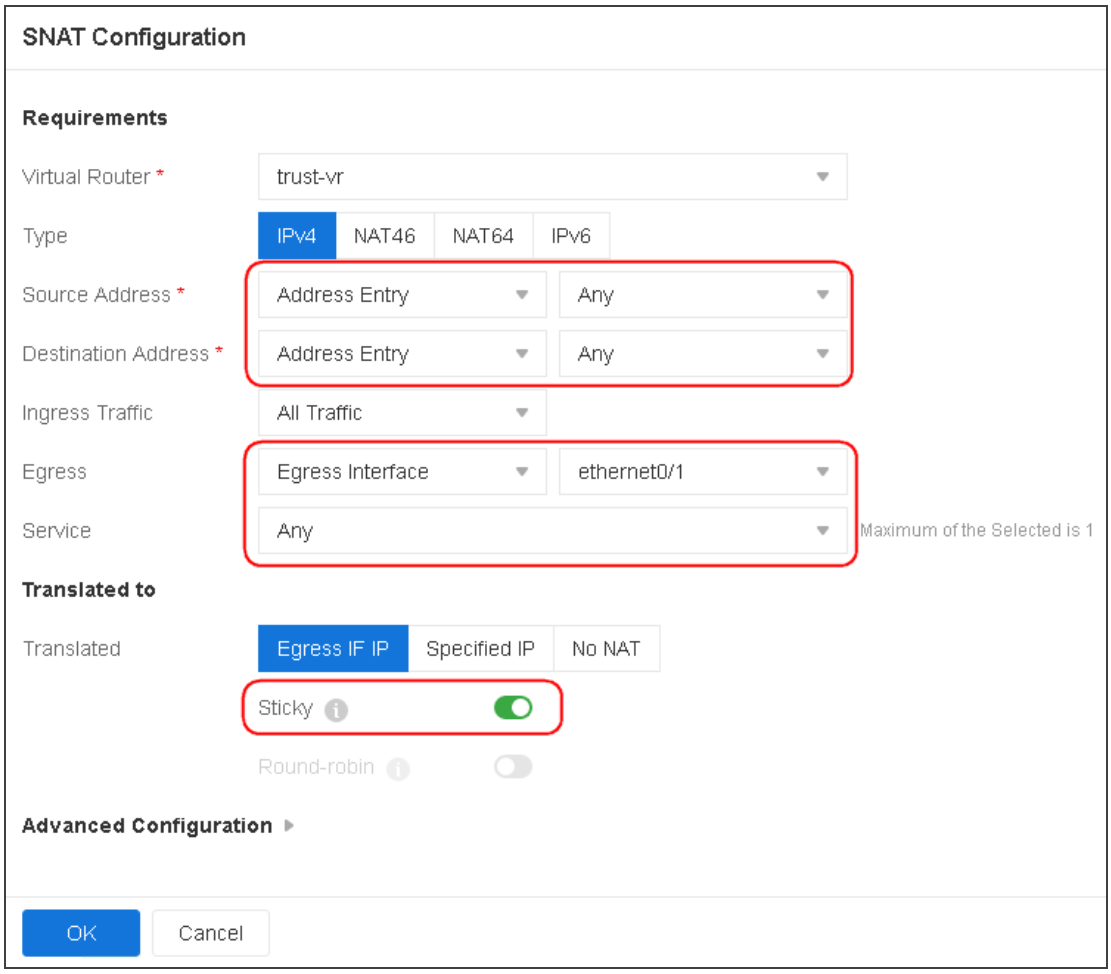
Option	Value
Zone	
Zone	untrust
Type	Static IP
IP Address	202.10.1.1 (public IP address provided by your ISP)
Netmask	255.255.255.0
Management	Select the protocols that you want to use to access the device.

3. Click **OK**.

Step 3: Creating a NAT rule to translate internal IP to public IP

1. Go to **Policy > NAT > SNAT**.

2. Select **New**



In the SNAT Configuration dialog box, enter values

Option	Value
Source Address	Address Entry, Any
Destination Address	Address Entry, Any

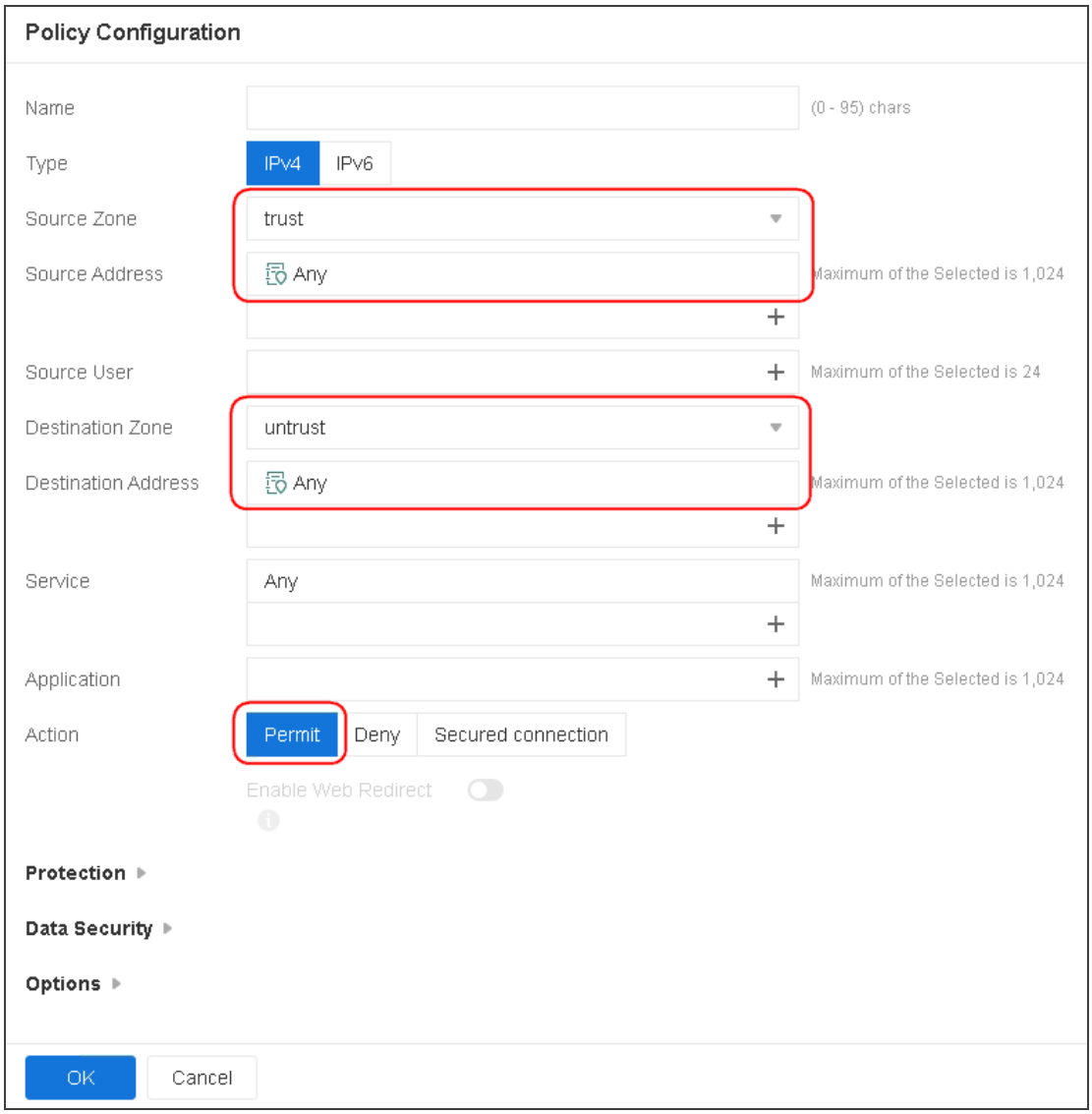
Option	Value
Egress	Egress interface, ethernet 0/1
Translated	Egress IP
Sticky	Enable

3. Click **OK**.

Step 4: Creating a security policy to allow internal users to access the Internet.

1. Go to **Policy > Security Policy>Policy**.

2. Click **New**,select **Policy** from the drop-down list.



In the Policy Configuration dialog box, enter values.

Source Information	
Zone	trust
Address	Any
Destination Information	

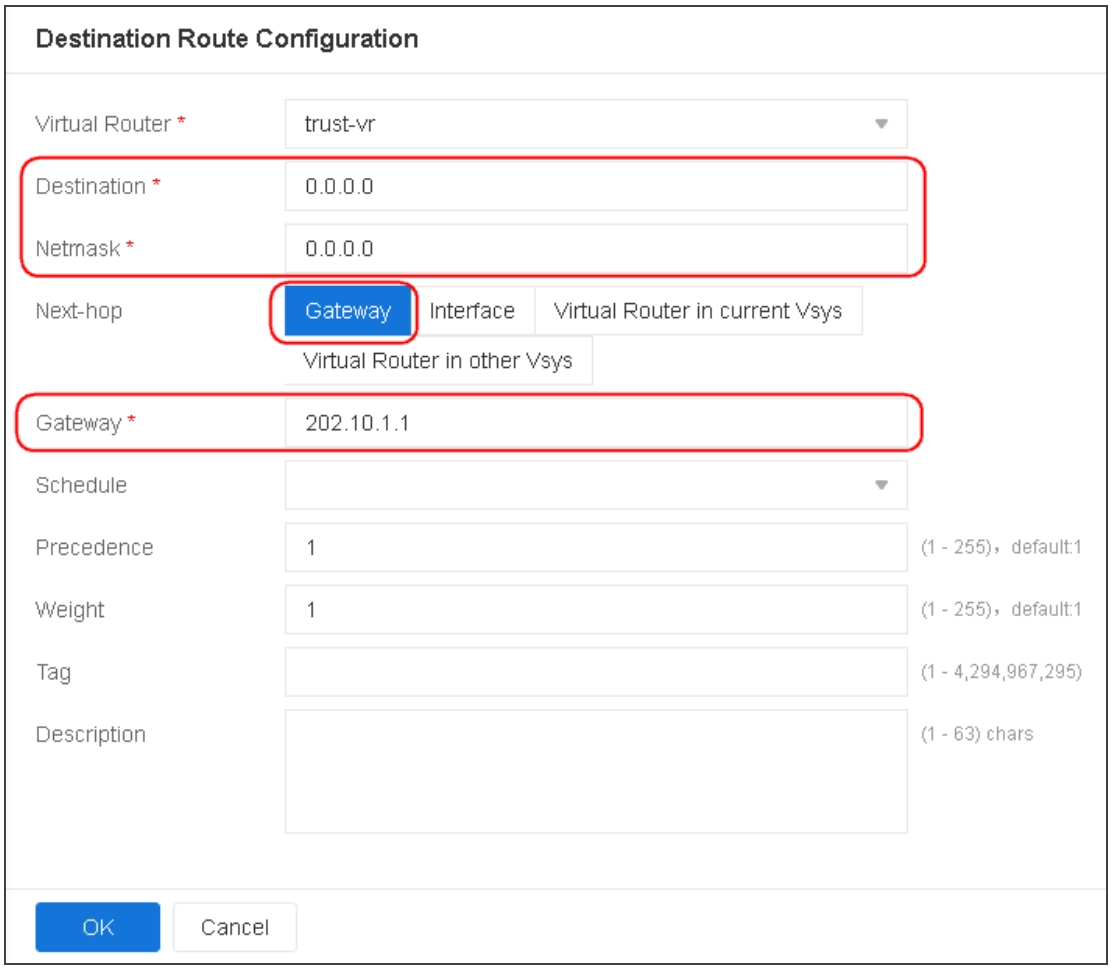
Zone	untrust
Address	Any
Other Information	
Service/Service Group	Any
APP/APP Group	-----
Action	Permit

3. Click OK.

Step 5: Configuring a default route

1. Go to **Network >Routing > Destination Route**.

2. Click **New**.

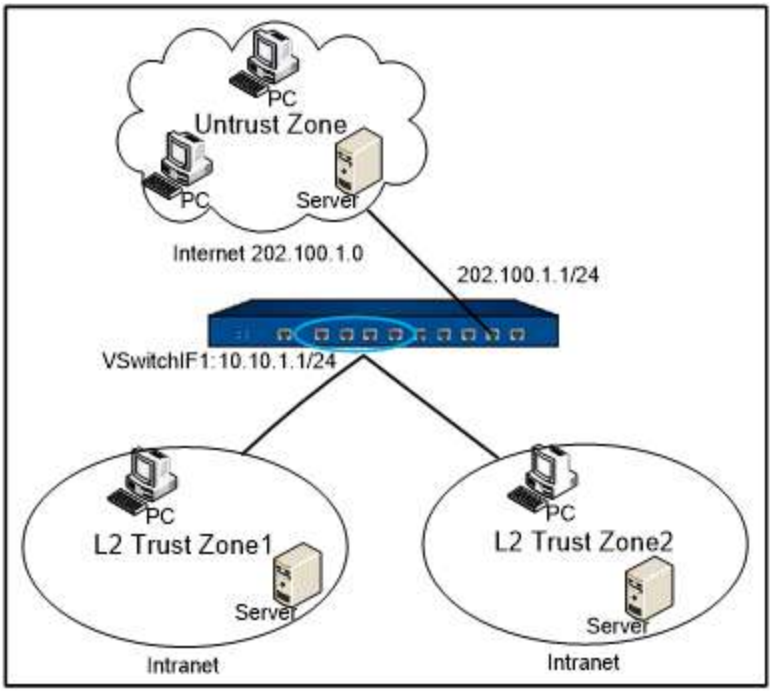


In the Destination Route Configuration dialog box, enter values.

Option	Value
Destination	0.0.0.0 (means all network)
Subnet Mask	0.0.0.0 (means all subnets)
Gateway	202.10.1.1 (gateway provided by your ISP)

Deploying Mix Mode

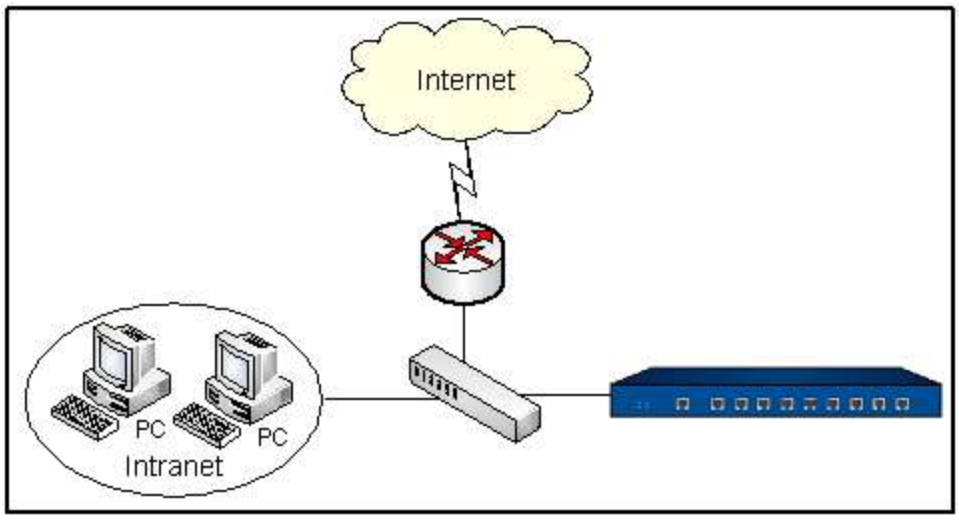
If the firewall has both L2 interfaces (transparent mode) and L3 interfaces (routing mode), the firewall is in mix mode.



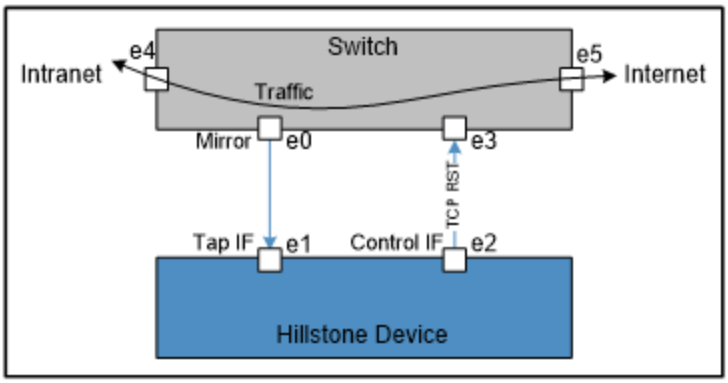
To configure a mix mode, you need to combine the routing mode of the deployment methods with the transparent mode. Please refer to these two modes.

Deploying Tap Mode

In most cases, the security device is deployed within the network as a serial node. However, in some other scenarios, an IT administrator would just want the auditing and statistical functions like IPS, antivirus, and Internet behavior control. For these features, you just need to connect the device to a mirrored interface of a core network. The traffic is mirrored to the security device for auditing and monitoring.



The bypass mode is created by binding a physical interface to a tap zone. Then, the interface becomes a bypass interface.



Use an Ethernet cable to connect e0 of the Switch with e1 of the Hillstone device. The interface e1 is the bypass interface and e2 is the bypass control interface. The interface e0 is the mirror interface of the switch.The switch mirrors the traffic to e1 and the Hillstone device will monitor,

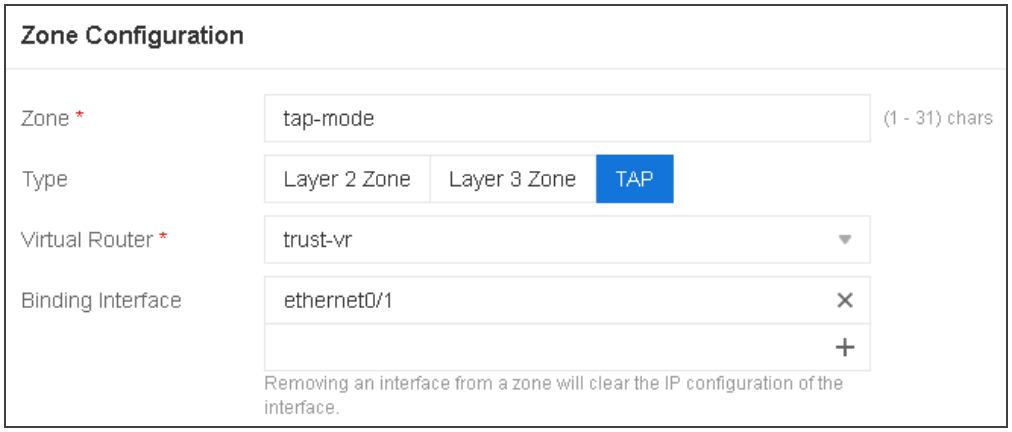
scan, and log the traffic received from e1. After configuring IPS, AV, or network behavior control on the Hillstone device, if the device detects network intrusions, viruses, or illegal network behaviors, it will send a TCP RST packet from e2 to the switch to tell it to reset the connections.

Notes: Before configuring tap mode in the device, you need to set up an interface mirroring your primary switch. Mirror the traffic of the switch from e0 to e1, and the device can scan, monitor and count the mirrored traffic.

Here provides an example of monitoring IPS in tap mode.

Step 1: Creating tap mode by binding an interface

1. Select **Network > Zone**, and click **New**.



Option	Value
Zone	enter a name, e.g. "tap-zone" .
Type	TAP
Binding Interface	Select the bypass interface (only a physical interface, aggregate interface or redundant interface can apply, sub-interface is not allowed).

2. Click **OK**.

Step 2: Creating an IPS rule

1. Select **Object > Intrusion Prevention System**.
2. Click **New**.
3. Enter the rule name.
4. Configure the signatures settings.
5. Configure the protocol settings.
6. Click **OK** to complete IPS rule configuration.

Step 3: Add IPS rule into Tap zone

1. Select **Network > Zone**, and double-click the tap zone created in step 1.
2. In the Treat Prevention tab, enable IPS and select the IPS rule created.

3. Click **OK**.

(Optional) Block traffic in switch

A bypass control interface is used to send control packets (TCP RST packet is supported in current version). After configuring IPS, AV, or network behavior control on the Hillstone device, if the device detects network intrusions, viruses, or illegal network behaviors, it will send a TCP RST packet from e2 to the switch to tell it to reset the connections.

By default, the bypass interface itself is the control interface. However, you may also change the control interface.

To change a bypass control interface, you can only use the command line interface:

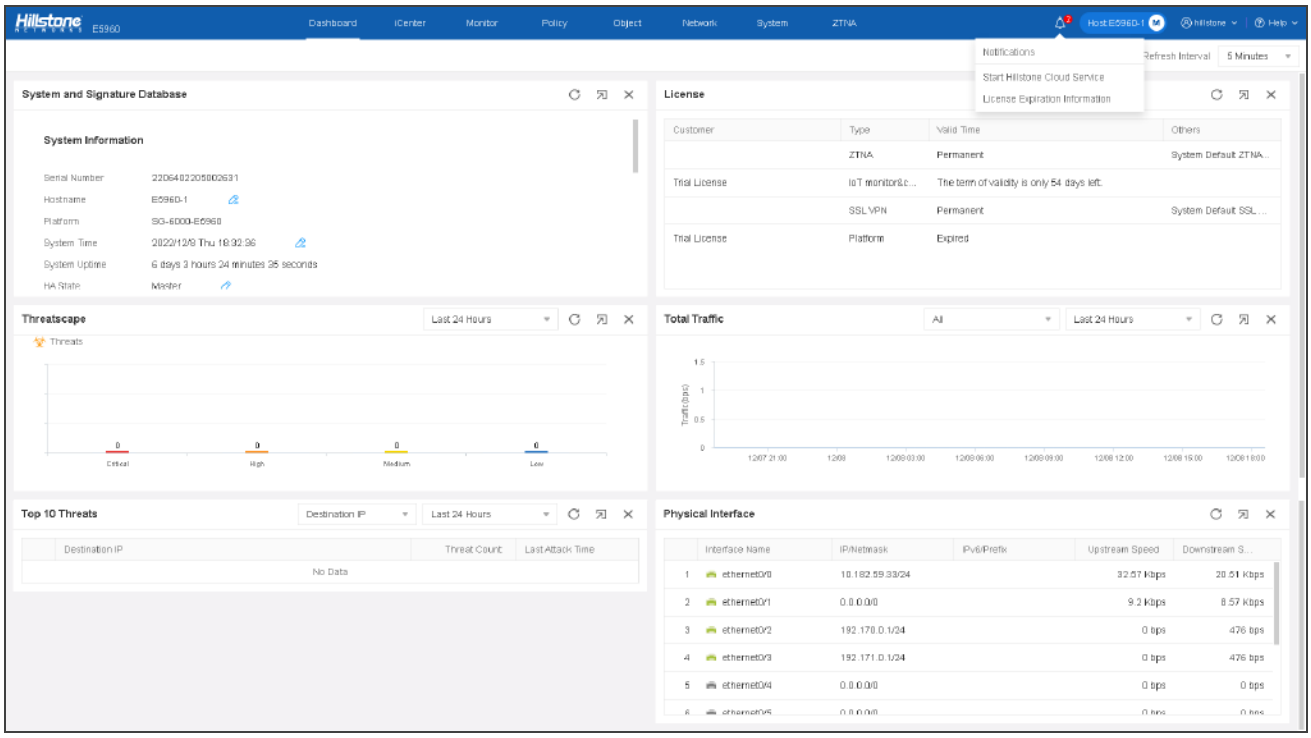
tap control-interface *interface-name*

- *interface-name* - Specifies which interface is used as the bypass control interface.

Chapter 3 Dashboard

This feature may vary slightly on different platforms. If there is a conflict between this guide and the actual page, the latter shall prevail.

The dashboard shows the system and threat information. The layout of the dashboard is shown below:



Customization

You can customize the dashboard display function or modify the function area location as needed.

- To customize the dashboard display function:

    1. Click **Customize** at the top-right corner.

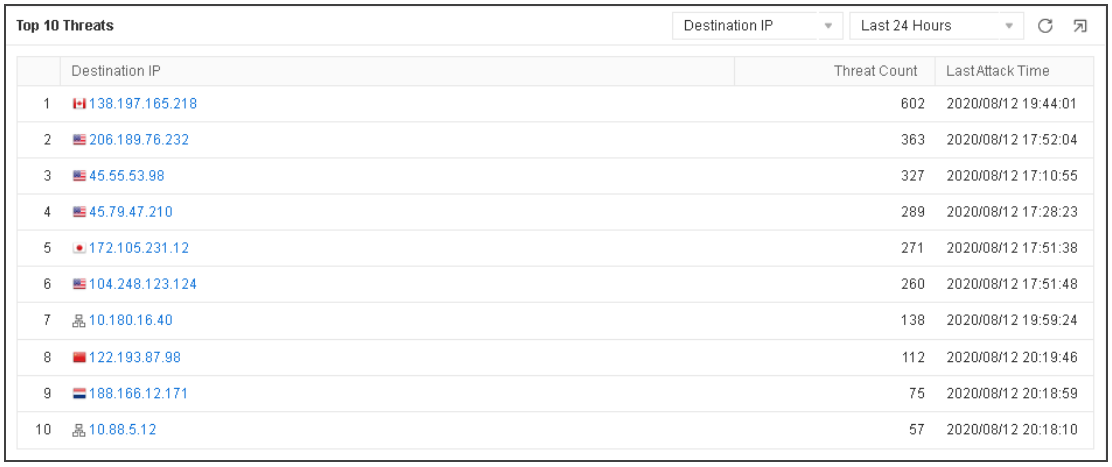
    2. Select the function check box from the expanded list.

- To modify the function area location:

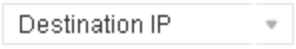
1. Hover your mouse over the title part in the ribbon.
2. When  appears, press and hold the mouse functional area , the regional location to be displayed .

Threats

Display the top 10 threats information within the specified period.

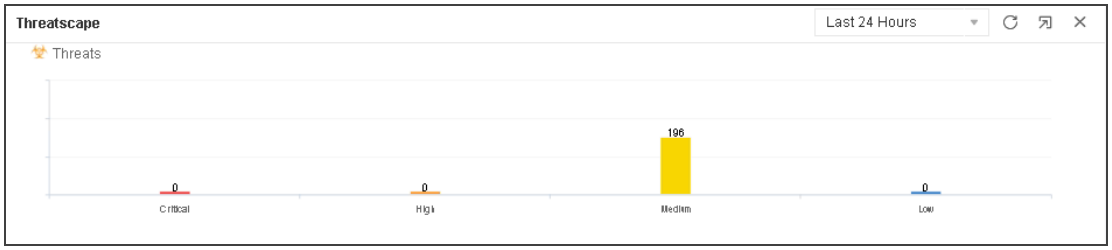


	Destination IP	Threat Count	Last Attack Time
1	138.197.165.218	602	2020/08/12 19:44:01
2	206.189.76.232	363	2020/08/12 17:52:04
3	45.55.53.98	327	2020/08/12 17:10:55
4	45.79.47.210	289	2020/08/12 17:28:23
5	172.105.231.12	271	2020/08/12 17:51:38
6	104.248.123.124	260	2020/08/12 17:51:48
7	10.180.16.40	138	2020/08/12 19:59:24
8	122.193.87.98	112	2020/08/12 20:19:46
9	188.166.12.171	75	2020/08/12 20:18:59
10	10.88.5.12	57	2020/08/12 20:18:10

- Click  to specify the type of display: Destination IP, Source IP or Threat Name.

Threatscape

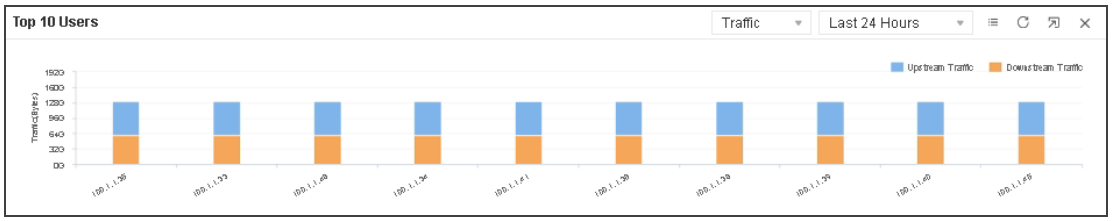
The threat information statistic chart is displayed within the specified period.



- Click the column to jump to the iCenter page, and the list will display the corresponding threat level.

User

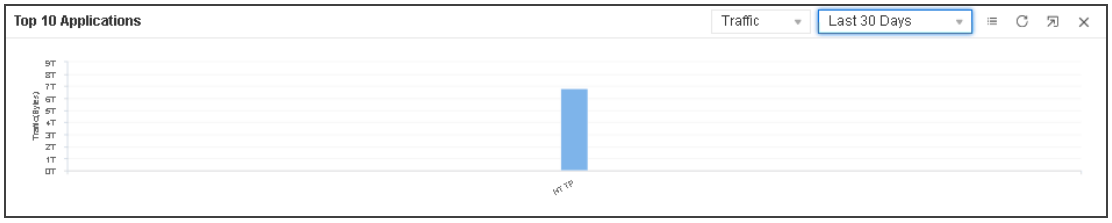
Display the top 10 user traffic information within the specified period.



- Specify the type of display: by Traffic or by Concurrent Sessions from the drop-down menu.
- Click and , switch between the table and the bar chart.
- Hover your mouse over a bar, to view users' upstream traffic, downstream traffic, total traffic or concurrent sessions.

Application

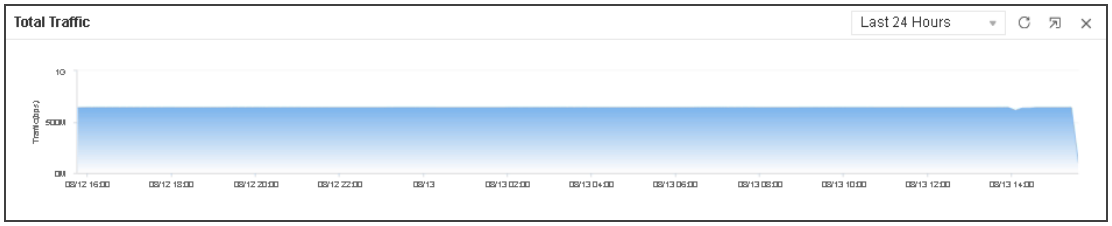
Display the top 10 application traffic information within the specified period.



- Specify the type of display: by Traffic or by concurrent sessions from the drop-down menu.
- Click and , switch between the table and the bar chart.
- Hover your mouse over a bar, to view users' total traffic or concurrent sessions.

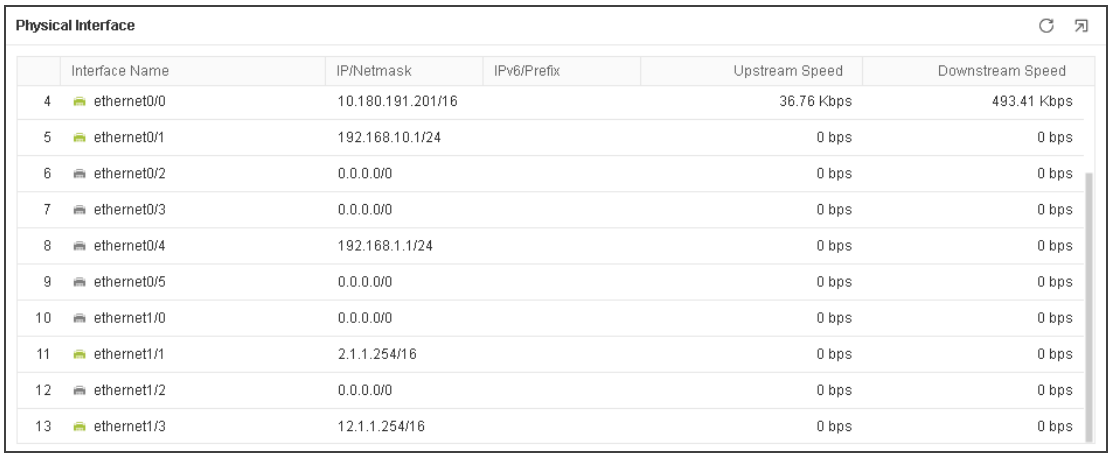
Total Traffic

Show the Total Traffic within the specified period .



Physical Interface

Display the statistical information of interfaces, including the interface name, IP address, upstream speed, downstream speed, and total speed.



	Interface Name	IP/Netmask	IPv6/Prefix	Upstream Speed	Downstream Speed
4	ethernet0/0	10.180.191.201/16		36.76 Kbps	493.41 Kbps
5	ethernet0/1	192.168.10.1/24		0 bps	0 bps
6	ethernet0/2	0.0.0.0/0		0 bps	0 bps
7	ethernet0/3	0.0.0.0/0		0 bps	0 bps
8	ethernet0/4	192.168.1.1/24		0 bps	0 bps
9	ethernet0/5	0.0.0.0/0		0 bps	0 bps
10	ethernet1/0	0.0.0.0/0		0 bps	0 bps
11	ethernet1/1	2.1.1.254/16		0 bps	0 bps
12	ethernet1/2	0.0.0.0/0		0 bps	0 bps
13	ethernet1/3	12.1.1.254/16		0 bps	0 bps

System and Signature Database

System Information

System information include.

- Serial number: The serial number of the device.
- Host name: The host name of the device.
- Platform: The platform type of the device.
- System Time: The time of system.
- System Uptime: The running time of system.

- HA State: The HA State of device:
  - Standalone: Non-HA mode which represents HA is disabled.
  - Init: Initial state.
  - Hello: Negotiation state which represents the device is negotiating the relationship between master and backup.
  - Master: Master state which represents current device is master.
  - Backup: Backup state which represents current device is backup.
  - Failed: Fault state which represents the device is failed.
  - Disabled: Disabled state which represents the interface is disabled. Only Peer Active-Active mode has this state.
- Firmware: The version number and version time of the firmware running on the device.
- Boot File: The version name of the current device boot file and the time when the file was compiled.

Signature DB Information

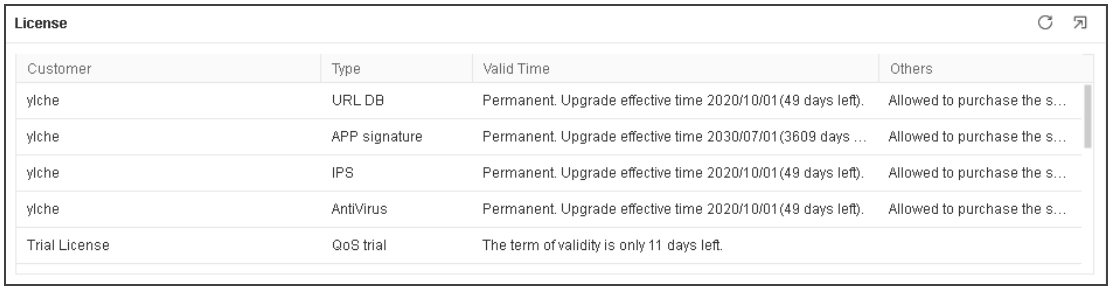
Signature database information include.

- Check Immediately: Click the **Check Immediately** to update and display the latest version number of the signature library.
  Note: The signature database license should been activated and the system already has a signature library version.
- Anti Virus Signature: The version number and time of the anti virus signature database.
- IPS Signature: The version number and time of the IPS signature database.

- Botnet Prevention Signature Database: The version number and time of the botnet prevention signature database.
- URL Category Database: The version number and time of the URL category database.
- Application Signature: The version number and time of the application signature database.
- Sandbox Whitelist Database: The version number and time of the sandbox whitelist database.
- IP Reputation Database: The version number and time of the IP reputation database.

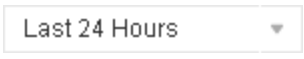
License

Display the detailed information of installed licenses.



- Customer: Displays the name of the customer who applied for the license.
- Type: Displays the type of license.
- Valid Time: Displays the valid time of license.
- Others: Displays additional notes for the license.

Specified Period

System supports the predefined time cycle and the custom time cycle. Click 

on the top right corner of each tab to set the time cycle.

- Realtime: Display the statistical information within 5 minutes of the current time.
- Last Hour: Display the statistical information within the latest 1 hour.
- Last Day: Display the statistical information within the latest 1 day.
- Last Month: Display the statistical information within the latest 1 month.
- Custom: Customize the time cycle. Select **Custom** and the **Custom Date and Time** dialog. Select the start time and the end time as needed.

In the top-right corner, you can set the refresh interface of the displayed data.

Notes: The specified period may vary slightly on different platforms and different statistical objects. Please see the actual page for the feature that your device delivers.

Chapter 4 iCenter

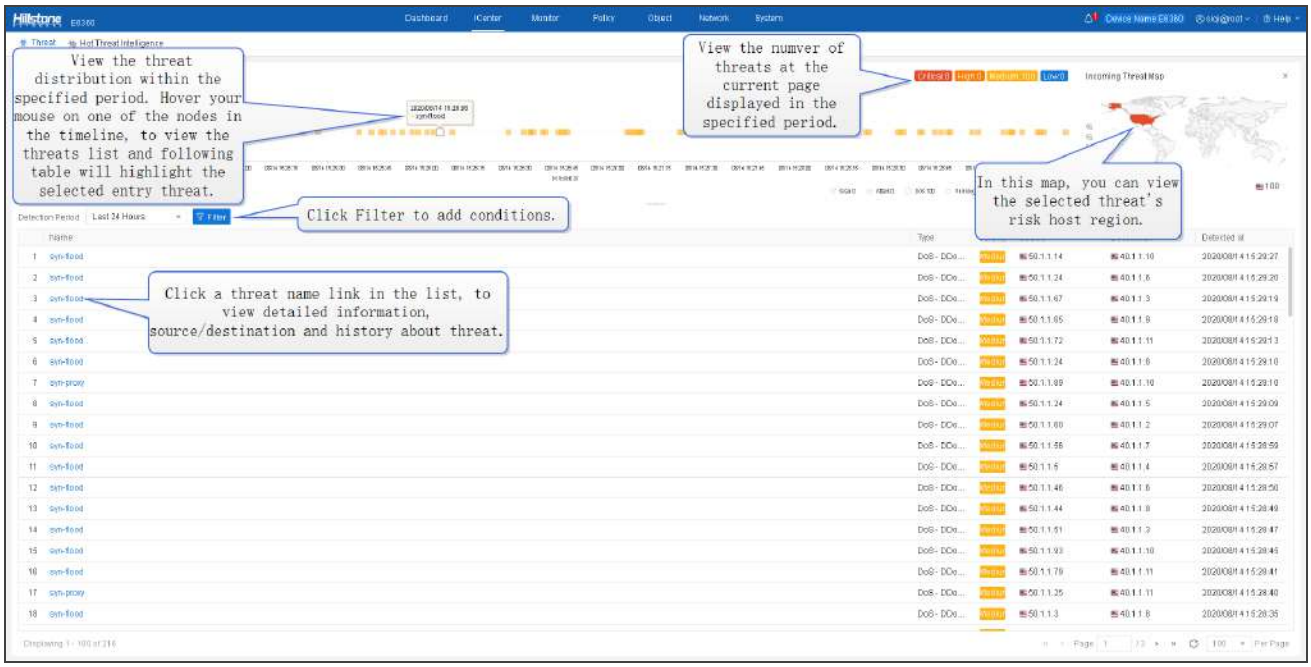
This feature may not be available on all platforms. Please check actual page in system to see whether your device delivers this feature.

The multi-dimensional features show threats to the whole network in depth. threats of the whole network.

If IPv6 function is enabled, you can view the threat information of IPv6 address through iCenter page.

Threat

Threats tab statistics and displays the all threats information of the whole network within the "Specified Period" on Page 156. Click **iCenter**.

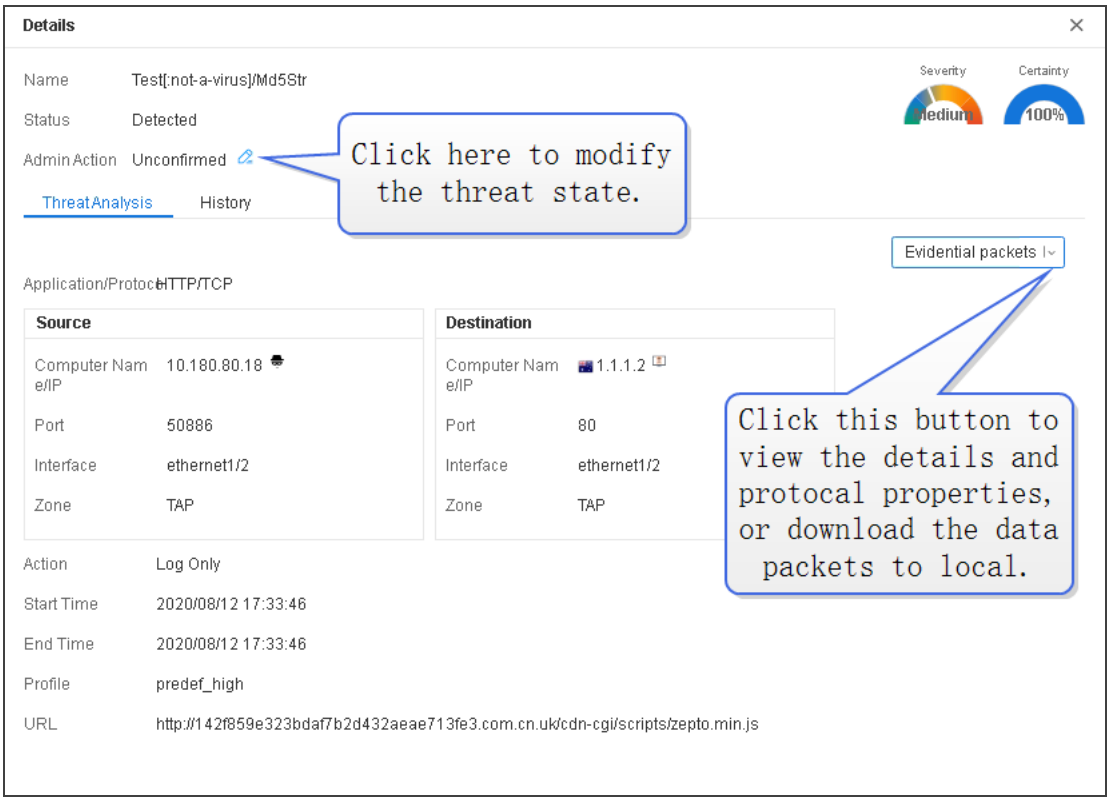


Click a threat name link in the list to view the detailed information , source/destination, knowledge base and history about the threat.

- Threat Analysis: Depending on the threats of the different detection engine , the content of

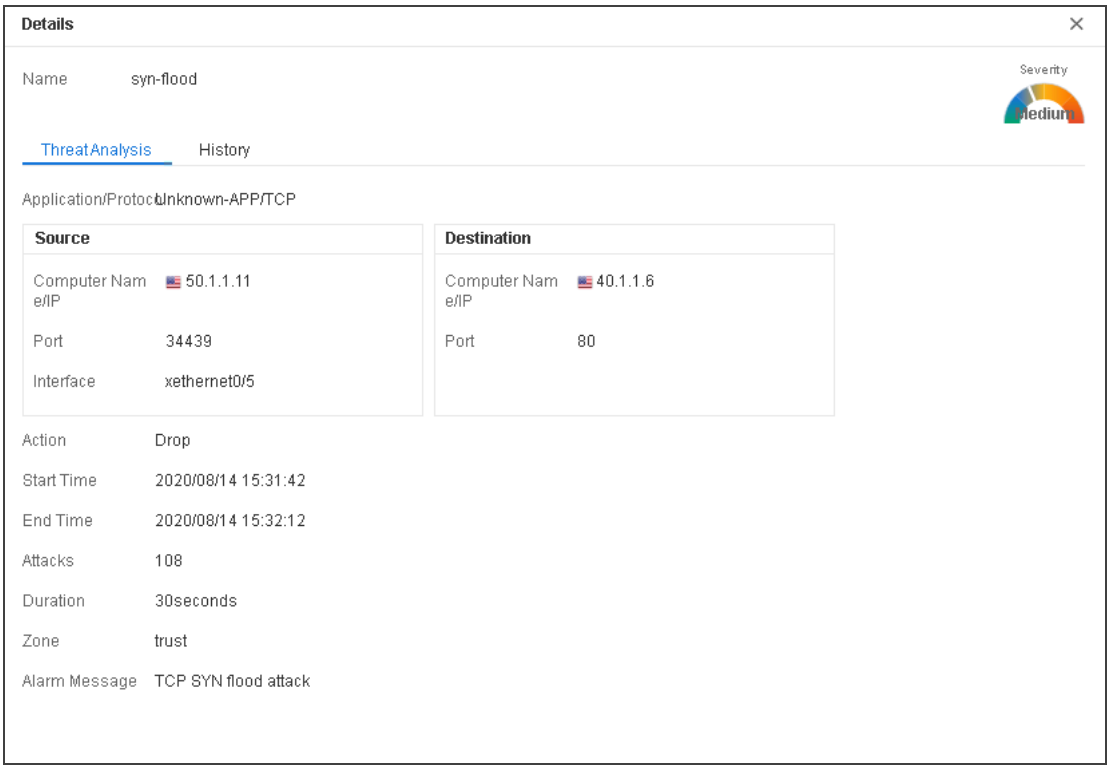
Threat Analysis tab is also different.

- **Anti Virus/IPS**: Display the detailed threat information .



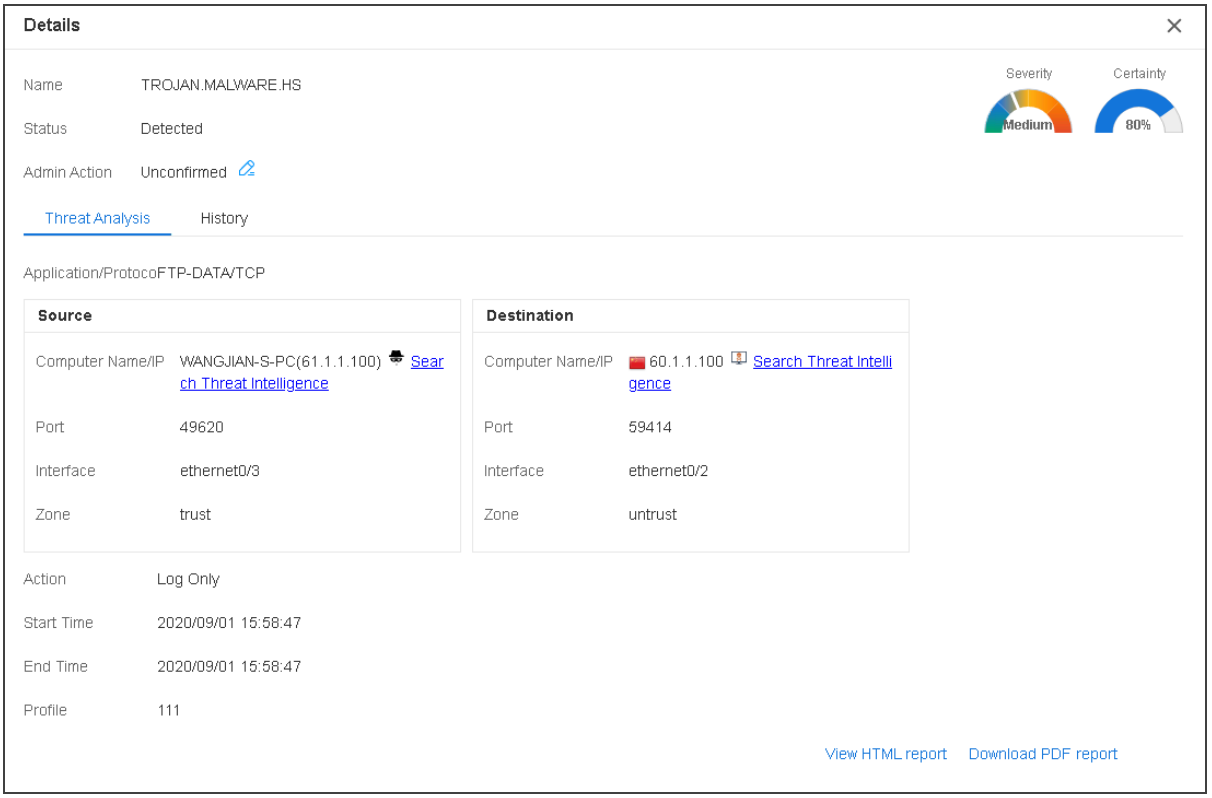
For the Anti Virus/IPS function introduction, see "Anti-Virus" on Page 1483/" Intrusion Prevention System" on Page 1495.

- **Attack Defense/Perimeter Traffic Filtering**: Display the threat detailed information.



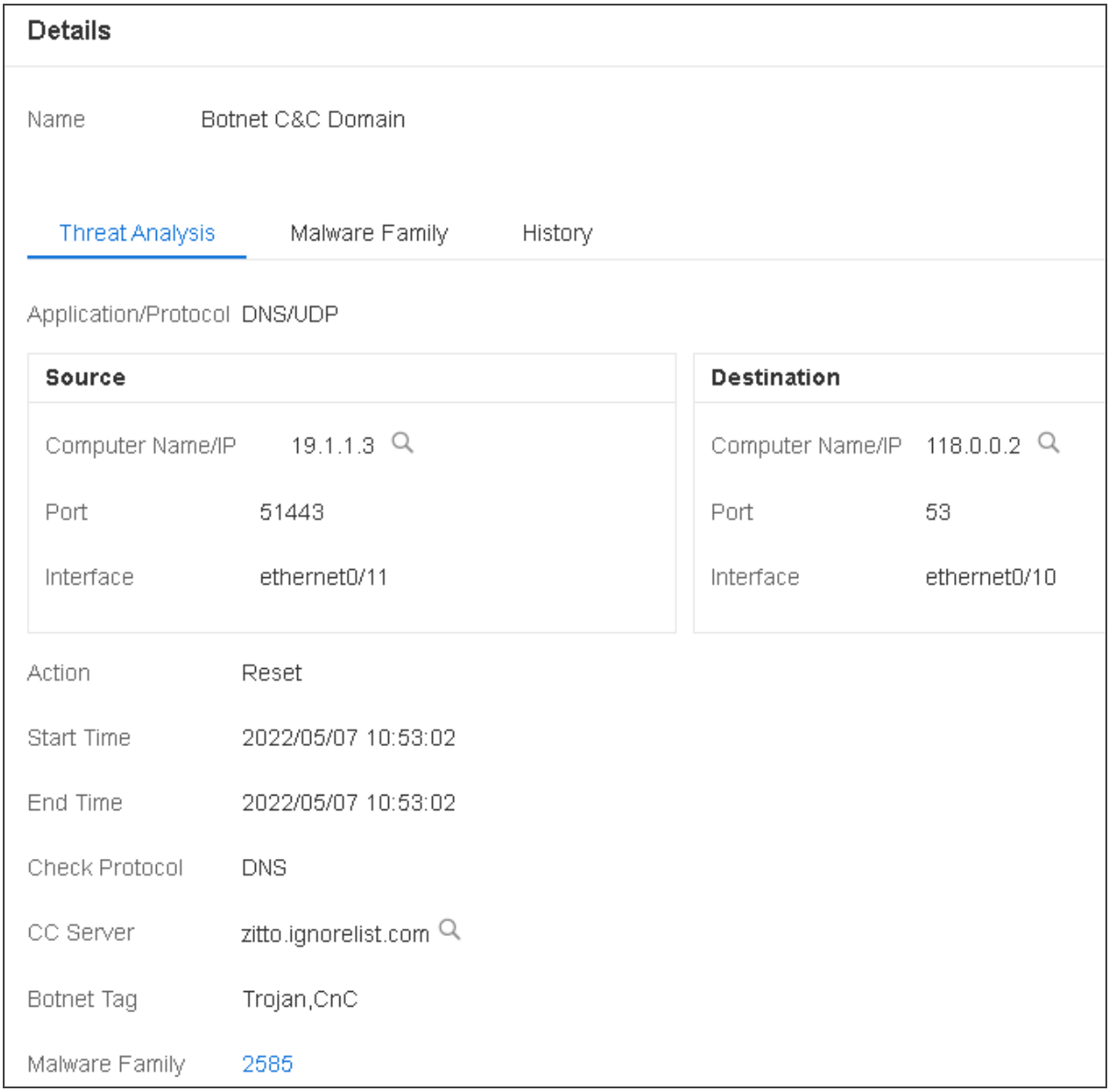
For the Attack Defense/Perimeter Traffic Filtering function introduction, see "Attack-Defense" on Page 1556/"Perimeter Traffic Filtering" on Page 1460.

- **Sandbox Threat Detection**: Display the detailed threat information of the suspicious file.



For the Sandbox function, see "Sandbox" on Page 1542.

- **Botnet Prevention**: Display the threat detailed information. If the threat is related to a malware family or APT group which is listed on the IOC blacklist, the system also displays the detailed information about the malware family or the APT group, including the Botnet tag.



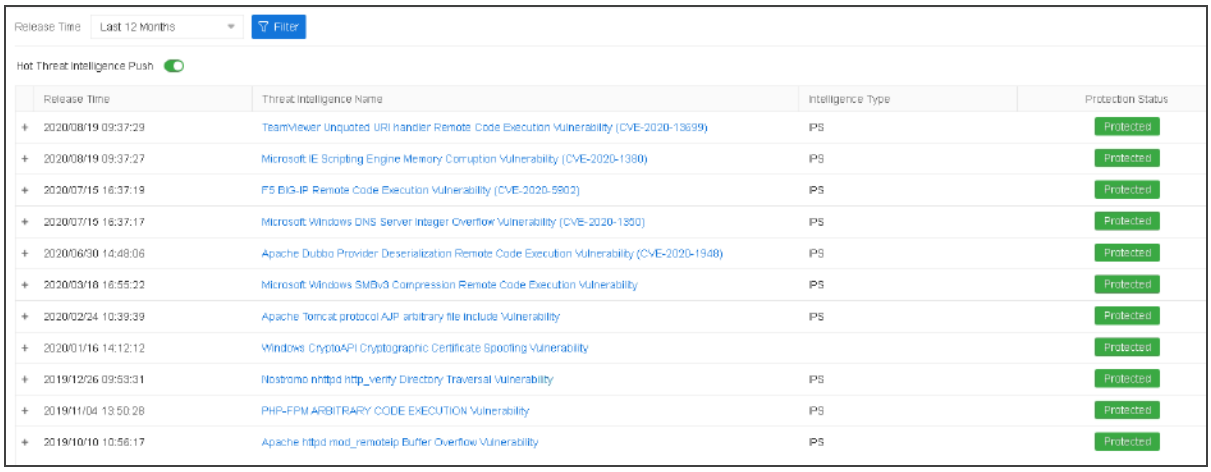
For the Botnet Prevention information, see "Botnet Prevention" on Page 1586.

- Knowledge Base: Display the specified threat description, solution, etc. of the threats detected by IPS .
- Threat History: Display the selected threat historical information of the whole network .

Hot Threat Intelligence

Hot threat intelligence page displays the intelligence of hot threats on the Internet, including IPS vulnerability, virus and threats detected by the cloud sandbox. You can view the details of the hot threats, or carry out protection operations to prevent them.

Click **iCenter> Hot Threat Intelligence** to enter the Hot Threat Intelligence page. By default, the threats intelligence list shows the information of the latest year, including the release time, name, type, protection status and operation.



- Select a time period from the **Release Time** drop-down list to filter the threat information of the specified time period. Click + Filter to add conditions to filter threat information as needed.
- Click the button after "Hot Threat Intelligence Push". If it's enabled, Hillstone Cloud server will push the latest hot threat intelligence to system , and once system gets threat intelligence from the Hillstone Cloud server, it will be notified in the form of pop-up window. Otherwise, Hillstone cloud platform will no longer push the latest hot threat intelligence. Meanwhile, the previously received threat intelligence can only be viewed, and relevant protective operations are not allowed.
- Select one threat intelligence item in the list and the corresponding threat details and protection logs will be displayed below the list.

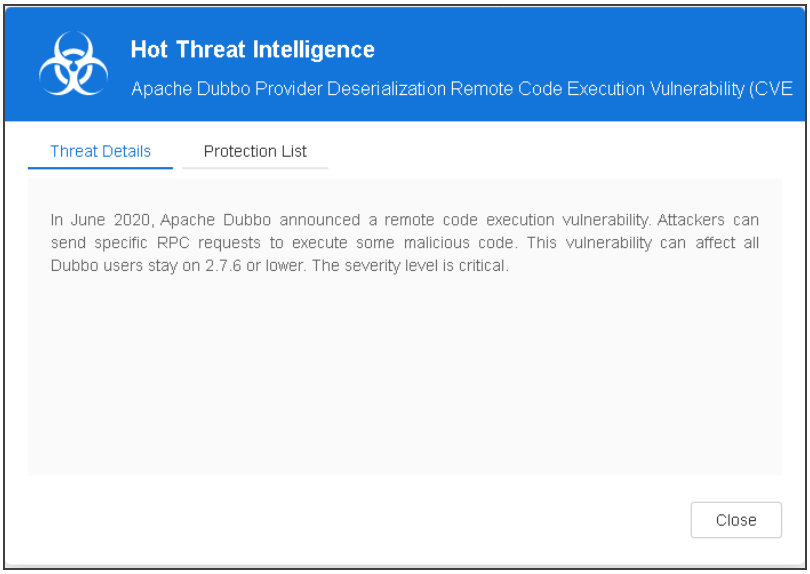
- **Threat Details**: You can view the detailed threat information, including the release time ,the name, signature ID, severity, details, solutions, affected systems and other information (the items may vary slightly for different types of threat).

Option	Description
Release Time	Displays the release time of threat intelligence.
Threat Intelligence Name	Displays the threat intelligence name.
Signature ID	Displays the corresponded signature ID of the IPS signature database of the threat intelligence.
Severity	Displays the severity of threat intelligence.
Details	Displays the details of threat intelligence.
Solution	Displays the solutions to the threat .
Affected Systems	Displays the name of operating system that the threat will affect.
CVE ID	Displays the CVE ID and link of the threat. Click the link address, and a new page will be opened, where you can view the CVE details.
Reference Information	Displays links of the reference information about the threat. Click the link address and a new page will be opened, where you can view details of the reference information.

- **Protection Log**: If system has been attacked by the threat described in the threat intelligence in the latest month, the protection logs will be displayed. If not, the protection log is empty.

- Click the threat intelligence name in the list or the corresponded operation ("Protect Now"

or "View Details") in the "Operation" column, and the < Hot Threat Intelligence > dialog box will pop up. You can view the information about the hot threat intelligence in the dialog.



- Click <Threat Summary> to view the information about the threat.
- For some threats in the "unprotected" status, you can see the corresponding protection solutions in the <Solution >tab. Click the links in sequence according to the steps in the solution, and configure the related functions. Only when you finish all the steps in one solutions (multiple solutions, at least one solution), the threat intelligence status will become "Protected".

  o For some threats in the "unprotected" status, the < Solutions> tab will not be displayed and you need to take the protective measures on other websites or servers, but system provides some solutions in the <Threats Details> tab. After the threat is protected, click **Confirm As Protected** button and the status of threat intelligence will be changed to "Protected".

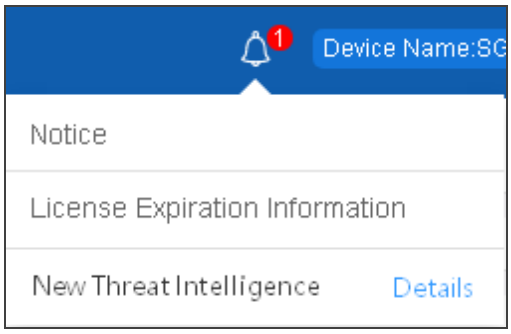
- For the threat in the "Protected" status, if it's protected by system, you can click < Protection List >to view the protective measures, and click "View Details" to view details of the protective measures.

Notes: Because the operation steps in the < Solution >tab are correlated, please follow the steps of the solution in turn. For example, if the signature database has not been upgraded, the signature ID will not be shown, and subsequent protections may be unavailable. Or after the signature database is upgraded, the subsequent steps may change or some of the subsequent steps may be omitted.

Viewing Hot Threat Intelligence

System will obtain and download the latest threat intelligence information from the Hillstone cloud server at the set time every day or when you log in to system, and the information will be upgraded in the hot threat intelligence list.

When you enable the "Hot Threat Hot Threat Intelligence Push" function, once system gets a new intelligence, the notice of New Threat Intelligence will display in the upper right corner of the page. Hover the mouse over the notification, click "details", and the page will jump to the hot threat intelligence page. On the **iCenter> Hot Threat Intelligence** page, the new threat intelligence will be displayed in the form of pop-up windows for users to view.



Chapter 5 Network

This chapter describes factors and configurations related to network connection, including:

- Security Zone: The security zone divides the network into different section, such as the trust zone and the untrust zone. The device can control the traffic flow from and to security zones once the configured policy rules have been applied.
- Interface: The interface allows inbound and outbound traffic flow to security zones. An interface must be bound to a security zone so that traffic can flow into and from the security zone.
- MGT Interface: To facilitate the management of the device and meet the requirement of separating the management traffic from the data traffic, system has an independent management interface(MGT Interface).
- VLAN: Virtual LAN.
- DNS: Domain Name System.
- DHCP: Dynamic Host Configuration Protocol.
- DDNS: Dynamic Domain Name Server.
- PPPoE: Point-to-Point Protocol over Ethernet.
- Virtual-Wire: The virtual wire allows direct Layer 2 communications between sub networks.
- Virtual Router: Virtual Routerouter (Virtual Router for short) acts as a router. Different Virtual Routers have their own independent routing tables.
- Virtual Switch: Running on Layer 2, VSwitch acts as a switch. Once a Layer 2 security zone is bound to a VSwitch, all the interfaces bound to that zone will also be bound to the VSwitch.

- Port Mirroring: Allow users to mirror the traffic of one interface to another interface (analytic interface) for analysis and monitoring.
- WLAN: WLAN represents the local area network that uses the wireless channel as the medial. By configuring the WLAN function, you can establish the wireless local area network and allow the users to access LAN through wireless mode.
- 3G/4G: By configuring the 3G/4G function, users can access the Internet through the wireless mode.
- Link Load Balancing: It takes advantage of dynamic link detection technique to assign traffic to different links appropriately, thus making full use of all available link resources.
- Application Layer Gate: ALG can assure the data transmission for the applications that use multiple channels and assure the proper operation of VoIP applications in the strictest NAT mode.
- Global Network Parameters: These parameters mainly include the IP packet's processing options, like IP fragmentation, TCP MSS value, etc.

Security Zone

Security zone is a logical entity. One or more interfaces can be bound to one zone. A zone applied with a policy is known as a security zone, while a zone created for a specific function is known as a functional zone. Zones have the following features:

- An interface should be bound to a zone. A Layer 2 zone will be bound to a VSwitch, while a Layer 3 zone will be bound to a VRouter. Therefore, the VSwitch to which a Layer 2 zone is bound decides which VSwitch the interfaces belong to in that Layer 2 zone, and the VRouter to which a Layer 3 zone is bound decides which VRouter the interfaces belong to in that Layer 3 zone.
- Interfaces in Layer 2 and Layer 3 are working in Layer 2 mode and Layer 3 mode respectively.
- System supports internal zone policies, like trust-to-trust policy rule.

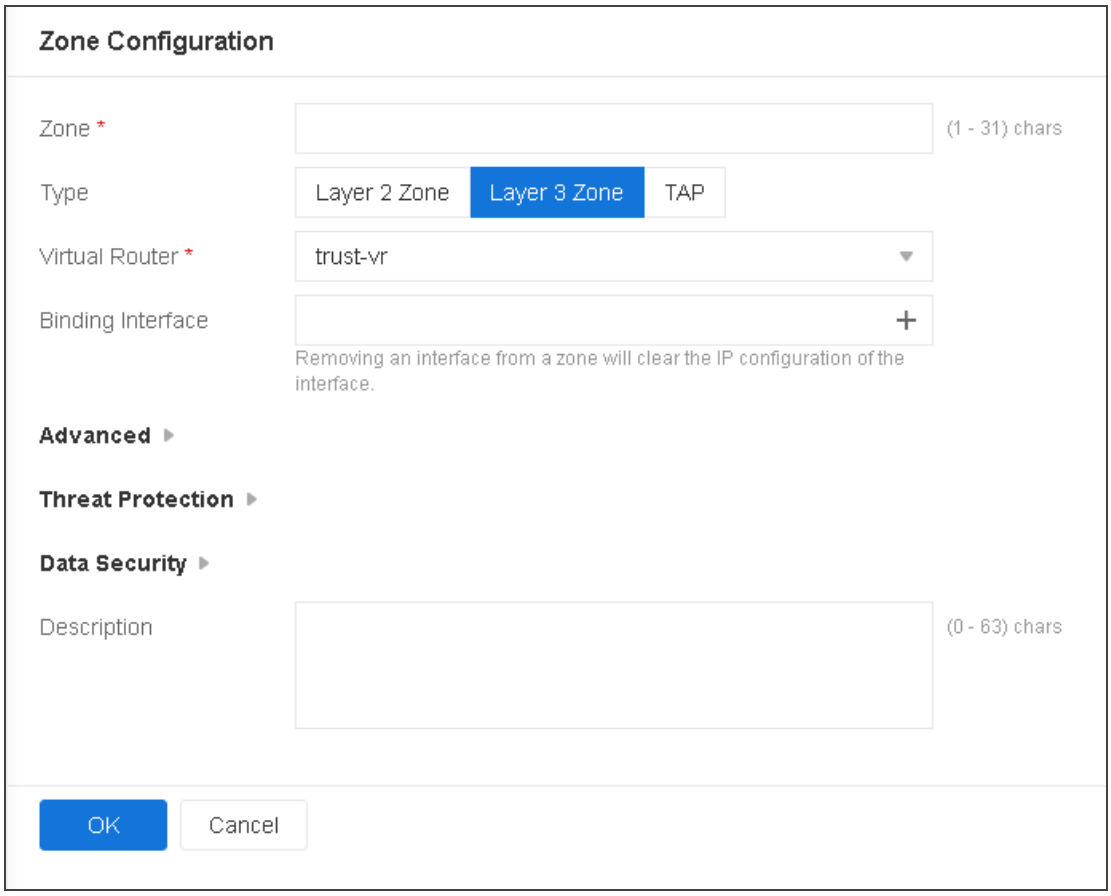
There are 8 pre-defined security zones in StoneOS, which are trust, untrust, dmz, L2-trust, L2-untrust, L2-dmz, vpnhub (VPN functional zone) and ha (HA functional zone). You can also customize security zones. Pre-defined security zones and user-defined security zones have no difference in functions, so you can make your choice freely.

Configuring a Security Zone

To create a security zone, take the following steps:

1. Select **Network > Zone**.

2. Click **New**.



3. In the Zone Configuration text box, type the name of the zone into the Zone box.

4. Type the descriptions of the zone in the Description text box.

5. Specify a type for the security zone. For a Layer 2 zone, select a VSwitch for the zone from the VSwitch drop-down list below; for a Layer-3 zone, select a VRouter from the Virtual Router drop-down list. If TAP is selected, the zone created is a tap zone, which is used in Bypass mode.

6. Bind interfaces to the zone. Select an interface from the Binding Interface drop-down list.

7. If needed, select the **Enable** button to enable APP identification for the zone.

8. If needed, select the **Enable** button to set the zone to a WAN zone, assuring the accuracy of the statistic analysis sets that are based on IP data.

9. If needed, select the **Enable** button to enable NetBIOS host query for the zone. For detailed instructions, see "DNS" on Page 288.

10. If needed, select Threat Protection tab and configure the parameters for Threat Protection function. For detailed instructions, see "Chapter 12 Threat Prevention" on Page 1480.

11. If needed, select Data Security tab and configure the parameters for Data Security function. For detailed instructions, see "Data Security" on Page 1204.

12. If needed, select End Point Prevention tab and configure the parameters for End Point Prevention function. For detailed instructions, see "End Point Protection" on Page 1262.

13. If needed, select IoT Monitor tab and configure the parameters for IoT Monitor function. For detailed instructions, see "IoT Policy" on Page 1275.

14. Click **OK**.

Notes:

- Pre-defined zones cannot be deleted.
- When changing the VSwitch to which a zone belong, make sure there is no binding interface in the zone.
- The interface bound to the Tap zone only monitor the traffic but does not forward the traffic, but when the device enters the Bypass state (such as system restart, abnormal operation, and device power off), the Bypass interface pair will be physically connected, and then the traffic will be forwarded to each

other. If you want to avoid this situation, try to avoid setting the pair of Bypass interfaces as the tap zone.

Interface

Interfaces allow inbound and outbound traffic to flow to security zones. An interface must be bound to a security zone so that traffic can flow into and from the security zone. Furthermore, for the Layer 3 security zone, an IP address should be configured for the interface, and the corresponding policy rules should also be configured to allow traffic transmission between different security zones. Multiple interfaces can be bound to one security zone, but one interface cannot be bound to multiple security zones.

The security devices support various types of interfaces which are basically divided into physical and logical interfaces based on the nature.

- Physical Interface: Each Ethernet interface on devices represents a physical interface. The name of a physical interface, consisting of media type, slot number and location parameter, is pre-defined, like ethernet2/1 or ethernet0/2.
- Logical Interface: Include sub-interface, VSwitch interface, VLAN interface, loopback interface, tunnel interface, aggregate interface, redundant interface, PPPoE interface and Virtual Forward interface.

Interfaces can also be divided into Layer 2 interface and Layer 3 interface based on their security zones.

- Layer 2 Interface: Any interface in Layer 2 zone or VLAN.
- Layer 3 Interface: Any interface in Layer 3 zone. Only Layer 3 interfaces can operate in NAT/routing mode.

Different types of interfaces provide different functions, as described in the table below.

Type	Description
Sub-interface	The name of an sub-interface is an extension to the name of its original interface, like ethernet0/2.1. System supports the following types of sub-interfaces: Ethernet sub-interface, aggreg-

Type	Description
	ate sub-interface and redundant sub-interface. An interface and its sub-interfaces can be bound to one single security zone, or to different zones.
VSwitch interface	A Layer 3 interface that represents the collection of all the interfaces of a VSwitch. The VSwtich interface is virtually the upstream interface of a switch that implements packet forwarding between Layer 2 and Layer 3.
VLAN interface	A Layer 3 interface that represents the collection of all the Ethernet interfaces within a VLAN. If only one Ethernet interface is in UP state, the VLAN interface will be UP as well. The VLAN interface is the outbound communication interface for all the devices within a VLAN. Typically its IP address is the gateway's address of the network device within the VLAN.
Loopback interface	A logical interface. If only the security device with loopback interface configured is in the working state, the interface will be in the working state as well. Therefore, the loopback interface is featured with stability.
Tunnel interface	Only a Layer 3 interface, the tunnel interface acts as an ingress for VPN communications. Traffic flows into VPN tunnel through this interface.
Aggregate interface	Collection of physical interfaces that include 1 to 16 physical interfaces. These interfaces averagely share the traffic load to the IP address of the aggregate interface, in an attempt to increase the available bandwidth for a single IP address. If one of the physical interfaces within an aggregate interface fails,

Type	Description
	other physical interfaces can still process the traffic normally. The only effect is the available bandwidth will decrease.
Redundant interface	The redundant interface allows backup between two physical interfaces. One physical interface, acting as the primary interface, processes the inbound traffic, and another interface, acting as the alternative interface, will take over the processing if the primary interface fails.
PPPoE interface	A logical interface based on Ethernet interface that allows connection to PPPoE servers over PPPoE protocol.
Virtual Forward interface	In HA environment, the Virtual Forward interface is HA group's interface designed for traffic transmission.

Configuring an Interface

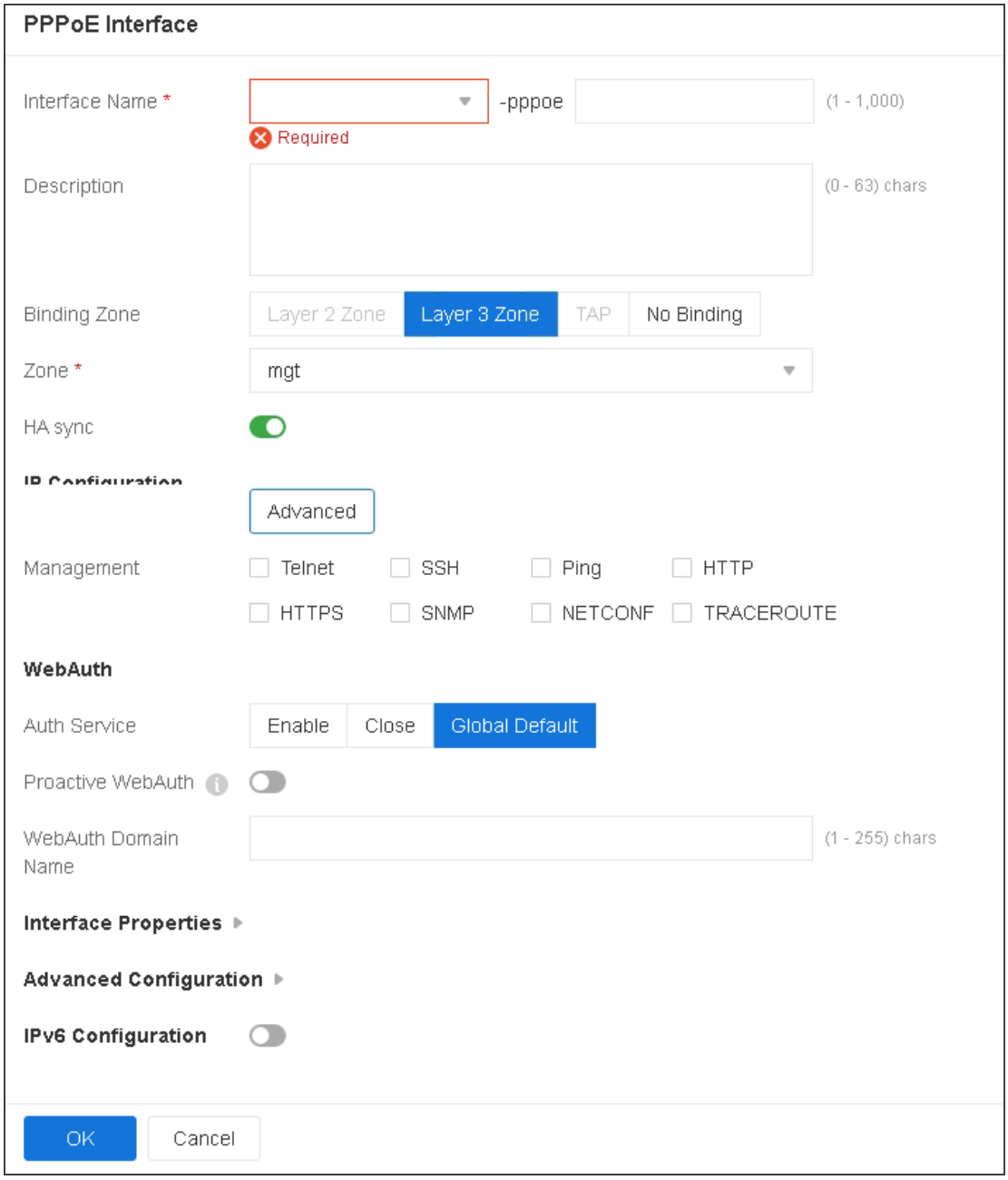
The configuration options for different types of interfaces may vary. For more information, see the following instructions.

Both IPv4 and IPv6 address can be configured for the interface.

Creating a PPPoE Interface

To create a PPPoE interface, take the following steps:

1. Select **Network > Interface**.
2. Click **New > PPPoE Interface**.



In this page, configure the following.

Option	Description
Interface	Specifies a name for the PPPoE interface.

Option	Description
Name	
Description	Enter descriptions for the PPPoE interface.
Binding Zone	If Layer 3 zone is selected, you should also select a security zone from the Zone drop-down list, and the interface will bind to a Layer 3 zone. If No Binding is selected, the interface will not bind to any zone.
Zone	Select a security zone from the Zone drop-down list.
HA sync	Click this button to enable the HA Sync function, which disables Local property and uses the virtual MAC, and the primary device will synchronize its information with the backup device; not clicking this button disables the HA Sync function, which enables Local property and uses the original MAC, and the primary device will not synchronize its information with the backup device.
IP Configuration	
User	Specifies a user name for PPPoE.
Password	Specifies PPPoE user's password.
Confirm Password	Enter the password again to confirm.
Idle interval	If the PPPoE interface has been idle (no traffic) for a certain period, i.e. the specified idle interval, system will disconnect the Internet connections; if the interface requires Internet access, the system will connect to the Internet

Option	Description
	automatically. The value range is 0 to 10000 minutes. The default value is 0.
Re-connect interval	Specifies a re-connect interval (i.e., system will try to re-connect automatically after being disconnected for the interval). The value range is 0 to 10000 seconds. The default value is 10, which means the function is disabled.
Set gateway information from PPPoE server as the default gateway route	With this selected check box, system will set the gateway information provided by PPPoE server as the default gateway route.
Advanced	In the Advanced page, configure advanced options for PPPoE, including: • Access Concentrator - Specifies a name for the concentrator. • Authentication - The devices will have to pass PPPoE authentication when trying to connect to a PPPoE server. The supported authentication methods include CHAP, PAP and Any (the default, anyone between CHAP and PAP). • Netmask - Specifies a netmask for the IP address obtained via PPPoE.

Option	Description
	• Static IP - You can specify a static IP address and negotiate about using this address to avoid IP change. To specify a static IP address, type it into the box. • Distance - Specifies a route distance. The value range is 1 to 255. The default value is 1. • Weight - Specifies a route weight. The value range is 1 to 255. The default value is 1. • Service - Specifies allowed service. The specified service must be the same with that provided by the PPPoE server. If no service is specified, system will accept any service returned from the server automatically.
DDNS	In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
Management	Select one or more management method check boxes to configure the interface management method, including **Telnet**, **SSH**, **Ping**, **HTTP**, **HTTPS**, **SNMP**, **NETCONF**, and **TRACEROUTE**.
WebAuth	

Option	Description
Auth Service	Click the **Enable**, **Close** or **Global Default** radio button as needed. • Enable: Enable the WebAuth function of the specified interface. • Close: Disable the WebAuth function of the specified interface. • Global Default: Specify that the interface uses the global default configuration of WebAuth. For the global default configuration of WebAuth function, see "Web Authentication" on Page 451.
Proactive WebAuth	Click the **Enable** button to enable proactive webauth function and Specify the AAA server. After enabling, you can access the Web authentication address initiate authentication request, and then fill in the correct user name and password in the authentication login page. The Web authentication address consists of the IP address of the interface and the port number of the HTTP/HTTPS of the authentication server. For example the IP address of the interface is 192.168.3.1, authentication server HTTP/HTTPS port number is respectively configured as 8182/44434. When the authentication server is configured for HTTP authentication mode, Web address is: http:// 192.168.3.1:8182; when the authentication

Option	Description
	server is configured for HTTPS mode, the Web address for the https:// 192.168.3.1:44434 certification.
WebAuth Domain Name	Specifies the WebAuth domain name for the interface. The value range is from 1 to 255 characters.In passive WebAuth, you will be prompted to check the identity on the authentication page if you visit a service. In this case, if the Web authentication address is configured with a domain name, the URL of the Web authentication page will be displayed with the domain name instead of the IP address. Enable Web authentication before configuring the WebAuth domain name.

Expand Interface Properties, configure properties for the interface.

Option	Description
Parameters	
ARP Learning	Click the **Enable** button to enable ARP learning.
ARP Learning Limit	When a user host that connects to the interface initiates ARP attacks, ARP entry resources may be exhausted, making other interfaces unable to perform ARP learning. To avoid this issue, the system allows you to enable ARP learning limit and specify the maximum number of ARP entries that can be learned on the interface. After a limit is specified, the interface can no longer perform ARP

Option	Description
	learning when the maximum number of ARP entries is reached. Click the button to enable ARP learning limit for the interface and enter the maximum number of ARP entries allowed on the interface. Valid values: 1 to capacity. **Note:** The capacity varies based on device platforms.
ARP Timeout	Specifies an ARP timeout for the interface. The value range is 5 to 65535 seconds. The default value is 1200.
Keep-alive IP	Specifies an IP address that receives the interface's keep-alive packets.
MAC clone	System clones a MAC address in the Ethernet sub-interface. If the user click "Restore Default MAC", the Ethernet sub-interface will restore the default MAC address.
Mirror	Enable port mirroring on an Ethernet interface, and select the traffic type to be mirrored.
Bandwidth	
Up Bandwidth	Specifies the maximum value of the up bandwidth of the interface.
Down Bandwidth	Specifies the maximum value of the down bandwidth of the interface.

Expand Advanced Configuration, configure advanced options for the interface.

Option	Description
NetFlow Configuration	Select a configured NetFlow profile from the drop-down list below.
Reverse Route	Enable or Disable reverse route as needed: • Enable: Force to use a reverse route. If the reverse route is not available, packets will be dropped. This option is enabled by default. • Close: Reverse route will not be used. When reaching the interface, the reverse data stream will be returned to its original route without any reverse route check. That is to say, reverse packets will be sent from the ingress interface that initializes the packets. • Auto: Reverse route will be prioritized. If available, the reverse route will be used to send packets; otherwise the ingress interface that initializes the packets will be used as the egress interface that sends reverse packets.
Shutdown	System supports interface shutdown. You can not only force a specific interface to shut down, but also control the time it shuts down by schedule or according to the link status of tracked objects. Configure the options as below: 1. Select the **Shut down** check box to enable inter-

Option	Description
	face shutdown. 2. To control the shutdown by schedule or tracked objects, select the appropriate check box, and then select an appropriate schedule or tracked object from the drop-down list or click ⊕ button to create a new schedule or a new track object.
Monitor and Backup	Configure the options as below: 1. Select the appropriate check box, and then select an appropriate schedule or tracked object from the drop-down list or click ⊕ button to create a new schedule or a new track object. 2. Select an action: • Shut down the interface: During the time specified in the schedule, or when the tracked object fails, the interface will be shut down and its related route will fail; • Migrate traffic to backup interface: During the time specified in the schedule, or when the tracked object fails, traffic flowing to the interface will be migrated to the backup interface. In such a case you need to select a backup interface from the

Option	Description
	Backup interface drop-down list and type the time into the Migrating time box. (Migrating time, 0 to 60 minutes, is the period during which traffic is migrated to the backup interface before the primary interface is switched to the backup interface. During the migrating time, traffic is migrated from the primary interface to the backup interface smoothly. By default the migrating time is set to 0, i.e., all the traffic will be migrated to the backup interface immediately.)

Select Network > Routing > RIP, click Interface Configuration to open the <Interface> page and configure RIP for the selected interface.

Option	Description
Authentication mode	Specifies a packet authentication mode for the system, including plain text (the default) and MD5. The plain text authentication, during which unencrypted string is transmitted together with the RIP packet, cannot assure security, so it cannot be applied to the scenarios that require high security.
Authentication string	Specifies a RIP authentication string for the interface.
Transmit ver-	Specifies a RIP information version number transmitted

Option	Description
sion	by the interface. By default V1&V2 RIP information will be transmitted.
Receive version	Specifies a RIP information version number transmitted by the interface. By default V1&V2 RIP information will be transmitted.
Split horizon	Select the **Enable** checkbox to enable split horizon. With this function enabled, routes learned from an interface will not be sent from the same interface, in order to avoid routing loop and assure correct broadcasting to some extent.
Passive mode	The interface which receives data only but not send is known as a passive interface. Click the button to enable the interface as passive interface.

Select Network > Routing > OSPF, click Interface Configuration to open the <Interface> page and configure OSPF for the selected interface.

Option	Description
Interface Timer	There are four interface timers: the interval for sending Hello packets, the dead interval of adjacent routers, the interval for retransmitting LSA, and the transmit delay for updating packets. • Hello Transmission Interval: Specifies the interval for sending Hello packets for an interface. The value range is 1 to 65535 seconds. The default

Option	Description
	value is 10. • Dead Time: Specifies the dead interval of adjacent routes for an interface. The value range is 1 to 65535 seconds. The default value is 40 (4 times of sending the Hello packets). If a router has not received the Hello packet from its peer for a certain period, it will determine the peering router is dead. This period is known as the dead interval between the two adjacent routers. • LSA Transmit Interval: Specifies the LSA retransmit interval for an interface. The value range is 3 to 65535 seconds. The default value is 5. • LSU Transmit Delay Time: Specifies the transmit delay for updating packet for an interface. The value range is 1 to 65535 seconds. The default value is 1.
Priority	Specifies the router priority. The value range is 0 to 255. The default value is 1. The router with priority set to 0 will not be selected as the designated router (The designated router will receive the link information of all the other routers in the network, and broadcast the received link information). If two routers within a network can

Option	Description
	both be selected as the designated router, the router with higher priority will be selected; if the priority level is the same, the one with higher Router ID will be selected.
Network Type	Specifies the network type of an interface. The network types of an interface have the following options: broadcast, point-to-point, and point-to-multipoint. By default, the network type of an interface is broadcast.
Link Cost	Click the **Enable** button to enable the link cost function. The value range is 1 to 65535. By default, the HA synchronization function is enabled, and the link cost will be synchronized to the backup device. Clear the check box to disable the synchronization function, and the system will stop synchronizing.

Select Network > Routing > OSPFv3, click Interface Configuration to open the <Interface> page and configure OSPFv3 for the selected interface.

Option	Description
Area ID	Specifies the area ID to which the interface belongs. The area ID is represented by 32 bits, which can be a number or an IP address.
Instance ID	Specifies the instance ID to which the interface belongs. The value range is 0 to 255. The default value is 0.
Interface Timer	There are four interface timers: the interval for sending Hello packets, the dead interval of adjacent routers, the

Option	Description
	interval for retransmitting LSA, and the transmit delay for updating packets. • Hello Transmission Interval: Specifies the interval for sending Hello packets for an interface. The value range is 1 to 65535 seconds. The default value is 10. • Dead Time: Specifies the dead interval of adjacent routes for an interface. The value range is 1 to 65535 seconds. The default value is 40 (4 times of sending the Hello packets). If a router has not received the Hello packet from its peer for a certain period, it will determine the peering router is dead. This period is known as the dead interval between the two adjacent routers. • LSA Transmit Interval: Specifies the LSA retransmit interval for an interface. The value range is 3 to 65535 seconds. The default value is 5. • LSU Transmit Delay Time: Specifies the transmit delay for updating packet for an interface. The value range is 1 to 65535 seconds. The default value is 1
Priority	Specifies the router priority. The value range is 0 to 255. The default value is 1. The router with priority set to 0

Option	Description
	will not be selected as the designated router (The designated router will receive the link information of all the other routers in the network, and broadcast the received link information). If two routers within a network can both be selected as the designated router, the router with higher priority will be selected; if the priority level is the same, the one with higher Router ID will be selected.
Link Cost	Specifies the link cost. The value range is 1 to 65535.
Passive	Some interfaces can be configured to receive updates but not send them. Such interfaces are passive interfaces. Click **Enable** to enable the passive interface.
MTU-Ignore	OSPFv3 uses DBD packets to check whether the MTU of interfaces between neighbors match. If mtus of adjacent OSPFv3 router interfaces do not match each other, they cannot establish an adjacency relationship. You can modify the MTU of the interface to solve this problem. MTU cannot be modified on some interfaces. In this case, you can click the **Enable** button to make OSPFv3 ignore the MTU matching check.

Expand IPv6 Configuration, configure the following.

Option	Description
Enable	Enable IPv6 in the interface.
IPv6	Specifies the IPv6 address prefix.

Option	Description
Address	
Prefix Length	Specifies the prefix length.
Auto-config	Select the check box to enable Auto-config function. In the address auto-config mode, the interface receives the address prefix in RA packets first, and then combines it with the interface identifier to generate a global address. • Set Default Route - If the interface is configured with a default router, this option will generate a default route to the default router.
Enable DNS Proxy	Select this check box to enable DNS proxy for the interface.
DHCP	System supports DHCPv6 client, DHCPv6 server and DHCPv6 relay proxy. • Select **DHCP** check box to enable DHCP client for the interface. After enabling, system will act as a DHCPv6 client and obtain IPv6 addresses from the DHCP server. Selecting **Rapid-commit** option can help fast get IPv6 addresses from the server. You need to enable both of the DHCP client and the server's Rapid-commit function. • Select **DHCPv6 Server** from DHCP drop-down list and configure options as Configuring DHCPv6 Server, system will act as a DHCPv6 server to

Option	Description
	appropriate IPv6 addresses for DHCP client. • Select **DHCPv6 Relay Proxy** from DHCP drop-down list and configure options as Configuring DHCPv6 Relay Proxy, system will act as a DHCPv6 relay proxy to receive requests from a DHCPv6 client and send requests to the DHCPv6 server
IPv6 Advanced	
Static	Click Add button to add several IPv6 address, at most 5 IPv6 addresses.. Click Delete button to delete IPv6 address.
Dynamic	Shows IPv6 address which is dynamic.
Link-local	Specifies link-local address. Link-local address is used for communication between adjacent nodes of a single link. For example, communication between hosts when there are no routers on the link. By default system will generate a link-local address for the interface automatically if the interface is enabled with IPv6 (in the interface configuration mode, use the command ipv6 enable). You can also specify a link-local address for the interface as needed, and the specified link-local address will replace the automatically generated one.
MTU	Specifies an IPv6 MTU for an interface. The default

Option	Description
	MTU value is 1500 bytes. The range is 1280 bytes to 1800/2000 bytes (Different devices support different maximum MTU value.). If the Jumbo Frame function is enabled, the MTU value range is changed to 1280 bytes to 9300 bytes and the default MTU value is 1500 bytes. For more information about the Jumbo Frame function, see Configuring Global Network Parameters.
DAD Attempts	Specifies NS packet attempt times. The value range is 0 to 20. Value 0 indicates DAD is not enabled on the interface. If system does not receive any NA response packets after sending NS packets for the attempt times, it will verify that the IPv6 address is an unique available address. DAD (Duplicate Address Detection) is designed to verify the uniqueness of IPv6 addresses. This function is implemented by sending NS (Neighbor Solicitation) requests. After receiving a NS packet, if any other host on the link finds that the address of the NS requester is duplicated, it will send a NA (Neighbor Advertisement) packet advertising that the address is already in use, and then the NS requester will mark the address as duplicate, indicating that the address is an invalid IPv6 address.
ND Learning	Click the button to enable ND learning for the interface. The interface obtains IP-MAC binding information in the

Option	Description
	internal network from ND learning and adds the binding information to the ND table. By default, ND learning is enabled. The interface continuously performs ND learning and adds the learned IP-MAC binding information to the ND table of the system. After the function is disabled, only IP addresses that are in the ND table can forward packets by using the interface.
ND Learning Limit	When a user host that connects to the interface initiates ND attacks, ND entry resources may be exhausted, making other interfaces unable to perform ND learning. To avoid this issue, the system allows you to enable ND learning limit and specify the maximum number of ND entries that can be learned on the interface. After a limit is specified, the interface can no longer perform ND learning when the maximum number of ND entries is reached. Click the button to enable ND learning limit for the interface and enter the maximum number of ND entries allowed on the interface. Valid values: 1 to capacity. **Note:** The capacity varies based on device platforms.
ND Interval	Specifies an interval for sending NS packets.
ND Reachable Time	Specifies reachable time. After sending an NS packet, if the interface receives acknowledgment from a neighbor within the specified time, it will consider the neighbor as reachable. This time is known as reachable time.

Option	Description
Hop Limit	Specifies the hop limit. Hop limit refers to the maximum number of hops for IPv6 or RA packets sent by the interface.
ND RA Suppress	Select the checkbox to disable RA suppress on LAN interfaces. By default, FDDI interface configured with IPv6 unicast route will send RA packets automatically, and interfaces of other types will not send RA packets.
Manage IP/MASK	Specifies the manage IP/MASK.

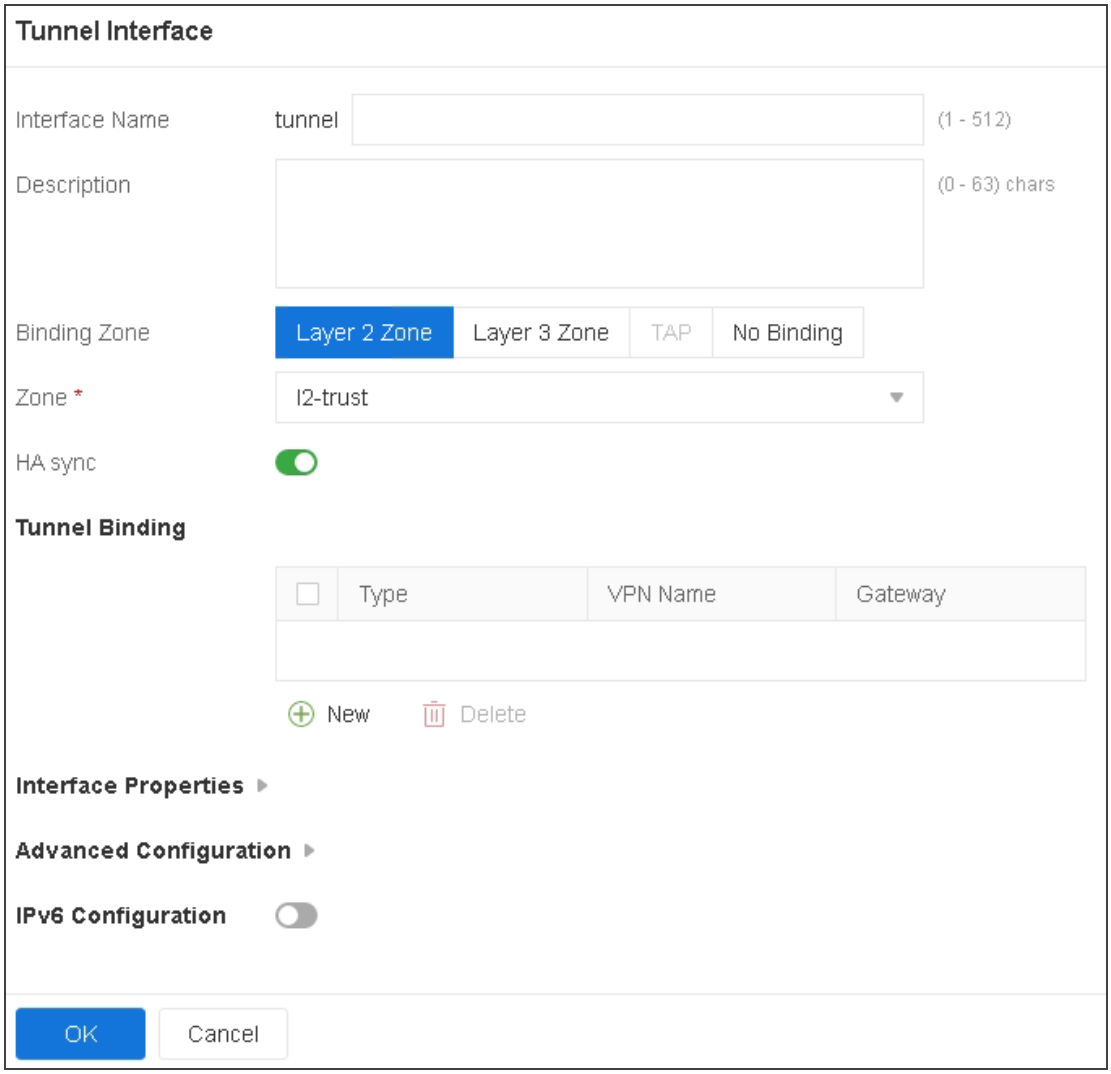
3. Click **OK**.

Creating a Tunnel Interface

To create a tunnel interface:

1. Select **Network > Interface**.

2. Select **New > Tunnel Interface**.



In this page, configure the following.

Option	Description
Interface Name	Specifies a name for the tunnel interface. The length varies from hardware platforms.

Option	Description
Description	Enter descriptions for the tunnel interface.
Binding Zone	If Layer 2 zone or Layer 3 zone is selected, you should also select a security zone from the Zone drop-down list, and the interface will bind to a Layer 2 zone or Layer 3 zone. If No Binding is selected, the interface will not bind to any zone.
Zone	Select a security zone from the Zone drop-down list.
HA sync	Click this button to enable the HA Sync function, which disables Local property and uses the virtual MAC, and the primary device will synchronize its information with the backup device; not clicking this button disables the HA Sync function, which enables Local property and uses the original MAC, and the primary device will not synchronize its information with the backup device.
NetFlow configuration	Select a configured NetFlow profile from the drop-down list below.
IP Configuration	

Option	Description
Static IP	IP address: Specifies an IP address for the interface.

Option	Description
	Netmask: Specifies a netmask for the interface.
	Set as Local IP: In an HA environment, if this option is specified, the interface IP will not synchronize to the HA peer.
	Advanced: • Management IP: Specifies a management IP for the interface. Type the IP address into the box. • Secondary IP: Specifies secondary IPs for the interface. You can specify up to 10 secondary IP addresses.  **Notes:** The secondary IP address of the configured interface and the current IP address of the interface must be in different network segments.
	DHCP: In the DHCP Configuration page, configure DHCP options for the interface. For detailed instructions, see "DHCP" on Page 304.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
Auto-obtain	Set gateway information from DHCP server as the default

Option	Description
	gateway route: With this check box selected, system will set the gateway information provided by the DHCP server as the default gateway route.
	Advanced: • Distance: Specifies a route distance. The value range is 1 to 255. The default value is 1. • Weight: Specifies a route weight. The value range is 1 to 255. The default value is 1. • Management Priority: Specifies a priority for the DNS server. Except for static DNS servers, system can also learn DNS servers dynamically via DHCP or PPPoE. Therefore, you need to configure priorities for the DNS servers, so that system can choose a DNS server according to its priority during DNS resolution. The priority is represented in numbers from 1 to 255. The larger the number is, the higher the priority is. The priority of static DNS servers is 20. • Classless Static Routes: Enable the classless static routing function via the DHCP options. When it is enabled, the DHCP client will send a request message with the Option121 (i.e., classless static routing option) to the server, and then the server will

Option	Description
	return the classless static route information. Finally, the client will add the classless static routing information to the routing table.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
Management	Select one or more management method check boxes to configure the interface management method, including **Telnet**, **SSH**, **Ping**, **HTTP**, **HTTPS**, **SNMP**, **NETCONF** and **TRACEROUTE**.
Tunnel Binding	Bind the interface to a VPN tunnel or ZTNA instance. One tunnel interface can be bound to multiple IPSec VPN tunnels, while only to one SSL VPN tunnel. • IPSec VPN: Select IPSec VPN radio button. Specifies a name for the IPSec VPN tunnel that is bound to the interface. Then select a next-hop address for the tunnel, which can either be the IP address or the egress IP address of the peering tunnel interface. This parameter, which is 0.0.0.0 by default, will only be valid when multiple IPSec VPN tunnels is bound to the tunnel interface. • SSL VPN: Select SSL VPN radio button. Specifies

Option	Description
	a name for the SSL VPN tunnel that is bound to the interface.
TAP Configuration	• Control Interface: A bypass control interface is used to send control packets (TCP RST packet is supported in current version). After configuring IPS, AV, or network behavior control on the Hillstone device, if the device detects network intrusions, virus, or illegal network behaviors, it will send TCP RST packet from e2 to the switch to tell it to reset the connections. By default, the bypass control interface is the bypass interface itself. For tunnel interfaces, if the interface itself is used as the control interface, the control message sent by the tunnel interface may not be processed correctly. It is recommended that bypass tunnel interfaces be configured with other interfaces as control interfaces. When configuring, ensure that the control interface can send messages to the switch normally. • LAN Address: Specify a LAN address. Packets whose source IP is in the specified range will be counted.
Firewall Linkage Con-	Specify the firewall information (firewall's IP, SSH port, login name, and password) in Firewall Linkage

Option	Description
figuration	Configuration to combine the current device with a Hillstone firewall. If the device detects the attack traffic, it will send the IP of the attack source to the linkage firewall in the form of blacklist, and the linkage firewall will block the traffic of the attack source IP.
Up Band-width	Specifies the maximum value of the up bandwidth of the interface.
Down Band-width	Specifies the maximum value of the down bandwidth of the interface.
Tunnel Binding	
IPv4/IPv6 Gateway	The next hop IP addresses can be specified to either IPv4 or IPv6 addresses. Only when GRE VPN is bound can next hop IP addresses.

3. Expand Interface Properties, configure properties for the interface.

Option	Description
Parameters	
MTU	Specifies a MTU for the interface. The value range is 1280 to 1500/1800 bytes (The max MTU may vary on different platforms). The default value is 1500. Specifies the MTU value. The default MTU value is 1500 bytes. The range is 1280 bytes to 1800/2000 bytes (Different devices support different maximum MTU value.). If the Jumbo Frame function is enabled, the MTU value range is changed to 1280 bytes to 9300 bytes and the

Option	Description
	default MTU value is 1500 bytes. For more information about the Jumbo Frame function, see Configuring Global Network Parameters.
ARP Timeout	Specifies an ARP timeout for the interface. The value range is 5 to 65535 seconds. The default value is 1200.
Keep-alive IP	Specifies an IP address that receives the interface's keep-alive packets.
MAC clone	System clones a MAC address in the Ethernet sub-interface. If the user click "Restore Default MAC", the Ethernet sub-interface will restore the default MAC address.
Mirror	Enable port mirroring on an Ethernet interface, and select the traffic type to be mirrored.
Bandwidth	
Up Bandwidth	Specifies the maximum value of the up bandwidth of the interface.
Down Bandwidth	Specifies the maximum value of the down bandwidth of the interface.

4. Expand IPv6 Configuration, configure the following.

Option	Description
Enable	Enable IPv6 in the interface.
IPv6 Address	Specifies the IPv6 address prefix.

Option	Description
Prefix Length	Specifies the prefix length.
Autoconfig	Select the check box to enable Auto-config function. In the address auto-config mode, the interface receives the address prefix in RA packets first, and then combines it with the interface identifier to generate a global address. • Set Default Route - If the interface is configured with a default router, this option will generate a default route to the default router.
Enable DNS Proxy	Select this check box to enable DNS proxy for the interface.
DHCP	System supports DHCPv6 client, DHCPv6 server and DHCPv6 relay proxy. • Select **DHCP** check box to enable DHCP client for the interface. After enabling, system will act as a DHCPv6 client and obtain IPv6 addresses from the DHCP server. Selecting **Rapid-commit** option can help fast get IPv6 addresses from the server. You need to enable both of the DHCP client and the server's Rapid-commit function. • Select **DHCPv6 Server** from DHCP drop-down list and configure options as Configuring DHCPv6

Option	Description
	Server, system will act as a DHCPv6 server to appropriate IPv6 addresses for DHCP client. • Select **DHCPv6 Relay Proxy** from DHCP drop-down list and configure options as Configuring DHCPv6 Relay Proxy, system will act as a DHCPv6 relay proxy to receive requests from a DHCPv6 client and send requests to the DHCPv6 server.
IPv6 Advanced	
Static	Click Add button to add several IPv6 address, at most 5 IPv6 addresses.. Click Delete button to delete IPv6 address.
Dynamic	Shows IPv6 address which is dynamic.
Link-local	Specifies link-local address. Link-local address is used for communication between adjacent nodes of a single link. For example, communication between hosts when there are no routers on the link. By default system will generate a link-local address for the interface automatically if the interface is enabled with IPv6 (in the interface configuration mode, use the command ipv6 enable). You can also specify a link-local address for the interface as needed, and the specified link-local address will replace the automatically generated one.
MTU	Specifies an IPv6 MTU for an interface. The default MTU

Option	Description
	value is 1500 bytes. The range is 1280 bytes to 1800/2000 bytes (Different devices support different maximum MTU value.). If the Jumbo Frame function is enabled, the MTU value range is changed to 1280 bytes to 9300 bytes and the default MTU value is 1500 bytes. For more information about the Jumbo Frame function, see Configuring Global Network Parameters.
DAD Attempts	Specifies NS packet attempt times. The value range is 0 to 20. Value 0 indicates DAD is not enabled on the interface. If system does not receive any NA response packets after sending NS packets for the attempt times, it will verify that the IPv6 address is an unique available address. DAD (Duplicate Address Detection) is designed to verify the uniqueness of IPv6 addresses. This function is implemented by sending NS (Neighbor Solicitation) requests. After receiving a NS packet, if any other host on the link finds that the address of the NS requester is duplicated, it will send a NA (Neighbor Advertisement) packet advertising that the address is already in use, and then the NS requester will mark the address as duplicate, indicating that the address is an invalid IPv6 address.
ND Interval	Specifies an interval for sending NS packets.
ND Reach-	Specifies reachable time. After sending an NS packet, if the

Option	Description
able Time	interface receives acknowledgment from a neighbor within the specified time, it will consider the neighbor as reachable. This time is known as reachable time.
Hop Limit	Specifies the hop limit. Hop limit refers to the maximum number of hops for IPv6 or RA packets sent by the interface.
ND RA Suppress	Select the checkbox to disable RA suppress on LAN interfaces. By default, FDDI interface configured with IPv6 unicast route will send RA packets automatically, and interfaces of other types will not send RA packets.
Manage IP/MASK	Specifies the manage IP/MASK.

5. "Expand Interface Properties, configure properties for the interface." on Page 204
6. "Select Network > Routing > RIP, click Interface Configuration to open the <Interface> page and configure RIP for the selected interface." on Page 186
7. "Select Network > Routing > OSPF, click Interface Configuration to open the <Interface> page and configure OSPF for the selected interface." on Page 187
8. "Select Network > Routing > OSPFv3, click Interface Configuration to open the <Interface> page and configure OSPFv3 for the selected interface. " on Page 189
9. Click **OK**.

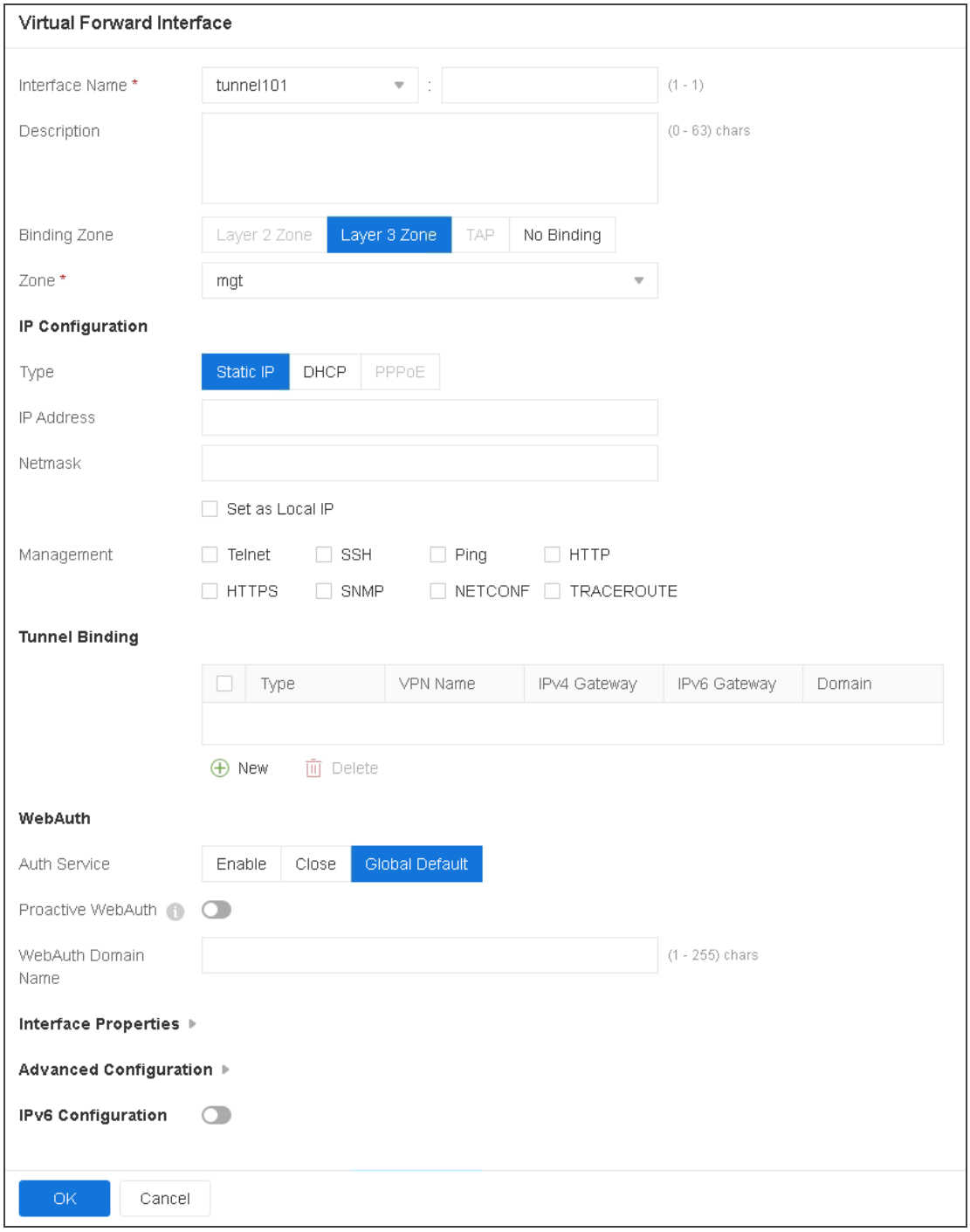
Creating a Virtual Forward Interface

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

To create a virtual forward interface, take the following steps:

1. Select **Network > Interface**.

2. Select **New > Virtual Forward Interface**.



In this page, configure the following.

Option	Description
Interface Name	Specifies a name for the virtual forward interface.
Description	Enter descriptions for the virtual forward interface.
Binding Zone	If Layer 2 zone or Layer 3 zone is selected, you should also select a security zone from the Zone drop-down list, and the interface will bind to a Layer 2 zone or Layer 3 zone. If No Binding is selected, the interface will not bind to any zone.
Zone	Select a security zone from the Zone drop-down list.
IP Configuration	

Option	Description
Static IP	IP address: Specifies an IP address for the interface.

Option	Description
	Netmask: Specifies a netmask for the interface.
	Set as Local IP: In an HA environment, if this option is specified, the interface IP will not synchronize to the HA peer.
	Advanced: • Management IP: Specifies a management IP for the interface. Type the IP address into the box. • Secondary IP: Specifies secondary IPs for the interface. You can specify up to 10 secondary IP addresses. **Notes:** The secondary IP address of the configured interface and the current IP address of the interface must be in different network segments.
	DHCP: In the DHCP Configuration page, configure DHCP options for the interface. For detailed instructions, see "DHCP" on Page 304.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
Auto-obtain	Set gateway information from DHCP server as the default

Option	Description
	gateway route: With this check box selected, system will set the gateway information provided by the DHCP server as the default gateway route.
	Advanced: • Distance: Specifies a route distance. The value range is 1 to 255. The default value is 1. • Weight: Specifies a route weight. The value range is 1 to 255. The default value is 1. • Management Priority: Specifies a priority for the DNS server. Except for static DNS servers, system can also learn DNS servers dynamically via DHCP or PPPoE. Therefore, you need to configure priorities for the DNS servers, so that system can choose a DNS server according to its priority during DNS resolution. The priority is represented in numbers from 1 to 255. The larger the number is, the higher the priority is. The priority of static DNS servers is 20. • Classless Static Routes: Enable the classless static routing function via the DHCP options. When it is enabled, the DHCP client will send a request message with the Option121 (i.e., classless static routing option) to the server, and then the server will

Option	Description
	return the classless static route information. Finally, the client will add the classless static routing information to the routing table.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
Management	Select one or more management method check boxes to configure the interface management method, including **Telnet**, **SSH**, **Ping**, **HTTP**, **HTTPS**, **SNMP**, **NETCONF** and **TRACEROUTE**.
WebAuth	
Auth Service	Click the **Enable**, **Close** or **Global Default** radio button as needed. • Enable: Enable the WebAuth function of the specified interface. • Close: Disable the WebAuth function of the specified interface. • Global Default: Specify that the interface uses the global default configuration of WebAuth. For the global default configuration of WebAuth function, see "Web Authentication" on Page 451.

Option	Description
Proactive WebAuth	Click the **Enable** button to enable proactive webauth function and Specify the AAA server. After enabling, you can access the Web authentication address initiate authentication request, and then fill in the correct user name and password in the authentication login page. The Web authentication address consists of the IP address of the interface and the port number of the HTTP/HTTPS of the authentication server. For example the IP address of the interface is 192.168.3.1, authentication server HTTP/HTTPS port numbe is respectively configured as 8182/44434. When the authentication server is configured for HTTP authentication mode, Web address is: http:// 192.168.3.1:8182; when the authentication server is configured for HTTPS mode, the Web address for the https:// 192.168.3.1:44434 certification.
WebAuth Domain Name	Specifies the WebAuth domain name for the interface. The value range is from 1 to 255 characters.In passive WebAuth, you will be prompted to check the identity on the authentication page if you visit a service. In this case, if the Web authentication address is configured with a domain name, the URL of the Web authentication page will be displayed with the domain name instead of the IP address. Enable Web authentication before configuring the WebAuth domain name.

3. "Expand IPv6 Configuration, configure the following." on Page 191

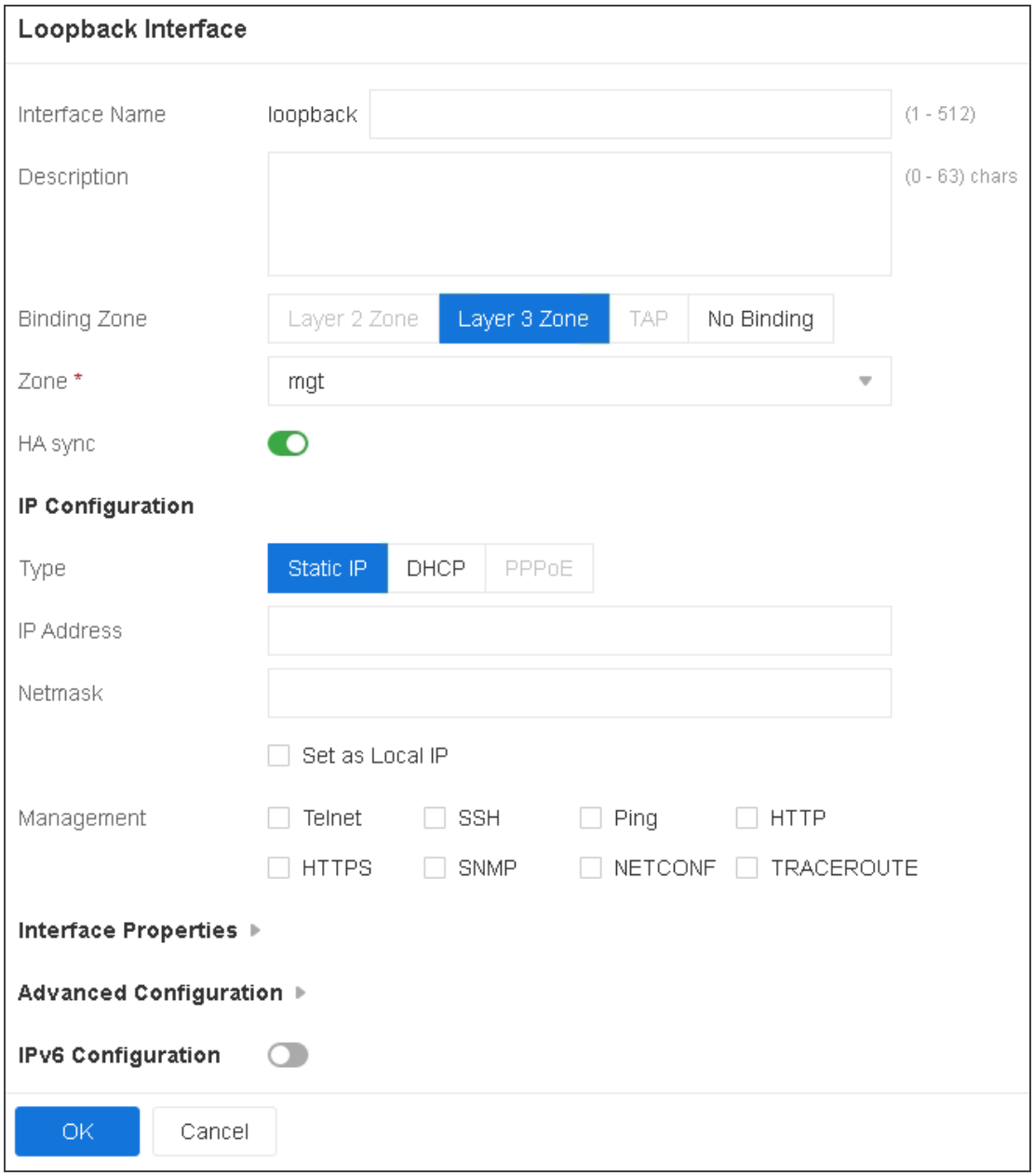
4. "Expand Interface Properties, configure properties for the interface." on Page 204
5. "Expand Advanced Configuration, configure advanced options for the interface." on Page 183
6. "Select Network > Routing > RIP, click Interface Configuration to open the <Interface> page and configure RIP for the selected interface." on Page 186
7. "Select Network > Routing > OSPF, click Interface Configuration to open the <Interface> page and configure OSPF for the selected interface." on Page 187
8. "Select Network > Routing > OSPFv3, click Interface Configuration to open the <Interface> page and configure OSPFv3 for the selected interface. " on Page 189
9. Click **OK**.

Creating a Loopback Interface

To create a loopback interface, take the following steps:

1. Select **Network > Interface**.

2. Click **New > Loopback Interface**.



In this page, configure the following.

Option	Description
Interface Name	Specifies a name for the loopback interface.
Description	Enter descriptions for the loopback interface.
Binding Zone	If Layer 2 zone or Layer 3 zone is selected, you should also select a security zone from the Zone drop-down list, and the interface will bind to a Layer 2 zone or Layer 3 zone. If No Binding is selected, the interface will not bind to any zone.
Zone	Select a security zone from the Zone drop-down list.
HA sync	Click this button to enable the HA Sync function, which disables Local property and uses the virtual MAC, and the primary device will synchronize its information with the backup device; not clicking this button disables the HA Sync function, which enables Local property and uses the original MAC, and the primary device will not synchronize its information with the backup device.
IP Configuration	

Option	Description
Static IP	IP address: Specifies an IP address for the interface.

Option	Description
	Netmask: Specifies a netmask for the interface.
	Set as Local IP:In an HA environment, if this option is specified, the interface IP will not synchronize to the HA peer.
	Advanced: • Management IP: Specifies a management IP for the interface. Type the IP address into the box. • Secondary IP: Specifies secondary IPs for the interface. You can specify up to 10 secondary IP addresses.  **Notes:** The secondary IP address of the configured interface and the current IP address of the interface must be in different network segments.
	DHCP: In the DHCP Configuration page, configure DHCP options for the interface. For detailed instructions, see "DHCP" on Page 304.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
Auto-obtain	Set gateway information from DHCP server as the default

Option	Description
	gateway route: With this check box selected, system will set the gateway information provided by the DHCP server as the default gateway route.
	Advanced: • Distance: Specifies a route distance. The value range is 1 to 255. The default value is 1. • Weight: Specifies a route weight. The value range is 1 to 255. The default value is 1. • Management Priority: Specifies a priority for the DNS server. Except for static DNS servers, system can also learn DNS servers dynamically via DHCP or PPPoE. Therefore, you need to configure priorities for the DNS servers, so that system can choose a DNS server according to its priority during DNS resolution. The priority is represented in numbers from 1 to 255. The larger the number is, the higher the priority is. The priority of static DNS servers is 20. • Classless Static Routes: Enable the classless static routing function via the DHCP options. When it is enabled, the DHCP client will send a request message with the Option121 (i.e., classless static routing option) to the server, and then the server will

Option	Description
	return the classless static route information. Finally, the client will add the classless static routing information to the routing table.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
Management	Select one or more management method check boxes to configure the interface management method, including **Telnet**, **SSH**, **Ping**, **HTTP**, **HTTPS**, **SNMP**, **NETCONF** and **TRACEROUTE**.

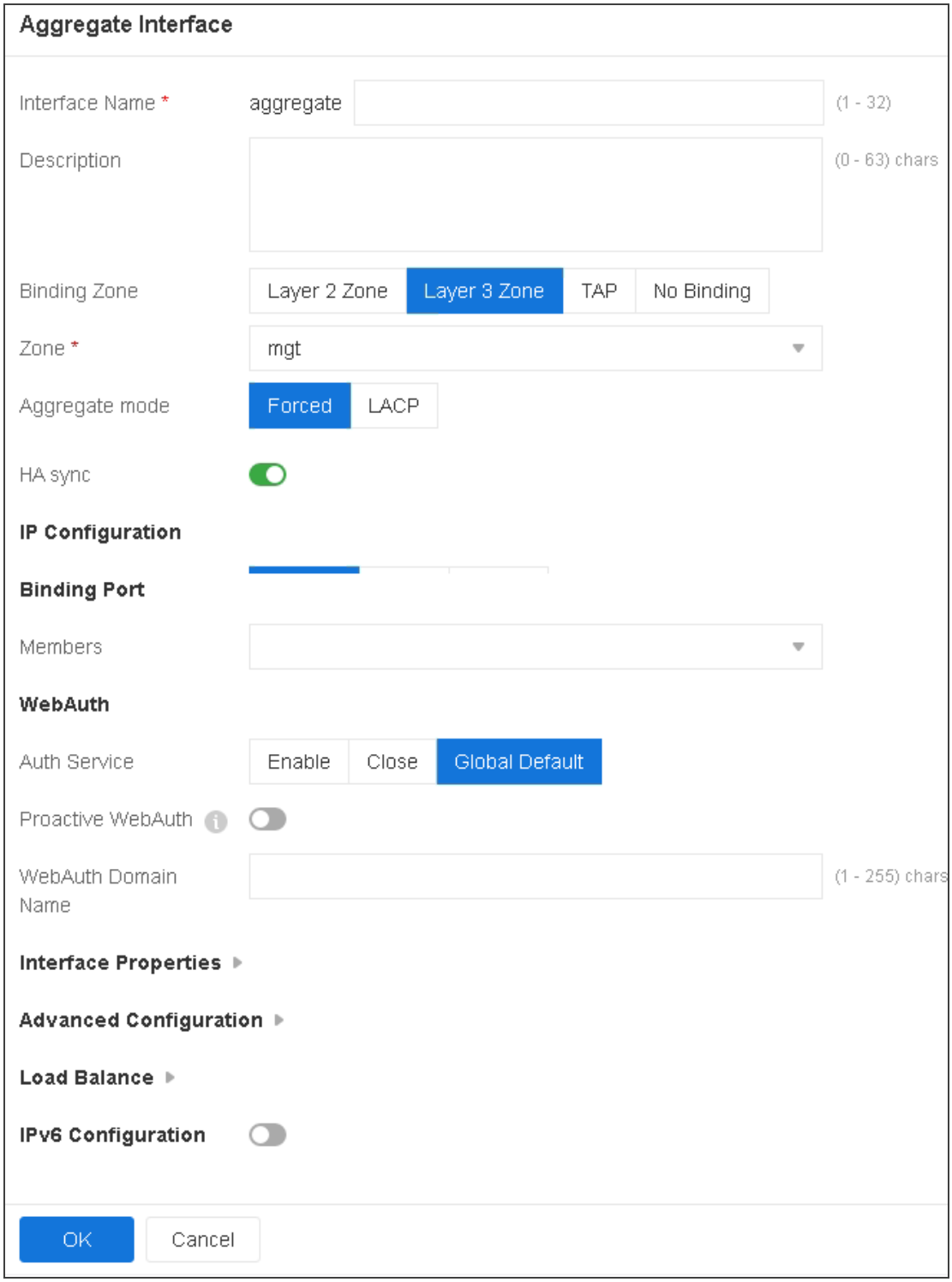
3. "Expand IPv6 Configuration, configure the following." on Page 191
4. "Expand Interface Properties, configure properties for the interface." on Page 204
5. "Expand Advanced Configuration, configure advanced options for the interface." on Page 183
6. "Select Network > Routing > RIP, click Interface Configuration to open the <Interface> page and configure RIP for the selected interface." on Page 186
7. "Select Network > Routing > OSPF, click Interface Configuration to open the <Interface> page and configure OSPF for the selected interface." on Page 187
8. "Select Network > Routing > OSPFv3, click Interface Configuration to open the <Interface> page and configure OSPFv3 for the selected interface. " on Page 189
9. Click **OK**.

Creating an Aggregate Interface

To create an aggregate interface, take the following steps:

1. Select **Network > Interface**.

2. Click **New > Aggregate Interface**.



3. In this page, configure the following.

Option	Description
Interface Name	Specifies a name for the aggregate interface.
Description	Enter descriptions for the aggregate interface.
Binding Zone	Specifies the zone type. If Layer 3 or Layer 2 zone is selected, you should also select a security zone from the Zone drop-down list, and the interface will bind to a Layer 3 or Layer 2 zone. If TAP is selected, the interface will bind to a tap zone. You can specify the IPv4 or IPv6 LAN addresses from the LAN Address drop-down menu. With this configured, the device can identify the intranet traffic, and display them in the Monitor. And you can also specify the firewall information (firewall's Pv4 or IPv6 address, SSH port, login name, and password) in Firewall Linkage Configuration to make the current device link with a Hillstone firewall. When the current device is working in the TAP mode and this interface is the one that receives the mirror traffic, if one or more of the following configurations are made, the device will send the matched traffic information to the linkage firewall which will block the traffic: • The source zone and destination zone in the security policy is the TAP zone with this interface

Option	Description
	Belong to: Description VLAN: Acess mode (one VLAN) — The interface in Access mode is designed for terminal users and only allows packets from one VLAN to pass through. Trunk mode (multiple VLANs) — The interface in Trunk mode is typically used for inter-connections between devices, and allows packets from multiple VLANs to pass through. When Native VLAN is configured, the interface will delete the tag of the Native VLAN packets being transmitted, and add a Native VLAN tag to the received packets with no tag set. Aggregate Interface — The interface you specified belongs to an aggregate interface. Choose an aggregate interface which the aggregate interface belongs to from the Interface Group drop-down list. Redundant Interface — This interface belongs to a redundant interface. Select that redundant interface from the Interface Group drop-down list. None — This interface does not belong to any object.

Option	Description
Zone	Select a security zone from the Zone drop-down list.

Aggregate mode	• Forced: Aggregates multiple physical interfaces to form an aggregate interface. These physical interfaces will share the traffic passing through the aggregate interface equally.
	• Enables LACP on the interface to negotiate aggregate interfaces dynamically. LACP options are:
	  • System priority: Specifies the LACP system priority. The value range is 1 to 32768, the default value is 32768. This parameter is used to assure the interfaces of two ends are consistent. System will select interfaces based on the end with higher LACP system priority. The smaller the value is, the higher the priority will be. If the LACP system priorities of the two ends are equal, system will compare MACs of the two ends. The smaller the MAC is, the higher the priority will be.
	  • Max bundle: Specifies the maximum active interfaces. The value range is 1 to 16, the default value is 16. When the active interfaces reach the maximum number, the status of other legal interfaces will change to Standby.

Option	Description
	• Min bundle: Specifies the minimum active interfaces. The value range is 1 to 8, the default value is 1. When the active interfaces reach the minimum number, the status of all the legal interfaces in the aggregation group will change to Standby automatically and will not forward any traffic.
HA sync	Click this button to enable HA sync function. The primary device will synchronize its information with the backup device.
IP Configuration	

Option	Description
Static IP	IP address: Specifies an IP address for the interface.

Option	Description
	Netmask: Specifies a netmask for the interface. Set as Local IP: In an HA environment, if this option is specified, the interface IP will not synchronize to the HA peer. Advanced: • Management IP: Specifies a management IP for the interface. Type the IP address into the box. • Secondary IP: Specifies secondary IPs for the interface. You can specify up to 10 secondary IP addresses.  **Notes:** The secondary IP address of the configured interface and the current IP address of the interface must be in different network segments. DHCP: In the DHCP Configuration page, configure DHCP options for the interface. For detailed instructions, see "DHCP" on Page 304. DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.

Option	Description
Auto-obtain	Set gateway information from DHCP server as the default gateway route: With this check box being selected, system will set the gateway information provided by the DHCP server as the default gateway route.
	Advanced: • Distance: Specifies a route distance. The value range is 1 to 255. The default value is 1. • Weight: Specifies a route weight. The value range is 1 to 255. The default value is 1. • Management Priority: Specifies a priority for the DNS server. Except for static DNS servers, system can also learn DNS servers dynamically via DHCP or PPPoE. Therefore, you need to configure priorities for the DNS servers, so that system can choose a DNS server according to its priority during DNS resolution. The priority is represented in numbers from 1 to 255. The larger the number is, the higher the priority is. The priority of static DNS servers is 20. • Classless Static Routes: Enable the classless static routing function via the DHCP options. When it is enabled, the DHCP client will send a request message with the Option121 (i.e., classless static routing option) to the server, and then the server will

Option	Description
	return the classless static route information. Finally, the client will add the classless static routing information to the routing table.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
PPPoE	Obtain IP through PPPoE。Configure the following options: • User - Specifies a username for PPPoE. • Password - Specifies PPPoE user's password. • Confirm password - Enter the password again to confirm. • Idle interval - If the PPPoE interface has been idle (no traffic) for a certain period, i.e., the specified idle interval, the system will disconnect the Internet connection; if the interface requires Internet access, the system will connect to the Internet automatically. The value range is 0 to 10000 minutes. The default value is 30. • Re-connect interval - Specifies a re-connect inter-

Option	Description
	val (i.e., system will try to re-connect automatically after being disconnected for the interval). The value range is 0 to 10000 seconds. The default value is 0, which means the function is disabled. • Set gateway information from PPPoE server as the default gateway route - With this check box selected, system will set the gateway information provided by PPPoE server as the default gateway route.
Management	Select one or more management method check boxes to configure the interface management method, including **Telnet**, **SSH**, **Ping**, **HTTP**, **HTTPS**, **SNMP**, **NETCONF** and **TRACEROUTE**.
TAP Configuration	• Control Interface: A bypass control interface is used to send control packets (TCP RST packet is supported in current version). After configuring IPS, AV, or network behavior control on the Hillstone device, if the device detects network intrusions, virus, or illegal network behaviors, it will send TCP RST packet from e2 to the switch to tell it to reset the connections. By default, the bypass control interface is the bypass interface itself. For tunnel interfaces, if the interface itself is used as the control interface, the control message sent by

Option	Description
	the tunnel interface may not be processed correctly. It is recommended that bypass tunnel interfaces be configured with other interfaces as control interfaces. When configuring, ensure that the control interface can send messages to the switch normally. • LAN Address: Specify a LAN address. Packets whose source IP is in the specified range will be counted.
Firewall Linkage Configuration	Specify the firewall information (firewall's IP, SSH port, login name, and password) in Firewall Linkage Configuration to combine the current device with a Hillstone firewall. If the device detects the attack traffic, it will send the IP of the attack source to the linkage firewall in the form of blacklist, and the linkage firewall will block the traffic of the attack source IP.
WebAuth	
Auth Service	Click the **Enable**, **Close** or **Global Default** radio button as needed. • Enable: Enable the WebAuth function of the specified interface. • Close: Disable the WebAuth function of the specified interface. • Global Default: Specify that the interface uses the

Option	Description
	global default configuration of WebAuth. For the global default configuration of WebAuth function, see "Web Authentication" on Page 451.
Proactive WebAuth	Click the **Enable** button to enable proactive webauth function and Specify the AAA server. After enabling, you can access the Web authentication address initiate authentication request, and then fill in the correct user name and password in the authentication login page. The Web authentication address consists of the IP address of the interface and the port number of the HTTP/HTTPS of the authentication server. For example the IP address of the interface is 192.168.3.1, authentication server HTTP/HTTPS port number is respectively configured as 8182/44434. When the authentication server is configured for HTTP authentication mode, Web address is: http:// 192.168.3.1:8182; when the authentication server is configured for HTTPS mode, the Web address for the https:// 192.168.3.1:44434 certification.
WebAuth Domain Name	Specifies the WebAuth domain name for the interface. The value range is from 1 to 255 characters.In passive WebAuth, you will be prompted to check the identity on the authentication page if you visit a service. In this case, if the Web authentication address is configured with a

Option	Description
	domain name, the URL of the Web authentication page will be displayed with the domain name instead of the IP address. Enable Web authentication before configuring the WebAuth domain name.

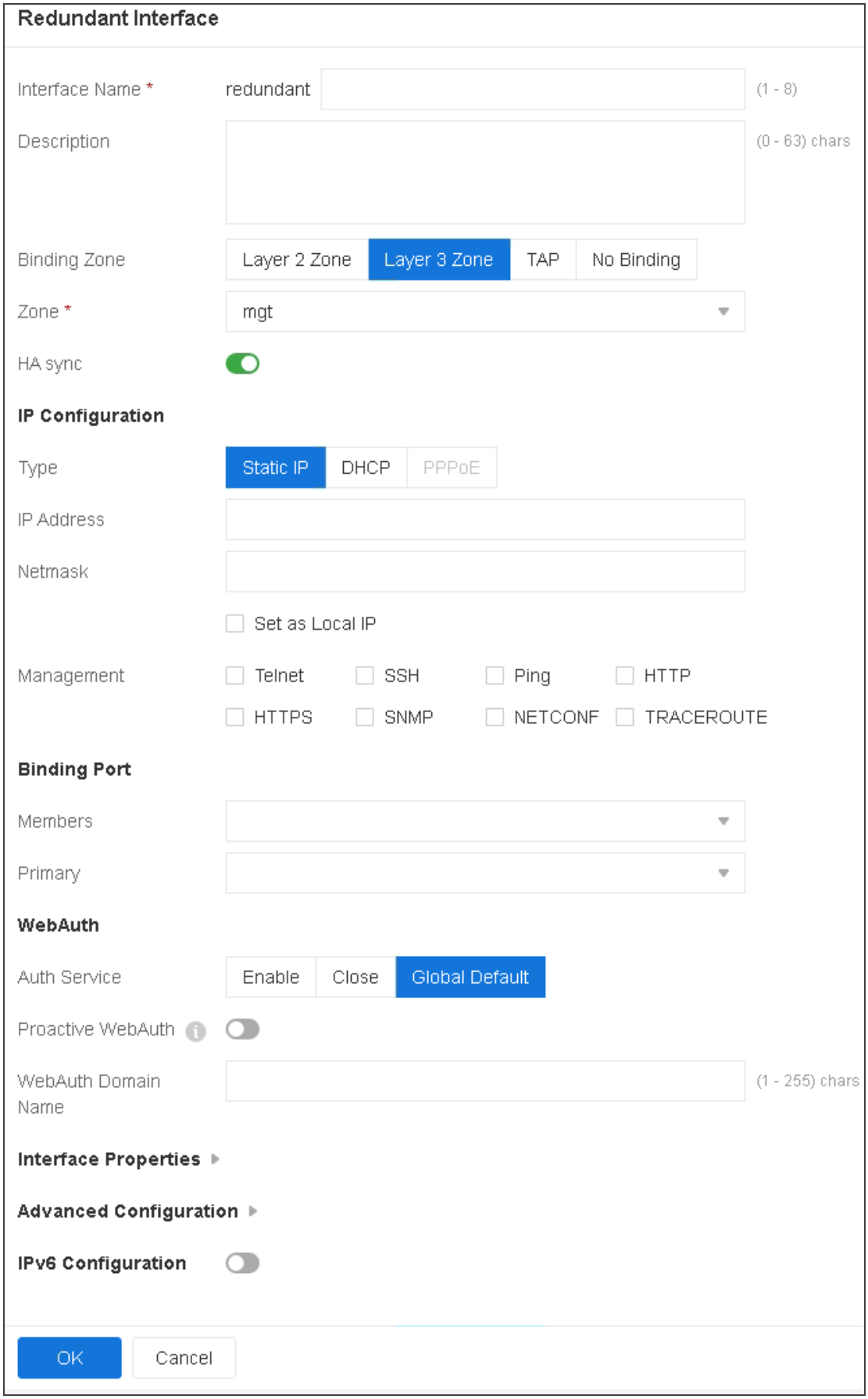
4. "Expand IPv6 Configuration, configure the following." on Page 191
5. "Expand Interface Properties, configure properties for the interface." on Page 204
6. "Expand Advanced Configuration, configure advanced options for the interface." on Page 183
7. "Select Network > Routing > RIP, click Interface Configuration to open the <Interface> page and configure RIP for the selected interface." on Page 186
8. "Select Network > Routing > OSPF, click Interface Configuration to open the <Interface> page and configure OSPF for the selected interface." on Page 187
9. "Select Network > Routing > OSPFv3, click Interface Configuration to open the <Interface> page and configure OSPFv3 for the selected interface. " on Page 189
10. Expand Load Balance, configure a load balance mode for the interface. "Flow-based" means enabling automatic load balance based on the flow. This is the default mode. "Tuple" means enabling load based on the source/destination IP, source/destination MAC, source/destination interface or protocol type of packet, or the combination of the selected items.
11. Click **OK**.

Creating a Redundant Interface

To create a redundant interface, take the following steps:

1. Select **Network > Interface**.

2. Click **New > Redundant Interface**.


Redundant Interface
Interface Name *
redundant
(1 - 8)
Description
(0 - 63) chars
Binding Zone
Layer 2 Zone
Layer 3 Zone
TAP
No Binding
Zone *
mgt
HA sync
IP Configuration
Type
Static IP
DHCP
PPPoE
IP Address
Netmask
Set as Local IP
Management
Telnet
SSH
Ping
HTTP
HTTPS
SNMP
NETCONF
TRACEROUTE
Binding Port
Members
Primary
WebAuth
Auth Service
Enable
Close
Global Default
Proactive WebAuth
WebAuth Domain Name
(1 - 255) chars
Interface Properties
Advanced Configuration
IPv6 Configuration
OK
Cancel

3. "In this page, configure the following." on Page 228
4. "Expand IPv6 Configuration, configure the following." on Page 191
5. "Expand Interface Properties, configure properties for the interface." on Page 204
6. "Expand Advanced Configuration, configure advanced options for the interface." on Page 183
7. "Select Network > Routing > RIP, click Interface Configuration to open the <Interface> page and configure RIP for the selected interface." on Page 186
8. "Select Network > Routing > OSPF, click Interface Configuration to open the <Interface> page and configure OSPF for the selected interface." on Page 187
9. "Select Network > Routing > OSPFv3, click Interface Configuration to open the <Interface> page and configure OSPFv3 for the selected interface. " on Page 189
10. Click **OK**.

Creating an Ethernet Sub-interface/an Aggregate Sub-interface/a Redundant Sub-interface

To create an ethernet sub-interface/an aggregate sub-interface/a redundant sub-interface, take the following steps:

1. Select **Network > Interface**.
2. Click **New > Ethernet Sub-interface/Aggregate Sub-interface/Redundant Sub-interface**.
3. In this page, configure the following.

Option	Description
Interface	Specifies a name for the virtual forward interface.

Option	Description
Name	
Description	Enter descriptions for the virtual forward interface.
Binding Zone	If Layer 2 zone or Layer 3 zone is selected, you should also select a security zone from the Zone drop-down list, and the interface will bind to a Layer 2 zone or a Layer 3 zone. If No Binding is selected, the interface will not bind to any zone.
Zone	Select a security zone from the Zone drop-down list.
IP Configuration	

Option	Description
Static IP	IP address: Specifies an IP address for the interface.

Option	Description
	Netmask: Specifies a netmask for the interface.
	Set as Local IP: In an HA environment, if this option is specified, the interface IP will not synchronize to the HA peer.
	Advanced: • Management IP: Specifies a management IP for the interface. Type the IP address into the box. • Secondary IP: Specifies secondary IPs for the interface. You can specify up to 10 secondary IP addresses.  **Notes:** The secondary IP address of the configured interface and the current IP address of the interface must be in different network segments.
	DHCP: In the DHCP Configuration page, configure DHCP options for the interface. For detailed instructions, see "DHCP" on Page 304.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
Auto-obtain	Set gateway information from DHCP server as the default

Option	Description
	gateway route: With this check box selected, system will set the gateway information provided by the DHCP server as the default gateway route.
	Advanced: • Distance: Specifies a route distance. The value range is 1 to 255. The default value is 1. • Weight: Specifies a route weight. The value range is 1 to 255. The default value is 1. • Management Priority: Specifies a priority for the DNS server. Except for static DNS servers, system can also learn DNS servers dynamically via DHCP or PPPoE. Therefore, you need to configure priorities for the DNS servers, so that the system can choose a DNS server according to its priority during DNS resolution. The priority is represented in numbers from 1 to 255. The larger the number is, the higher the priority is. The priority of static DNS servers is 20. • Classless Static Routes: Enable the classless static routing function via the DHCP options. When it is enabled, the DHCP client will send a request message with the Option121 (i.e., classless static routing option) to the server, and then the server will

Option	Description
	return the classless static route information. Finally, the client will add the classless static routing information to the routing table.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
PPPoE	Obtain IP through PPPoE。Configure the following options：(Effective only when creating a aggregate sub-interface) • User - Specifies a username for PPPoE. • Password - Specifies PPPoE user's password. • Confirm password - Enter the password again to confirm. • Idle interval -If the PPPoE interface has been idle (no traffic) for a certain period, i.e., the specified idle interval, system will disconnect the Internet connection; if the interface requires Internet access, the system will connect to the Internet automatically. The value range is 0 to 10000 minutes. The default value is 30. • Re-connect interval - Specifies a re-connect inter-

Option	Description
	val (i.e., system will try to re-connect automatically after being disconnected for the interval). The value range is 0 to 10000 seconds. The default value is 0, which means the function is disabled. • Set gateway information from PPPoE server as the default gateway route - With this check box selected, system will set the gateway information provided by PPPoE server as the default gateway route.
Management	Select one or more management method check boxes to configure the interface management method, including **Telnet**, **SSH**, **Ping**, **HTTP**, **HTTPS**, **SNMP**, **NETCONF** and **TRACEROUTE**.
WebAuth	
Auth Service	Click the **Enable**, **Close** or **Global Default** radio button as needed. • Enable: Enable the WebAuth function of the specified interface. • Close: Disable the WebAuth function of the specified interface. • Global Default: Specify that the interface uses the global default configuration of WebAuth. For the

Option	Description
	global default configuration of WebAuth function, see "Web Authentication" on Page 451.
Proactive WebAuth	Click the **Enable** button to enable proactive webauth function and Specify the AAA server. After enabling, you can access the Web authentication address initiate authentication request, and then fill in the correct user name and password in the authentication login page. The Web authentication address consists of the IP address of the interface and the port number of the HTTP/HTTPS of the authentication server. For example the IP address of the interface is 192.168.3.1, authentication server HTTP/HTTPS port number is respectively configured as 8182/44434. When the authentication server is configured for HTTP authentication mode, Web address is: http:// 192.168.3.1:8182; when the authentication server is configured for HTTPS mode, the Web address for the https:// 192.168.3.1:44434 certification.
WebAuth Domain Name	Specifies the WebAuth domain name for the interface. The value range is from 1 to 255 characters.In passive WebAuth, you will be prompted to check the identity on the authentication page if you visit a service. In this case, if the Web authentication address is configured with a domain name, the URL of the Web authentication page will be displayed with the domain name instead of the IP

Option	Description
	address. Enable Web authentication before configuring the WebAuth domain name.

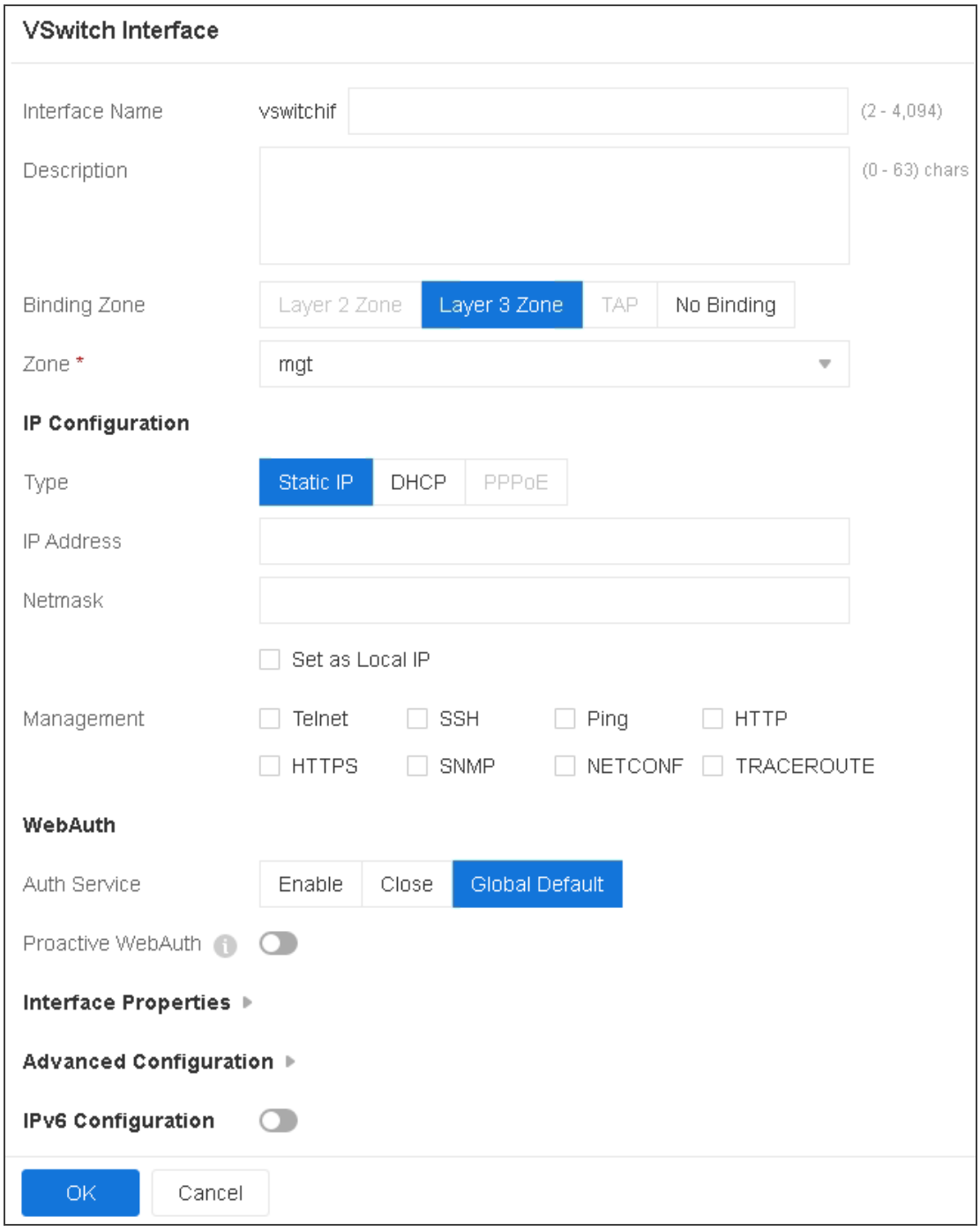
4. "Expand IPv6 Configuration, configure the following." on Page 191
5. "Expand Interface Properties, configure properties for the interface." on Page 204
6. "Expand Advanced Configuration, configure advanced options for the interface." on Page 183
7. "Select Network > Routing > RIP, click Interface Configuration to open the <Interface> page and configure RIP for the selected interface." on Page 186
8. "Select Network > Routing > OSPF, click Interface Configuration to open the <Interface> page and configure OSPF for the selected interface." on Page 187
9. "Select Network > Routing > OSPFv3, click Interface Configuration to open the <Interface> page and configure OSPFv3 for the selected interface. " on Page 189
10. Click **OK**.

Creating a VSwitch Interface/a VLAN Interface

To create a VSwitch interface/a VLAN interface, take the following steps:

1. Select **Network > Interface**.

2. Click **New > VSwitch Interface/VLAN Interface**.



3. "In this page, configure the following." on Page 212

4. "Expand IPv6 Configuration, configure the following." on Page 191
5. "Expand Interface Properties, configure properties for the interface." on Page 204
6. "Expand Advanced Configuration, configure advanced options for the interface." on Page 183
7. "Select Network > Routing > RIP, click Interface Configuration to open the <Interface> page and configure RIP for the selected interface." on Page 186
8. "Select Network > Routing > OSPF, click Interface Configuration to open the <Interface> page and configure OSPF for the selected interface." on Page 187
9. "Select Network > Routing > OSPFv3, click Interface Configuration to open the <Interface> page and configure OSPFv3 for the selected interface. " on Page 189
10. Click **OK**.

Editing an Interface

To edit an interface, take the following steps:

1. Select **Network > Interface**.
2. Select the interface you want to edit from the interface list and click **Edit**.
3. In this page, configure the following.

Option	Description
Interface Name	Specifies a name for the interface.
Description	Enter descriptions for the interface.
Binding	Specifies the zone type. If Layer 3 or Layer 2 zone is

Option	Description
Zone	Layer 2 zone. If TAP is selected, the interface will bind to a tap zone. You can specify the IPv4 or IPv6 LAN addresses from the LAN Address drop-down menu. With this configured, the device can identify the intranet traffic, and display them in the Monitor. You can also specify the firewall information (firewall's IPve4 or IPv6 address, SSH port, login name, and password) in Firewall Linkage Configuration to make the current device link with a Hillstone firewall. When the current device is working in the TAP mode and this interface is the one that receives the mirror traffic, if one or more of the following configurations are made, the device will send the matched traffic information to the linkage firewall which will block the traffic: • The source zone and destination zone in the security policy is the TAP zone with this interface bound, and the action of the IPS rule that referenced by the security policy is Block IP or Block service; • The source zone of the share access rule is the TAP zone with this interface bound, and the action of the share access rule is Block; • The source zone and destination zone in the security policy is the TAP zone with this interface

Option	Description		
	Belong to VLAN	Description	
		Acess mode(one VLAN)	The interface in Access mode is designed for terminal users and only allows packets from one VLAN to pass through.
		Trunk mode(multiple VLANs)	The interface in Trunk mode is typically used for inter-connections between devices, and allows packets from multiple VLANs to pass through. When Native VLAN is configured, the interface will delete the tag of the Native VLAN packets being transmitted, and add a Native VLAN tag to the received packets with no tag set.
	Aggregate Interface	The interface you specified belongs to a aggregate interface. • Interface: Choose an aggregate interface which the aggregate interface belongs to from Interface drop-down list. • Port LACP priority: Port LACP pri-	

Option	Description
	ority determines the sequence of becoming the Selected status for the members in the aggregate group. The smaller the number is, the higher the priority will be. Link in the aggregate group that will be aggregated is determined by the interface LACP priority and the LACP system priority. • Port timeout mode: The LACP timeout refers to the time interval for the members The system supports **Fast** (1 second) and **Slow** (30 seconds, the default value) waiting to receive the LACPDU packets. If the local member does not receive the LACPDU packet from its peer in three timeout values, the peer will be conclude as down, and the status of the local member will change from Active to Selected, and stop traffic forwarding. Redundant Interface: This interface belongs to a redundant interface. Select that redundant interface from the Interface drop-down list.

Option	Description
	None This interface does not belong to any object.

Aggregare mode	• Forced: Aggregates multiple physical interfaces to form an aggregate interface. These physical interfaces will share the traffic passing through the aggregate interface equally.
	• Enables LACP on the interface to negotiate aggregate interfaces dynamically. LACP options are:
	  • System priority: Specifies the LACP system priority. The value range is 1 to 32768, the default value is 32768. This parameter is used to assure the interfaces of two ends are consistent. System will select interfaces based on the end with higher LACP system priority. The smaller the value is, the higher the priority will be. If the LACP system priorities of the two ends are equal, system will compare MACs of the two ends. The smaller the MAC is, the higher the priority will be.
	  • Max bundle: Specifies the maximum active interfaces. The value range is 1 to 16, the default value is 16. When the active interfaces reach the maximum number, the status of other legal interfaces will change to

Option	Description
	Standby. • Min bundle: Specifies the minimum active interfaces. The value range is 1 to 8, the default value is 1. When the active interfaces reach the minimum number, the status of all the legal interfaces in the aggregation group will change to Standby automatically and will not forward any traffic.
Zone	Select a security zone from the Zone drop-down list.
IP Configuration	

Option	Description
Static IP	IP address: Specifies an IP address for the interface.

Option	Description
	Netmask: Specifies a netmask for the interface.
	Set as Local IP: In an HA environment, if this option is specified, the interface IP will not synchronize to the HA peer.
	Advanced: • Management IP: Specifies a management IP for the interface. Type the IP address into the box. • Secondary IP: Specifies secondary IPs for the interface. You can specify up to 10 secondary IP addresses.  **Notes:** The secondary IP address of the configured interface and the current IP address of the interface must be in different network segments.
	DHCP: In the DHCP Configuration page, configure DHCP options for the interface. For detailed instructions, see "DHCP" on Page 304.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
Auto-obtain	Set gateway information from DHCP server as the default

Option	Description
	gateway route: With this check box selected, system will set the gateway information provided by the DHCP server as the default gateway route.
	Advanced: • Distance: Specifies a route distance. The value range is 1 to 255. The default value is 1. • Weight: Specifies a route weight. The value range is 1 to 255. The default value is 1. • Management Priority: Specifies a priority for the DNS server. Except for static DNS servers, system can also learn DNS servers dynamically via DHCP or PPPoE. Therefore, you need to configure priorities for the DNS servers, so that system can choose a DNS server according to its priority during DNS resolution. The priority is represented in numbers from 1 to 255. The larger the number is, the higher the priority is. The priority of static DNS servers is 20. • Classless Static Routes: Enable the classless static routing function via the DHCP options. When it is enabled, the DHCP client will send a request message with the Option121 (i.e., classless static routing option) to the server, and then the server will

Option	Description
	return the classless static route information. Finally, the client will add the classless static routing information to the routing table.
	DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
PPPoE	User: Specifies a user name for PPPoE. Password: Specifies PPPoE user's password. Confirm Password: Enter the password again to confirm. Idle Interval: If the PPPoE interface has been idle (no traffic) for a certain period, i.e. the specified idle interval, system will disconnect the Internet connection; if the interface requires Internet access, system will connect to the Internet automatically. The value range is 0 to 10000 minutes. The default value is 30. Re-connect Interval: Specifies a re-connect interval (i.e., system will try to re-connect automatically after being disconnected for the interval). The value range is 0 to 10000 seconds. The default value is 0, which means the function is disabled. Set gateway information from PPPoE server as the default gateway route: With this check box being selec-

Option	Description
	ted, system will set the gateway information provided by PPPoE server as the default gateway route. Advanced Access concentrator: Specifies a name for the concentrator. Authentication: The devices will have to pass PPPoE authentication when trying to connect to a PPPoE server. The supported authentication methods include CHAP, PAP and Any (the default, anyone between CHAP and PAP). Click an authentication method. Netmask: Specifies a netmask for the IP address obtained via PPPoE. Static IP: You can specify a static IP address and negotiate to use this address to avoid IP change. To specify a static IP address, type it into the box. Service: Specifies allowed service. The specified service must be the same with that provided by the PPPoE server. If no service is specified, Hillstone will accept any service returned from the server automatically. Distance: Specifies a route distance. The value range is 1 to 255. The default value is

Option	Description
	1. Weight: Specifies a route weight. The value range is 1 to 255. The default value is 1. DDNS: In the DDNS Configuration page, configure DDNS options for the interface. For detailed instructions, see "DDNS" on Page 319. Tip: This function is available only when you edit the interface.
Management	Select one or more management method check boxes to configure the interface management method, including **Telnet**, **SSH**, **Ping**, **HTTP**, **HTTPS**, **SNMP**, **NETCONF** and **TRACEROUTE**.
WebAuth	
Auth Service	Click the **Enable**, **Close** or **Global Default** radio button as needed. • Enable: Enable the WebAuth function of the specified interface. • Close: Disable the WebAuth function of the specified interface. • Global Default: Specify that the interface uses the global default configuration of WebAuth. For the global default configuration of WebAuth function, see "Web Authentication" on Page 451.

Option	Description
Proactive WebAuth	Click the **Enable** button to enable proactive webauth function and Specify the AAA server. After enabling, you can access the Web authentication address initiate authentication request, and then fill in the correct user name and password in the authentication login page. The Web authentication address consists of the IP address of the interface and the port number of the HTTP/HTTPS of the authentication server. For example the IP address of the interface is 192.168.3.1, authentication server HTTP/HTTPS port numbe is respectively configured as 8182/44434. When the authentication server is configured for HTTP authentication mode, Web address is: http:// 192.168.3.1:8182; when the authentication server is configured for HTTPS mode, the Web address for the https:// 192.168.3.1:44434 certification.
WebAuth Domain Name	Specifies the WebAuth domain name for the interface. The value range is from 1 to 255 characters.In passive WebAuth, you will be prompted to check the identity on the authentication page if you visit a service. In this case, if the Web authentication address is configured with a domain name, the URL of the Web authentication page will be displayed with the domain name instead of the IP address. Enable Web authentication before configuring the WebAuth domain name.

4. "Expand IPv6 Configuration, configure the following." on Page 191

5. Expand Interface Properties, configure properties for the interface.

Property	Description
Duplex	Specifies a duplex working mode for the interface. Options include auto, full duplex and half duplex. Auto is the default working mode, in which system will select the most appropriate duplex working mode automatically. 1000M half duplex is not supported.
Rate	Specifies a working rate for the interface. Options include Auto, 10M, 100M and 1000M. Auto is the default working mode, in which system will detect and select the most appropriate working mode automatically. 1000M half duplex is not supported.
Combo type	This option is applicable to the Combo port of copper port + fiber port. If both the copper port and the fiber port are plugged with cable, the fiber port will be prioritized by default; if the copper port is used at first, and the cable is plugged into the fiber port, and the fiber port will be used for data transmission after reboot. You can specify how to use a copper port or fiber port. For detailed options, see the following instructions: • Auto: The above default scenario. • Copper forced: The copper port is enforced. • Copper preferred: The copper port is prioritized. • Fiber forced: The fiber port is enforced.

Property	Description
	• Fiber preferred: The fiber port is prioritized. With this option configured, the device will migrate the traffic on the copper port to the fiber port automatically without reboot.
MTU	The default MTU value is 1500 bytes. The range is 1280 bytes to 1800/2000 bytes (Different devices support different maximum MTU value.). If the Jumbo Frame function is enabled, the MTU value range is changed to 1280 bytes to 9300 bytes and the default MTU value is 1500 bytes. For more information about the Jumbo Frame function, see Configuring Global Network Parameters.
ARP Learning	Select the Enable checkbox to enable ARP learning.
ARP Learning Limit	When a user host that connects to the interface initiates ARP attacks, ARP entry resources may be exhausted, making other interfaces unable to perform ARP learning. To avoid this issue, the system allows you to enable ARP learning limit and specify the maximum number of ARP entries that can be learned on the interface. After a limit is specified, the interface can no longer perform ARP learning when the maximum number of ARP entries is reached. Click the button to enable ARP learning limit for the interface and enter the maximum number of ARP entries

Property	Description
	allowed on the interface. Valid values: 1 to capacity. **Note:** The capacity varies based on device platforms.
ARP Timeout	Specifies an ARP timeout for the interface. The value range is 5 to 65535 seconds. The default value is 1200.
Keep-alive IP	Specifies an IP address that receives the interface's keep-alive packets.
MAC clone	System clones a MAC address to the Ethernet sub-interface. If the user click "Restore Default MAC", the Ethernet sub-interface will retore the default MAC address.
Bandwidth	
Up Bandwidth	Specifies the maximum value of the up bandwidth of the interface.
Down Bandwidth	Specifies the maximum value of the down bandwidth of the interface.

6. "Expand Advanced Configuration, configure advanced options for the interface." on Page 183
7. "Select Network > Routing > RIP, click Interface Configuration to open the <Interface> page and configure RIP for the selected interface." on Page 186
8. "Select Network > Routing > OSPF, click Interface Configuration to open the <Interface> page and configure OSPF for the selected interface." on Page 187
9. "Select Network > Routing > OSPFv3, click Interface Configuration to open the <Interface> page and configure OSPFv3 for the selected interface. " on Page 189
10. Click **OK**.

Notes:

- Before deleting an aggregate/redundant interface, you must cancel other interfaces' bindings to it, aggregate/redundant sub-interface's configuration, its IP address configuration and its binding to the security zone.
- An Ethernet interface can only be edited but cannot be deleted.
- When a VSwitch interface is deleted, the corresponding VSwitch will be deleted as well.
- The HA interface can not bind the track object.

Viewing the Interface Status

Select **Network** > **Interface**, you can view the status information of the interface in the **Interface Status** column of the interface list, and the status indicators are indicated as follows:

- Physical Status: Display the physical state of the interface. The  icon indicates connected, the  icon indicates HA keep up, the  icon indicates disconnected or lacp disconnected.
- Management Status: Display the management state of the interface. The  icon indicates connected, the  icon indicates disconnected or lacp disconnected.
- Link Status: Display the link state of the interface. The  icon indicates connected, the  icon indicates HA keep up, the  icon indicates disconnected or lacp disconnected.
- IPv4 Protocol Status (Only "Protocol Status" is displayed in the IPv4 version): Display the IPv4 protocol state of the interface. The  icon indicates connected, the  icon indicates HA keep up, the  icon indicates disconnected or lacp disconnected.

- IPv6 Protocol Status (Only displayed in the IPv6 version): Display the IPv6 protocol state of the interface. The icon indicates connected, the icon indicates HA keep up, the icon indicates disconnected or lacp disconnected.

The interface list is displayed as follows:

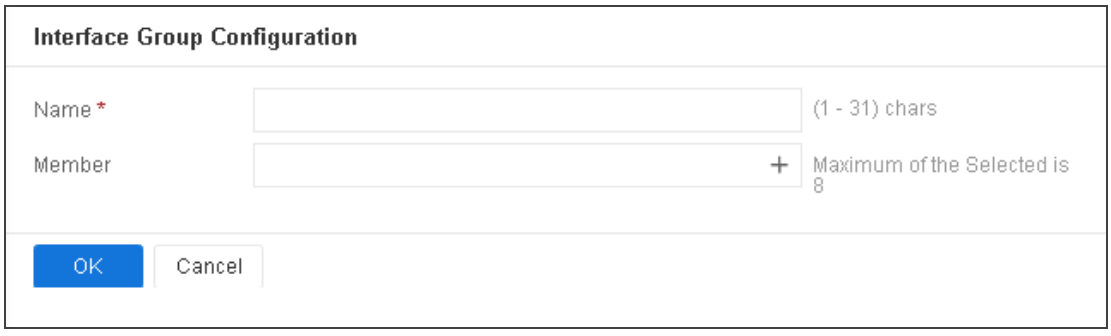
Interface Group

The interface group function binds the status of several interfaces to form a logical group. If any interface in the group is faulty, the status of the other interfaces will be down. After all the interfaces return to normal, the status of the interface group will be Up. The interface group function can binds the status of interfaces on different expansion modules.

Creating an Interface Group

To create an interface group, take the following steps:

1. Select **Network > Interface Group**.
2. Click **New**.



3. In the Interface Group Configuration page, type the name for the interface group. Names of the interface group can not be the same.

4. In the **Member** drop-down list, select the interface you want to add to the interface group. The maximum number of interfaces is 8.

   Note: Members of an interface group can not conflict with other interface groups.

5. Click **OK**.

   You can click **Edit** or **Delete** button to edit the members of interface group or delete the interface group.

LLDP

Network devices are increasingly diverse, and their configurations are respectively complicate. Therefore, mutual discovery and interactions in information of system and configuration between devices of different manufacturers are necessary to facilitate management. LLDP (Link Layer Discovery Protocol) is a neighbor discovery protocol defined in IEEE 802.1ab, which provides a discovery method in link layer network. By means of the LLDP technology, the system can quickly master the information of topology and its changes of the layer-2 network when the scale of network expands rapidly.

By means of LLDP, the LLDP information of the device, including the device information, system name, system description, port description, network management address and so on, can be sent in the form of standard TLV (Type Length Value) multicast message from the physical port to the directly-connected neighbor. If the neighbor enables LLDP too, then neighbor relations will be established between both sides. When the neighbor receives these messages, they are stored in the form of MIB in the SNMP MIB database, in order to be utilized by the network management system to search and analyze the two-layer topology and the problems in it of the current network.

LLDP Work Mode

The 4 work modes of LLDP are listed below:

- Transmit and Receive: the port transmits and receives LLDP messages.
- Receive only: the port only receives LLDP messages.
- Transmit only: the port only transmits LLDP messages.
- Not work: the port neither transmits nor receives LLDP messages.

Related links:

- Configuring LLDP
- Viewing MIB Topology

Configuring LLDP

Configuring LLDP can enable neighbor devices' collection of network topology changes.

- Enabling LLDP
- Modifying LLDP Configuration

Enabling LLDP

LLDP is enabled only when the "Global LLDP" and the "LLDP of Port" are enabled at the same time, so the corresponding port can transmit and receive LLDP messages.

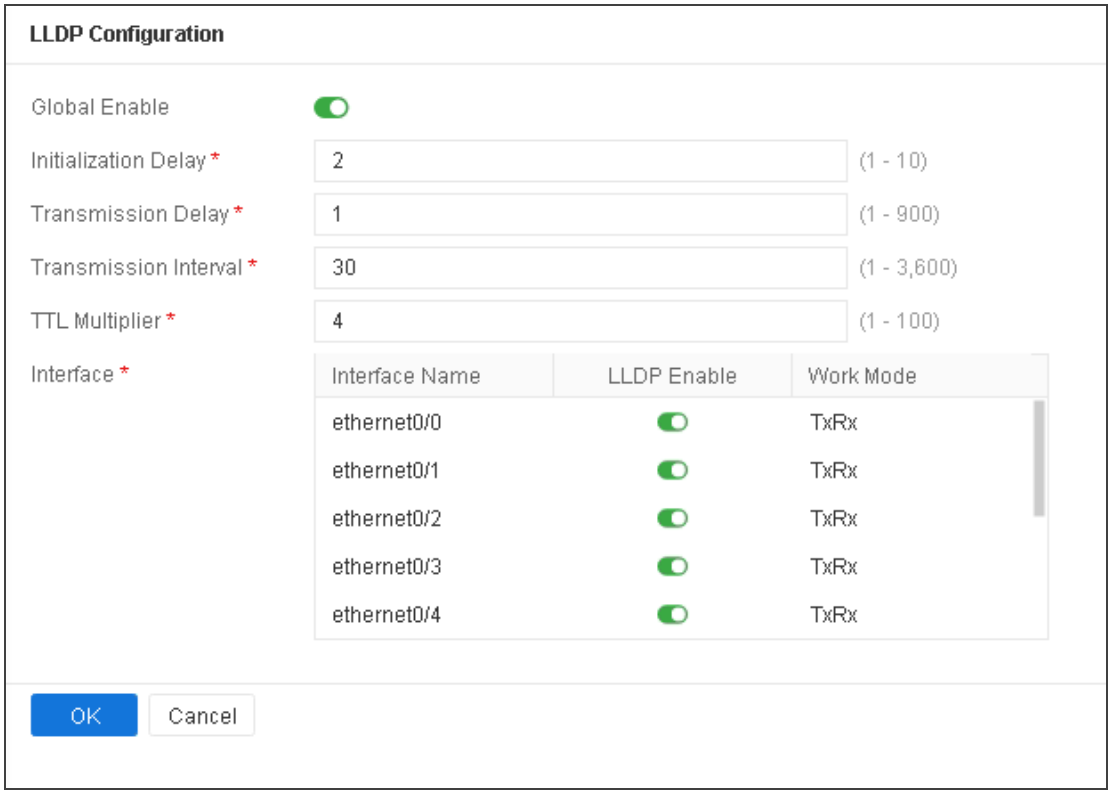
- By default, the global LLDP and the LLDP of port are both disabled.
- When the global LLDP is enabled, the LLDP of port of all the ports of the system will be enabled.
- When the global LLDP is disabled, the LLDP of port of all the ports of the system will be disabled.

- When the global LLDP is enabled, the user does not have to modify LLDP configuration, for LLDP can be enabled by default configuration. If there is a need to optimize LLDP configuration, please see Modifying LLDP Configuration.

Notes: Only the physical port of the device supports enabling LLDP. Logical port does not support this function.

To enable the global LLDP, take the following steps:

1. Select **Network > LLDP > LLDP Configuration**.
2. Click **Global Enable** button.



3. Click **OK** to enable LLDP by default configuration.

LLDP default configuration is as follows:

Option	Default
Initialization Delay	2 seconds
Transmission Delay	1 seconds
Transmission Interval	30 seconds
TTL Mul-tiplier	4 seconds
port	LLDP is enabled in all the physical ports with the work mode being Transmit and Receive.

Modifying LLDP Configuration

According to the loading condition of network, the user can modify related LLDP configuration to reduce the consumption of system resources and optimize the LLDP performance.

To modify LLDP configuration, take the following steps:

- Select **Network > LLDP > LLDP Configuration**.

In the LLDP Configuration page, configure as follows:

Option	Description
Initialization Delay	When the LLDP work mode of the port changes, the sys-tem will operate initialization on the port. Configuring the initialization delay of the port can avoid continuous ini-tialization of the port due to frequent changes of the LLDP work mode.

Option	Description
	Type the delay time of initialization of the port in the **Initialization Delay** text box. The measurement is second-based, and the range is from 1 to 10.
Transmission Delay	Transmission delay refers to the minimal delay time before the LLDP messages are sent to the neighbor device when the state of the local device frequently changes. Type the minimal delay time before the LLDP message is sent in the **Transmission Delay** text box. The measurement is second-based, and the range is from 1 to 900.
Transmission Interval	Transmission interval refers to the time period of transmitting the LLDP message to the neighbor device when the state of the local device state remains stable. Type the transmission period before the LLDP message is sent in the **Transmission Interval** text box. The measurement is second-based, and the range is from 1 to 3600.
TTL Multiplier	TTL (Time to Live) refers to the living time of the local device information in the neighbor device. TTL multiplier is used to adjust the living time of the local device information in the neighbor device. The computational formula is: TTL = Transmission Interval × TTL Multiplier. Type the TTL multiplier value in the **TTL Multiplier** text box. The range is from 1 to 100.
port	Click the Enable button under **LLDP Enable** to enable the

Option	Description
	LLDP function of the port. Select LLDP work mode from the **Work Mode** drop-down menu to modify the LLDP work mode of the port. **Note**: For the introduction of the LLDP work mode, please see LLDP Work Mode.

- Click **OK**.

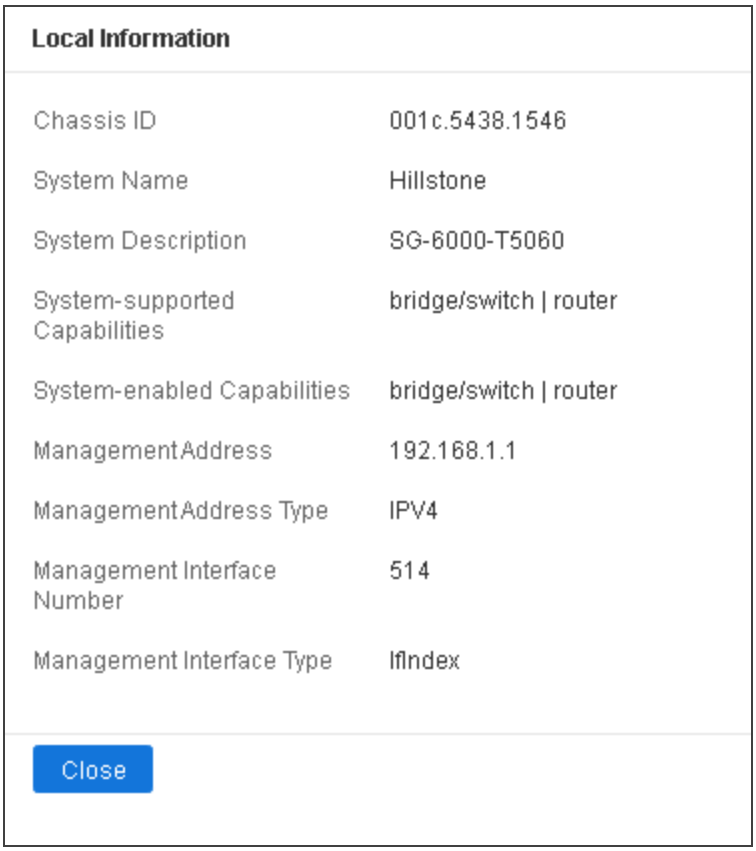
Viewing MIB Topology

The user can view the LLDP local information and the neighbor information (the LLDP information sent from the neighbor device to the local device) of the port in the **MIB Topology** page.

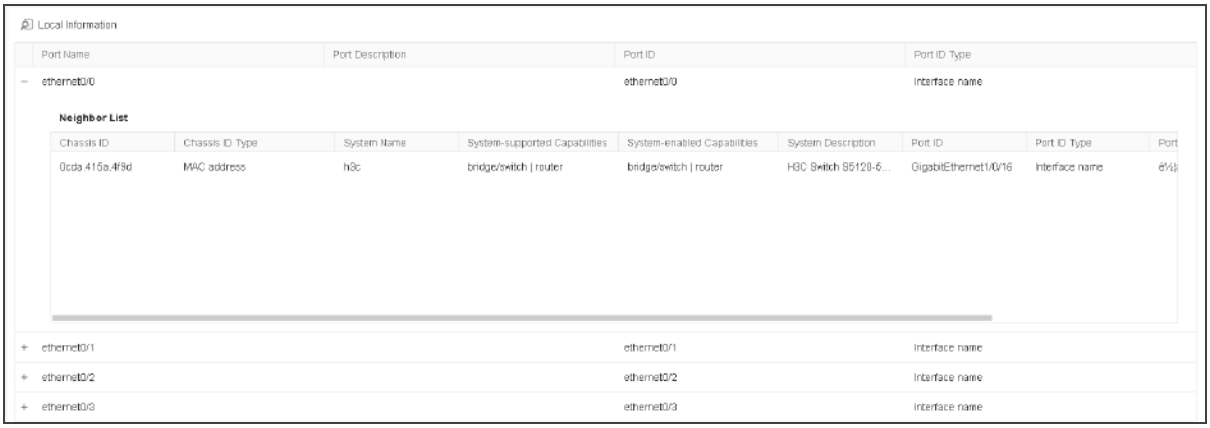
To view the MIB topology, take the following steps.

1. Select **Network > LLDP > MIB Topology**.
2. Click the **Local Information** button to open the **Local Information** page and view the LLDP local information, including chassis ID, system name, system description, system-supported

capabilities, management address and so on.



3. View the MIB topology and neighbor information of all the ports which enable LLDP in the list in the **MIB Topology** page.



Management Interface

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

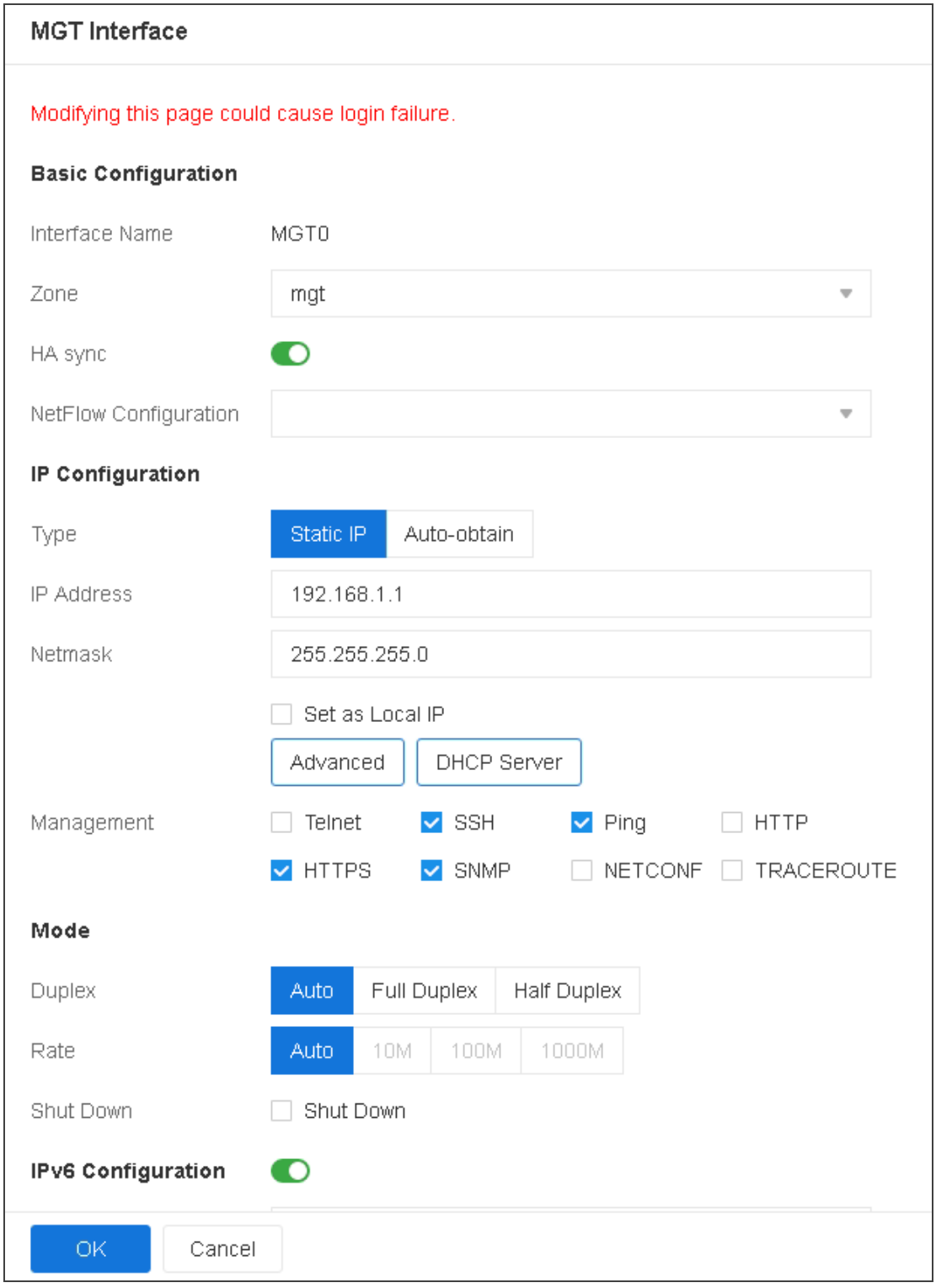
To facilitate the management of the device and meet the requirement of separating the management traffic from the data traffic, the system has an independent management interface (MGT Interface). By default, the management interface belongs to the mgt zone and the mgt-vr virtual router. The mgt zone belongs to the mgt-vr virtual router, the information of routing, ARP table are independent.

Configuring a Management Interface

To configure a MGT interface, take the following steps:

1. Select **Network > Management Interface**.

2. To edit a MGT interface, select the interface and click **Edit**, and the **MGT Interface** page pops up.



In this page, configure the following.

Option	Description
Interface Name	Show the name for the interface.
Zone	Specifies the zone for the management interface in the Zone drop-down list. You can only select a Layer 3 zone. By default, the interface is bound in the mgt zone.
HA sync	Click this button to enable the HA Sync function, which disables Local property and uses the virtual MAC, and the primary device will synchronize its information with the backup device; not clicking this button disables the HA Sync function, which enables Local property and uses the original MAC, and the primary device will not synchronize its information with the backup device.
NetFlow configuration	Select a configured NetFlow profile from the drop-down list below.
IP Configuration	

Option	Description
Static IP	IP address: Specifies an IP address for the interface.
	Netmask: Specifies a netmask for the interface.
	Set as Local IP: In an HA environment, if this option is specified, the interface IP will not synchronize to the HA peer.
	Advanced: • Management IP: Specifies a management IP for the interface. Type the IP address into the box. • Secondary IP: Specifies secondary IPs for the interface. You can specify up to 10 secondary IP addresses.
	DHCP Server: Click the button to configure DHCP options for the interface in the DHCP Configuration page. For detailed instructions, see "DHCP" on Page 304.
Auto-obtain	Specifies to obtain the IP address through DHCP.
Management	Specifies the management methods by selecting the "Telnet/SSH/Ping/HTTP/HTTPS/SNMP" check boxes of the desired management methods.
Transmission Mode	Specifies the mode and rate of the management interface. If you select the Auto duplex transmission mode , you can only select the Auto rate.
Shut Down	Select the check box to shut down the management interface.

3. Expand IPv6 Configuration, configure the following.

Option	Description
Enable	Enable IPv6 in the interface.
IPv6 Address	Specifies the IPv6 address prefix.
Prefix Length	Specifies the prefix length.
Autoconfig	Select the check box to enable Auto-config function. In the address auto-config mode, the interface receives the address prefix in RA packets first, and then combines it with the interface identifier to generate a global address. • Set Default Route - If the interface is configured with a default router, this option will generate a default route to the default router.
DHCP	System supports DHCPv6 client and DHCPv6 server. • Select **DHCP** check box to enable DHCP client for the interface. After enabling, system will act as a DHCPv6 client and obtain IPv6 addresses from the DHCP server. Selecting **Rapid-commit** option can help fast get IPv6 addresses from the server. You need to enable both of the DHCP client and the server's Rapid-commit function. • Click the **DHCPv6 Server** button and configure options as Configuring DHCPv6 Server, system will

Option	Description
	act as a DHCPv6 server to appropriate IPv6 addresses for DHCP client.
IPv6 Advanced	
Static	Click Add button to add several IPv6 address, at most 5 IPv6 addresses. Click Delete button to delete IPv6 address.
Dynamic	Shows IPv6 address which is dynamic.
Link-local	Specifies link-local address. Link-local address is used for communication between adjacent nodes of a single link. For example, communication between hosts when there are no routers on the link. By default system will generate a link-local address for the interface automatically if the interface is enabled with IPv6 (in the interface configuration mode, use the command ipv6 enable). You can also specify a link-local address for the interface as needed, and the specified link-local address will replace the automatically generated one.
MTU	Specifies an IPv6 MTU for an interface. The default MTU value is 1500 bytes. The range is 1280 bytes to 1800/2000 bytes (Different devices support different maximum MTU value.). If the Jumbo Frame function is enabled, the MTU value range is changed to 1280 bytes to 9300 bytes and the default MTU value is 1500 bytes. For more information about the Jumbo Frame function, see Configuring Global Network Parameters.

Option	Description
DAD Attempts	Specifies NS packet attempt times. The value range is 0 to 20. Value 0 indicates DAD is not enabled on the interface. If system does not receive any NA response packets after sending NS packets for the attempt times, it will verify that the IPv6 address is an unique available address. DAD (Duplicate Address Detection) is designed to verify the uniqueness of IPv6 addresses. This function is implemented by sending NS (Neighbor Solicitation) requests. After receiving a NS packet, if any other host on the link finds that the address of the NS requester is duplicated, it will send a NA (Neighbor Advertisement) packet advertising that the address is already in use, and then the NS requester will mark the address as duplicate, indicating that the address is an invalid IPv6 address.
ND Interval	Specifies an interval for sending NS packets.
ND Reachable Time	Specifies reachable time. After sending an NS packet, if the interface receives acknowledgment from a neighbor within the specified time, it will consider the neighbor as reachable. This time is known as reachable time.
Hop Limit	Specifies the hop limit. Hop limit refers to the maximum number of hops for IPv6 or RA packets sent by the interface.
ND RA	Select the checkbox to disable RA suppress on LAN inter-

Option	Description
Suppress	faces. By default, FDDI interface configured with IPv6 unicast route will send RA packets automatically, and interfaces of other types will not send RA packets.
Manage IP/MASK	Specifies the manage IP/MASK.

4. Click **OK**.

5. To create the virtual forward interface of MGT0 (that is, the MGT interface of HA group 1）, click **New** to open **Virtual Forward Interface** page for configuration.

VLAN

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

VLAN, the abbreviation for Virtual Local Area Network, is defined in IEEE 802.1Q. VLAN has the following features:

- A physical LAN can be divided into multiple VLANs, and a VLAN might include devices from multiple physical networks.
- A VLAN is virtually a broadcast domain. Layer 2 packets between VLANs are isolated. Communication between VLANs can only be implemented by a Layer 3 route technique (through routers, Layer 3 switches, or other Layer 3 network devices).

VLANs are distinguished by VLAN numbers. The value range is 1 to 4094. System reserves 32 VLAN numbers (224 to 255) for BGroup, but the unused numbers within the range are also available to VLANs.

Configuring a VLAN

To create a VLAN, take the following steps:

1. Select **Network > VLAN**.
2. Click **New**.

   In the VLAN Configuration page, type a number in the VLAN ID text box, the value range is from 1 to 4094.
3. Click **OK**.

DNS

DNS, the abbreviation for Domain Name System, is a computer and network service naming system in form of domain hierarchy. DNS is designed for TCP/IP network to query for Internet domain names (e.g., www.xxxx.com) and translate them into IP addresses (e.g., 10.1.1.1) to locate related computers and services.

The security device's DNS provides the following functions:

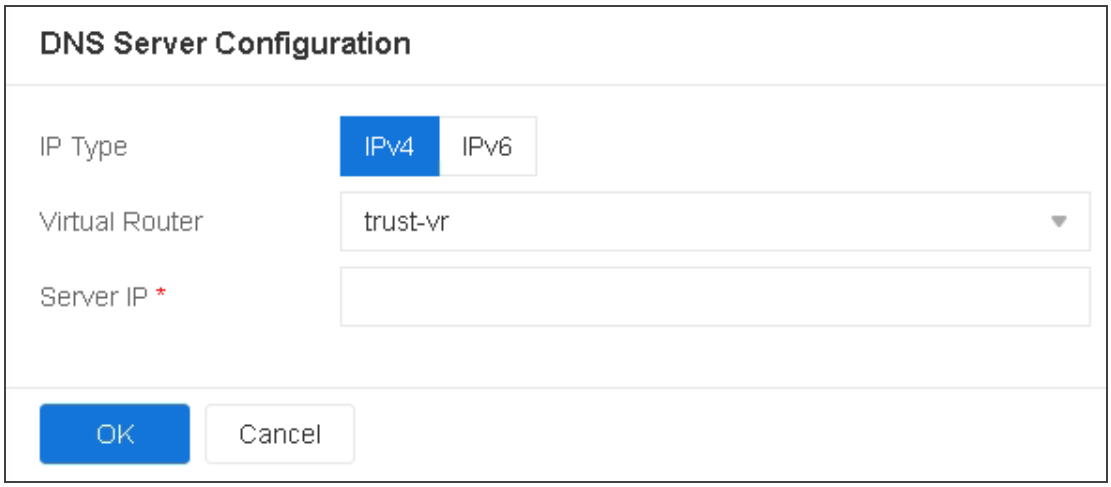
- Server: Configures DNS servers and default domain names for the security device.
- Proxy:As a DNS proxy, the device can filter the DNS request according to the DNS proxy rules set by the user, and system will forwarded the qualified DNS request to the designated DNS server.
- Analysis: Sets retry times and timeout for device's DNS service.
- Cache: DNS mappings to cache can speed up query. You can create, edit and delete DNS mappings.
- NBT Cache: Displays NBT cache information.

Configuring a DNS Server

You can configure a DNS server for system to implement DNS resolution. To create a DNS server, take the following steps:

1. Select **Network > DNS > DNS Server**.

2. Click **New** in the DNS Server section.



3. Select the IP address type, including IPv4 or IPv6.

4. Select a VRouter from the VR drop-down list. The default VRouter is trust-vr.

5. Type the IP address for the DNS server into the Server IP box

6. Click **OK**.

Configuring a DNS Proxy

DNS Proxy function take effect by the DNS proxy rules.Generally a proxy rule consists of two parts: filtering condition and action. You can set the filtering condition by specifying traffic's ingress interface , source address, destination address, and domain name. The action of the DNS proxy rules includes proxy,bypass and block. When the action of the proxy rule is specified as proxy, you need to configure the DNS proxy servers, so that the DNS request meeting the filtering condition will be resolved by these DNS proxy servers.

Configuring a DNS Proxy Rule

To create a DNS proxy rule, take the following steps:

1. Select **Network > DNS > DNS Proxy**.

2. Click **New** in the DNS Proxy section.

3. In the <DNS Proxy Rule Configuration> page, configure the following settings.

Option	Description
Description	Add the description.
Type	Specify the type of a DNS proxy rule, IPv4 or IPv6.
Ingress Interface	Specify the ingress interface of DNS request in the rule to filter the DNS request message.It is permissible to specify numbers of interfaces.
Source Address	Specify the source address of DNS request to filter the DNS request message. It is permissible to specify multiple source address filtering conditions. Select the address entry type and then type the address. Click Add to add the selected entry to the pane. 1. Select an address type from the **Address** drop-down list. 2. Select or type the source addresses based on the selected type. 3. Click **Add** to add the addresses to the left pane. 4. After adding the desired addresses, click **Close** to complete the source address configuration. You can also perform other operations: • When selecting the **Address Book** type, you can

Option	Description
	click  button to create a new address entry. • You can click in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched. • When selecting the **IPv4** type, the default address configuration is any. To restore the configuration to this default one, select the **any** check box. • When selecting the **IPv6** type, the default address

Option	Description
	configuration is IPv6-any. To restore the configuration to this default one, select the **IPv6-any** check box.
Destination Address	Specify the destination address of DNS request to filter the DNS request message. It is permissible to specify multiple destination address filtering conditions. Select the address entry type and then type the address. Click Add to add the selected entry to the pane. 1. Select an address type from the **Address** drop-down list. 2. Select or type the destination addresses based on the selected type. 3. Click **Add** to add the addresses to the left pane. 4. After adding the desired addresses, click **Close** to complete the destination address configuration. You can also perform other operations: • When selecting the **Address Book** type, you can click ⊕ button to create a new address entry. • You can click ▼ in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the

Option	Description
	Address field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched. • When selecting the **IPv4** type, the default address configuration is any. To restore the configuration to this default one, select the **any** check box. • When selecting the **IPv6** type, the default address configuration is IPv6-any. To restore the configuration to this default one, select the **IPv6-any** check box
Domain	Specify the domain name of DNS request to filter the DNS request message. It is permissible to specify multiple domain name filtering conditions.

Option	Description
	Select the domain entry type and then type the domain. Click **Add** to add the selected entry to the pane. 1. Select an address type from the **Domain** drop-down list. 2. Select or type the domain name. 3. Click **Add** to add the domain to the left pane. 4. After adding the desired domain, click **Close** to complete the domain configuration. You can also perform other operations: • When selecting the **Host Book** type, you can click **Add** to create a new host book entry. • The default domain configuration is any. To restore the configuration to this default one, select the **any** check box.
Action	Specify the action for a DNS proxy rule. For the DNS request that meets the filtering conditions, system can proxy, bypass or block the traffic.
DNS Proxy Failed	Specify the action for DNS proxy failed. System can block or bypass the DNS request and then forward it to the DNS server originally requested by the message.
Log	Click the **Enable** button to enable the DNS proxy log function. With this function enabled, the system will gen-

Option	Description
	erate log information when there is DNS request traffic matching this DNS proxy rule. You can view the DNS proxy log in the "Network Log" on Page 1696 page.
DNS Server	Specify the DNS proxy server. When the action of the proxy rule is specified as proxy, you need to configure the DNS proxy servers. You can specify up to six DNS server and you can configure the interface and preferred properties for the DNS server as needed. When you configure multiple DNS servers, the DNS server with preferred property will be selected for domain name resolution. If no preferred server is specified, the system will query whether there are DNS servers that have specified the egress interface; If so, select these DNS server in a round robin. Except for these two kinds of DNS servers, which means that there are only regular DNS server, then system will select this kind of DNS servers in a round robin. At the bottom of the DNS server list, click the "+" button, and a table entry will be added. Enter the IP address (IPv4 address or IPv6 address) of server and other parameters ,such as the virtual router.
DNS64	If the IPv6 client host receives the DNS query request, it will use DNS64 to resolve the AAAA record (IPv6 address) in the DNS query information. If the resolution is successful, the IPv6 address is directly returned to the

Option	Description
	client. If the resolution fails, it will use DNS64 to resolve the A record (IPv4 address) in the DNS query information, and return the A record (IPv4 address) to the AAAA record (IPv6 address) to the client. Click the **Enable** button to enable the DNS64 function. By default, the DNS64 function is disabled.
DNS64 Server	The DNS64 server is used to resolve the A record (IPv4 address) in the DNS query information. Each IPv6 DNS proxy rule can specify up to 6 DNS64 servers. DNS64 Prefix: Specifies the DNS64 prefix and prefix length. The DNS64 prefix to synthesize the A record (IPv4 address) into an AAAA record (IPv6 address). The synthesized IPv6 address is in the form of "DNS64 prefix + IPv4 address". By default, the DNS64 prefix is "64:ff9b:: /96". At the bottom of the DNS64 server list, click the "+" button, and a table entry will be added. Enter the IP address (IPv4 address) of server and other parameters ,such as the virtual router.

4. Click **OK**.

Enabling/Disabling a DNS Proxy Rule

DNS proxy rule is enabled by default. To disable or enable the function, take the following steps:

1. Select **Network > DNS > DNS Proxy**.
2. Select the rule that you want to enable/disable.
3. Click **Enable** or **Disable** to enable or disable the rule.

Adjusting DNS Proxy Rule Position

To adjust the rule position, take the following steps:

1. Select **Network > DNS > DNS Proxy**.
2. Select the check box of the security policy whose position will be adjusted.
3. Click **Priority**.
4. In the pop-up menu, type the rule ID or name , and click **Top**, **Bottom**, **Before ID** , **After ID** , **Before Name** or **After Name**. Then the rule will be moved to the top, to the bottom, before or after the specified ID or name.

DNS Proxy Global Configuration

To set the DNS proxy global configuration, take the following steps:

1. Select **Network > DNS > DNS Proxy**.
2. Click **DNS Proxy Global Configuration** in the DNS Proxy section.
3. In the <DNS Proxy Global Configuration> page, configure the following settings.

Option	Description
TTL	Enable and specifies the TTL for DNS-proxy’ s response packets. If the DNS-proxy requests are not responded after the TTL, the DNS client will clear all DNS records.

Option	Description
	The value range is 30 to 600 seconds. The default value is 60.
Server Track	Enable the DNS proxy server track and configure the time interval of tracking for DNS proxy server. System will periodically detect the DNS proxy server at a specific time interval. When the server cannot be tracked, the IP address of server will be removed from the DNS resolution list untill the link is restored. By default, the tracking for DNS proxy server is enabled.
UDP Checksum	Click the checkbox to enable/disable calculating the checksum of UDP packet for DNS proxy. The system will calculate the checksum of UDP packet for DNS proxy when the DNS proxy on interfaces is enabled. If you need to improve the performance of the device, you can disable this function.

4. Click **OK**.

DNS Proxy Hit Analysis

DNS Proxy Hit Analysis is a process to check the DNS proxy rule hit counts, that is, when DNS request traffic matches a certain DNS proxy rule, the hit count will increase by 1 automatically, and the ratio of the hit number of each DNS proxy rule to all the DNS requests of the system is counted, which directly shows the efficiency of the use of DNS proxy rules in the user network.

To view DNS proxy statistics, take the following steps:

1. Select **Network > DNS > DNS Proxy**.
2. Click **DNS Proxy Hit Analysis** above the DNS proxy rule list.

   View DNS proxy statistics in the <DNS Proxy Hit Analysis> page:

Option	Description
Time	Select a statistic period from the drop-down list: • Last 60 Minutes: Displays the statistical information within the latest 1 hour. • Last 24 Hours: Displays the statistical information within the latest 1 day. • Last 7 Days: Displays the statistical information within the latest 1 week. • Last 30 Days: Displays the statistical information within the latest 1 month. • All: Displays all the statistical information.
Clear	Click **Clear** to clear all the statistical information of all DNS proxy rules.
ID	Shows DNS proxy rule ID.
Hit count	Shows the hit count of a DNS proxy rule within the specified statistic period.
Hit percentage	Shows the ratio of the hit number of a DNS proxy rule to all the DNS requests of the system within the specified statistic period.

3. Click **Close**.

Configuring an Analysis

Analysis configuration includes DNS requests' retry times and timeout.

- Retry: If there is no response from the DNS server after the timeout, system will send the request again; if there is still no response from the DNS server after the specified retry times (i.e. the number of times to repeat the DNS request), system will send the request to the next DNS server.
- Timeout: System will wait for the DNS server's response after sending the DNS request and will send the request again if no response returns after a specified time. The period of waiting for a response is known as timeout.
- TTL: TTL refers to the survival time of the DNS domain name resolution cache (including dynamic DNS cache and register DNS cache). If the DNS resolution cache are not responded after the TTL, the system will clear all domain name records.

To configure the retry times, timeout and TTL for DNS requests, take the following steps:

1. Select **Network > DNS > Analysis**
2. Select the retry times radio button.
3. Select the timeout values radio button.
4. Select the TTL radio button, which can be a value returned by DNS server (the default value) or a user-defined value (range from 60s to 600s).
5. Click **Apply**.

Configuring a DNS Cache

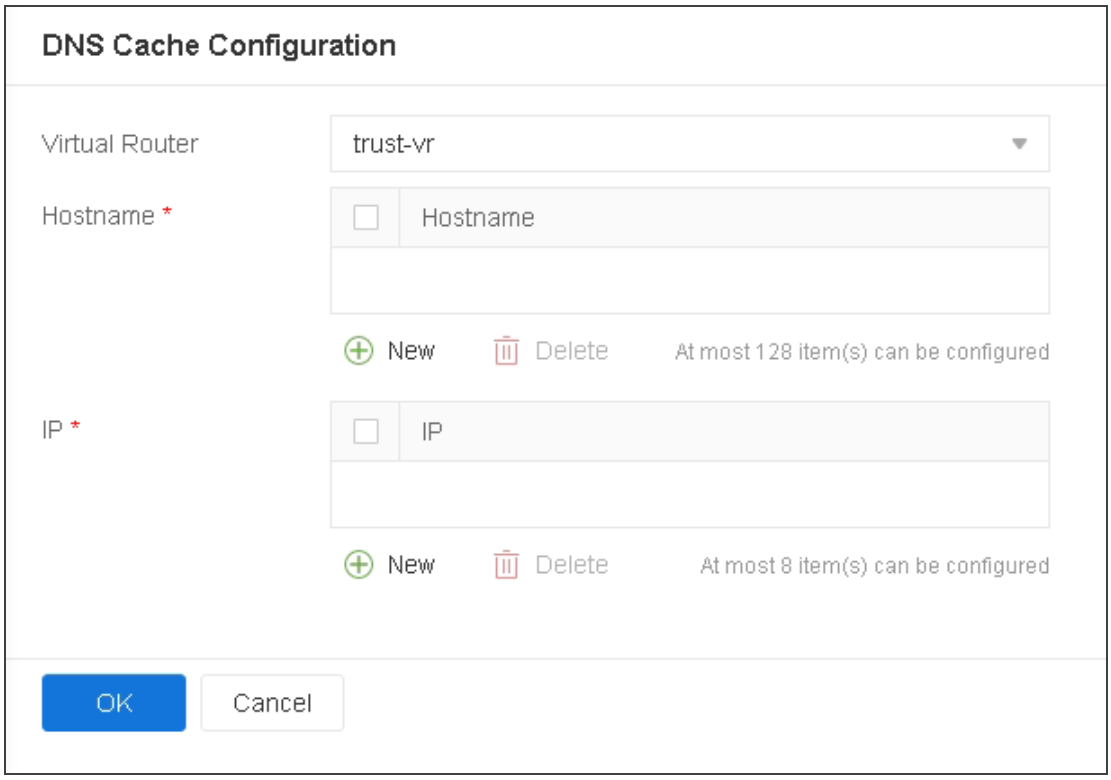
When using DNS, system might store the DNS mappings to its cache to speed up the query. There are three ways to obtain DNS mappings:

- Dynamic: Obtains from DNS response.
- Static: Adds DNS mappings to cache manually.
- Register: DNS hosts specified by some modules of security devices, such as NTP, AAA, etc.

For convenient management , DNS static cache supports group function, which means users make the multiple domain hosts with the same IP address and virtual router is a DNS static cache group.

To add a static DNS mapping to cache, take the following steps:

1. Select **Network > DNS > Cache**
2. Click **New**.



Option	Description
Hostname	Specify the hostname of a DNS cache group. You can

Option	Description
	click ⊕ to add or click 🗑 button to delete the specified hostname. The maximum number of domain hosts is 128, and the maximum length of each hostname is 255 characters.
IP	Specify the host IPv4 address of a DNS cache group. You can click ⊕ to add or click 🗑 button to delete the specified IP. The maximum number of host IP address is 8, and the earlier configured IP will be matched first.
Virtual Router	Select a VRouter.

3. Click **OK**.

Notes:

- Only DNS static cache group can support new, edit and delete operation , while dynamic and register cache cannot .
- The DNS dynamic cache can be deleted by command or the lifetime reset. For detailed information , refer to **StoneOS CLI User Guide** and download PDF on website.
- User can clear the register cache only by deleting the defined hosts in function module.
- DNS static cache is superior to dynamic and register cache, which means the static cache will cover the same existed dynamic or register cache.

NBT Cache

System supports NetBIOS name resolution. With this function enabled, system can automatically obtain all the NetBIOS host names registered by the hosts within the managed network, and store them in the cache to provide IP address to NetBIOS host name query service for other modules.

Enabling a NetBIOS name resolver is the pre-requisition for displaying host names in NAT logs. For more information on how to display host names in the NAT logs, see "Log Configuration" on Page 1713.

To enable NetBIOS for a zone, select the NBT cache check box when creating or editing the zone. For more details, see "Security Zone" on Page 169. The security zone with NetBIOS enabled should not be the zone that is connected to WAN. After NetBIOS is enabled, the query process might last for a while, and the query result will be added to the NetBIOS cache table. System will perform the query again periodically and update the result.

Notes: Only when PCs have NetBIOS enabled can their host names be queried. For more information on how to enable NetBIOS, see the detailed instructions of your PC's Operating System.

To clear NBT cache, take the following steps:

1. Select **Network > DNS > NBT Cache**.
2. Select a VRouter from the VR drop-down list to display the NBT cache in that VRouter.
3. Select a NBT cache entry from the list and click **Delete**.

DHCP

DHCP, the abbreviation for Dynamic Host Configuration Protocol, is designed to allocate appropriate IP addresses and related network parameters for subnetworks automatically, thus reducing requirement on network administration. Besides, DHCP can avoid address conflict to assure the re-allocation of idle resources.

DHCP supports to allocate IPv4 and IPv6 addresses.

System supports DHCP client, DHCP server and DHCP relay proxy.

- DHCP client: The interface can be configured as a DHCP client and obtain IP addresses from the DHCP server. For more information on configuring a DHCP client, see "Configuring an Interface" on Page 176.
- DHCP server: The interface can be configured as a DHCP server and allocate IP addresses chosen from the configured address pool for the connected hosts.
- DHCP relay proxy: The interface can be configured as a DHCP relay proxy to obtain DHCP information from the DHCP server and forward the information to connected hosts.

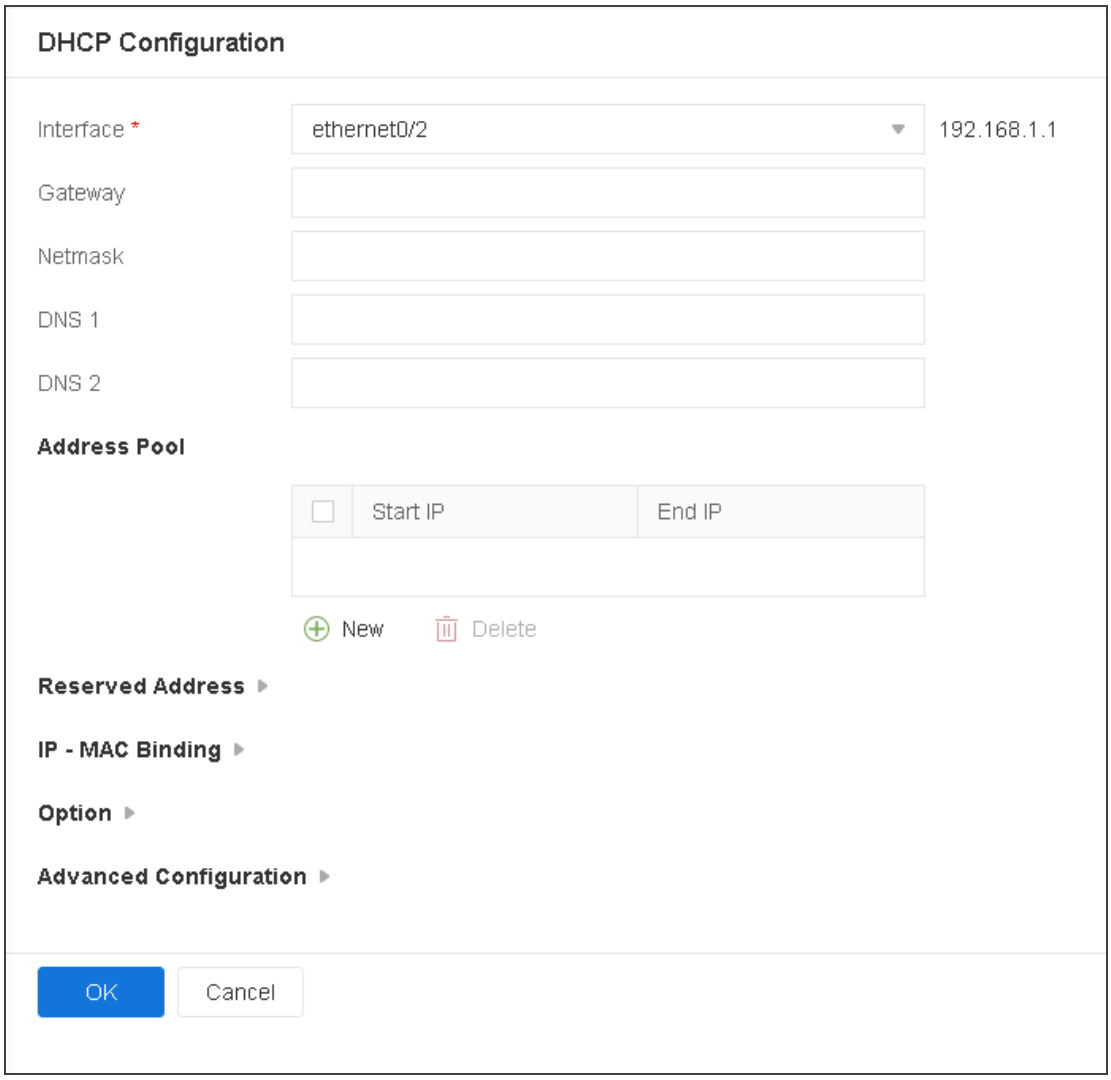
The security devices are designed with all the above three DHCP functions, but an individual interface can be only configured with one of the above functions.

Configuring a DHCP Server

To create a DHCP server, take the following steps:

1. Select **Network > DHCP**.

2. Select **New > DHCP Server**.



3. In the DHCP Configuration page, configure as following:

Option	Description
Interface	Configures a interface which enables the DHCP server.
Gateway	Configures a gateway IP for the client.

Option	Description
Netmask	Configures a netmask for the client.
DNS1	Configures a primary DNS server for the client. Type the server's IP address into the box.
DNS2	Configures an alternative DNS server for the client. Type the server's IP address into the box.
Address pool	Configures an IP range in the address pool. The IPs within this range will be allocated. Take the following steps: 1. Type the start IP and end IP into the Start IP and End IP box respectively. 2. Click **New** to add an IP range which will be displayed in the list below. 3. Repeat the above steps to add more IP ranges. To delete an IP range, select the IP range you want to delete from the list and click **Delete**.

4. Configure Reserved Address (IP addresses in the Reserved Address, within the IP range of the address pool, are reserved for the DHCP server and will not be allocated).
   To configure a reserved address, expand **Reserved Address**, type the start and end IP for an IP range into the Start IP and End IP box respectively, and then click **New**. To delete an IP range, select the IP range you want to delete from the list and then click **Delete**.

5. Configure IP-MAC Binding. If the IP is bound to a MAC address manually, the IP will only be allocated to the specified MAC address.
   To configure an IP-MAC Binding, expand **IP-MAC Binding** and type the IP and MAC

address into the IP address and MAC box respectively, type the description in the Description text box if necessary, and then click **New**. Repeat the above steps to add multiple entries. To delete an IP-MAC Binding, select an entry from the list and click **Delete**.

6. **Expand Option, configure the options supported by DHCP server.**

Option	Description
43	Option 43 is used to exchange specific vendor specific information (VSI) between DHCP client and DHCP server. The DHCP server uses option 43 to assign Access Controller (AC) addresses to wireless Access Point (AP), and the wireless AP use DHCP to discover the AC to which it is to connect. 1. Click **New**. 2. Select **43** from the **Option** drop-down list. 3. Select the type of the VSI, ASCII or HEX. When selecting ASCII, the VSI matching string must be enclosed in quotes if it contains spaces. 4. Enter the VSI in the **Sign** text box. **Notes:** If the VCI matching string has been configured, first of all, you need to verify the VCI carried by the option 60 field in client's DHCP packets. When the VCI matches the configured one, the IP address, option 43 and corresponding information will be offered. If not, DHCP server will drop client's DHCP

Option	Description
	packets and will not reply to the client.
49	After you configure the option 49 settings, the DHCP client can obtain the list of the IP addresses of systems that are running the X window System Display Manager. To configure the option 49 settings: 1. Click **New**. 2. Select **49** from the **Option** drop-down list. 3. Enter the IP address of the system that is running the X window System Display Manager into the **IP address** box. 4. Repeat the above steps to add multiple entries. To delete an entry, select it from the list and click **Delete**.
60	After configuring the VCI carried by option 60 for DHCP server, the DHCP packets sent by the DHCP server will carry this option and the corresponding VCI. 1. Click **New**. 2. Select **60** from the **Option** drop-down list. 3. Select the type of the VCI, ASCII or HEX. When selecting ASCII, the VCI matching string must be enclosed in quotes if it contains spaces.

Option	Description
	4. Enter the VCI in the **Sign** text box. 5. Repeat the above steps to add multiple entries. To delete an entry, select it from the list and click **Delete**.
66	The option 66 is used to configure the TFTP server name option. By configuring Option 66, the DHCP client get the domain name or the IP address of the TFTP server. You can download the startup file specified in the Option 67 from the TFTP server. 1. Click **New**. 2. Select **66** from the **Option** drop-down list. 3. Select the type of the TFTP server name, ASCII or HEX. When selecting ASCII, the length of TFTP server is 1 to 255 characters, but the maximum length between the two periods (.) is only 63 characters. 4. Enter the domain name or the IP address of the TFTP server in the **Sign** text box. 5. Repeat the above steps to add multiple entries. To delete an entry, select it from the list and click **Delete**.
67	The option 67 is used to configure the startup file name

Option	Description
	option for the TFTP server. By configuring option 67, the DHCP client can get the name of the startup file. 1. Click **New**. 2. Select **67** from the **Option** drop-down list. 3. Select the type of the startup file name, ASCII or HEX. When selecting ASCII, the length of startup file name is 1 to 255 characters. 4. Enter the startup file name in the **Sign** text box. 5. Repeat the above steps to add multiple entries. To delete an entry, select it from the list and click **Delete**.
138	The DHCP server uses option 138 to carry a list of 32-bit (binary) IPv4 addresses indicating one or more CAPWAP ACs available to the WTP. Then the WTP discovers and connects to the AC according to the provided AC list. 1. Click **New**. 2. Select **138** from the **Option** drop-down list. 3. Enter the AC IP address in the **IP address** text box. 4. Repeat the above steps to add multiple entries. To delete an entry, select it from the list and

Option	Description
	click **Delete**. You can add up to four AC IP addresses. If you do not set the option 138 for the DHCP server or the DHCP client does not request option 138, DHCP server will not offer the option 138 settings.
150	The option 150 is used to configure the address options for the TFTP server. By configuring option 150, the DHCP client can get the address of the TFTP server. 1. Click **New**. 2. Select **150** from the **Option** drop-down list. 3. Enter the TFTP server IP address in the **IP address** text box. 4. Repeat the above steps to add multiple entries. To delete an entry, select it from the list and click **Delete**.
242	The option 242 is a private DHCP private option for IP phones. By configuring option 242, the specific parameters information of IP phone can be exchanged between DHCP server and DHCP client, such as call server address (MCIPADD), call the server port (MCPORT), the address of the TLS server (TLSSRVR), HTTP (HTTPSRVR) HTTP server address and server port (HTTPPORT) etc.

Option	Description
	1. Click **New**. 2. Select **242** from the **Option** drop-down list. 3. Select the type of the specific parameters of the IP phone, ASCII or HEX. When selecting ASCII, the length of startup file name is 1 to 255 characters. 4. Enter the specific parameters of the IP phone in the **Sign** text box. 5. Repeat the above steps to add multiple entries. To delete an entry, select it from the list and click **Delete**.

7. Expand Advanced Configuration to configure the DHCP server's advanced options.

Option	Description
Domain	The domain name configured by the DHCP client.
Lease	Specifies a lease time. The value range is 300 to 1048575 seconds. The default value is 3600. Lease is the period during which a client is allowed to use an IP address, starting from the time the IP address is assigned. After the lease expires, the client will have to request an IP address again from the DHCP server.
Auto Configure	Enables automatic configuration. Select an interface with DHCP client enabled on the same gateway from the drop-

Option	Description
	down list. "----"indicates auto configure is not enabled. Auto configure will activate function in the following condition: Another interface with DHCP configured on the device enables DHCP client. When auto configure is enabled, if the DHCP server (Hillstone device) does not have DNS, WINS or domain name configured, the DHCP client (DHCP) will dispatch the DNS, WINS and domain name information obtained from a connected DHCP server to the host that obtains such information from the DHCP server (Hillstone device). However, the DNS, WINS and domain name that are configured manually still have the priority.
WINS1	Configures a primary WINS server for the client. Type the server's IP address into the box.
WINS2	Configures an alternative WINS server for the client. Type the server's IP address into the box.
Server	
SMTP server	Configures a SMTP server for the client. Type the server's IP address into the box.
POP3 server	Configures a POP3 server for the client. Type the server's IP address into the box.
News server	Configures a news server for the client. Type the server's IP address into the box.

Option	Description
Relay agent	When the device1 with DHCP server enabled is connected to another device2 with DHCP relay enabled, and the PC obtains device1's DHCP information from device2, then only when the relay agent's IP address and netmask are configured on device1 can the DHCP information be transmitted to the PC successfully. Relay agent: Type relay agent's IP address and netmask, i.e., the IP address and netmask for the interface with relay agent enabled on device2.
VCI-match-string	The DHCP server can verify the VCI carried by option 60 in the client’ s DHCP packets.When the VCI in the client's DHCP packet matches the VCI matching string you configured in the DHCP server, the DHCP server will offer the IP address and other corresponding information. If not, the DHCP server will drop the client's DHCP packets and will not reply to the client. If you do not configure a VCI matching string for the DHCP server, it will ignore the VCI carried by option 60. 1. Select the type of the VCI matching string, ASCII or HEX. When selecting ASCII, the VCI matching string must be enclosed in quotes if it contains spaces. 2. Enter the VCI matching string in the text box.

8. Click **OK**.

Configuring a DHCP Relay Proxy

The device can act as a DHCP relay proxy to receive requests from a DHCP client and send requests to the DHCP server, and then obtain DHCP information from the server and return it to the client.

To create a DHCP relay proxy, take the following steps:

1. Select **Network > DHCP**.
2. Click **New > DHCP Relay Proxy**.
3. In the DHCP Relay Proxy page, select an interface to which the DHCP Relay Proxy will be applied from the Interface drop-down list.
4. Type the IP addresses of DHCP servers into the Server 1/Server 2/Server 3 boxes.
5. Click **OK**.

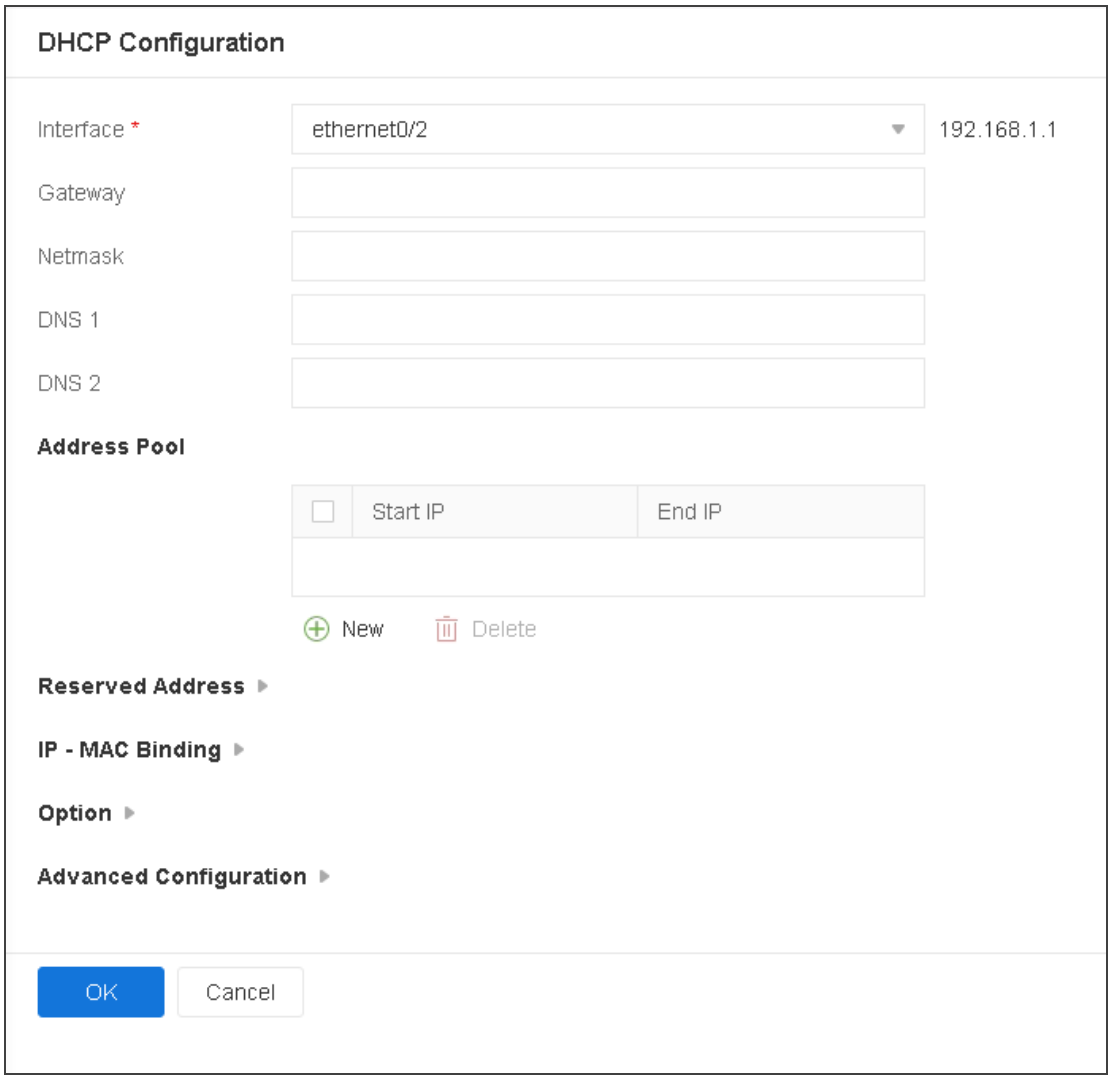
Notes: To ensure that clients can successfully obtain IP addresses, the administrator needs to configure DHCP relay permit policies in the direction from the DHCP server to clients.

Configuring a DHCPv6 Server

To create a DHCPv6 server to appropriate IPv6 addresses, take the following steps:

1. Select **Network > DHCP**.

2. Select **New > DHCPv6 Server**.



3. In the DHCPv6 Configuration page, configure as following:

Option	Description
Interface	Configures a interface which enables the DHCPv6 server to appropriate IPv6 addresses.
rapid-commit	Clicking this button can help fast get IPv6 address from

Option	Description
	the server. You need to enable both of the DHCP client and server's Rapid-commit function.
Preference	Specifies the priority of the DHCPv6 server. The range should be from 0 to 255. The bigger the value is, the higher the priority is.
DNS1	Configures a primary DNS server for the client. Type the server's IP address into the box.
DNS2	Configures an alternative DNS server for the client. Type the server's IP address into the box.
Domain	Configures the domain name for the DHCP client.
Address Pool: System can act as a DHCPv6 server to allocate IPv6 addresses for the DHCP clients in the subnets.	
IP	Specifies the IPv6 address prefix and prefix length.
Valid Life-time	Specifies the lifetime of the address.
Preferred Lifetime	Specifies the preferred lifetime for the IPv6 address. The preferred lifetime should not be larger than the valid life-time.

4. Click **OK**.

Configuring a DHCPv6 Relay Proxy

The device can act as a DHCPv6 relay proxy to receive requests from a DHCPv6 client and send requests to the DHCPv6 server, and then obtain DHCP information from the server and return it to the client.

To create a DHCPv6 relay proxy, take the following steps:

1. Select **Network > DHCP**.
2. Click **New > DHCPv6 Relay Proxy**.
3. In the DHCP Relay Proxy page, select an interface to which the DHCPv6 Relay Proxy will be applied from the Interface drop-down list.
4. Type the IPv6 addresses of DHCPv6 servers into the Server 1/Server 2/Server 3 boxes.
5. If the DHCPv6 server is specified as link-local address, you need to select the egress interface name from Egress Interface 1/Egress Interface 2/Egress Interface 3 dropdown list.
6. Click **OK**.

DDNS

DDNS (Dynamic Domain Name Server) is designed to resolve fixed domain names to dynamic IP addresses. Generally you will be allocated with a dynamic IP address from ISP each time you connect to the Internet, i.e., the allocated IP addresses for different Internet connections will vary. DDNS can bind the domain name to your dynamic IP address, and the binding between them will be updated automatically each time you connect to the Internet.

In order to enable DDNS, you will have to register in a DDNS provider to obtain a dynamic domain name. Hillstone devices support the following 5 DDNS providers, and you can visit one of the following websites to complete the registration:

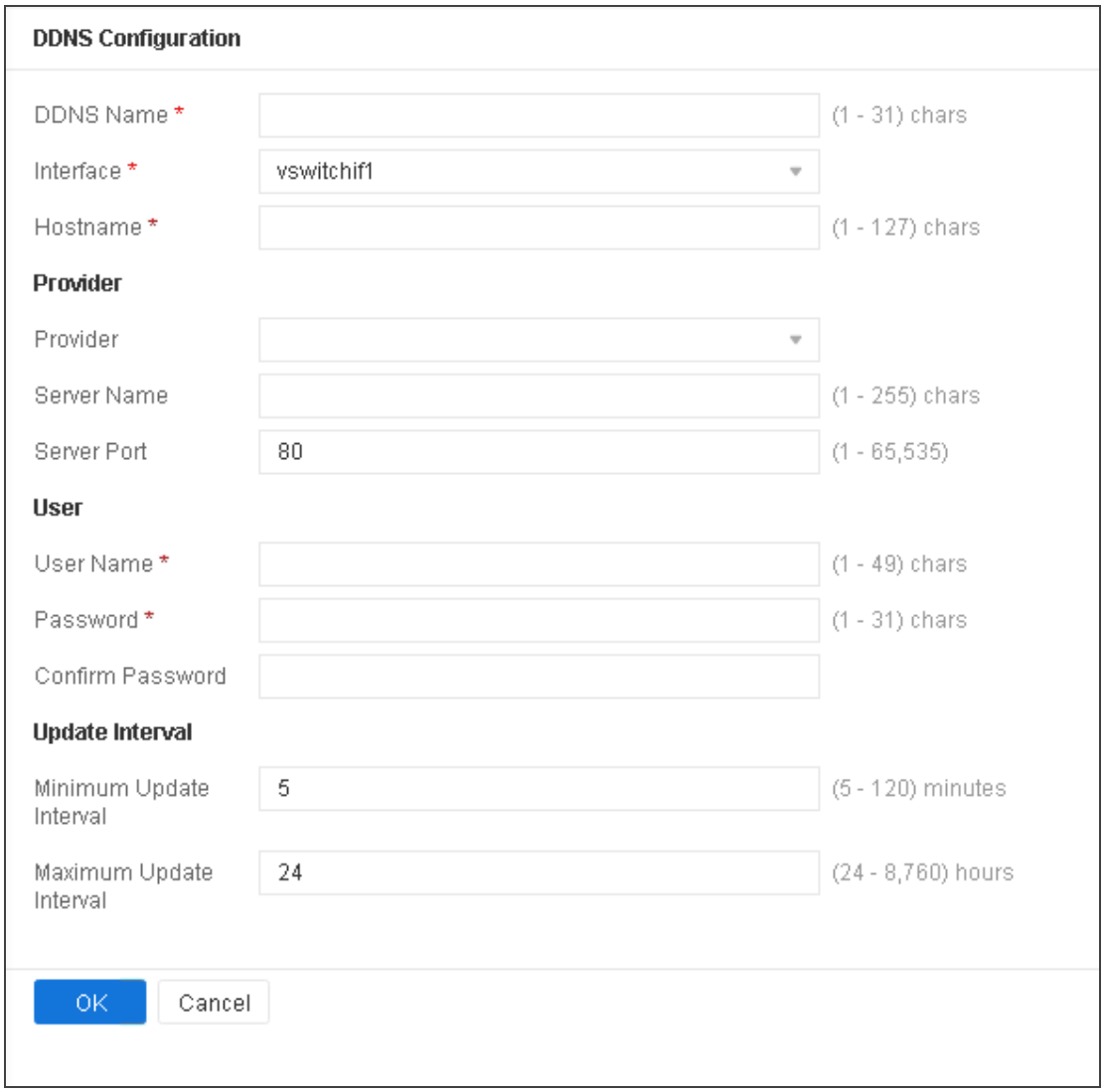
- dyndns.org: http://dyndns.com/dns
- 3322.org: http://www.pubyun.com
- no-ip.com: http://www.noip.com
- Huagai.net: http://www.ddns.com.cn
- ZoneEdit.com: http://www.zoneedit.com

Configuring a DDNS

To create a DDNS, take the following steps:

1. Select **Network > DDNS**.

2. Click **New**.



3. In the DDNS Configuration page, configure as follows:

Option	Description
DDNS Name	Specifies the name of DDNS.
Interface	Specifies the interface to which DDNS is applied.

Option	Description
Hostname	Specifies the domain name obtained from the DDNS provider.
Provider	
Provider	Specifies a DDNS provider. Choose one from the drop-down list.
Server Name	Specifies a server name for the configured DDNS.
Server Port	Specifies a server port number for the configured DDNS. The value range is 1 to 65535.
User	
User Name	Specifies the user name registered in the DDNS provider.
Password	Specifies the corresponding password.
Confirm Password	Enter the password again to confirm.
Update Interval	
Minimum Update Interval	When the IP address of the interface with DDNS enabled changes, system will send an update request to the DDNS server. If the server does not respond to the request, system will send the request again according to the configured min update interval. For example, if the minimum update interval is set to 5 minutes, then system will send the second request 5 minutes after the first request failure; if it fails again, system will send the third

Option	Description
	request 10 (5x2) minutes later; if it fails again, and system will send the forth request 20 (10*2) minutes later, and so forth. The value will not increase anymore when reaching 120 minutes. That is, system will send the request at a fixed interval of 120 minutes. The default value is 5.
Maximum Update Interval	In case the IP address has not changed, system will send an update request to the DDNS server at the maximum update interval. Type the maximum update interval into the box. The value range is 24 to 8760 hours. The default value is 24.

4. Click **OK**.

Notes: The Server name and Server port in the configuration options must be the corresponding name and port of the DDNS server. Do not configure these options if the exact information is unknown. The server will return the name and port information automatically after connection to the DDNS server has been established successfully.

PPPoE

PPPoE, Point-to-Point Protocol over Ethernet, combines PPP protocol and Ethernet to implement access control, authentication, and accounting on clients during an IP address allocation.

The implementation of PPPoE protocol consists of two stages: discovery stage and PPP session stage.

- Discovery stage: The client discovers the access concentrator by identifying the Ethernet MAC address of the access concentrator and establishing a PPPoE session ID.
- PPP session stage: The client and the access concentrator negotiate over PPP. The negotiation procedure is the same with that of a standard PPP negotiation.

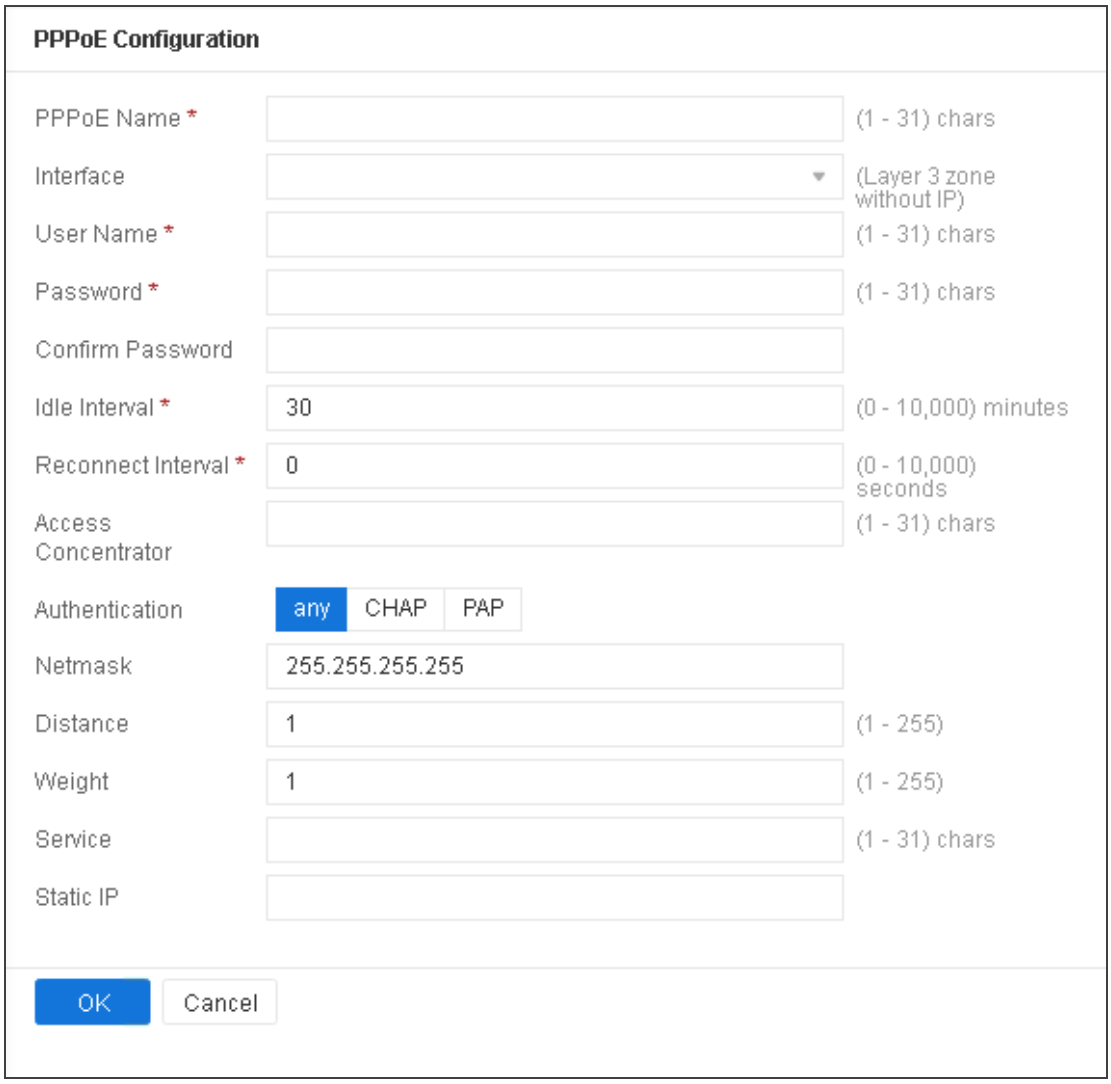
Interfaces can be configured as PPPoE clients to accept PPPoE connections.

Configuring PPPoE

To create a PPPoE instance, take the following steps:

1. Select **Network > PPPoE**.

2. Click **New**.



3. In the PPPoE Configuration page, configure as follows.

Option	Description
PPPoE Name	Specifies a name for the PPPoE instance.
Interface	Select an interface from the drop-down list.

Option	Description
User Name	Specifies a username.
Password	Specifies the corresponding password.
Conform Password	Enter the password again to confirm.
Idle Interval	Automatic connection. If the PPPoE interface has been idle (no traffic) for a certain period, i.e., the specified idle interval, system will disconnect the Internet connection; if the interface requires Internet access, system will connect to the Internet automatically. The value range is 0 to 10000 minutes. The default value is 0.
Reconnect Interval	If the PPPoE connection disconnects for any reason for a certain period, i.e. the specified re-connect interval, system will try to re-connect automatically. The value range is 0 to 10000 seconds. The default value is 10, which means the function is disabled.
Access Concentrator	Specifies a name for the concentrator.
Authentication	The devices will have to pass PPPoE authentication when trying to connect to a PPPoE server. The supported authentication methods include CHAP, PAP and Any (the default, anyone between CHAP and PAP). To configure a PPPoE authentication method, click the authentication you want to select. The configured

Option	Description
	authentication must be the same with that configured in the PPPoE server.
Netmask	Specifies a netmask for the IP address obtained via PPPoE.
Distance	Specifies a route distance. The value range is 1 to 255. The default value is 1.
Weight	Specifies a route weight. The value range is 1 to 255. The default value is 1.
Service	Specifies allowed service. The specified service must be the same with that provided by the PPPoE server. If no service is specified, system will accept any service returned from the server automatically.
Static IP	You can specify a static IP address and negotiate to use this address to avoid IP change. To specify a static IP address, type it into the Static IP box.

4. Click **OK**.

Virtual Wire

The system supports the VSwitch-based Virtual Wire. With this function enabled and the Virtual Wire interface pair configured, the two Virtual Wire interfaces form a virtual wire that connects the two subnetworks attached to the Virtual Wire interface pair together. The two connected sub-networks can communicate directly on Layer 2, without other sub network's forwarding. Furthermore, controls of policy rules or other functions are still available when Virtual Wire is used.

Virtual Wire operates in two modes, which are Strict and Non-Strict mode respectively, as detailed below:

- **Strict Virtual Wire mode**: In this mode, Hillstone devices does not need to perform MAC address learning. Packets can only be transmitted between Virtual Wire interfaces, and the VSwitch cannot operate in Hybrid mode. Any PC connected to Virtual Wire can neither manage devices nor access Internet over this interface.
- **Non-Strict Virtual Wire mode**: In this mode, Hillstone devices can perform MAC address learning. Packets can be transmitted between Virtual Wire interfaces, and the VSwitch also supports data forwarding in Hybrid mode. That is, this mode only restricts Layer 2 packets' transmission between Virtual Wire interfaces, and does not affect Layer 3 packets' forwarding.

The table below lists packet transmission conditions in Strict Virtual Wire and Non-Strict Virtual Wire mode. You can choose an appropriate Virtual Wire mode according to the actual requirement.

Packet	Strict	Non-strict
Egress and ingress are interfaces of one Virtual Wire interface pair	Allow	Allow
Ingress is not Virtual Wire's interface	Deny	Deny
Egress and ingress are interfaces of different Virtual Wire interface pairs	Deny	Deny

Packet	Strict	Non-strict
Ingress of to-self packet is a Virtual Wire’ s interface	Deny	Allow
Ingress is Virtual Wire's interface, and egress is a Layer 3 interface	Deny	Allow

Configuring a Virtual-Wire

To create a Virtual-Wire, take the following steps:

1. Select **Network > Virtual-Wire**.
2. Click **New**.
3. In the Virtual-Wire Configuration page, select a virtual switch from the VSwitch drop-down list.
4. In the Interface 1 drop-down list, specify an interface for the virtual wire interface pair. The two interfaces in a single virtual wire interface pair must be different, and one interface cannot belong to two different virtual wire interface pairs simultaneously.
5. In the Interface 2 drop-down list, specify an interface for the virtual wire interface pair. The two interfaces in a single virtual wire interface pair must be different, and one interface cannot belong to two different virtual wire interface pairs simultaneously.
6. Click **OK**.

Configuring the Virtual Wire Mode

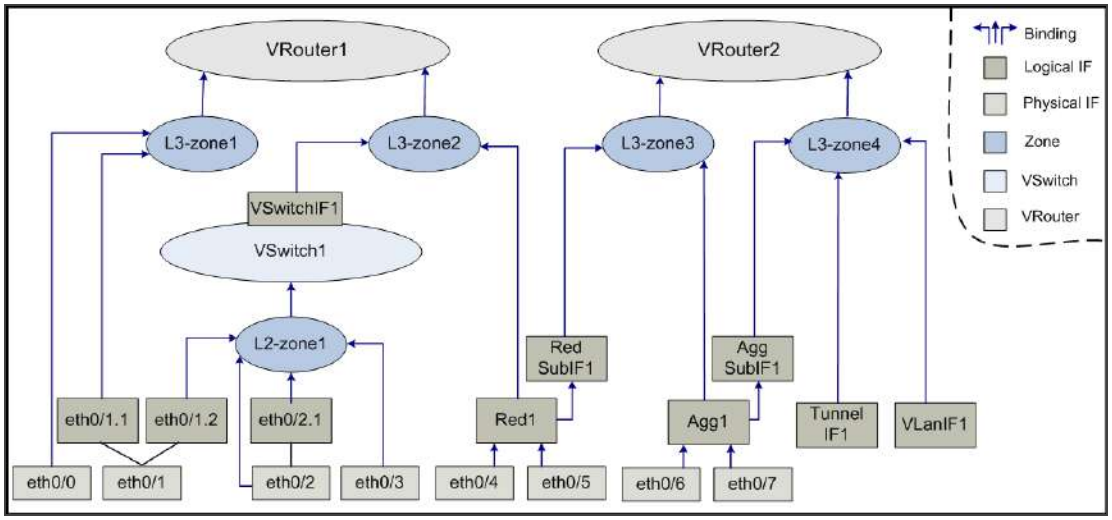
To configure a virtual wire mode, take the following steps:

1. Select **Network > Virtual-Wire**.
2. Click **Virtual-Wire Mode**.

3. In the Virtual-Wire Mode Configuration page, select a virtual switch from the VSwitch drop-down list.
4. Specify a virtual wire mode from one of the following options:
    - Strict - Packets can only be transmitted between virtual wire interfaces, and the VSwitch cannot operate in Hybrid mode. Any PC connected to the virtual wire can neither manage devices nor access Internet over this interface.
    - Non-strict - Packets can be transmitted between virtual wire interfaces, and the VSwitch also supports data forwarding in Hybrid mode. That is, this mode only restricts Layer 2 packets' transmission between virtual wire interfaces, and does not affect Layer 3 packets' forwarding.
    - Disabled - Disables the virtual wire.
5. Click **OK**.

Virtual Router

Virtual Router (VRouter) is known as VR in system. VR acts as a router, and different VRs have their own independent routing tables. A VR named "trust-vr" is implemented with the system, and by default, all of the Layer 3 security zones are bounded to the trust-vr automatically. Hillstone devices support multiple VRs, and the max amount of supported VRs may vary with different hardware platforms. Multiple VRs divide a device into multiple virtual routers, and each router utilizes and maintains their independent routing table. In such a case one device is acting as multiple routers. Multiple VRs allow a device to achieve the effects of the address isolation between different route zones and address overlapping between different VRs, as well as to avoid route leaking to some extent, enhancing route security of network. For more information about the relationship between interface, security zone, VSwitch and VRouter, see the following diagram:



As shown above, the binding relationship between them are:

- Interfaces are bound to security zones. Those that are bound to Layer 2 security zones and Layer 3 security zones are known as Layer 2 interfaces and Layer 3 interfaces respectively. One interface can be only bound to one security zone; the primary interface and sub interface can belong to different security zones.

- Security zones are bound to a VSwitch or VRouter. Layer 2 security zones are bound to a VSwitch (by default the pre-defined Layer 2 security zone is bound to the default VSwitch1), and Layer 3 security zones are bound to a VRouter (by default the pre-defined Layer 3 security zone is bound to the default trust-vr), thus realizing the binding between the interfaces and VSwitch or VR. One security zone can be only bound to one VSwtich or VR.

Creating a Virtual Router

To create a Virtual Router, take the following steps:

1. Select **Network > Virtual Router > Virtual Router**.
2. Click **New**.
3. Type the name into the Virtual Router name box.
4. Click the **Enable** button for Vsys Share to share the Virtual Router between different virtual systems.
5. Click **OK**.

Global Configuration

Virtual Router's global configuration is the configuration for multiple Virtual Routers. To configure Multi-Virtual Router, take the following steps:

1. Select **Network > Virtual Router > Global Configuration**.
2. Click the **Enable** button for Multi-Virtual Router.
3. Click **Apply**.

Notes:

- After Multi-Virtual Router is enabled or disabled, system must reboot to make it take effect. After rebooting, system's max concurrent sessions might decrease if the function is enabled, or restore to normal if the function is disabled. For more information about the maximum concurrent sessions, see "The Maximum Concurrent Sessions" on Page 1924.
- If Multi-Virtual Router is enabled, traffic can traverse up to 3 Virtual Routers, and any traffic that has to traverse more than 3 Virtual Routers will be dropped.

Virtual Switch

System might allow packets between some interfaces to be forwarded in Layer 2 (known as transparent mode), and packets between some interfaces to be forwarded in Layer 3 (known as routing mode), specifically depending on the actual requirement. To facilitate a flexible configuration of hybrid mode of Layer 2 and Layer3, system introduces the concept of Virtual Switch (VSwitch). By default system uses a VSwitch known as VSwitch1. Each time you create a VSwitch, system will create a corresponding VSwitch interface (VSwitchIF) for the VSwitch automatically. You can bind an interface to a VSwitch by binding that interface to a security zone, and then binding the security zone to the VSwitch.

A VSwitch acts as a Layer 2 forwarding zone, and each VSwitch has its own independent MAC address table, so the packets of different interfaces in one VSwitch will be forwarded according to Layer 2 forwarding rules. You can configure policy rules conveniently in a VSwitch. A VSwitchIF virtually acts as a switch uplink interface, allowing packets forwarding between Layer 2 and Layer 3.

Creating a VSwitch

To create a VSwitch, take the following steps:

1. Select **Network > VSwitch**.
2. Click **New**.

Options are described as follows.

Option	Description
VSwitch Name	Specifies a name for the VSwitch.
Vsys Shared	Click the **Enable** button and then system will share the VSwitch with different VSYS.
Virtual-Wire	Specifies a Virtual-Wire mode for the VSwitch, including

Option	Description
Mode	(for specific information on Virtual Wire, see "Virtual Wire" on Page 327) • Strict - Packets can only be transmitted between Virtual Wire interfaces, and the VSwitch cannot operate in Hybrid mode. Any PC connected to Virtual Wire can neither manage devices nor access Internet over this interface. • Non-strict - Packets can be transmitted between Virtual Wire interfaces, and the VSwitch also supports data forwarding in Hybrid mode. That is, this mode only restricts Layer 2 packets' transmission between Virtual Wire interfaces, and does not affect Layer 3 packets' forwarding. • Disabled - Disables Virtual Wire.
IGMP Snooping	Enables IGMP snooping on the VSwitch.
Forward Tagged Packets	Enables VLAN transparent so that the device can transmit VLAN tagged packets transparently, i.e., packets tagged with VLAN ID will still keep the original ID after passing through the device.
Forward Double Tagged Packets	Enables VLAN transparent so that the device can transmit VLAN double tagged packets transparently, i.e., packets tagged with VLAN ID will still keep the original ID

Option	Description
ets	after passing through the device.
Drop Unknown Multicast Packets	Drops the packets sent to unknown multicast to save bandwidth.

3. Click **OK**.

Port Mirroring

The device is designed with port mirroring on Ethernet interfaces. This function allows users to mirror the traffic of one interface to another interface (analytic interface) for analysis and monitoring.

Model	Port Mirroring Supported on Ethernet interfaces on the Front Panel	Port Mirroring Supported on Ethernet interfaces on Expansion Modules	
SG-6000-E2800/E2300 /E1700/E1606/E1600/E1100	No	Expansion module is not supported.	
SG-6000-E3968/E3960 /E3668/E3662/E3660 /E2868/E2860	Yes	IOC-8SFP-M	Yes (Ethernet interfaces on the expansion module and on the front panel belong to two different mirroring groups.)
		IOC-8GE-M	Yes (Ethernet interfaces on the expansion module and on the front panel belong to two different mirroring groups.)
		IOC-4GE-B-M	Yes (Ethernet interfaces on the front panel and on

Model	Port Mirroring Supported on Ethernet interfaces on the Front Panel	Port Mirroring Supported on Ethernet interfaces on Expansion Modules	
			expansion modules belong to the same mirroring group.)
SG-6000-E5568/E5560 /E5268/E5260/E5168/E3965	Yes	IOC-8SFP-M	Yes (Ethernet interfaces on the expansion module and on the front panel belong to two different mirroring groups.)
		IOC-8GE-M	Yes (Ethernet interfaces on the expansion module and on the front panel belong to two different mirroring groups.)
		IOC-4GE-B-M	Yes (Ethernet interfaces on the front panel and on expansion modules belong to the same mirroring group.)

Model	Port Mirroring Supported on Ethernet interfaces on the Front Panel	Port Mirroring Supported on Ethernet interfaces on Expansion Modules	
		IOC-8SFP+	Yes (Ethernet interfaces on the expansion module and on the front panel belong to two different mirroring groups.)
		IOC-4SFP+	Yes (Ethernet interfaces on the expansion module and on the front panel belong to two different mirroring groups.)
		IOC-2SFP+-Lite	When IOC-2SFP+-Lite is inserted in Slot4, XE4/0 does not support port mirroring. However, XE4/1 supports port mirroring and belongs to the same mirroring group as Ethernet interfaces on the front panel.
SG-6000-	Yes	IOC-8SFP-M	Yes

Model	Port Mirroring Supported on Ethernet interfaces on the Front Panel	Port Mirroring Supported on Ethernet interfaces on Expansion Modules	
E5960/E5760/E5660			(Ethernet interfaces on the expansion module and on the front panel belong to two different mirroring groups.)
		IOC-8GE-M	Yes (Ethernet interfaces on the expansion module and on the front panel belong to two different mirroring groups.)
		IOC-4GE-B-M	Yes (Ethernet interfaces on the front panel and on expansion modules belong to the same mirroring group.)
		IOC-8SFP+	Yes (Ethernet interfaces on the expansion module and on the front panel belong to two different

Model	Port Mirroring Supported on Ethernet interfaces on the Front Panel	Port Mirroring Supported on Ethernet interfaces on Expansion Modules	
			mirroring groups.)
		IOC-4SFP+	Yes (Ethernet interfaces on the expansion module and on the front panel belong to two different mirroring groups.)
		IOC-2SFP+-Lite	When IOC-2SFP+-Lite is inserted in Slot2, port mirroring is not supported. When IOC-2SFP+-Lite is inserted in Slot 4, port mirroring is supported. Meanwhile, Ethernet interfaces on this module belong to the same mirroring group as those on the front panel.
SG-6000-E6368/E6360 /E6168/E6160	No	IOC-8SFP-M	yes
		IOC-8GE-M	yes

Notes:

- Port mirroring is only supported on Ethernet interfaces that are in the same mirroring group. Port mirroring across mirroring groups is not supported.
- Port mirroring is not supported on the MGT interface and HA interface.

To configure port mirroring, take the following steps:

1. Enable port mirroring on an Ethernet interface, and select the traffic type to be mirrored.
2. Configure a destination interface.

To configure the destination interface of port mirroring:

1. Select **Network > Port Mirroring**.
2. Select an interface from the Destination Interface drop-down list, and click **OK**. All the source and destination interface will be listed in the table below.

WLAN

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

WLAN (Wireless Local Area Network) represents the local area network that uses the wireless channel as the medial. WLAN is important supplements and extensions of the wired LAN. By configuring the WLAN function, you can establish the wireless local area network and allow the users to access LAN through wireless mode.

Creating a WLAN

To create a WLAN, take the following steps:

1. Select **Network > WLAN**.
2. Click **New**.

In the WLAN Configuration page, configure the following information.

Option	Description
SSID	Specifies the name of the WLAN.
WLAN Interface	Specifies the WLAN interface bound to this newly-created WLAN.
SSID Broadcast	Click the **Enable** button to enable the SSID broadcast. After enabling SSID broadcast, any user can search it.
Security Mode	Configures the security mode: • No encryption - Do not perform the encryption. • MAC-PSK - Integrates MAC authentication

Option	Description
	with WPA-WPA2-PSK authentication. • WEP - Specifies the security mode as wired equivalent privacy. • WPA、WPA2 - Specifies the security mode as Wi-FI and uses 802.1X authentication. WPA and WPA2 have stronger performance than WEP. The safety of WPA2 is more reliable than WPA. • WPA-WPA2 - Compatible with WPA and WPA-2. • WPA-PSK、WPA2-PSK - Specifies the security mode as Wi-FI and uses the pre-shared key authentication. • WPA-WPA2-PSK - Compatible with WPA-PSK and WPA2-PSK.
Link-lay-erAuthentication Mode	When using the WEP security mode, specify the authentication mode for the WLAN. • open-system - The default authentication mode. This is the easiest authentication, ie. do not need to certify. • shared-key - Certify with the same shared key authentication.

Option	Description
Data Encryption	When using a security mode besides WEP, specifies the data encryption mode, including TKIP, CCMP, and TKIP-CCMP.
Key	When using the WEP security mode, specify the form and the value of the key. The form of the key can be a character string or a hexadecimal number. When using character strings, you can specify 5 characters or 13 characters. When using hexadecimal numbers, you can specify 10 hexadecimal numbers or 26 hexadecimal numbers.
Pre-shared Key	When using the MAC-PSK, WPA-PSK, WPA2-PSK, WPA-WPA2-PSK security modes, specify the form and the value of the pre-defined key. The form of the key can be a character string or a hexadecimal number. When using character strings, you can specify 8-63 characters. When using hexadecimal numbers, you can specify 64 hexadecimal numbers.
Maximum Users	Specifies the allowed maximum number of users that can access this WLAN. The value ranges from 1 to 128. The default value is 64.
User Isolation	Select **Enable** to enable the user isolation function. After enabling the user isolation, users within one WLAN cannot access each other. User isolation enhances the security for different users.

Option	Description
AAA Server	When specifying the security mode as WPA, WPA2, WPA-WPA2, or MAC-PSK, you must select a configured AAA server as the authentication server for user identification.

3. Click **OK**.

Advanced Settings

To configure the advanced settings for WLAN, take the following steps:

1. Select **Network > WLAN**.
2. Click **Advanced**.

3. In the Advanced page, configure the following information.

Option	Description
Countries & Regions	Different countries or regions have different management and limitations on RF use. The country/region code determines the available frequency range, channel, and legal level of transmit power. The default value is United States.
Working Mode	Configure the working mode. • 802.11a represents that the interface works in the 802.11a mode. • 802.11b represents that the interface works in the 802.11b mode. • 802.11g represents that the interface works in the 802.11g mode. • 802.11an represents that the interface works in the 802.11n mode of 5GHz. • 802.11bgn represents that the interface works in the 802.11n mode of 2.4GHz.
Channel	The available channels you can select vary with the country/region code and RF type. The default value is auto, which represents to ask the system to select the channel automatically. After the country/region code or the operation mode is changed, system will select the channel automatically.

Option	Description
Maximum Transmit Power	The maximum transmit power varies with the country/region code and RF type. By default, there are four levels: 12.5% of the maximum transmit power, 25% of the maximum transmit power, 50% of the maximum transmit power, and 100% of the maximum transmit power.

4. Click **OK**.

3G/4G

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

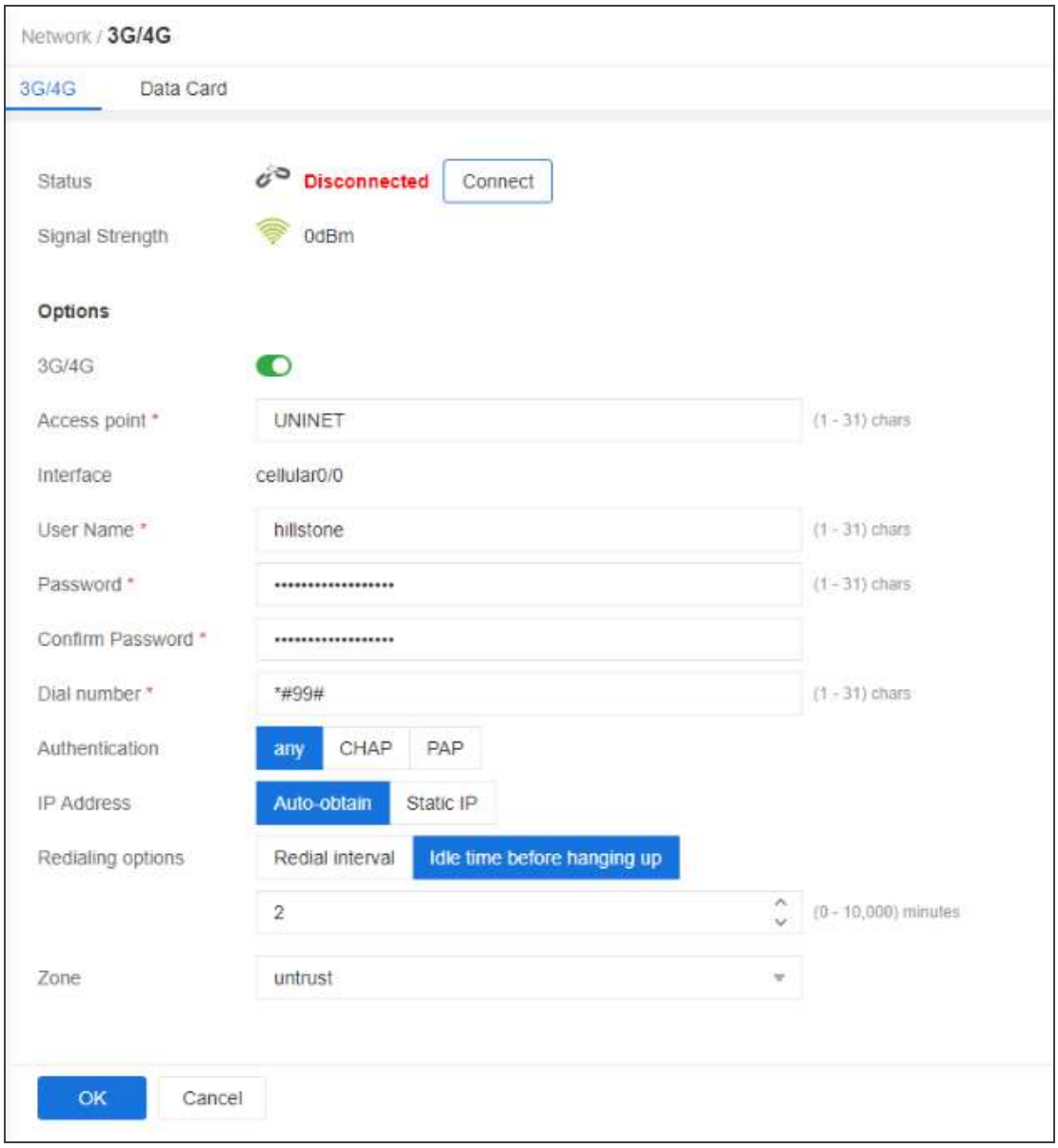
The third generation of mobile telecommunications technology supports the high speed data transmission. By configuring the 3G/4G function, users can access the Internet through wireless mode.

The 3G/4G function needs the support of ISP. Before configuring the 3G/4G function, you need to purchase the SIM card from the ISP, enable the data connection service, and obtain the following 3G/4G parameters: access point, username, password, dial-up string, and correctly installed SIM card.

Configuring 3G/4G Settings

To configure 3G/4G settings, take the following steps:

1. Select **Network > 3G/4G**.



2. In the 3G/4G tab, you can view the 3G/4G connection status in the Status section. Click **Connect** to connect to the 3G network.

3. Select **Enable** to enable the 3G/4G function. By default, the 3G function is enabled.

4. Enter the name of the access point in the Access point text box. You can enter up to 31 characters.

5. Specify the 3G/4G user information. In the User Name text box, enter the username of the 3G/4G user. You can enter up to 31 characters. In the Password text box, enter the corresponding password.

6. Configure the dial-up string. Ask your ISP to provide the dial-up string and enter the dial-up string in the Dial number text box.

7. Specify the authentication mode. When 3G/4G dial-up establishes the connection, it needs to pass the PPP protocol verification. The device supports the following verification methods: CHAP, PAP, and Any. Select the desired method by selecting the Authentication radio button.

8. Configure the IP address information for the 3G/4G interface. Select **Auto-obtain** to make the 3G/4G interface obtain the IP address automatically. Select **Static IP** to enter the static IP address and the netmask.

9. Specify the online mode in Redialing options. 3G/4G dial-up has two online modes as follows:

    - Redial interval: When the 3G/4G connection disconnects due to certain reasons and the disconnection time exceeds the specified time interval, system will redial automatically. Specify the time interval in the Redial interval text box. The value ranges from 0 to 10000 seconds. The default value is 0, which represents that the system does not use the **redial automatically** mode.

    - Idle time before hanging up: When the idle time of the 3G/4G (cellular) interface reaches the specified value, system will disconnect the 3G/4G connection. Specify the length of time in the Idle time before hanging up text box. The value ranges from

0 to 10000 seconds. The default value is 0, which represents that the system does not use the **hang up after a specified idle time** mode

> **Notes:** The above two modes cannot be used simultaneously. Without configuring the schedule, system will use the "Redial interval" mode by default.

10. Specify the security zone of the 3G/4G interface.
11. Click **OK**.

> **Notes:** After installing the SIM card, system can automatically configure the settings in the 3G/4G tab based on the information of the 3G/4G module. The settings include the name of the access point, 3G/4G user information, and dial-up string. You can modify the settings according to your requirements.

Managing Data Card

PIN (Personal Identification Number) code is used to identify the user of the SIM card and avoid the illegal use of the SIM card.

Automatically Verifying the PIN Code

After enabling the PIN code protection, you can save the PIN code in system. After system reboots, it can automatically verify the PIN code.

To automatically verify the PIN code, take the following steps:

1. Select **Network > 3G/4G**.
2. Click **Data Card** tab.

3. Enter the PIN code in the PIN Code text box. The value ranges from 4 to 8 numbers.
4. Click **Apply** to make the system save the PIN code.

Notes: After three consecutive failed attempts at PIN code, the SIM card will be locked.

Enabling/Disabling the PIN Code Protection

To enable/disable the PIN code protection, take the following steps:

1. Select **Network > 3G/4G**.
2. Click **Data Card** tab.
3. Click Enable PIN code protection in the PIN code management section to enable the PIN code protection function. To disable the function, click Disable PIN code protection.
4. Enter the PIN code in the PIN code text box. The PIN code consists of 4-8 decimal numbers.
5. Click **Apply**.

Modifying the PIN Code

To modify the PIN code, take the following steps:

1. Select **Network > 3G/4G**.
2. Click **Data Card** tab.
3. Click Change PIN code in the PIN code management section.
4. Specify the current PIN code in the Current PIN code text box. The PIN code consists of 4-8 decimal numbers.

5. Specify a new PIN code in the New PIN code text box. The PIN code consists of 4-8 decimal numbers.
6. Confirm the new PIN code in the Confirm PIN code text box.
7. Click **Apply**.

Manually Verifying the PIN Code

To manually verify the PIN code, take the following steps:

1. Select **Network > 3G/4G**.
2. Click **Data Card** tab.
3. Click Verify PIN Code in the PIN code management section.
4. Enter the PIN code in the PIN code text box. The PIN code consists of 4-8 decimal numbers.
5. Click **Apply**.

Unlocking the PIN Code

If the SIM card is locked, you need to obtain the PUK code from the ISP to unlock the SIM card and set the new PIN code. To use the PUK code to unlock the PIN code, take the following steps:

1. Select **Network > 3G/4G**.
2. Click **Data Card** tab.
3. Click **Unlock PIN Code** in the PIN code management section.
4. Enter the PUK code in the PUK code text box.

5. Specify a new PIN code in the New PIN code text box. The PIN code consists of 4-8 decimal numbers.
6. Confirm the new PIN code in the Confirm PIN code text box.
7. Click **Apply**.

Outbound Link Load Balancing

For Outbound LLB, the system can intelligently oute and dynamically adjust the traffic load of each link by monitoring the delay, jitter, packet loss rate and bandwidth utilization of each link in real-time.You can configure a flexible LLB profile to bind to the route (the current system only supports DBR and PBR), forming LLB rules to implement outbound dynamic link load balancing, and thus make efficient use of network bandwidth.

Configuring LLB Profile

The LLB profile contains the parameters of the load balancing algorithm, such as bandwidth utilization threshold, probe switch, probe mode, and equalization direction.

1. Select **Network > Outbound LLB > Profile**.

2. Click **New**.

3. In the LLB Profile Configuration page, configure as follows:

Option	Description
Profile Name	Specifies the Profile name whose length range is 1-96

Option	Description
	characters.
Type	Specifies the IP type of the LLB Profile as IPv4 or IPv6. The default type is IPv4.
Bandwidth Utilization	Specifies the bandwidth utilization threshold of the interface. When the rate does not exceed the threshold by the interface bandwidth, the system will only analysis delay, jitter and packet loss rate to dynamically adjust the routing link; when the rate exceeds the threshold by the interface bandwidth, system will analysis of each link bandwidth utilization rate of the parameters at the same time to adjust the routing method. Value ranges from 0 to 100 (0% to 100%) and defaults to 60.
Balance Mode	There are two equalization modes: High Performance and High Compatibility. • High Performance - In this mode, system adjusts link to keep the link balance as fast as possible • High Compatibility - When the link load changes, system does not switch the link frequently, but ensures that the service is as far as possible on the previous link. This mode is suitable for services that are sensitive to link switching, such as banking services, only when the previous link is overloaded.

Option	Description
Description	Configure Additional details for the LLB profile.

4. Click **OK**.

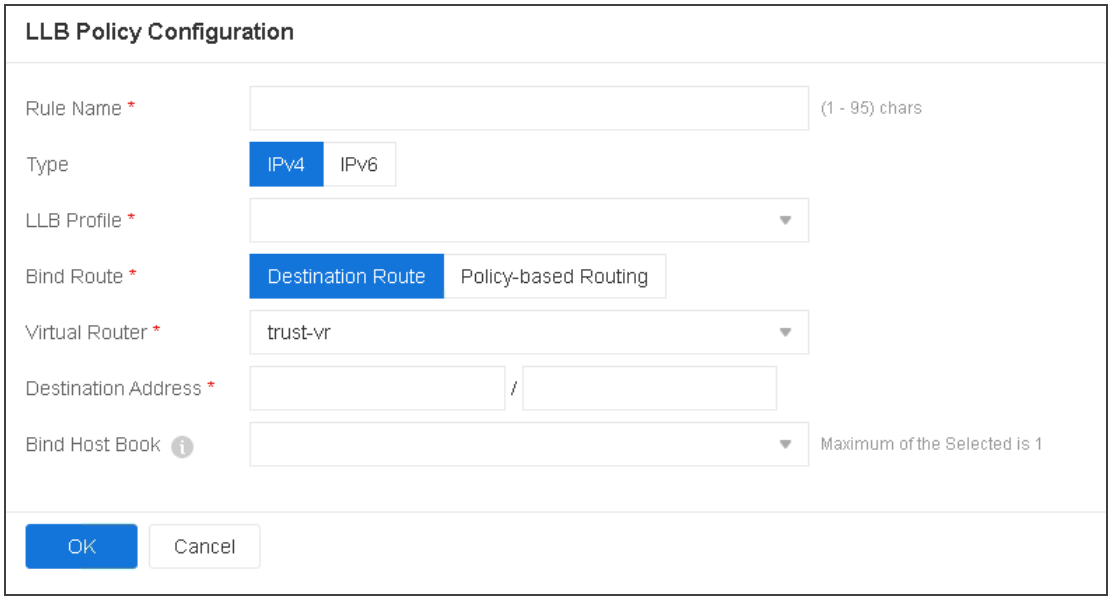
Notes: Changing the IP type is not allowed when editing the LLB Profile.

Configuring LLB Rule

The LLB Profile and the route is bound by the formation of LLB rules that currently support binding destination routing (DBR) and policy-based routing (PBR).

1. Select **Network > Outbound LLB > Rule**.

2. Click **New**.



3. In the LLB Policy Configuration page, configure the following:

Option	Description
Rule Name	Specifies the Rule name, length of 1-96 characters
Type	Specifies the type of the LLB Rule as IPv4 or IPv6. The default type is IPv4.
LLB Profile	Select LLB Profile to bind. When the type of the LLB Rule is specified as IPv4, only the LLB Profile of IPv4 can be bound. When the type of the LLB Rule is specified as IPv6, only the LLB Profile of IPv6 can be bound. This item is required.
Bind Route	Specify the route to be bound in the rule: Destination Route or Policy Based Route. • Destination Route - When this option is selected, specify the virtual router and destination address of the destination route. • Policy Based Routing - Select this option to specify the name and id of the policy route. The IP type of PBR rule should be the same as the LLB Rule. If the IP tyoe of LLB Rule is IPv6, the IP type of PBR rule should be IPv6 as well.
Virtual Router	Specifies the name of the virtual router in the drop-down menu. The default vrouter is trust-vr.
Destination Address	Specifies the Vrouter destination address. When the type of the LLB Rule is specifies as IPv6, use *X:X:X:X::X/M* to configure the destination address of Vrouter. When the

Option	Description
	type of the LLB Rule is specifies as IPv4, the device supports two modes, A.B.C.D / M or A.B.C.D A.B.C.D, for example, 1.1.1.0/24 or 1.1.1.0 255.255.255.0.
Bind Host Book	Select the host book when destination route is specified.

4. Click **OK**.

Inbound Link Load Balancing

After enabling the LLB for inbound traffic, the system will resolve domains of different IPs based on the sources of the DNS requests and return IPs for different ISPs to the corresponding users who initiate the requests, which reduces access across ISPs. Such a resolution method is known as SmartDNS.

You can enable inbound LLB by the following steps:

1. Enable SmartDNS. This is the prerequisite for the implementation of inbound LLB.
2. Configure a SmartDNS rule table. The smart domain-to-IP resolution is implemented based on the rule table.

Creating a Smart DNS Rule Table

To create a SmartDNS rule table, take the following steps:

1. Select **Network > Inbound LLB**.
2. Click **New > Domain Table**.
3. In the Domain Configuration page, type a domain table name into Domain Table text box.
4. Type a domain name into Domain text box. Separate multiple domain names with comma. Each rule table supports up to 64 domain names (case insensitive).
5. Click **OK**.
6. In the Inbound LLB page, click the domain table name you already created and then click **New**.

In the New SmartDNS Rule page, configure the following:

Option	Description
ISP Static Address	Select a predefined or user-defined ISP from the drop-down list. If the source address matches any address entry of the ISP, system will return the specified IP.
Return IP	Specifies the return IP for different request sources. You can configure up to 64 IPs for a domain name.
Weight	Specifies the weight of the return IP. The value range is 1 to 100. The default value is 1. In the SmartDNS rule table, one domain name might correspond to multiple IPs. System will sort the IPs based on the weight and then return to the users.
Inbound Interface	Specifies the inbound interface for the return IP address. System will judge whether the return IP address is valid according to the track result or the protocol status of the inbound interface. Only the valid IP address will be returned to the request source. Select the proximity address to which the request source address will be matched from the drop-down list.
Track Object	Select a track object of interface type from the drop-

Option	Description
	down list. When the track object fails, the return IP address is invalid. When there's track object configured on the inbound interface, if the track status is successful, the return IP address is valid. Otherwise the IP address is invalid. When there's no track object configured on inbound interface, if the protocol state of the interface is UP, the return IP address is valid. Otherwise the IP address is invalid. If you don't specify the inbound interface for the return IP address, the return IP address is always valid.

7. Click **OK**.

Notes: The ISP route being referenced by the SmartDNS rule table cannot be deleted.

Application Layer Gateway (ALG)

Some applications use multi-channels for data transmission, such as the commonly used FTP. In such a condition the control channel and data channel are separated. Devices under strict security policy control may set strict limits on each data channel, like only allowing FTP data from the internal network to the external network to transfer on the well-known port TCP 21. Once in the FTP active mode, if a FTP server in the public network tries to initiate a connection to a random port of the host in the internal network, devices will reject the connection and the FTP server will not work properly in such a condition. This requires devices to be intelligent enough to properly handle the randomness of legitimate applications under strict security policies. In FTP instances, by analyzing the transmission information of the FTP control channel, devices will be aware that the server and the client reached an agreement, and open up a temporary communication channel when the server takes the initiative to connect to a port of the client, thus assuring the proper operation of FTP.

The system adopts the strictest NAT mode. Some VoIP applications may work improperly after NAT due to the change of IP address and port number. The ALG mechanism can ensure the normal communication of VoIP applications after the NAT. Therefore, the ALG supports the following functions:

- Ensures normal communication of multi-channel applications under strict security policy rules.
- Ensures the proper operation of VoIP applications such as SIP and H.323 in NAT mode, and performs monitoring and filtering according to policies.

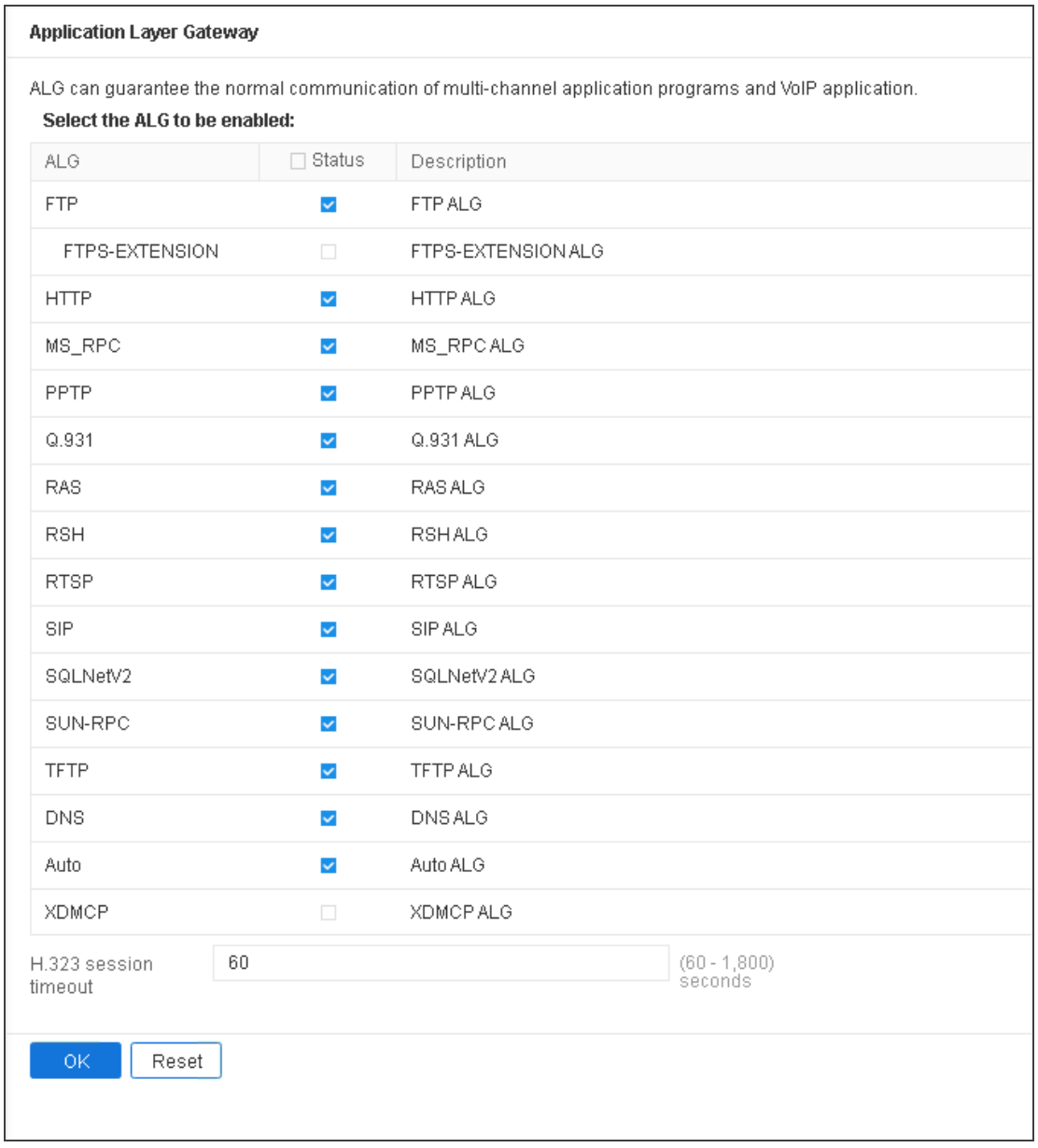
Enabling ALG

The system allows you to enable or disable ALG for different applications. Devices support ALG for the following applications: FTP, HTTP, MSRPC, PPTP, Q.931, RAS, RSH, RTSP, SIP, SQLNetV2, SUNRPC, TFTP, DNS, Auto and XDMCP. You can not only enable ALG for applications, but also specify H323's session timeout.

To enable the ALG for applications, take the following steps:

1. Select **Network> Application Layer Gateway**.

2. In the Application Layer Gateway dialog, select the applications that require ALG.



3. To modify H323's session timeout, type the value into the **H323 session timeout** box. The value range is 60 to 1800 seconds. The default value is 60.

4. Click **OK** to save your changes.

Notes: Only when the FTP ALG is enabled can the FTPS ALG be selected.

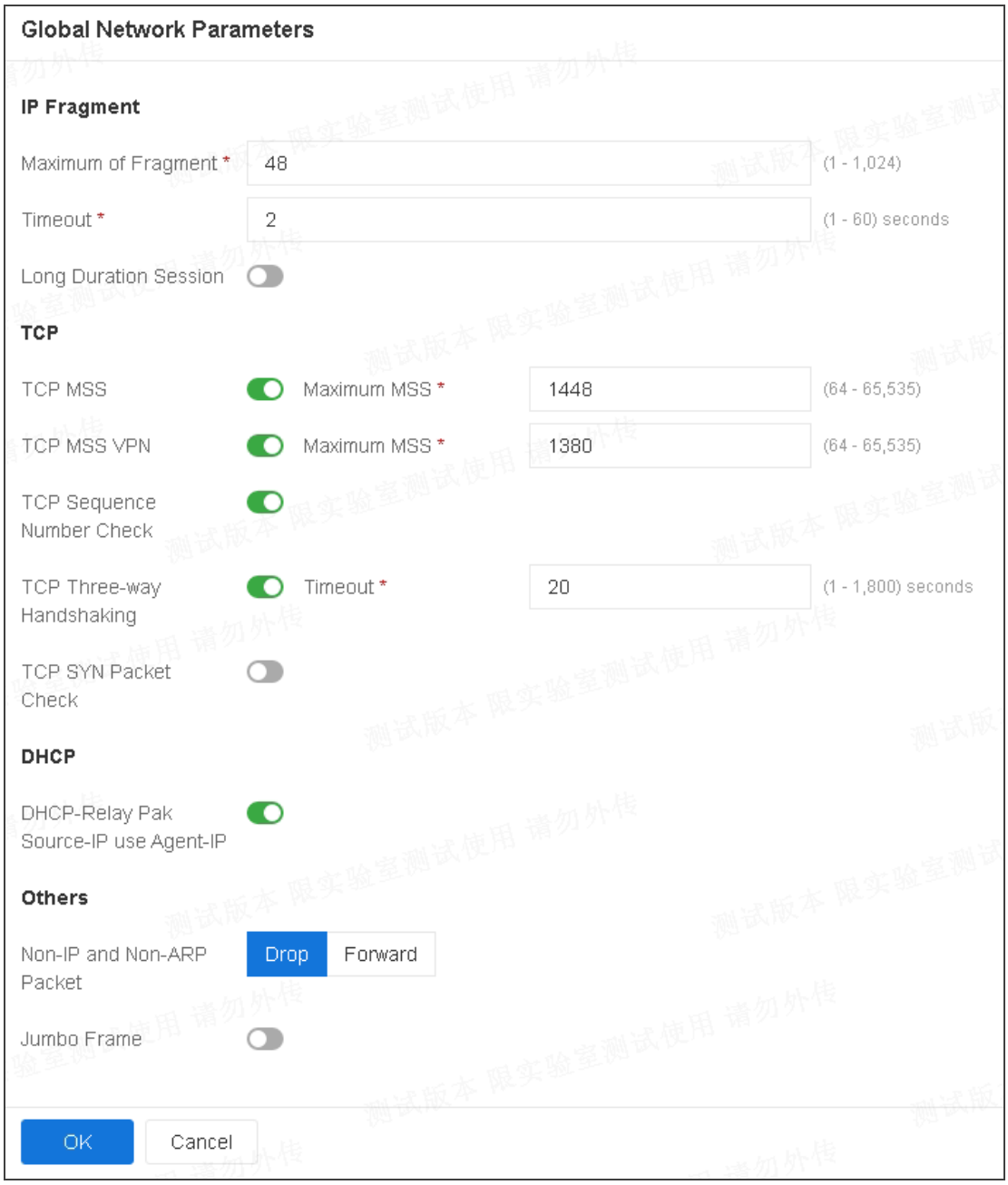
Global Network Parameters

Global network parameter configuration includes IP fragment, TCP packet processing methods and other options.

Configuring Global Network Parameters

To configure global network parameters, take the following steps:

1. Select **Network > Global Network Parameters > Global Network Parameters.**



2. Configure the following parameters.

Option	Description
IP Fragment	
Maximum Fragment Number	Specifies a maximum fragment number for every IP packet. The value range is 1 to 1024. The default value is 48. Any IP packet that contains more fragments than this number will be dropped.
Timeout	Specifies a timeout period of fragment reassembling. The value range is 1 to 30. The default value is 2. If the Hillstone device has not received all the fragments after the timeout, the packet will be dropped.
Long Duration Session	Enables or disables long duration session. If this function is enabled, specify long duration session's percentage in the Percentage text box below. The default value is 10, i.e., 10% of long duration session in the total sessions.
TCP	
TCP MSS	Specifies a MSS value for all the TCP SYN/ACK packets. Click the **Enable** button, and type the value into the Maximum MSS text box below.
Maximum MSS	Type the max MSS value into the Maximum MSS text box below. The value range is 64 to 65535. The default value is 1448.
TCP MSS VPN	Specifies a MSS value for IPSec VPN's TCP SYN packets. Click the **Enable** button, and type the value into the Maximum MSS text box below.

Option	Description
Maximum MSS	Type the max MSS value for IPSEC VPN into the Maximum MSS text box below. The value range is 64 to 65535. The default value is 1380.
TCP Sequence Number Check	Configures if the TCP sequence number will be checked. When this function is enabled, if the TCP sequence number exceeds TCP window, that TCP packet will be dropped.
TCP Three-way Handshaking	Configures if the timeout of TCP three-way handshaking will be checked. Click the **Enable** button to enable this function, and specify a timeout value in the Timeout text box below. The value range is 1 to 1800 seconds. The default value is 20. If the three-way handshaking has not been completed after timeout, the connection will be dropped.
TCP SYN Packet Check	Click the **Enable** button to enable this function and specify the action for TCP non-SYN packet. When the received packet is a TCP SYN packet, the TCP connection will be established. When the received packet is a TCP non-SYN packet, the packet will be processed according to the specified action. • drop: When the received packet is a TCP non-SYN packet, the system will drop the packet. • reset: When the received packet is a TCP non-

Option	Description
	SYN packet, the system will drop the packet and send RST packet to the peer device.
DHCP	
DHCP-Replay Pak Source IP use Agent-IP	Click the button to enable this function. This way, when the device acts as a DHCP relay proxy, the source IP of the DHCP relay packets is replaced with the agent IP, and the source port of the packets is changed to 67. By default, this function is disabled, indicating that the source IP of the DHCP relay packets is the IP address of the egress interface and the source port of the packets is 68.
Others	
Non-IP and Non-ARP Packet	Specifies how to process packets that are neither IP nor ARP.
Jumbo Frame	Click the **Enable/Disable** button to enable or disable the Jumbo Frame function. This function is disabled by default. With the Jumbo Frame function enabled, the system can forward packets less than or equal to 9216 bytes as follows: • For IPv4/IPv6 packets that are less than the MTU value of the outbound interface, forward them directly.

Option	Description
	• For IPv4 packets that are larger than the MTU value of the outbound interface, the packets are forwarded in fragments. • For IPv6 packets that are larger than the MTU value of the outbound interface, an "ICMPv6 Packet Too Big" error message will be sent to the source node of the packets, and the sender is urged to shorten the length of the packets.  **Notes:** • When the Jumbo Frame function is enabled, the MTU configuration range of the interface will be changed. For more information about the MTU value configuration of the interface, see Configuring an Interface.

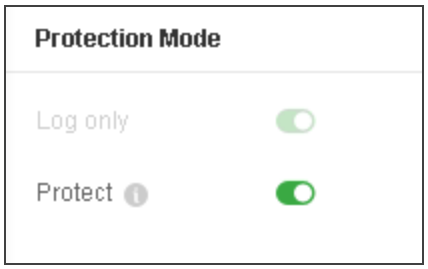
3. Click **OK**.

Configuring Protection Mode

To configure the protection mode, take the following steps:

1. Select **Network > Global Network Parameters > Protection Mode**.

2. Configure the traffic working mode.



- Log only - System only generates protocol anomaly alarms and attacking behavior logs, but will not block attackers or reset connections.
- Protect - System not only records attack behavior detected by Intrusion Prevention System, Anti-Virus or AD, Policy, Black list, but also reset the connection or block the access.

Notes: Log & reset mode is recommended. In this mode, the security performance of the device can take effect normally. If log only mode is selected, system can only record logs, and functions which can block traffic in system will be invalid, including policy, IPS, AV, QoS, etc.

Chapter 6 Advanced Routing

Routing is the process of forwarding packets from one network to the destination address in another network. Router, a packet forwarding device between two networks, is designed to transmit packets based on the various routes stored in routing tables. Each route is known as a routing entry.

Hillstone devices are designed with Layer 3 routing. This function allows you to configure routing options and forward various packets via VRouter. System implements with a default VRouter trust-vr, and also supports multiple VRouters (multi-VR).

Hillstone devices support destination routing, ISP routing, Source-Based Routing (SBR), Source-Interface-Based Routing (SIBR), Destination-Interface-Based Routing (DIBR), Policy-Based Routing (PBR), dynamic routing (including RIP, OSPF and BGP) and Equal Cost MultiPath Routing (ECMP).

- Destination Routing: A manually-configured route which determines the next routing hop according to the destination IP address.
- DIBR: A manually-configured route which determines the next routing hop according to the destination IP address and ingress interface.
- SBR: Source IP based route which selects routers and forwards data according to the source IP address.
- SIBR: Source IP and ingress interface based route.
- ISP Profile: Add a subnet to an ISP.
- ISP Routing: A kind of route which determines the next hop based on different ISPs.
- PBR: A route which forwards data based on the source IP, destination IP address and service type.

- Dynamic Routing: Selects routers and forwards data according to the dynamic routing table generated by dynamic routing protocols ("RIP" on Page 412, "OSPF" on Page 417 or BGP).
- ECMP: Load balancing traffic destined to the same IP address or segment in multiple routes with equal management distance.

When forwarding the inbound packets, the device will select a route in the following sequence: PBR > SIBR > SBR > DIBR > Destination routing/ISP routing/Proximity routing/Dynamic routing.

Routing supports IPv4 and IPv6 address. If IPv6 is enabled, you can configure IPv6 address entry for the routing rule.

Related Topics:

- "Destination Route" on Page 375
- "Destination-Interface Route" on Page 378
- "Source Route" on Page 382
- "Source-Interface Route" on Page 386
- "ISP Profile" on Page 390
- "ISP Route" on Page 394
- "Policy-based Route" on Page 398
- "RIP" on Page 412

Destination Route

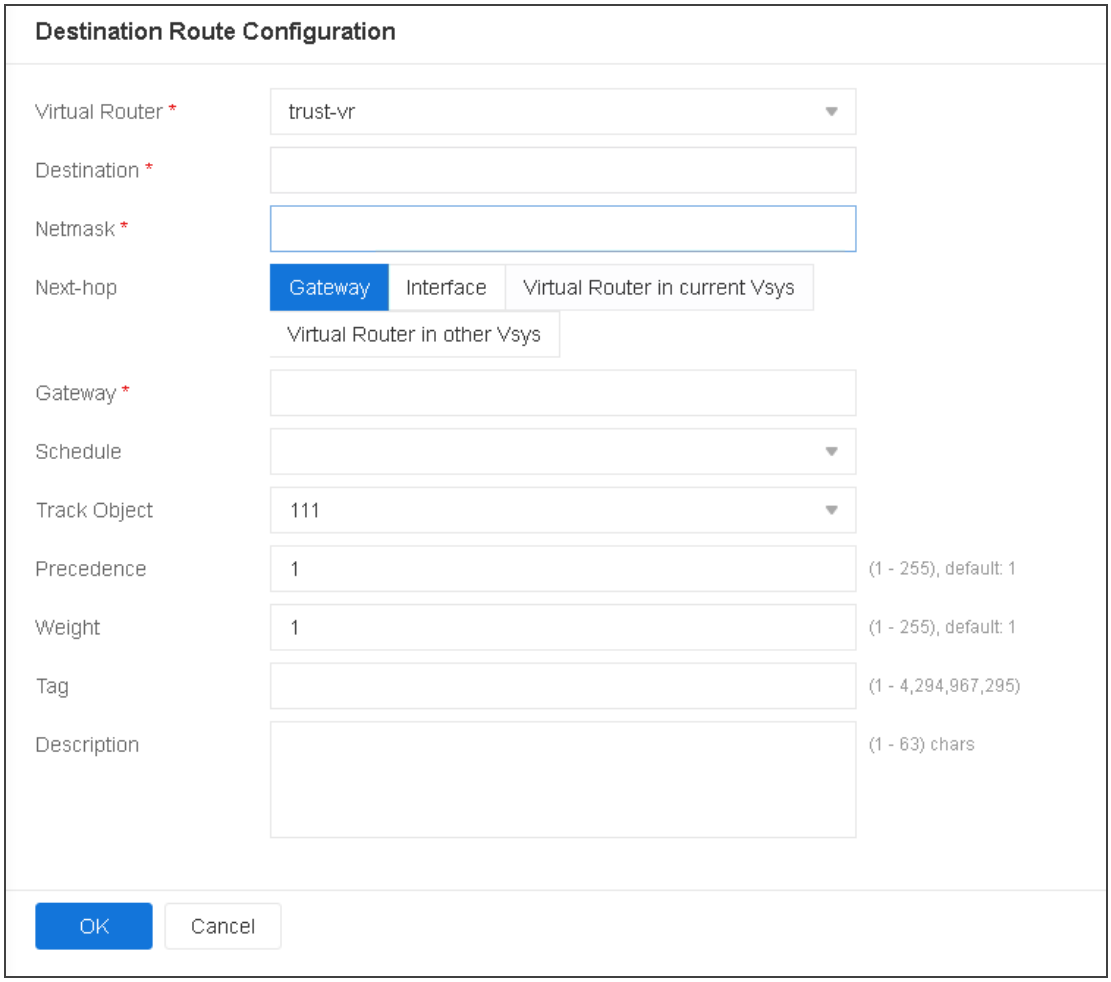
The destination route is a manually-configured route entry that determines the next routing hop based on the destination IP address. Usually a network with comparatively a small number of out-bound connections or stable Intranet connections will use a destination route. You can add a default route entry at your own choice as needed.

Creating a Destination Route

To create a destination route, take the follwing steps:

1. Select **Network** > **Routing** > **Destination Route**.
2. Select the IPv4 or IPv6 tab page, and create an IPv4 destination route or IPv6 destination route on the corresponding page. This step is only applicable for IPv6 version.
3. Click **New**.

   In the Destination Route Configuration page, enter values.



Option	Description
Virtual Router	From the Virtual Router drop-down list, select the Virtual Routerouter for the new route. The default value is "trust-vr".
Destination	Type the IP address for the route into the text box.
Netmask	Type the corresponding subnet mask into the text box.
Next-hop	To specify the type of next hop, click **Gateway**, **Current VRouter**, **Interface**, or **Other VRouter**.

Option	Description
	• Gateway: Type the IP address into the **Gateway** text box. • Current VRouter: Select a name from the drop-down list. • Interface: Select a name from the **Interface** drop-down list. Type the IP address into the **Gateway** text box. For a tunnel interface, you need to type the gateway address for the tunnel's peer in the optional box below. • Other VRouter: Select a name from the **Vsys** drop-down list. Select a name from the **Virtual Router** drop-down list.
Schedule	Specifies a schedule when the rule will take effect. Select a desired schedule from the **Schedule** drop-down list. After selecting the desired schedules, click the blank area in this dialog to complete the schedule configuration. To create a new schedule, click **New Schedule**.
Track Object	Select a created track object from the drop-down manual. When the track fails, the route will be invalid.
Precedence	Type the route precedence into the text box. The smaller the parameter is, the higher the precedence is. If multiple routes are available, the route with higher precedence will be prioritized. The value range is 1 to 255. The default

Option	Description
	value is 1. When the value is set to 255, the route will be invalid.
Weight	Type the weight for the route into the text box. This parameter is used to determine the weight of traffic forwarding in load balance. The value range is 1 to 255. The default value is 1.
Tag	Specifies the tag value of the destination route. When OSPF redistributes routes, if the configured routing tag values here are matched to the rules in the routing mapping table, the route will be redistributed to filter its information. The value range is 1 to 4294967295.
Description	Type the description information into the Description text box if necessary.

4. Click **OK**.

Destination-Interface Route

Destination interface route is designed to select a route and forward data based on the Destination IP address and ingress interface of a packet.

Creating a Destination-Interface Route

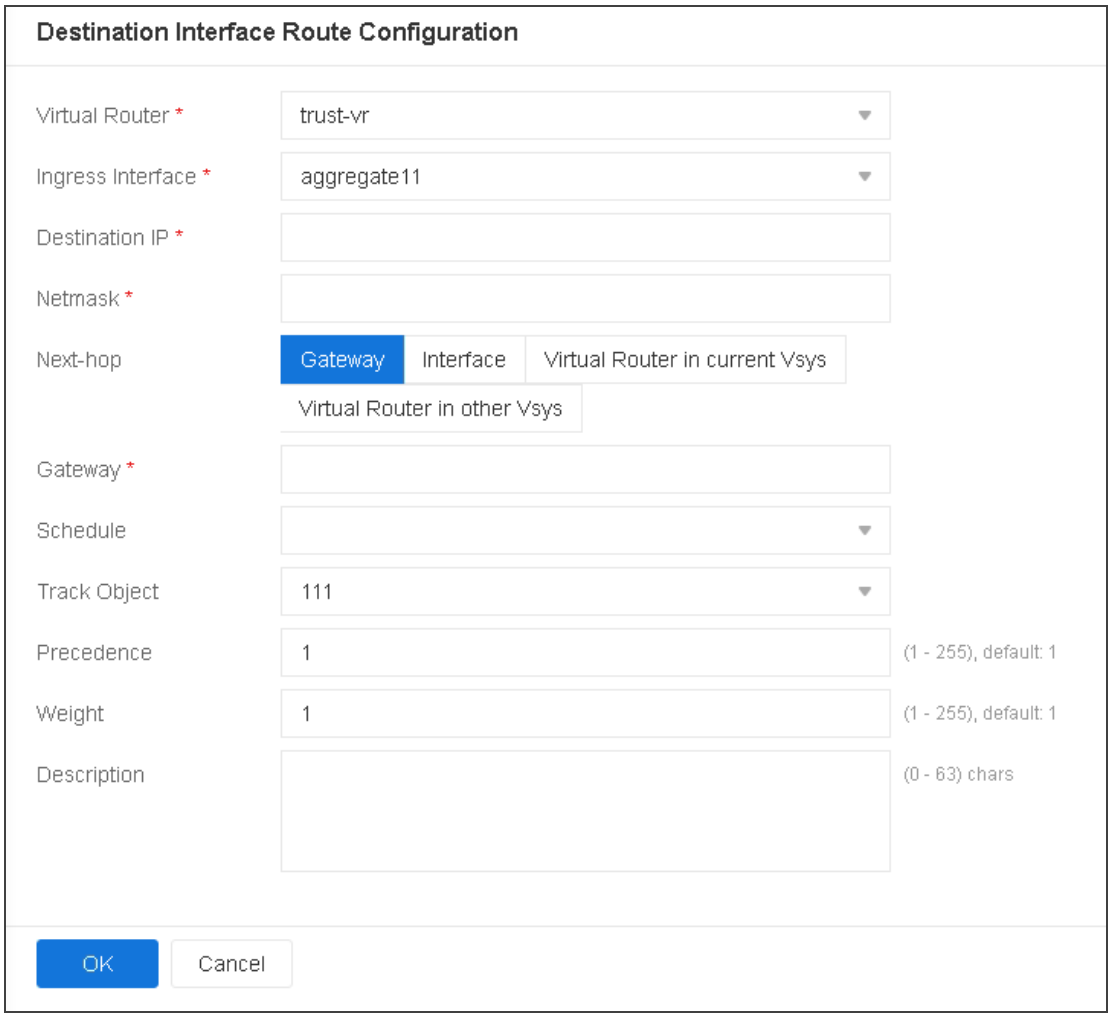
To create a Destination-Interface route, take the following steps:

1. Select **Network** > **Routing** > **Destination Interface Route**.

2. Select the IPv4 or IPv6 tab page, and create an IPv4 Destination-Interface route or IPv6 Destination-Interface route on the corresponding page. This step is only applicable for IPv6 version.

3. Click **New**.

   In the Destination Interface Route Configuration page, enter values.



Option	Description
Virtual Router	From the Virtual Router drop-down list, select the Virtual Routerouter for the new route. The default value is

Option	Description
	"trust-vr".
Ingress Interface	Select an interface for the route from the drop-down list.
Destination IP	Type the Destination IP for the route into the textbox.
Netmask	Type the corresponding subnet mask into the textbox.
Next-hop	To specify the type of next hop, click **Gateway**, **Virtual Router in current Vsys**, **Interface**, or **Virtual Router in other Vsys**. • Gateway: Type the IP address into the **Gateway** text box. • Virtual Router in current Vsys: Select a name from the **Virtual Router** drop-down list. • Interface: Select a name from the **Interface** drop-down list. Type the IP address into the **Gateway** text box. For a tunnel interface, you need to type the gateway address for the tunnel's peer in the optional box below. • Virtual Router in other Vsys: Select a name from the **Vsys** drop-down list. Select a name from the **Virtual Router** drop-down list.
Schedule	Specifies a schedule when the rule will take effect. Select

Option	Description
	a desired schedule from the **Schedule** drop-down list. After selecting the desired schedules, click the blank area in this dialog to complete the schedule configuration. To create a new schedule, click **New Schedule**.
Track Object	Select a created track object from the drop-down manual. When the track fails, the route will be invalid.
Precedence	Type the route precedence into the textbox. The smaller the parameter is, the higher the precedence is. If multiple routes are available, the route with higher precedence will be prioritized. The value range is 1 to 255. The default value is 1. When the value is set to 255, the route will be invalid.
Weight	Type the weight for the DIBR into the textbox. This parameter is used to determine the weight of traffic forwarding in load balance. The value range is 1 to 255. The default value is 1.
Description	Type the description information into the Description text box if necessary.

4. Click **OK**.

Source Route

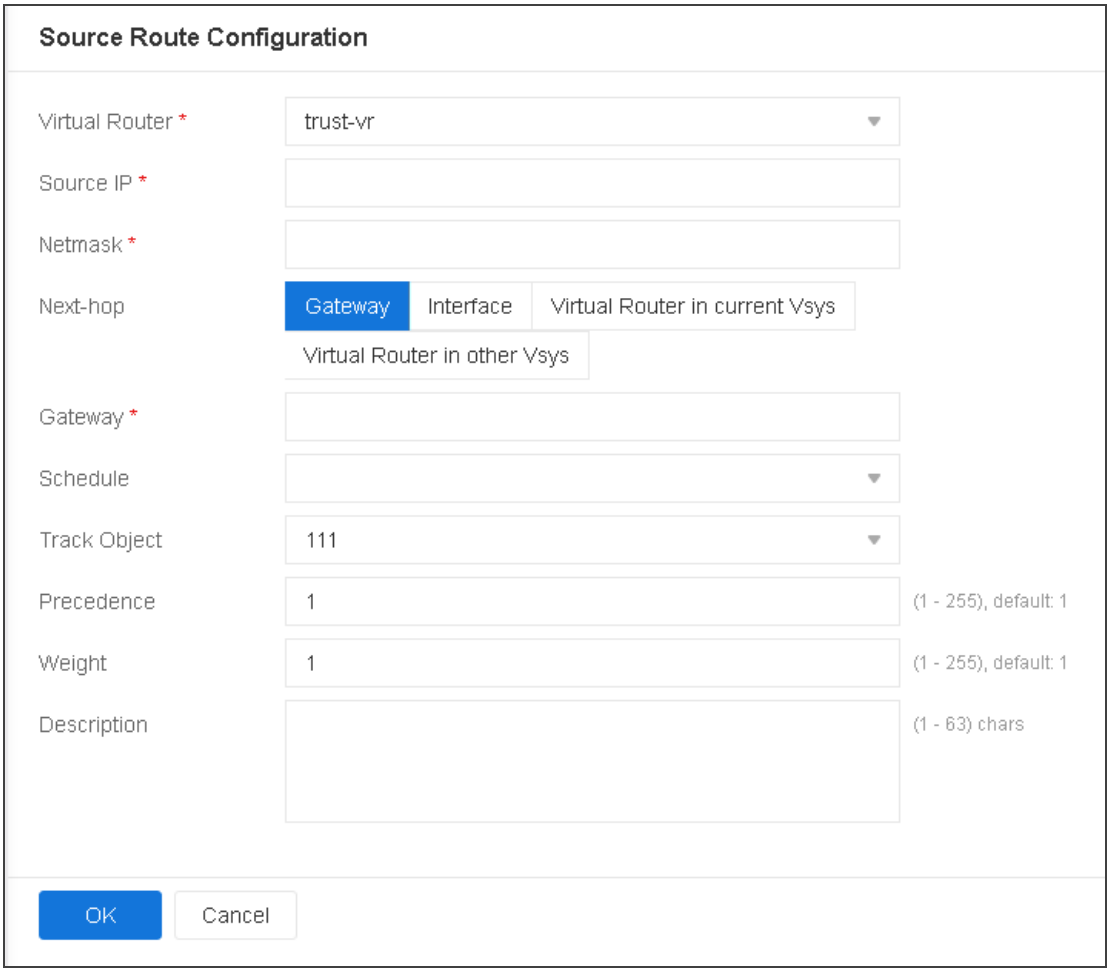
Source route is designed to select a router and forward data based on the source IP address of a packet.

Creating a Source Route

To create a source route, take the following steps:

1. Select **Network** > **Routing** > **Source Route**.
2. Select the IPv4 or IPv6 tab page, and create an IPv4 source route or IPv6 source route on the corresponding page. This step is only applicable for IPv6 version.
3. Click **New**.

   In the Source Route Configuration page, enter values.



Option	Description
Virtual Router	From the Virtual Router drop-down list, select the Virtual Routerouter for the new route. The default value is "trust-vr".
Source IP	Type the source IP for the route into the box.
Netmask	Type the corresponding subnet mask into the box.
Next-hop	To specify the type of next hop, click **Gateway**, **Virtual Router in current Vsys**, **Interface**, or **Virtual Router in other Vsys**.

Option	Description
	• Gateway: Type the IP address into the **Gateway** text box. • Virtual Router in current Vsys: Select a name from the drop-down list. • Interface: Select a name from the **Interface** drop-down list. Type the IP address into the **Gateway** text box. For a tunnel interface, you need to type the gateway address for the tunnel's peer in the optional box below. • Virtual Router in other Vsys: Select a name from the **Vsys** drop-down list. Select a name from the **Virtual Router** drop-down list.
Schedule	Specifies a schedule when the rule will take effect. Select a desired schedule from the **Schedule** drop-down list. After selecting the desired schedules, click the blank area in this dialog to complete the schedule configuration. To create a new schedule, click **New Schedule**.
Track Object	Select a created track object from the drop-down manual. When the track fails, the route will be invalid.
Precedence	Type the route precedence into the box. The smaller the parameter is, the higher the precedence is. If multiple routes are available, the route with higher precedence will be prioritized. The value range is 1 to 255. The default value is 1. When the value is set to 255, the route will be invalid.

Option	Description
Weight	Type the weight for the route into the box. This parameter is used to determine the weight of traffic forwarding in load balance. The value range is 1 to 255. The default value is 1.
Description	Type the description information into the Description text box if necessary.

4. Click **OK**.

Source-Interface Route

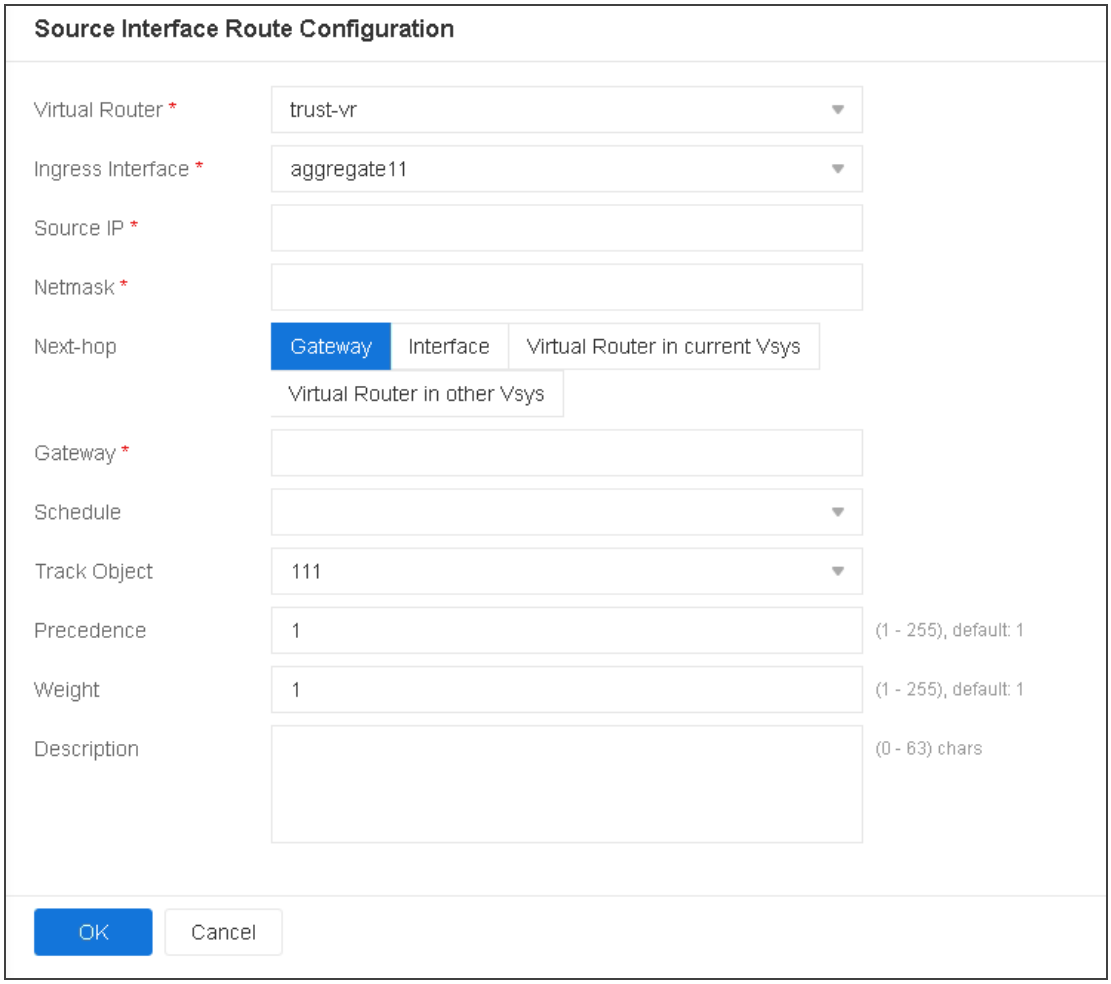
Source interface route is designed to select a router and forward data based on the source IP address and ingress interface of a packet.

Creating a Source-Interface Route

To create a Source-Interface route, take the following steps:

1. Select **Network** > **Routing** > **Source Interface Route**.
2. Select the IPv4 or IPv6 tab page, and create an IPv4 Source-Interface route or IPv6 Source-Interface route on the corresponding page. This step is only applicable for IPv6 version.
3. Click **New**.

   In the Source Interface Route Configuration page, enter values.



Option	Description
Virtual Router	From the Virtual Router drop-down list, select the Virtual Routerouter for the new route. The default value is "trust-vr".
Ingress Interface	Select an interface for the route from the drop-down list.
Source IP	Type the source IP for the route into the textbox.
Netmask	Type the corresponding subnet mask into the textbox.

Option	Description
Next-hop	To specify the type of next hop, click **Gateway**, **Virtual Router in current Vsys**, **Interface**, or **Virtual Router in other Vsys**. • Gateway: Type the IP address into the **Gateway** text box. • Virtual Router in current Vsys: Select a name from the **Virtual Router** drop-down list. • Interface: Select a name from the **Interface** drop-down list. Type the IP address into the **Gateway** text box. For a tunnel interface, you need to type the gateway address for the tunnel's peer in the optional box below. • Virtual Router in other Vsys: Select a name from the **Vsys** drop-down list. Select a name from the **Virtual Router** drop-down list.
Schedule	Specifies a schedule when the rule will take effect. Select a desired schedule from the **Schedule** drop-down list. After selecting the desired schedules, click the blank area in this dialog to complete the schedule configuration. To create a new schedule, click **New Schedule**.
Track Object	Select a created track object from the drop-down manual. When the track fails, the route will be invalid.
Precedence	Type the route precedence into the textbox. The smaller

Option	Description
	the parameter is, the higher the precedence is. If multiple routes are available, the route with higher precedence will be prioritized. The value range is 1 to 255. The default value is 1. When the value is set to 255, the route will be invalid.
Weight	Type the weight for the ISP route into the textbox. This parameter is used to determine the weight of traffic forwarding in load balance. The value range is 1 to 255. The default value is 1.
Description	Type the description information into the Description text box if necessary.

4. Click **OK**.

ISP Profile

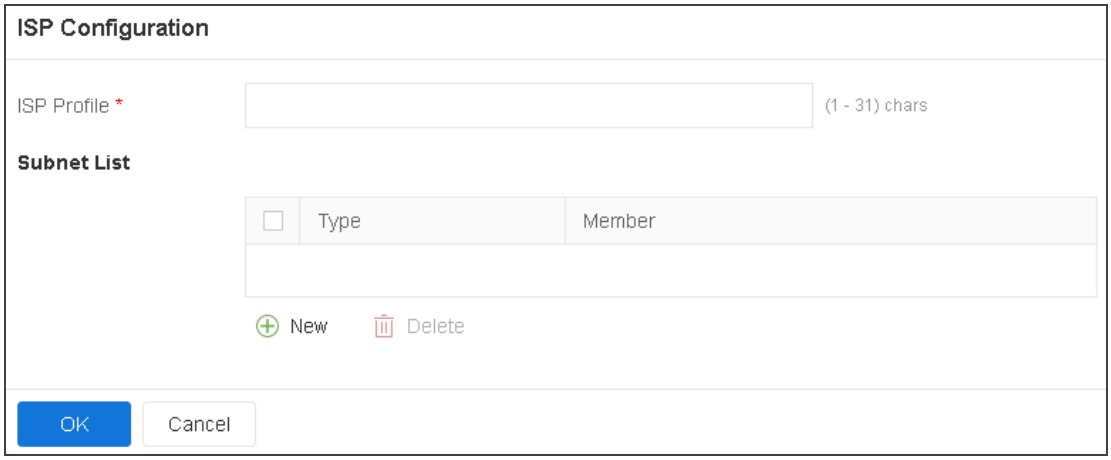
To configure an ISP route, you need to first add a subnet to an ISP, and then configure the ISP route. The destination of the route is determined by the name of the ISP. You can customize ISP information, or upload and download custom profiles that contain different ISP information. You can implement remote or local update on pre-defined ISP profiles by using the ISP information database. By default, the system automatically updates the ISP information database on a daily basis. You can modify the update configuration as needed. For more information, see Updating Signature Database.

Creating an ISP Profile

To create an ISP Profile, take the following steps:

1. Select **Network** > **Routing** > **ISP Profile**.
2. Select the **IPv4** or **IPv6** tab, this option can only be configured in the IPv6 version
3. Click **New**.

In the ISP Configuration page, enter values.



Option	Description
ISP Profile	Type the name for the new ISP profile into the textbox.

Option	Description
Subnet List	
Member	Specifies the member type of the ISP profile, including subnet member entry and ISP profile member entry. When creating an IPv4 ISP profile: • Add subnet member: Select **IP/Netmask** from the drop-down list, and then type the IPv4 address and nermask for the subnet into the textbox. • Add an IPv4 ISP menber: Add an IPv4 ISP profile entry, that is to add other configured IPv4 ISP profile (predefined IPv4 ISP profile or user-defined IPv4 ISP profile), select **ISP Profile** from the drop-down list, and then select the ISP profile name. When creating an IPv6 ISP profile: • Add subnet member: Select **IPv6/Prefix** from the drop-down list, and then type the IPv6 address and prefix for the subnet into the textbox. • Add an IPv6 ISP menber: Add an IPv6 ISP profile entry, that is to add other configured IPv6 ISP profile (predefined IPv6 ISP profile or user-defined IPv6 ISP profile), select **ISP Profile** from the drop-down list, and then select the ISP profile name.
New	Add the member to the ISP profile. The member will be displayed in the list below. If needed, repeat the steps to

Option	Description
	add multiple subnets for the ISP profile.
Delete	Delete the selected ISP profiles.

4. Click **OK**.

Deleting a User-defined ISP Profile

To delete a user-defined ISP Profile, take the following steps:

1. Select **Network** > **Routing** > **ISP Profile**.
2. Select the **IPv4** or **IPv6** tab, this option can only be configured in the IPv6 version
3. Selete the user-defined ISP profile, and click **Delete**.

Notes:

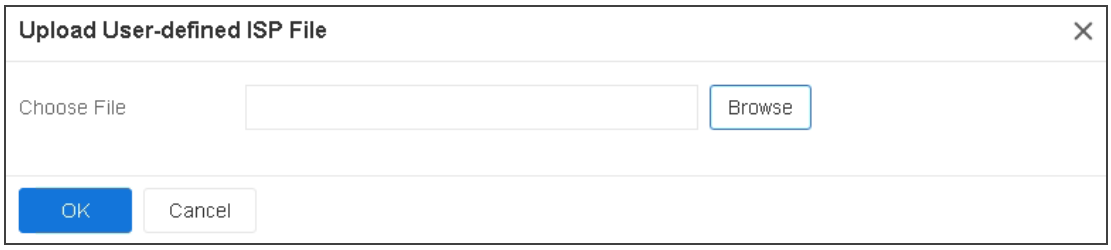
- The predefined ISP profile cannot be deleted.
- To ensure that the custom ISP profile can be deleted normally, please delete the nested ISP profile entry before deleting it.

Uploading a User-defined ISP Profile

To upload a user-defined ISP Profile, take the following steps:

1. Select **Network** > **Routing** > **ISP Profile**.
2. Select the **IPv4** or **IPv6** tab, this option can only be configured in the IPv6 version.

3. Click **Upload**.



4. Click **Browse** to select the user-defined ISP profile in your PC.
5. Click **Upload** to upload the selected user-defined ISP profile to device.

Downloading an ISP Profile

To download an ISP Profile, take the following steps:

1. Select **Network** > **Routing** > **ISP Profile**.
2. Select the **IPv4** or **IPv6** tab, this option can only be configured in the IPv6 version.
3. Click **Download**.
4. In the Download User Defined ISP File panel, select an ISP profile from the **ISP profile** drop-down list.
5. Click **OK** to download the profile to a specified location in PC.

ISP Route

Generally many users might apply for multiple lines for load balancing purpose. However, a typical balance will not have the function based on the traffic's direction. For such a scenario, the device provides the ISP route, which allows traffic from different ISPs to take their proprietary routes, thus accelerating network access.

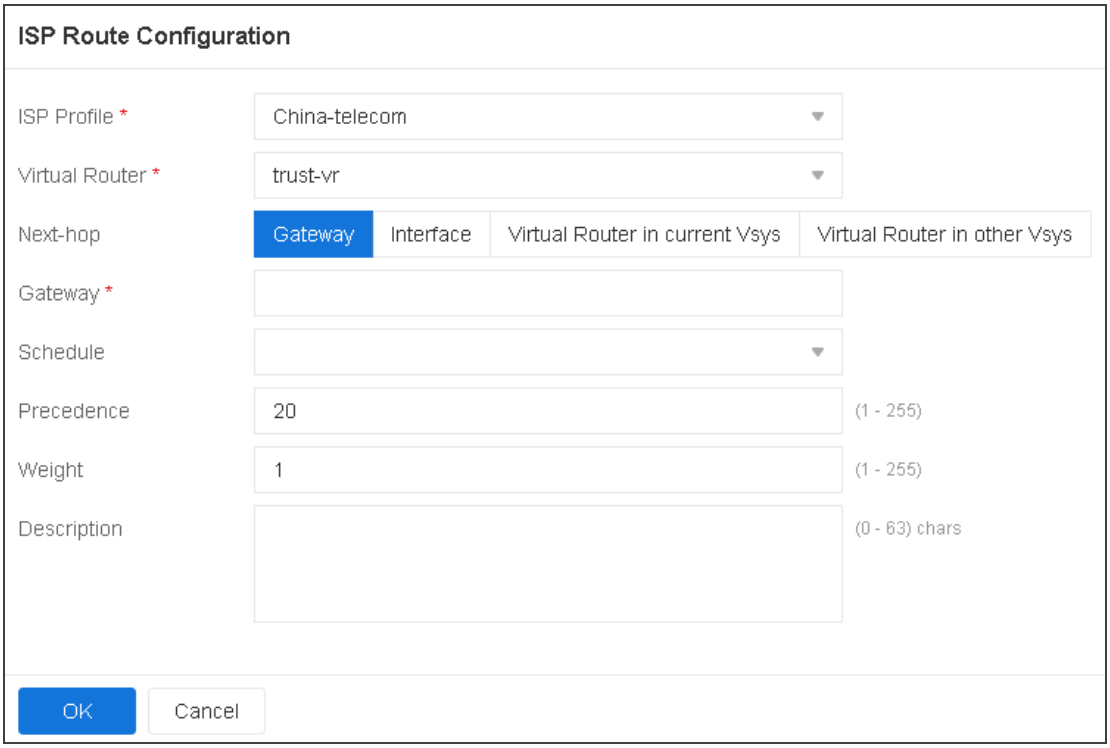
To configure an ISP route, first you need to add a subnet to an ISP, and then configure the ISP route. The destination of the route is determined by the name of the ISP. You can customize ISP information, or upload and download custom profiles that contain different ISP information. You can implement remote or local update on pre-defined ISP profiles by using the ISP information database. By default, the system automatically updates the ISP information database on a daily basis. You can modify the update configuration as needed. For more information, see Updating Signature Database.

Creating an ISP Route

To create an ISP route, take the following steps:

1. Select **Network** > **Routing** > **ISP Route**.
2. Select the **IPv4** or **IPv6** tab, this option can only be configured in the IPv6 version.
3. Click **New**.

   In the ISP Configuration page, enter values.



Option	Description
ISP Profile	Select an ISP profile name from the drop-down list.
Virtual Router	From the **Virtual Router** drop-down list, select the Virtual Router for the new route. The default value is "trust-vr".
Next-hop	To specify the type of next hop, click **Gateway**, **Current VRouter**, **Interface**, or **Other VRouter**. • Gateway: Type the IP address into the **Gateway** text box. • Current VRouter: Select a name from the **Virtual Router** drop-down list.

Option	Description
	• Interface: Select a name from the **Interface** drop-down list. Type the IP address into the **Gateway** text box. For a tunnel interface, you need to type the gateway address for the tunnel's peer in the optional box below. • Other VRouter: Select a name from the **Vsys** drop-down list. Select a name from the **Virtual Router** drop-down list.
Schedule	Specifies a schedule when the rule will take effect. Select a desired schedule from the **Schedule** drop-down list. After selecting the desired schedules, click the blank area in this dialog to complete the schedule configuration. To create a new schedule, click **New Schedule**.
Precedence	Type the route precedence into the textbox. The smaller the parameter is, the higher the precedence is. If multiple routes are available, the route with higher precedence will be prioritized. The value range is 1 to 255. The default value is 10. When the value is set to 255, the route will be invalid.
Weight	Type the weight for the ISP route into the textbox. This parameter is used to determine the weight of traffic forwarding in load balance. The value range is 1 to 255. The default value is 1.
Description	Type the description information into the Description

Option	Description
	text box if necessary.

4. Click **OK**.

Policy-based Route

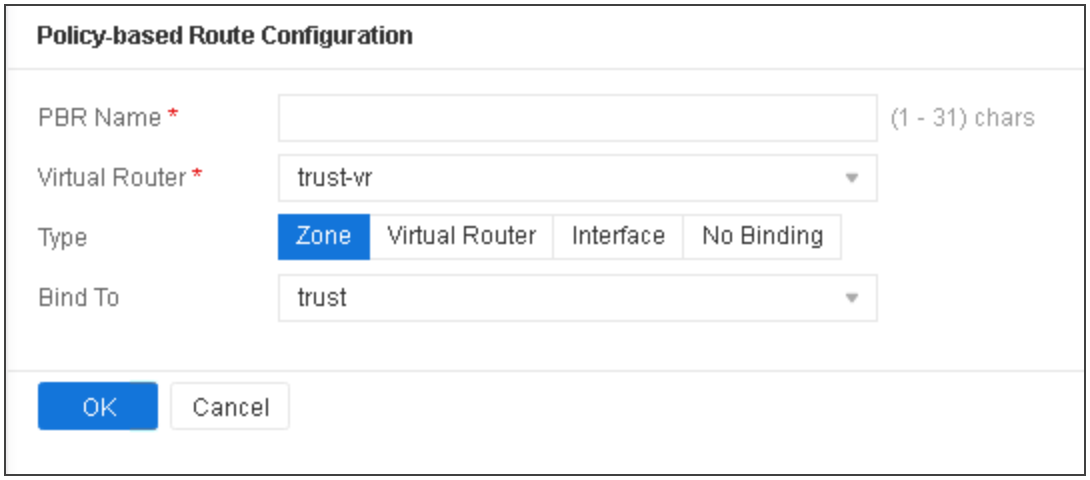
Policy-based Route (PBR) is designed to select a router and forward data based on the source IP address, destination IP address and service type of a packet.

Creating a Policy-based Route

To create a Policy-based route, take the following steps:

1. Select **Network** > **Routing** > **Policy-based Routing**.
2. Click **New**. Select **PBR** from the drop-down list.

In the Policy-based Route Configuration page, configure the following.



Option	Description
PBR Name	Specifies a name for the policy-based route.
Virtual Router	From the Virtual Router drop-down list, select the Virtual Router for the new route. The default value is "trust-vr".
Type	Specifies the object type that the policy-based route binds to. You can select **Zone**, **Virtual Router**, **Interface**

Option	Description
	or **No Binding**. • Zone: Click this option button and select a zone from the **Bind To** drop-down list. • Virtual Router: Click this option button and show the virtual router that the policy-based route bind to. • Interface: Click this option button and select a interface from the **Bind To** drop-down list. • No Binding: This policy-based route is no binding.

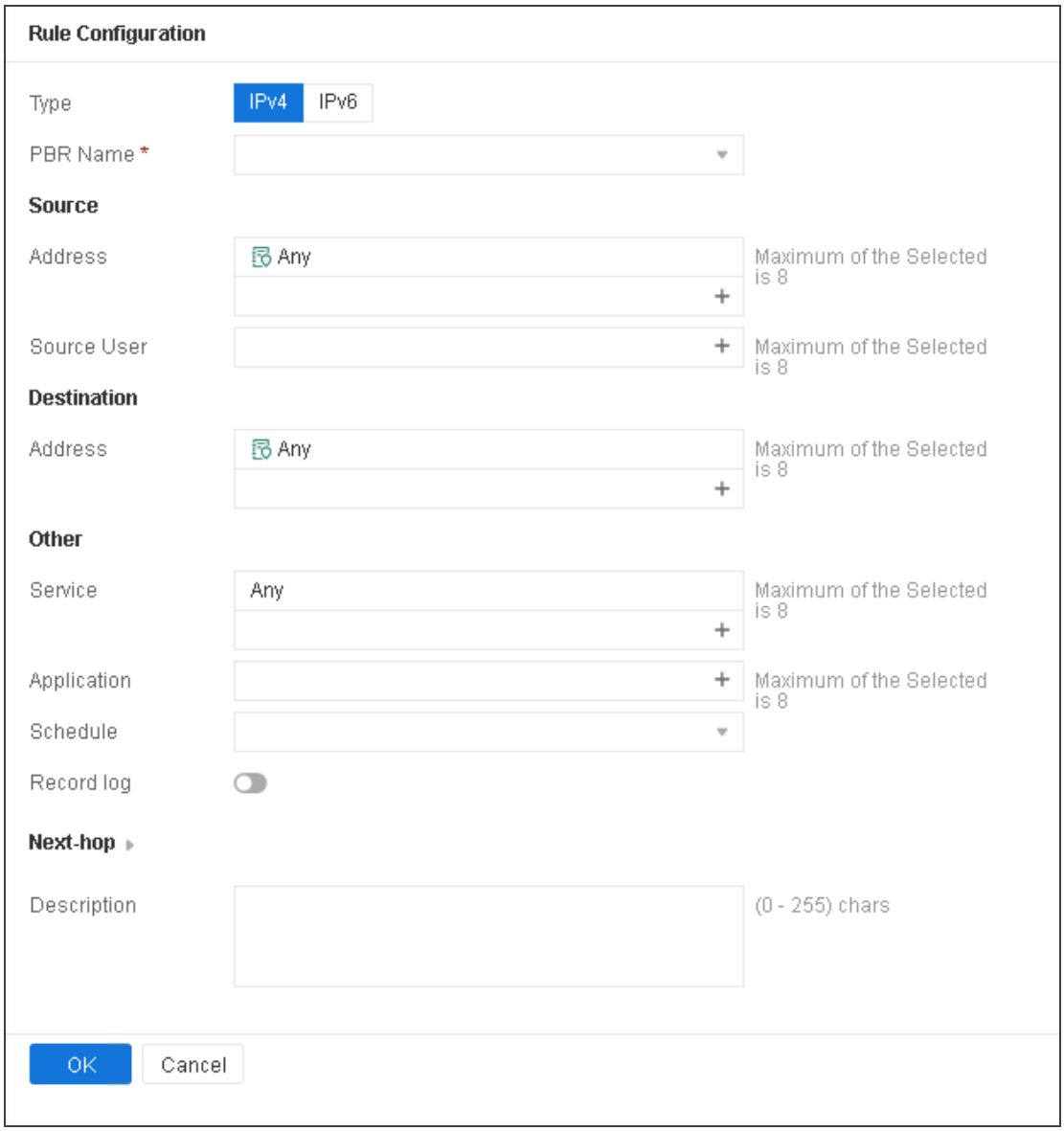
3. Click **OK**.

Creating a Policy-based Route Rule

To create a Policy-based Route rule, take the following steps:

1. Select **Network** > **Routing** > **Policy-based Routing**.

2. Click **New**. Select **Rule** from the drop-down list.



In this page, configure the following.

Option	Description
PBR Name	Specifies a name for the policy-based route.

Option	Description
Description（Optional）	Type information about the PBR rule.
Source	
Address	Specifies the source addresses of PBR rule. 1. Select an address type from the **Address** drop-down list. 2. Select or type the source addresses based on the selected type. 3. Click **Add** to add the addresses to the left pane. 4. After adding the desired addresses, click **Close**. You can also perform other operations: • When selecting the **Address Book** type, you can click ⊕ button to create a new address entry. • You can click ▼ in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address

Option	Description
	book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched. • The default address configuration is any. To restore the configuration to this default one, select the **any** check box.
User	Specifies a role, user or user group for the PBR rule. 1. From the **User** drop-down menu, select the AAA server which the users and user groups belongs to. To specify a role, select **Role** from the **AAA Server** drop-down list. 2. Based on different types of AAA server, you can execute one or more actions: search a user/user group/role, expand the user/user group list, enter the name of the user/user group. 3. After selecting users/user groups/roles, click them to add them to the left panes.

Option	Description
	4. After adding the desired objects, click the **Close** to complete the user configuration.
Destination	
Address	Specifies the destination addresses of PBR rule. 1. Select an address type from the **Address** drop-down list. 2. Select or type the source addresses based on the selected type. 3. Click **Add** to add the addresses to the left panes. 4. After adding the desired addresses, click **Close**. You can also perform other operations: • When selecting the **Address Book** type, you can click ⊕ button to create a new address entry. • You can click ▼ in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address

Option	Description
	book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched. • The default address configuration is any. To restore the configuration to this default one, select the **any** check box.
Other	
Service	Specifies a service or service group. 1. From the **Service** drop-down menu, select a type: Service, Service Group. 2. You can search the desired service/service group, expand the service/service group list. 3. After selecting the desired services/service groups, click them to add them to the left panes. 4. After adding the desired objects, click **Close**. You can also perform other operations: • To add a new service or service group, select **User-**

Option	Description
	defined from the **Predefined** drop-down listr, and click  button. • The default service configuration is any. To restore the configuration to this default one, select the **any** check box.
Application	Specifies an application/application group/application filters. 1. From the **Application** drop-down menu, you can search the desired application/application group/application filter, expand the list of applications/application groups/application filters. 2. After selecting the desired applications/application groups/application filters, click them to add them to the left panes. 3. After adding the desired objects, click **Close** to complete the application configuration. You can also perform other operations: • To add a new application group, click **New AppGroup**. • To add a new application filter, click **New AppFilter**.
Schedule	Specifies a schedule when the PBR rule will take effect.

Option	Description
	Select a desired schedule from the **Schedule** drop-down list. After selecting the desired schedules, click **Close** to complete the schedule configuration. To create a new schedule, click **New Schedule**.
Record log	Click the **Enable** button to enable the logging function for PBR rules.

Expand Next-hop, configure the following.

Option	Description
Set Next-hop	To specify the type of next hop, click **IP Address**, **Virtual Router in current Vsys**, **Interface**, or **Virtual Router in other Vsys**. • IP Address: Type IP address into the **IP address** text box and specify the weight into the **Weight** text box. When more than one next hops are available, the traffic will be allocated to the different next hops according to the weight value. • Virtual Router in current Vsys: Select a name from the **Next-Hop Virtual Router** drop-down list and specify the weight into the **Weight** text box. When more than one next hops are available, the traffic will be allocated to the different next hops according to the weight value. • Interface: Select an interface from the **Interface**

Option	Description
	drop-down list and specify the weight into the **Weight** text box. When more than one next hops are available, the traffic will be allocated to the different next hops according to the weight value. • Virtual Router in other Vsys: Check the radio button to specify a virtual router in the current VSYS as the next hop. Select a virtual router from the **Virtual Router** drop-down list and specify the weight into the **Weight** text box. When more than one next hops are available, the traffic will be allocated to the different next hops according to the weight value.
Track Object	Select the track object from the drop-down list or click ⊕ button to create a new track object. See "Track Object" on Page 1169.
Weight	Specifies the weight for the next hop. The value range is 1 to 255. The default value is 1. If a PBR rule is configured with multiple next hops, system will distribute the traffic in proportion to the corresponding weight.
Add	Click to add the specified next hop.
Delete	Select next-hop entries from the next hop table and click this button to delete.

Adjusting Priority of a PBR Rule

To adjust priority of a Policy-based Route rule, take the following steps:

1. Select **Network** > **Routing** > **Policy-based Routing**.

2. From the **Virtual Router** drop-down list, select the Virtual Router for the new route.

3. Select the rule you want to adjust priority from the list below, click **Priority**.

4. In the Priority page, enter values.

Option	Description
Top	Click this option button to move the PBR rule to the top.
Bottom	Click this option button to move the PBR rule to the bottom.
Before ID	Click this option button and type the ID into the box to move the PBR rule to the position before the ID.
After ID	Click this option button and type the ID into the box to move the PBR rule to the position after the ID.

Notes: Each PBR rule is labeled with a unique ID. When traffic flows into a Hillstone device, the device will query for PBR rules by turn, and process the traffic according to the first matched rule. However, the PBR rule ID is not related to the matching sequence during the query. You can move a PBR rule's location up or down at your own choice to adjust the matching sequence accordingly.

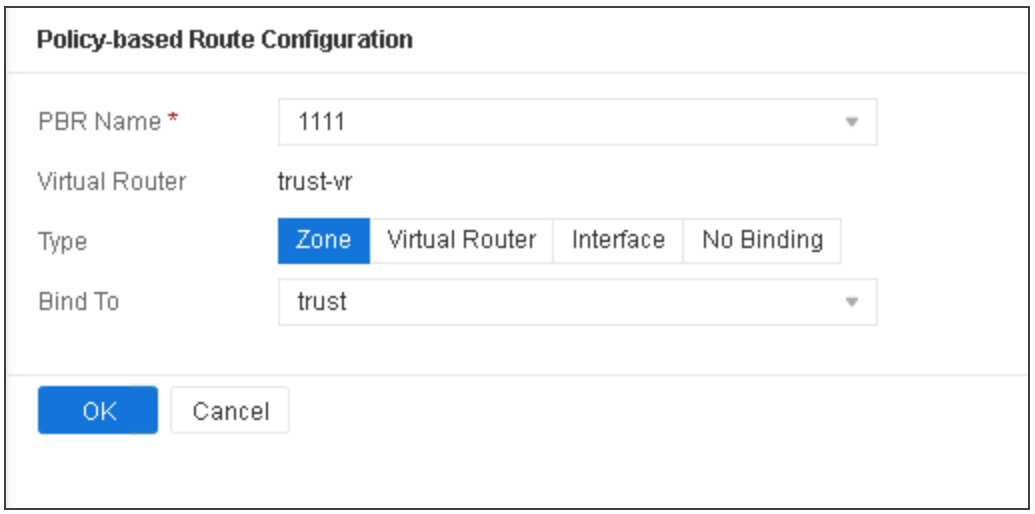
Applying a Policy-based Route

You can apply a policy-based route by binding it to an interface, virtual router or zone.

To apply a policy-based route, take the following steps:

1. Select **Network** > **Routing** > **Policy-based Routing**.
2. From the **Virtual Router** drop-down list, select the Virtual Router for the new route.
3. Click **Bind to**.

   In the Policy-based Route Configuration page, enter values.



Option	Description
PBR Name	Select a route from the PBR name drop-down list.
Virtual Router	From the **Virtual Router** drop-down list, select the Virtual Router for the new route. The default value is "trust-vr".
Type	Specifies the object type that the policy-based route binds to. You can select **Zone**, **Virtual Router**, **Interface** or **No Binding**.

Option	Description
	• Zone: Click this option button and select a zone from the **Bind To** drop-down list. • Virtual Router: Click this option button and show the virtual router that the policy-based route binds to. • Interface: Click this option button and select a interface from the **Bind To** drop-down list. • No Binding: This policy-based route is no binding.

4. Click **OK**.

DNS Redirect

System supports the DNS redirect funtion, which redirects the DNS requests to a specified DNS server. For more information about specifying IP addresses of the DNS server, see Configuring a DNS Server. Currently, the DNS redirect function is mainly used to redirect the video traffic for load balancing. With the policy based route working together, system can redirect the Web video traffic to different links, improving the user experience.

To enable the DNS redirect function, take the following steps:

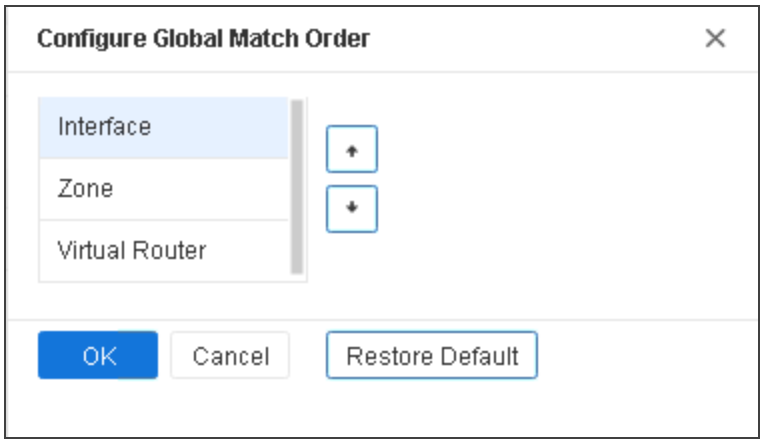
1. Select **Network** > **Routing** > **Policy-based Routing**.
2. Click **Enable DNS Redirect**.

Configuring the Global Match Order

By default, if the PRB rule is bound to both an interface , VRouter and the security zone the interface belongs to, the traffic matching sequence will be: Interface > Zone > VRouter. You can configure the global match order of PBR.

To configure the global match order, take the following steps:

1. Select **Network** > **Routing** > **Policy-based Routing**.
2. Click **Config Global Match Order**.



3. Select the items that need to be adjusted, and click  and  .
4. To restore the default matching sequence, click **Restore Default**.
5. Click **OK**.

RIP

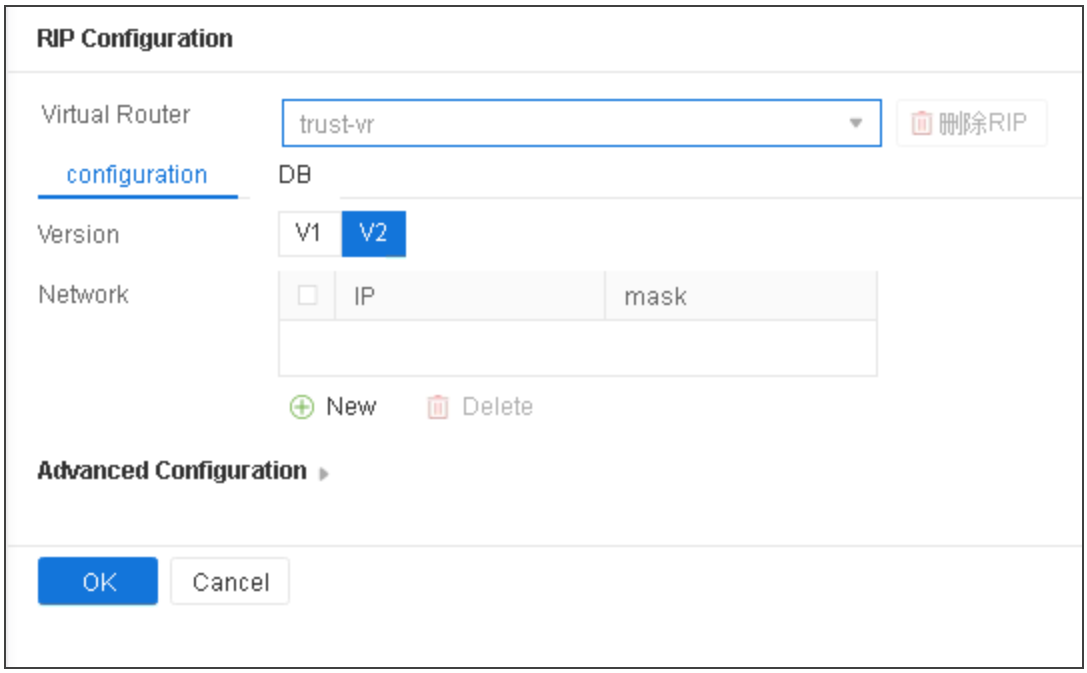
RIP, Routing Information Protocol, is an internal gateway routing protocol that is designed to exchange routing information between routers. Currently, devices support both RIP versions, i.e., RIP-1 and RIP-2.

RIP configuration includes basic options, redistribute, Passive IF, neighbor, network and distance. You will also need to configure RIP parameters for different interfaces, including RIP version, split horizon, and authentication mode.

Creating RIP

To create RIP, take the following steps:

1. Select **Network** > **Routing** > **RIP**.
2. From the **Virtual Router** drop-down list, select the Virtual Router for the new route.
3. Click **New**.



In the configuration tab, configure the following.

Option	Description
Version	Specifies a RIP version. Hillstone devices support RIP-1 and RIP-2. RIP-1 transmits packets by broadcasting, while RIP-2 transmits packet by multicasting. Select a version from the drop-down list. The default version is RIP-2.
Network	
Network (IP/netmask)	Type the IP address and netmask into the **Network (IP/netmask)** box.
New	Click **New** to add the network. All the networks that have been added will be displayed in the list below.
Delete	Repeat the above steps to add more networks. To delete a network, select the entry you want to delete from the list, and click **Delete**.

Click Advanced Configuration, configure the following.

Option	Description
Metric	Specifies a default metric. The value range is 1 to 15. If no value is specified, the value of 1 will be used. RIP measures the distance to the destination network by hops. This distance is known as metric. The metric from a router to a directly connected network is 1, increment is 1 for every additional router between them. The max metric is 15, and the network with metric larger than 15 is not

Option	Description
	reachable. The default metric will take effect when the route is redistributed.
Distance	Specifies a default distance. The value range is 1 to 255. If no value is specified, the value of 120 will be used.
Default-info originate	Specifies if the default route will be redistributed to other routers with RIP enabled. By default RIP will not redistribute the default route. Click the **Enable** button to redistribute the default route.
Update interval	Specifies an interval in which all RIP routes will be sent to all the neighbors. The value range is 0 to 16777215 seconds. The default value is 30.
Invalid time	If a route has not been updated for the invalid time, its metric will be set to 16, indicating an unreachable route. The value range is 1 to 16777215 seconds. The default value is 180.
Hold-down time	If the metric becomes larger (e.g., from 2 to 4) after a route has been updated, the route will be assigned with a holddown time. During the holddown time, the route will not accept any update. The value range is 1 to 16777215 seconds. The default value is 180.
Flush time	System will keep on sending the unreachable routes (metric set to 16) to other routers during the flush time. If the route still has not been updated after the end of flush time, it will be deleted from the RIP information data-

Option	Description
	base. The value range is 1 to 16777215 seconds. The default value is 240.
Redistribute	
Protocol	Select a protocol type for the route from the **Protocol** drop-down list. The type can be Connected, Static, IS-IS, OSPF or BGP.
New	Click **New** to add the Redistribute route entry. All the entries that have been added will be displayed in the Redistribute Route list below.
Delete	Repeat the above steps to add more Redistribute route entries. To delete a Redistribute route entry, select the entry you want to delete from the list, and click **Delete**.
Neighbor	
Neighbor IP	Type the neighbor IP into the **Neighbor IP** box.
New	Click **New** to add the neighbor IP. All the neighbor IPs that have been added will be displayed in the list below.
Delete	Repeat the above steps to add more neighbor IPs. To delete a neighbor IP, select the entry you want to delete from the list, and click **Delete**.
Distance	
Distance	Type the distance into the **Distance** box. The priority of the specified distance is higher than than the default distance.

Option	Description
Network (IP/netmask)	Type the IP prefix and netmask into the **Network(IP/net-mask)** box.
New	Click **New** to add the distance. All the distances that have been added will be displayed in the list below.
Delete	Repeat the above steps to add more distances. To delete a distance, select the entry you want to delete from the list, and click **Delete**.

Click **Interface Configuration**, configure the following.

Option	Description
Edit	Select the check box of an interface from the Interface page, and click **Edit** to open the Interface Configuration page.

In the DB tab, view the database of the RIP route .

All the route entries that can reach target network are stored in the database.

4. Click **OK**.

Notes: Configuration for RIP on Hillstone device's interfaces includes: RIP version, split horizon and authentication mode. For more information on how to configure RIP on an interface, see "Configuring an Interface" on Page 176.

OSPF

OSPF, the abbreviation for Open Shortest Path First, is an internal gateway protocol based on link state developed by IETF. The current version of OSPF is version 2 (RFC2328). OSPF is applicable to networks of any size. Its quick convergence feature can send update message immediately after the network topology has changed, and its algorithm assures it will not generate routing loops. OSFP also have the following characteristics:

- Area division: divides the network of autonomous system into areas to facilitate management, thereby reducing the protocol's CPU and memory utilization, and improving performance.
- Classless routing: allows the use of variable length subnet mask.
- ECMP: improves the utilization of multiple routes.
- Multicasting: reduces the impact on non-OSPF devices.
- Verification: interface-based packet verification ensures the security of the routing calculation.

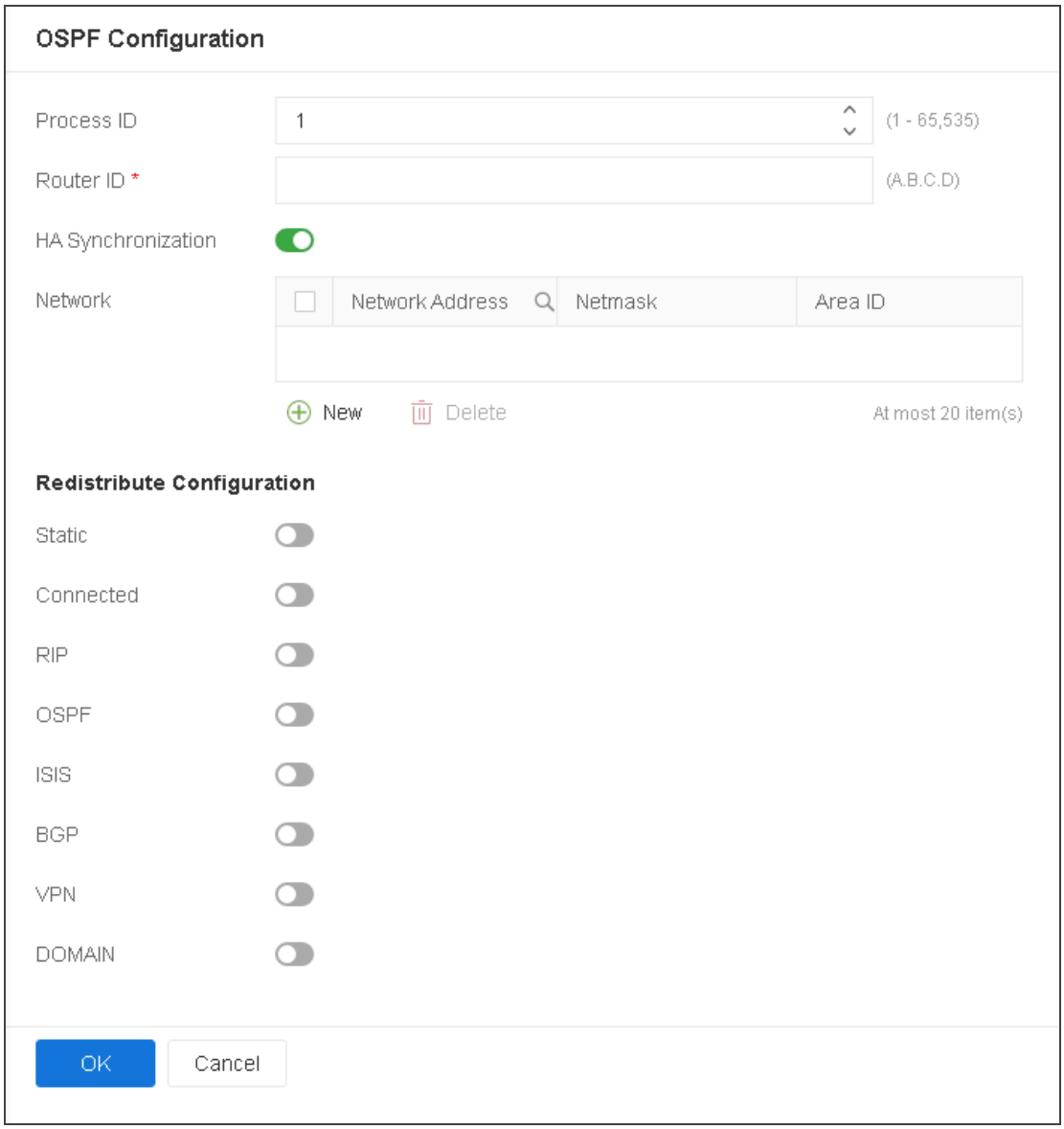
Note: Autonomous system is a router and network group under the control of a management institution. All routers within an autonomous system must run the same routing protocol.

Creating OSPF

To create OSPF, take the following steps:

1. Select **Network** > **Routing** > **OSPF**.
2. From the **Virtual Router** drop-down list, select the Virtual Router for the new route.

3. Click **New**.



In this page, configure the following.

Option	Description
Process ID	Enter the OSPF process ID. The default value is 1. The value ranges from 1 to 65535. Each OSPF process is individual, and has its own link

Option	Description
	state database and the related OSPF routing table. Each VRouter supports up to 4 OSPF processes and multiple OSPF processes maintain a routing table together. When specifying the OSPF process ID, note the following matters: • When running multiple OSPF processes in a VRouter, the network advertised in interfaces in each OSPF process cannot be same. • When route entries with the same prefix exist in multiple OSPF processes, the system will compare the administrative distance of each route entry and the route entry with the lower administrative distance will be added to the VRouter's routing table. If their AD is the same, the route entry that was first discovered will be added to the routing table. • If the OSPF route entries are redistributed to other routing protocols, the routing information of process 1 will be redistributed by default. If this process does not exist, the routing information of

Option	Description
	OSPF will not be redistributed.
Router ID	Enter the Router ID used by OSPF protocol. Each router running OSPF protocol should be labeled with a Router ID. The Router ID is the unique identifier of an individual router in the whole OSPF domain, represented in the form of an IP address.
HA Synchronization	Click the **Enable** button to enable HA synchronization. The OSPF configuration of the master and backup will be synchronized.
Network	Configure the network interface that enables OSPF and add the network to the specified area. Click **New**, and enter the network address, network mask and area ID. • Network Address: Enter the IP address of network interface that enables OSPF protocol. • Network Mask: Enter the mask of IP address. • Area ID: Enter the area ID the network will be added to, in form of a 32-bit digital number, or an IP address.
Redistribute Configuration	

Option	Description
Static	Click the **Enable** button to introduce the static route protocol into the OSPF route and redistribute.
Connected	Click the **Enable** button to introduce the connected route protocol into the OSPF route and redistribute.
RIP	Click the **Enable** button to introduce the RIP route protocol into the OSPF route and redistribute.
OSPF	Click the **Enable** button to introduce the OSPF route protocol into the OSPF route and redistribute.
ISIS	Click the **Enable** button to introduce the ISIS route protocol into the OSPF route and redistribute.
BGP	Click the **Enable** button to introduce the BGP route protocol into the OSPF route and redistribute.
VPN	Click the **Enable** button to introduce the VPN route into the OSPF route and redistribute.

4. Click **OK**.

Notes: Configuration for OSPF on Hillstone device's interfaces includes: hello transmission interval, dead time, LSA transmit interval and LSU transmit delay time. For

more information on how to configure OSPF on an interface, see "Configuring an Interface" on Page 176.

Viewing the Neighbor Information

To view the neighbor information, take the following steps:

1. Select **Network** > **Routing** > **OSPF**.
2. Select the process ID check box, and the neighbor information will be displayed in the list below.

- Neighbor Router ID: Shows the router ID of OSPF neighbors.
- Priority: Shows the router priority. The router priority is used to determine which router will act as the designated router. The designated router will receive the link information of all the other routers in the network, and broadcast the received link information.
- Neighbor State: Shows the OSPF neighbor state. The OSPF neighbor state includes 8 types: Down, Attempt, Init, 2-Way, Exstart, Exchange, Loading and Full. The Full state includes Full/DR and Full/BDR.
- Timeout: Shows the neighbor timeout, which is the difference between dead time and hello transmission interval. The unit is second. If the OSPF doesn't receive the Hello packets from neighbor, the neighbor ship cannot be established continually.

- Neighbor IP: Shows the IP address of neighbor router.
- Local Interface: Shows the interface sends the Hello packets to the neighbor router.

Configuring OSPFv3

OSPFv3 is the third version of Open Shortest Path First and mainly provides the support of IPv6. Before configuring OSPFv3, you need to enable IPv6 at **Network** > **Interface** > **New**, and configure an OSPFv3 interface. For how to configure the OSPFv3 interface, refer to **Configuring an Interface**.

The similarities between OSPFv3 and OSPFv2 are as follows:

- Both protocols use 32 bits Router ID and Area ID.
- Both protocols use the Hello packets, DD (database description) packets, LSR (link state request) packets, LSU (link state update) packets, and LSAck (link state acknowledgment) packets.
- Both protocols use the same mechanisms of finding neighbors and establishing adjacencies.
- Both protocols use the same mechanisms of LSA flooding and aging.

The differences between OSPFv3 and OSPFv2 are as follows:

- OSPFv3 runs on a per-link basis and OSPFv2 is on a per-IP-subnet basis.
- OSPFv3 supports multiple instances per link.
- OSPFv3 identifies neighbors by Router ID, and OSPFv2 identifies neighbors by IP address.

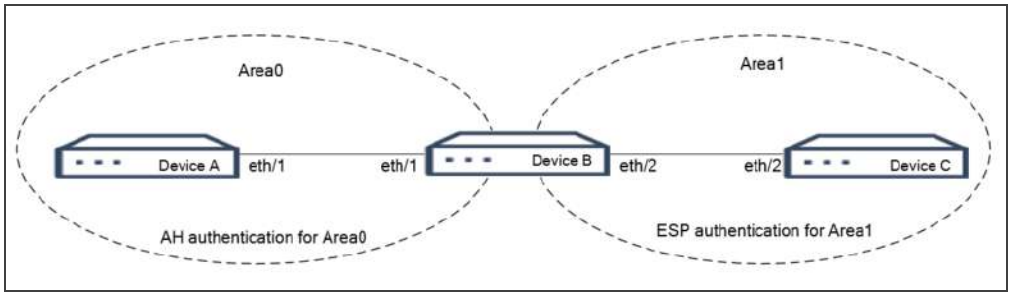
You can configure the OSPFv3 protocol for each VRouter respectively.

OSPFv3 can use IPSec Authentication Header (AH) and IPSec Encapsulating Security Payload (ESP) header capabilities to achieve encryption and authentication between neighbor devices. You can enable encryption and authentication for an OSPFv3 area and on an interface within the OSPFv3 area.

- When you need to protect all OSPFv3 packets in an area, you can enable encryption and authentication for this area. In this case, all devices in this area needs to be configured with

the same encryption and authentication policy, including the authentication method, SIP value, authentication algorithm, authentication key, etc.

- When you need to protect OSPFv3 packets of a specified interface within an area, you can enable encryption and authentication on this interface. In this case, the interface of the directly connected neighbor needs to be configured with the same encryption and authentication policy, including the authentication method, SIP value, authentication algorithm, authentication key, etc.

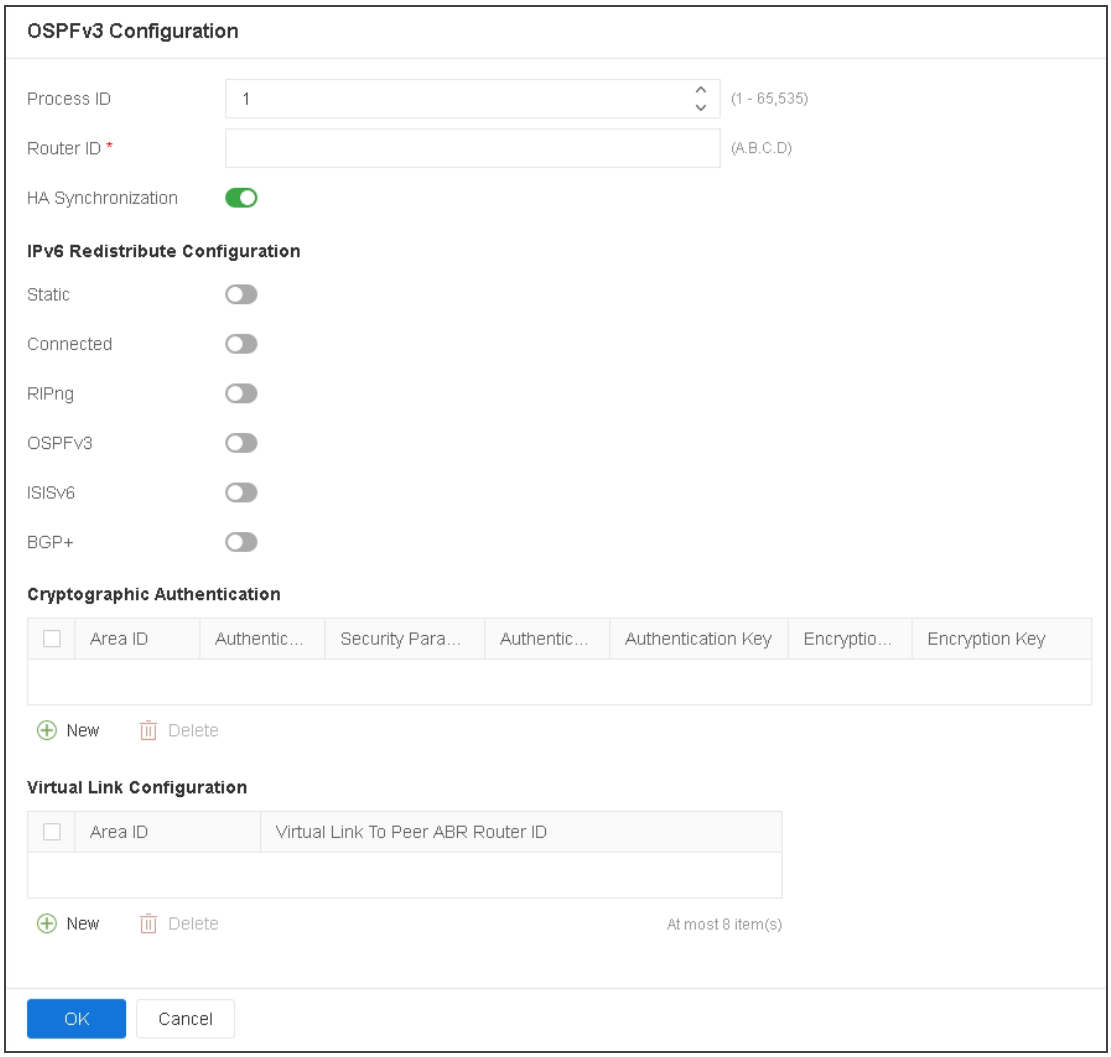


Creating OSPFv3

To create the OSPFv3 process, take the following steps:

1. Select **Network** > **Routing** > **OSPFv3**.
2. Select a VR from the **Virtual Router** drop-down list.

3. Click **New** to open the **OSPFv3 Configuration** page.



In this page, configure as follows:

Option	Description
Process ID	Enter the OSPFv3 process ID. The default value is 1. The value ranges from 1 to 65535. Each OSPFv3 process is individual, and has its own link state database and the related OSPFv3 routing table. Each VRouter supports up to 4 OSPFv3 pro-

Option	Description
	cesses and multiple OSPFv3 processes maintain a routing table together. When specifying the OSPFv3 process ID, note the following matters: • When running multiple OSPFv3 processes in a VRouter, the network advertised in interfaces in each OSPFv3 process cannot be same. • When route entries with the same prefix exist in multiple OSPFv3 processes, the system will compare the administrative distance of each route entry and the route entry with the lower administrative distance will be added to the VRouter's routing table. If their AD is the same, the route entry that was first discovered will be added to the routing table. • If the OSPFv3 route entries are redistributed to other routing protocols, the routing information of process 1 will be redistributed by default. If this process does not exist, the routing information of OSPFv3 will not be redistributed.
Router ID	Specifies the router ID of the router running the

Option	Description
	OSPFv3. The router ID is the unique identifier of an router in the OSPFv3 domain. The router ID should be in the format of IP address.
HA Synchronization	Click the **Enable** button to enable HA synchronization. The OSPFv3 configuration of the master and backup will be synchronized.
IPv6 Redistribute Configuration	
Static	Click the **Enable** button to introduce the static route protocol into the OSPFv3 route and redistribute.
Connected	Click the **Enable** button to introduce the connected route protocol into the OSPFv3 route and redistribute.
RIPng	Click the **Enable** button to introduce the RIPng route protocol into the OSPFv3 route and redistribute.
ISISv6	Click the **Enable** button to introduce the ISISv6 route protocol into the OSPFv3 route and redistribute.
BGP+	Click the **Enable** button to introduce the BGP+ route protocol into the OSPFv3 route and redistribute.
Cryptographic Authentication: Click New to enable encryption and authentication for the OSPFv3 area	

Option	Description
Area ID	Enter the area ID of OSPFv3, which can be a 32-bit digital number, or an IP address.
Authentication Method	Select an authentication method for the OSPFv3 area from the drop-down list. Valid values: AH and ESP. Note: AH authentication does not support data encryption. In other words, you cannot configure the Encryption Algorithm and Encryption Key parameters.
Security Parameter Index	Enter the Security Parameter Index (SPI) value. Valid values: 256 to 4294967295. The receiver authenticates received packets by using the SPI value.
Authentication Algorithm	Select an authentication algorithm in the OSPFv3 area from the drop-down list. Valid values: MD5 and SHA1.
Authentication Key	Enter the authentication key in the hexadecimal string format in the OSPFv3 area.
Encryption Algorithm	If the Authentication Method parameter is set to ESP, you need to specify the encryption algorithm, which can be "-", "DES", "3DES", "AES-128", "AES-192", or "AES-256". "-" indicates that no encryption algorithm is specified and ESP provides only the authentication function.
Encryption Key	After you specify the encryption algorithm, you

Option	Description
	need to enter a corresponding encryption key in the hexadecimal string format. **Note:** If the Encryption Algorithm parameter is set to "-", you do not need to configure an encryption key.
Virtual Link Configuration	
Area ID	Virtual link is used to connect the discontinuous backbone areas, so that they can maintain logical continuity. Specifies an area ID that requires virtual link, in form of a 32-bit digital number, or an IP address.
Virtual Link To Peer ABR Router ID	Virtual link always connect two area border routers. You need to configure the router ID of the area border routers respectively.

4. Click **OK** to save the configurations and the created OSPFv3 process will be displayed in the list.

5. Expand **Interface Configuration**, configure the following.

Option	Description
Edit	Select the check box of an interface from the Interface page, and click **Edit** to open the Interface Configuration page.
Interface Area Configuration	Configure the area and instance where the OSPFv3 interface belongs to.

Option	Description
	• **Interface**: Specifies the interface running OSPFv3. • **Area ID**: Specifies the area ID that the interface belongs to. The area ID is in form of a 32-bit digital number, or an IP address. • **Instance ID**: Specifies the instance ID that the interface belongs to. To establish the neighbor relationship, interfaces must belong to the same instance. The value ranges from 0 to 255. The default value is 0. • **Interface Timer**: There are four interface timers: the interval for sending Hello packets, the dead interval of adjacent routers, the interval for retransmitting LSA, and the transmit delay for updating packets. • Hello Transmission Interval: Specifies the interval for sending Hello packets for an interface. The value range is 1 to 65535 seconds. The default value is 10. If the OSPFv3 interface chooses the point-to-multipoint network type, the default value is 30.

Option	Description
	• Dead Time: Specifies the dead interval of adjacent routes for an interface. The value range is 1 to 65535 seconds. The default value is 40 (4 times of sending the Hello packets). If the OSPFv3 interface chooses the point-to-multipoint network type, the default value is 120.If a router has not received the Hello packet from its peer for a certain period, it will determine the peering router is dead. This period is known as the dead interval between the two adjacent routers. • LSA Transmit Interval: Specifies the LSA retransmit interval for an interface. The value range is 3 to 65535 seconds. The default value is 5. • LSU Transmit Delay Time: Specifies the transmit delay for updating packet for an interface. The value range is 1 to 65535 seconds. The default value is 1. • **Priority**: Specifies the router priority. The

Option	Description
	value range is 0 to 255. The default value is 1. The router with priority set to 0 will not be selected as the designated router (The designated router will receive the link information of all the other routers in the network, and broadcast the received link information). If two routers within a network can both be selected as the designated router, the router with higher priority will be selected; if the priority level is the same, the one with higher Router ID will be selected. • **Network Type**: Specifies the network type of an interface. The network types of an interface have the following options: broadcast, point-to-point, and point-to-multipoint. By default, the network type of an interface is broadcast. • **Link Cost**: The value range is 1 to 65535. By default, the HA synchronization function is enabled, and the link cost will be synchronized to the backup device. Clear the check box to disable the synchronization function, and the system will stop syn-

Option	Description
	chronizing. • **Passive**: Click the button to enable the interface as passive interface. The interface which receives data only but not send is known as a passive interface. • **MTU-Ignore**: Click the button to ignore the MTU check. OSPFv3 uses DBD packets to check whether the interface MTU set is matched or not between the neighbors. If the MTU set is not matched, the neighbors cannot establish the adjacency. You can modify the MTU set to solve this issue. For the interfaces whose MTU set cannot be modified, you can ignore the MTU check. • **Cryptographic Authentication**: Turn on the switch to enable the Cryptographic Authentication function in the interface within the OSPFv3 area. By default, this function is disabled. ◦ Authentication Method: Specifies the authentication method of the OSPFv3 interface. Valid values: AH, ESP, AH

Option	Description
	NULL, and ESP NULL. AH NULL indicates that AH authentication is disabled for the interface. ESP NULL indicates that ESP authentication is disabled for the interface. • Security Parameter Index: Specifies the Security Parameter Index (SPI) value. Valid values: 256 to 4294967295. The receiver authenticates received packets by using the SPI value. • Authentication Algorithm: Select an authentication algorithm of the OSPFv3 interface from the drop-down list. Valid values: MD5 and SHA1. • Authentication Key: Enter the authentication key in the hexadecimal string format of the OSPFv3 interface. • Encryption Algorithm: If the Authentication Method para-

Option	Description
	meter is set to ESP, you need to specify the encryption algorithm, which can be "-", "DES", "3DES", "AES-128", "AES-192", or "AES-256". "-" indicates that no encryption algorithm is specified and ESP provides only the authentication function. • Encryption Key: After you specify the encryption algorithm, you need to enter a corresponding encryption key in the hexadecimal string format. **Note:** If the Encryption Algorithm parameter is set to "-", you do not need to configure an encryption key.

Notes:

Take note of the following rules for the Cryptographic Authentication function of the OSPFv3 route:

- If the Cryptographic Authentication function is enabled for an area and is disabled on all interfaces within this area, the encryption and authentication policy of the area is applied to these interfaces.

- If the Cryptographic Authentication function is enabled for both an interface and the area where the interface belongs and the authentication method of the interface is neither AH NULL nor ESP NULL, the encryption and authentication policy of the interface takes effect.
- If the Cryptographic Authentication function is enabled for the area where the interface belongs and the authentication types of the interface and the area are different and the authentication method of the interface is NULL, the encryption and authentication policy of the area is applied to the interface. For example, if the area where the interface belongs is configured with AH authentication and the interface is configured with ESP NULL, the encryption and authentication policy of this area is applied to this interface.
- If the Cryptographic Authentication function is enabled for the area where the interface belongs and the authentication types of the interface and the area are the same but the authentication method of the interface is NULL, no encryption and no authentication is performed on packets on this interface. For example, if the area where the interface belongs is configured with ESP authentication and the interface is configured with ESP NULL, no encryption and no authentication is performed on packets on this interface.
- Both the interface and the area where the interface belongs can be configured with only one authentication method.

Viewing Neighbor Information

To view the neighbor information of the created OSPFv3 process, take the following steps:

1. Select **Network** > **Routing** > **OSPFv3**.

2. Select an OSPFv3 process and the neighbor information will be displayed below.

- Neighbor Router ID: Displays the ID of neighbor router.
- Priority: Displays the router priority. The router priority is used to determine which router will act as the designated router. The designated router will receive the link information of all the other routers in the network, and send the received link information.
- Link Local Address: Displays the Link-local of the neighbor router interface.
- Neighbor State: Displays the OSPFv3 neighbor state. The OSPFv3 neighbor state includes 8 types: Down, Attempt, Init, 2-Way, Exstart, Exchange, Loading and Full. The Full state includes Full/DR and Full/BDR.
- Timeout: Displays the neighbor timeout, which is the difference between dead time and hello transmission interval. The unit is second. If the OSPFv3 doesn't receive the Hello packets from neighbor, the neighbor ship cannot be established continually.
- Local Interface: Displays the interface sending the Hello packets to the neighbor router.

Configuring BGP

BGP, the abbreviation for Border Gateway Protocol, is a routing that is used to exchange dynamic routing information among the autonomous systems. Autonomous system means the router and network group under the control of a management institute. When BGP runs within the autonomous system, it is called IBGP (Internal Border Gateway Protocol); when BGP runs between the autonomous systems, it is called EBGP (External Border Gateway Protocol).

BGP GR

GR (Graceful Restart) is also called Non-Stop Forwarding (NSF).

The BGP GR ensures that the forwarding layer can continue to forward data during the switchover between backup and primary devices or device restart. Meanwhile, the operation of the forwarding layer is not affected by the re-establishment of neighbor relations and the routing computation of the control layer. In this scenario, BGP GR can help the system have less single point of failure, and reduce the influence of route flapping on the network during the switchover between backup and primary devices. Therefore, the network is more reliable and can avoid the influence of traffic interruption on users' important services.

Basic Concepts of BGP GR

- End-of-RIB marker: End-of RIB marker is a BGP Update message with no reachable Network Layer Reachability Information (NLRI) and its withdrawn NLRI is empty. When the current device receives the End-of-RIB marker from its peer, it indicates that this peer has sent all updates needing to be notified.
- Graceful Restart Capability: Graceful Restart Capability is a new BGP capability to better support GR functionality. It is advertised by the BGP with the Open message when a BGP connection is established. Graceful Restart Capability can indicate that the current device can preserve its forwarding state during BGP restart, and generate the End-of-RIB marker upon the completion of its initial updates.

- GR Restarter: GR Restarter is the device applying Graceful Restart during BGP restart or the switchover between backup and primary devices.
- GR Helper: GR Helper is the neighbor of GR Restarter, and is the device with GR Capability to assist GR Restarter in the Graceful Restart.

A device can be a GR Restarter or a GR Helper. Whether to become a GR Restarter or a GR Helper is determined according to the actual role the device plays in the procedures of BGP GR. Take device HA as an example. The working procedures of BGP GR are as follows:

1. In device HA, the new primary device works as the GR Restarter and re-establishes the BGP connection with the GR Helper.
2. The GR Helper disconnects its BGP neighborhood with the previous primary device and marks the BGP routes learned from the previous primary device as stale. But the GR Helper still forwards data messages via these routes and enables the Graceful-Restart Stale-Path-Time. To configure the Graceful-Restart Stale-Path-Time, use the **graceful-restart stale-path-time** *time* command.
3. If the GR Restarter successfully establishes the BGP session with the GR Helper within the notified Graceful-Restart Restart-Time, they become neighbors and will exchange routing information. If the GR Restarter cannot establish a BGP neighborhood with the GR Helper within the notified Graceful-Restart Restart-Time, the GR Helper will delete routes related to the GR Starter immediately. To configure Graceful-Restart Restart-Time, use the **graceful-restart restart-time** *time* command.
4. GR Helper sends updates after becoming a neighbor of the GR Restarter and generates an End-of-RIB marker upon the completion of the updates. Even if the GR Helper does not have updates to be notified, it is required to send the End-of-RIB marker.
5. GR Restarter starts to select the optimum path after receiving the End-of-RIB markers from its peers. If GR Restarter does not receive all the necessary End-of-RIB markers, it will start

to select the optimum path after the configured Graceful-Restart Wait-For-Rib-Time expires. To configure the Graceful-Restart Wait-For-Rib-Time, use the **graceful-restart wait-for-rib-time** *time* command.

6. After the selection of the optimum path, GR Restarter updates the RIB, then generates updates of the BGP route and sends the updates to its BGP neighbors. Whether there are updates or not, GR Restarter should notify the End-of-RIB marker.
7. After receiving the route updates, GR Helper removes the stale markers of relative routes. GR Helper will remove routes still with stale markers after receiving the End-of-RIB marker sent by the GR Restarter.
8. If routing information exchange is not completed within the Graceful-Restart Stale-Path-Time, GR Restarter is forced to quit GR and then GR Restarter updates RIB according to the learned BGP route information and deletes invalid RIB.

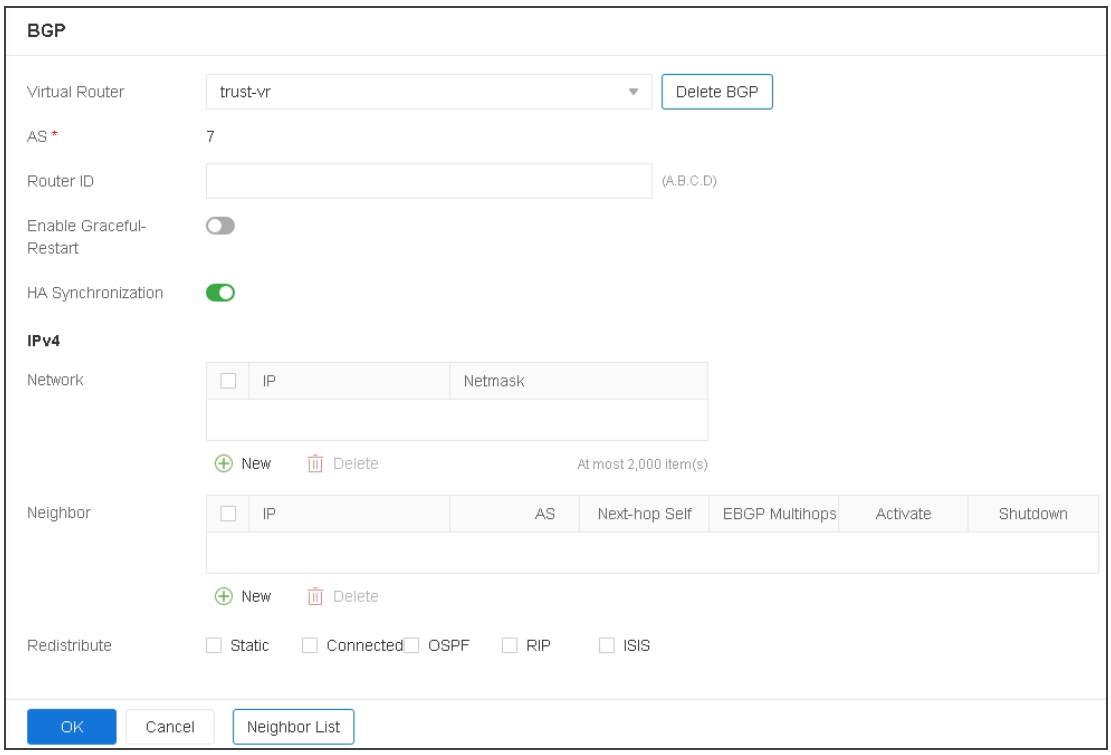
Notes:

- BGP GR cannot be applied in HA peer mode.
- Only when devices in the below scenarios can they work as the GR Restarter. Otherwise, they work as the GR Helper.
  - The newly elected primary device after HA switching;
  - Devices with SCM HA function, such as X6150/X6180/X7180/X9180/X10800/K9180.
- BGP GR does not work if HA between primary and backup devices dis-connects.

Basic

To configure a basic process, take the following steps:

1. Select **Network** > **Routing** > **BGP**
2. Select a VR from the **Virtual Router** drop-down list. The default VR is "trust-vr".
3. In this page, enter the basic information of BGP.



4. Configure the options as follows:

Option	Description
AS	Specifies the number of Autonomous System, ranging from 1 to 4294967295.
Enable Graceful-Restart	Click the **Enable** button. • Graceful-Restart Restart-Time: Specifies

Option	Description
	the longest time for a peer to wait for a BGP session to be re-established. The time range from 1 to 3600 seconds. The default Graceful-Restart Restart-Time is 120 seconds. • Graceful-Restart Stale-Path-Time: Specifies the longest time to retain the stale routes of the restarted peers. The time range from 1 to 3600 seconds. The default Graceful-Restart Stale-Path-Time is 360 seconds. • Graceful-Restart Wait-For-Rib-Time: Specifies the longest time for the GR Restarter to wait for the End-of-RIB markers from the neighbors. The time range from 1 to 3600 seconds. The default Graceful-Restart Wait-For-Rib-Time is 180 seconds.
Router ID	Specifies the router ID of the router running the BGP. The router ID is the unique identifier of an router in the BGP domain. The router ID should be in the format of IP address.
Enable IPv6	Click the **Enable** button to support the format of IPv6 address.
HA sync	Click this button to enable the HA Sync function,

Option	Description
	which disables Local property and uses the virtual MAC, and the primary device will synchronize its information with the backup device; not clicking this button disables the HA Sync function, which enables Local property and uses the original MAC, and the primary device will not synchronize its information with the backup device.
IPv4	
Network	You can add the specified network in the local routing table to the BGP routing table, and remove the specified network from the list. Then the network will be learned by the neighbor router configured later. • Add: Click the button, and specify the IPv4 address and netmask. When IPv6 is enabled, you can specify the IPv6 address and prefix. • Delete: If you want to delete the specified network, click the button.
Neighbor	You can add neighbor routers to exchange routing information with the specified router, or delete the specified router from the list. You can add at most 8 neighbor routers.

Option	Description

	• Add: To add a neighbor router, click the  button and enter the information as follows.
	  • **IP**: Enter the IP address of the specified neighbor router.
	  • **AS**: Specify the AS number of the neighbor router, ranging from 1 to 4294967295.
	  • **Next-hop Self**: For a neighbor router of the EBGP, if the next-hop address of the IBGP of the neighbor router cannot be reached, you should enable the next-hop as self.
	  • **EBGP Multihops**: For BGP running between different AS (i.e., EBGP), if the specified router and its neighbor router are not directly connected, you need to configure EBGP multi-hops, ranging from 0 to 255.
	  • **Activate**: You can activate the BGP connection between the configured neighbor router and the current device. By default, the function is enabled.

Option	Description
	• **Shutdown**: You can shutdown the neighbor router in the list. When it's shut down, all sessions with the neighbor router will be cut and all router information will be cleared. By default, the function is disabled. • Delete: To delete the specified neighbor router, click the  button.
Redistribute	When IPv4 is supported, the following routing protocols can be introduced and redistributed. • **Static**: Select the check box to introduce the static route protocol into the BGP route and redistribute. • **Connected**: Select the check box to introduce the connected route protocol into the BGP route and redistribute. • **OSPF**: Select the check box to introduce the OSPF route protocol into the BGP route and redistribute. • **RIP**: Select the check box to introduce the RIP route protocol into the BGP route and redistribute.

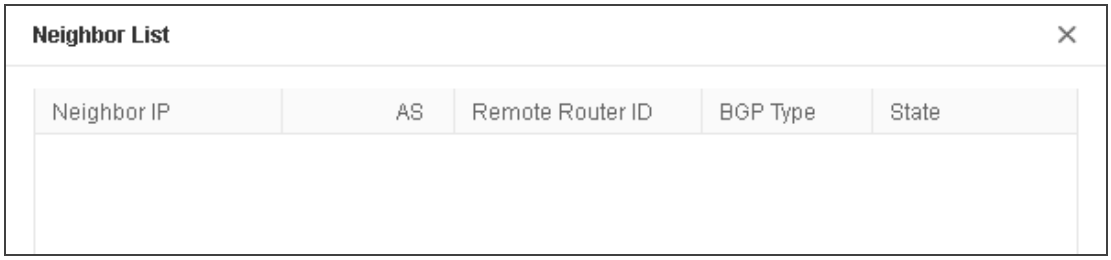
Option	Description
	• **IS-IS**: Select the check box to introduce the IS-IS route protocol into the BGP route and redistribute. When IPv6 is supported, the following routing protocols can be introduced and redistributed. • **Static**: Select the check box to introduce the static route protocol into the BGP route and redistribute. • **Connected**: Select the check box to introduce the connected route protocol into the BGP route and redistribute. • **OSPFv3**: Select the check box to introduce the OSPFv3 route protocol into the BGP route and redistribute. • **RIPng**: Select the check box to introduce the RIPng route protocol into the BGP route and redistribute. • **ISISv6**: Select the check box to introduce the ISISv6 route protocol into the BGP route and redistribute.

5. Click **OK** to save the configurations. The newly-created nwighbor router will be displayed in the list.

Neighbor List

To view the created neighbor router, take the following steps:

1. Select **Network** > **Routing** > **BGP**.
2. In the **Neighbor List** page, view the information of neighbor routers.



- **Neighbor IP**: Displays the IP address of the neighbor router.
- **AS**: Displays the autonomous system number of the neighbor router.
- **Remote Router ID**: When the neighbor router is connected with the peer router, the router ID of the peer router will be displayed.
- **BGP Type**: Displays the running type of BGP. When BGP runs between different AS, it displays as EBGP; when BGP runs within an AS, it displays as IBGP.
- **State**: Displays the status of connection between the neighbor router and its router, including Idle, Connect, Active, OpenSent, OpenConfirm and Established.

Delete BGP

To delete the BGP process, take the following steps:

1. Select **Network** > **Routing** > **BGP**.
2. Click the **Delete BGP** button, and all BGP configurations will be deleted.

Chapter 7 Authentication

Authentication is one of the key features for a security product. When a security product enables authentication, the users and hosts can be denied or allowed to access certain networks.

From a user's point of view, authentication is divided into the following categories:

- If you are a user from an internal network who wants to access the Internet, you can use:
  - "Web Authentication" on Page 451
  - "Single Sign-On" on Page 465
  - "PKI" on Page 520
- If you are a user from the Internet who wants to visit an internal network (usually with VPN), you can use:
  - "SSL VPN" on Page 586
  - "IPSec VPN" on Page 533 (IPSec VPN (with radius server)+Xauth)
  - "L2TP VPN" on Page 682 (L2TP over IPsec VPN)

Authentication Process

A user uses his/her terminal to connect to the firewall. The firewall calls the user data from the AAA server to check the user's identity.

- User (authentication applicant): The applicant initiates an authentication request, and enters his/her username and password to prove his/her identity.

- Authentication system (i.e. the firewall in this case):The firewall receives the username and password and sends the request to the AAA server. It is an agent between the applicant and the AAA server.
- "AAA Server" on Page 1113: This server stores user information like the username and password, etc. When the AAA server receives a legitimate request, it will check if the applicant has the right to the user network services and send back the decision. For more information, refer to "AAA Server" on Page 1113. AAA server has the following four types:
    - Local server
    - Radius server
    - LDAP server
    - AD server
    - TACACS+server

Web Authentication

After the Web authentication (WebAuth) is configured, when you open a browser to access the Internet, the page will redirect to the WebAuth login page. According to different authentication modes, you need to provide corresponded authentication information. With the successful Web authentication, system will allocate the role for IP address according to the policy configuration, which provides a role-based access control method.

Web authentication means you will be prompted to check the identity on the authentication page. It includes the following four modes:

- Password Authentication: Using username and password during the Web authentication.
- SMS Authentication: Using SMS during the Web authentication. In the login page, you need to enter the mobile number and the received SMS verification code. If the SMS verification code is correct, you can pass the authentication.
- NTLM Authentication: System obtains the login user information of the local PC terminal automatically, and then verifies the identity of the user. For more configurations, see NTLM Authentication.

Notes: NTLM authentication mode only supports the Active Directory servers deployed in Windows Server 2008 or older versions.

Enabling the WebAuth

To enable the Web authentication, take the following steps:

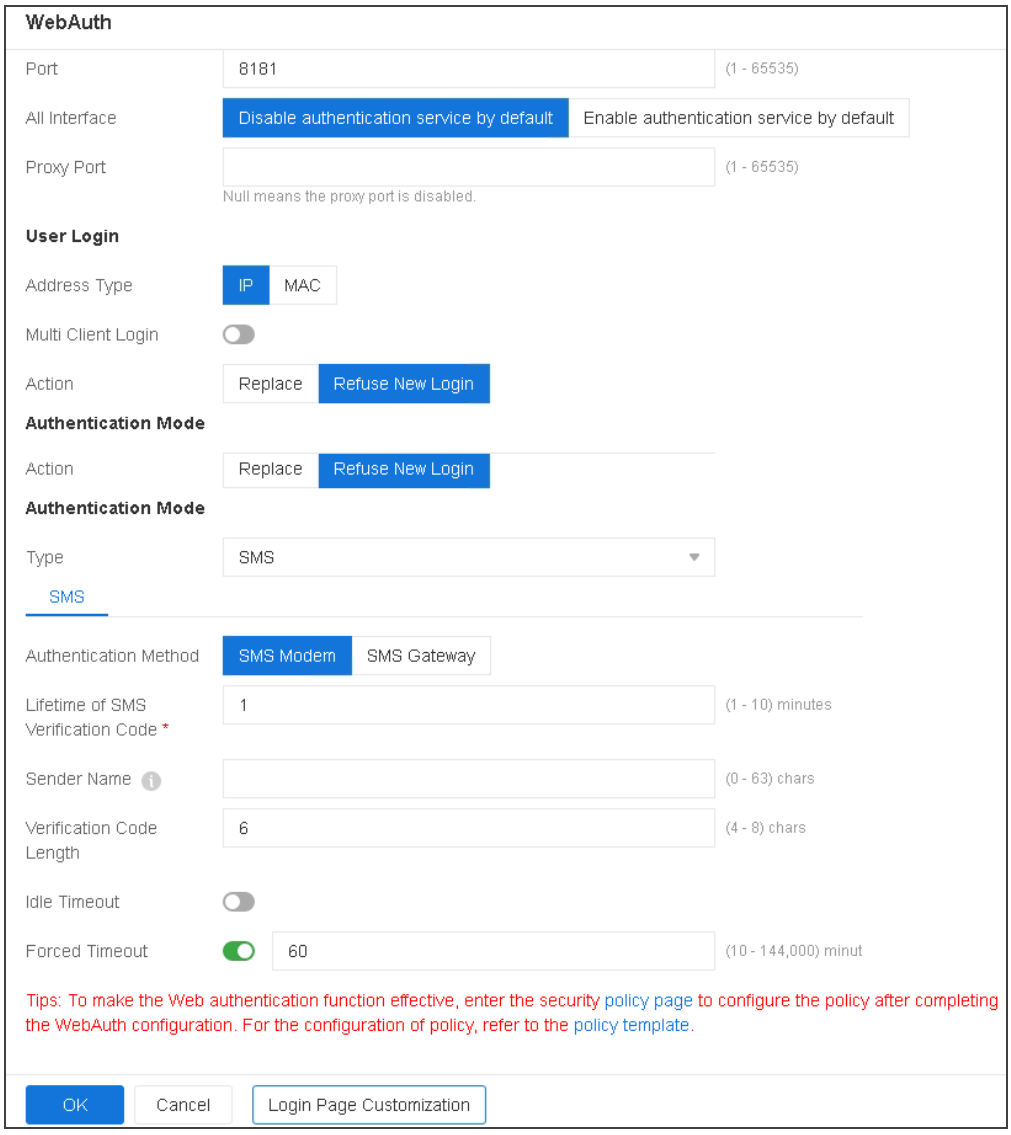
1. Click **Network > WebAuth > WebAuth**.
2. Select the **Enable** check box of **WebAuth** to enable the WebAuth function.

Configuring Basic Parameters for WebAuth

The basic parameters are applicable to all WebAuth polices.

To configure WebAuth basic parameters, take the following steps:

1. Click **Network > WebAuth > WebAuth**,click the **Enable** button.



2. In the Basic Configuration tab, configure the following options

Basic Configuration	
HTTP	Select the HTTP authentication methods. Port: Specifies the HTTP protocol transmission port number of the authentication server. The range is 1 to 65535, and the default value is 8181.
HTTPS	Select the HTTPS authentication methods. HTTPS is encrypted, and can avoid information leakage. Port: Specify the HTTPS protocol transmission port number of the authentication server. The range is 1 to 65535, and the default value is 44433. Trust Domain: Specifies the HTTPS trust domain. This domain is previously created in PKI and has imported international CA certified certificate.
All Interface	After the WebAuth function is enabled, the WebAuth function of all interfaces is disabled by default. You can specify the Webauth global default configuration of all interfaces, including **Disable authentication service by default** and **Enable authentication service by default**. For more information about configuring the WebAuth of interface, see "Configuring an Interface" on Page 176.
Proxy Port	Specifies the port number for HTTPS, HTTPS and SSO proxy server. The port number applies to all. If it changes in any page, the other mode will also use the new port. The range is 1 to 65535.
User Login	

Basic Configuration	
Address Type	Specifies IP address or MAC address as the address type of authentication user. By default, the address type of authentication user is IP address **Note**: When the MAC is specified as the address type of authentication user, the device needs to be deployed in the same Layer 2 network environment with the client. Otherwise, system will fail to get the MAC address of the client or get an incorrect MAC address.
Multiple Login	If you disable the multiple login, one account cannot login if it has already logged in elsewhere. You can click **Replace** to kick out the registered user or you can click **Refuse New Login** to prevent the same user from logging in again. If you enable multiple login, more than one clients can login with the same account. But you can still set up the maximum number of clients using one account.
Authentication Mode	
Password: Specifies the password authentication mode as the authentication mode.	
Idle Timeout	If there is no traffic during a specified time period after the successful authentication, system will disconnect the connection. By default, system will not disconnect the connection if there is no traffic after the successful authentication. Select the **Idle Timeout** check box to enable the idle timeout function, and type the idle timeout value

Basic Configuration	
	into the text box. Clear the check box to disable the idle timeout function.
Force Timeout	If the forced re-login function is enabled, users must re-login after the configured interval ends. Select the **Force Timeout** check box to enable the forced timeout function, and type the forced timeout value into the text box. Clear the check box to disable the forced timeout function.
Heartbeat Timeout	When authentication is successful, the system will automatically refresh the login page before the configured timeout value ends in order to maintain the login status. If configuring the idle time at the same time, you will log off from the system at the smaller value. Select the **Heartbeat Timeout** check box to enable the heartbeat timeout function, and type the heartbeat timeout value into the text box. Clear the check box to disable the heartbeat timeout function.
Re-Auth Interval	System can re-authenticate a user after a successful authentication. By default, the re-authentication function is inactive. Select the **Re-Auth Interval** check box to enable the re-auth function, and type the re-auth interval into the text box. Clear the check box to disable the re-auth function.
Redirect URL	The redirect URL function redirects the client to the specified URL after successful authentication. You need to turn off the pop-up blocker of your web browser to ensure this function can work properly.

Basic Configuration

Notes:

- You can specify the username and password in the URL address. When the specified redirect URL is the application system page with the authentication needed in the intranet, you do not need the repeat authentication and can access the application system. The corresponding keywords are $USER, $PWD, or $HASHPWD. Generally, you can select one keyword between $PWD and $HASHPWD. The formart of the URL is "URL" +"username=$USER&password=$PWD".
- When entering the redirect URL in CLI, add double quotations to the URL address if the URL address contains question mark. For example, "http://192.10.5.201/oa/-login.-do?username-

Basic Configuration	
	=$USER&password=$HASHPWD"
SMS: Specifies the SMS authentication mode as the authentication mode.	
Authentication Method	Select the method to send authentication SMS, SMS Modem or SMS Gateway.
Lifetime of SMS Verification Code	When using SMS authentication, users need to use the SMS verification code received by the mobile phone, and the verification code will be invalid after the timeout value reaches. After the timeout value reaches, if the verification code is not used, you needs to get the new SMS verification code again. Specifies the verification code interval, the range is 1 to 10 minutes. The default value is 1 minute.
Sender Name	The user can specify a message sender name to display in the message content. Specifies the sender name. The range is 1 to 63. **Note**: Due to the limitation of UMS enterprise information platform, when the the SMS gateway authentication is enabled, the sender name will be displayed on the name of the UMS enterprise information platform.
Sign Name	If an ALIYUNSMS service provider name is specified for the "SMS Gateway Name" option, the sign name must be entered in this field and will be displayed in the message content. The

Basic Configuration	
	range is 1 to 63 characters. This parameter should be the same with the sign name applied in the SMS of Alibaba Cloud.
Verification Code Length	Specifies the length of the SMS verification code. The range is 4 to 8 characters. The default value is 6.
Template Code	If the protocol type of the SMS Gateway is ALIYUNSMS, the code of the SMS template must be entered in this field. The range is 1 to 30 characters. This parameter should be the same with the template code applied in the SMS of Alibaba Cloud.
Idle Timeout	If there is no traffic during a specified time period after the successful authentication, system will disconnect the connection. By default, system will not disconnect the connection if there is no traffic after the successful authentication. Select the **Idle Timeout** check box to enable the idle timeout function, and type the idle timeout value into the text box. Clear the check box to disable the idle timeout function.
Force Timeout	If the forced re-login function is enabled, users must re-login after the configured interval ends. Select the **Force Timeout** check box to enable the forced timeout function, and type the forced timeout value into the text box. Clear the check

Basic Configuration	
	box to disable the forced timeout function.
NTLM: Specifies the NTLM authentication mode as the authentication mode.	
Idle Timeout	If there is no traffic during a specified time period after the successful authentication, the system will disconnect the connection. By default, the system will not disconnect the connection if there is no traffic after the successful authentication. Select the **Idle Timeout** check box to enable the idle timeout function, and type the idle timeout value into the text box. Clear the check box to disable the idle timeout function.
Force Timeout	If the forced re-login function is enabled, users must re-login after the configured interval ends. Select the **Force Timeout** check box to enable the forced timeout function, and type the forced timeout value into the text box. Clear the check box to disable the forced timeout function.
When NTLM Fails	It will define the next action when user fails to pass SSO login. Select **Use Password Mode**, and the next step is to use password authentication to continue authentication. Select **No Action**, and the users will fail to login in.
Password/ SMS: Specifies the password authentication or the SMS authentication as the authentication mode.	
Password	Click the **Password** tab, and configure the related parameters

Basic Configuration	
	for password authentication . For description of options, see "Password" section.
SMS	Click the **SMS** tab, and configure the related parameters for SMS authentication . For description of options, see "SMS" section.
SMS: Specifies the SMS authentication mode.	
SMS	Click the **SMS** tab, and configure the related parameters for SMS authentication . For description of options, see "SMS" section.

3. Click **Apply**.

Notes:

- If the WebAuth success page is closed, you can log out not only by timeout, but also by visiting the WebAuth status page (displaying online users, online times and logout button). You can visit it through "http (https):// IP-Address: Port-Number". In the URL, IP-Address refers to the IP address of the WebAuth interface, and Port-Number refers to HTTP/HTTPS port. By default, the HTTP port is 8181, the HTTPS port is 44433. The WebAuth status page will be invalid if there are no online users on the client or the WebAuth is disabled.
- After basic configurations, you should create two policy rules in "Security Policy" on Page 1286 to make WebAuth effective, and then adjust the priority of the two policies to the highest. The WebAuth policies need to be

configured according to the following policy template:

Policy Template(Ensure DNS traffic is permitted and enable WebAuth)

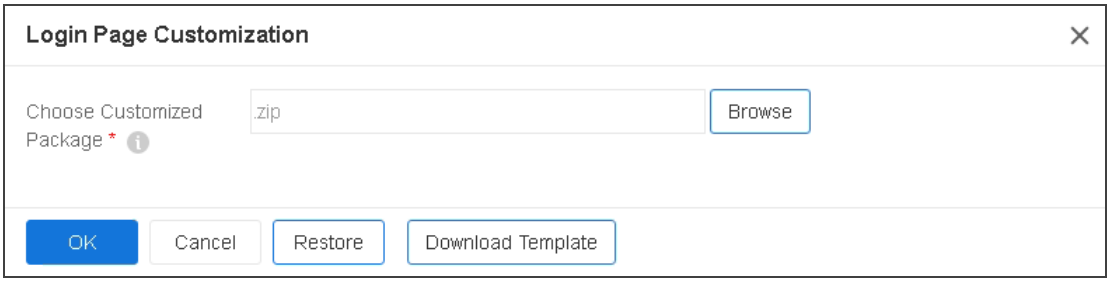
Source Z...	Destinatio...	Source A...	Destinati...	User	Service	Action
Any	Any	Any	Any		DNS	Permit
Any	Any	Any	Any	unknown	Any	WebAuth

- After WebAuth is configured, the users who matched the WebAuth policy are recommended to input the correct username and password, and then the users can access the network. System takes actions to avoid illegal users from getting usernames and passwords by brute-force. If one fails to log in through the same host three times in two minutes, that host will be blocked for 2 minutes.

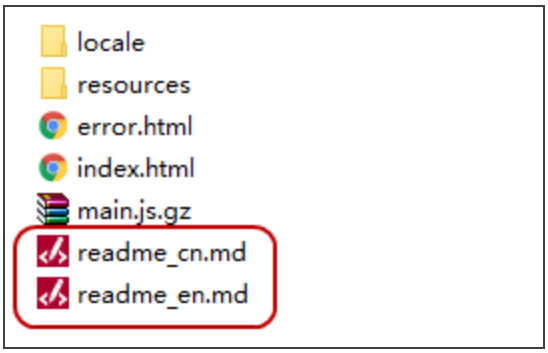
Customizing WebAuth Page

The WebAuth page is the redirected page when an authenticated user opens the browser. By default, you need to enter the username and password in the WebAuth page. You can also select the SMS authentication mode .

1. Click **Network > WebAuth > WebAuth**.
2. Click **Login Page Customization** tab, and click **Download Template** to download the zip file "webauth" of the default WebAuth login page, and then unzip the file.



3. Open the source file and modify the content(including style, picture, etc.)according to the requirements. For more detailed information, see the file of **readme_cn.md** or **readme_en.md**.



4. Compress the modified file and click **Upload** to upload the zip file to system.

Notes:

- After upgrading the previous version to the 5.5R6 version, the WebAuth login page you already specified will be invalid and restored to the default page. You should re-download the template after the version upgrade and customize the login page.
- After upgrading the system version, you should re-download the template, modify the source file, and then upload the custom page compression package. If the uploaded package version is not consistent with the current system version, the function of the custom login page will not be used normally.
- The zip file should comply with the following requirements: the file format should be zip; the maximum number of the file in the zip file is 50; the upper limit of the zip file is 1M; the zip file should contain “index.html”.

- System can only save one file of the default template page and the customized page. When you upload the new customized page file, the old file will be covered. You are suggested to back up the old file.
- If you want trigger WebAuth through HTTPS request, you need import the root certificate (certificate of the device) to the browser firstly. Triggering WebAuth through HTTPS requests depends on the feature of SSL proxy . If the devrice does not support the SSL proxy. Triggering WebAuth through HTTPS requests will not work and you can then trigger WebAuth through HTTP requests.

NTLM Authentication

This method still needs to trigger the browser, and the browser will send user information to the AD server automatically.

To configure the NTLM authentication, take the following two steps:

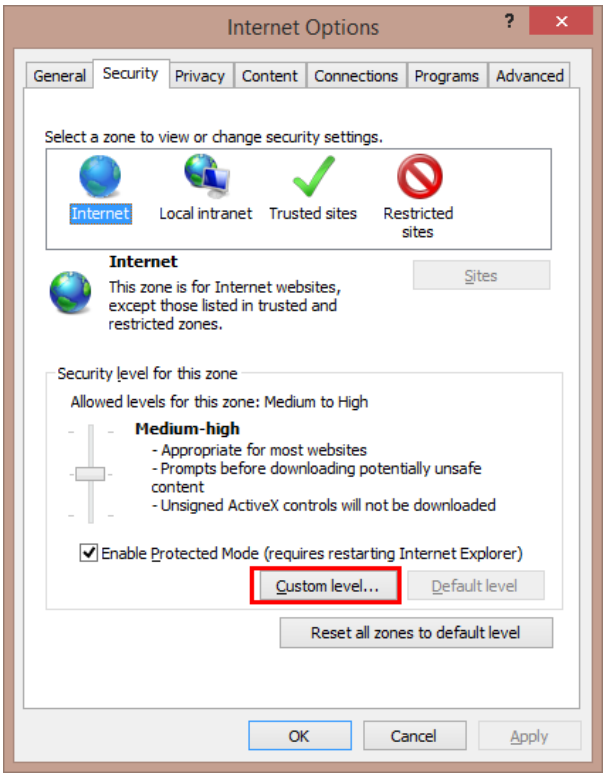
Step 1: Configure NTLM for System

1. Click **Network > WebAuth > WebAuth** to enter the WebAuth page.
2. Select **NTLM** from the **Authentication Mode** drop-down list. For the basic configurations, see Configuring Basic Parameters for WebAuth.
3. Click **Apply**.

Step 2: Configure settings for User Browser

1. On the PC terminal of a user, open a browser (take IE as an example).
2. On the menu bar of IE browser, select **Tools** > **Internet options**.

3. In the pop-up **Internet Options** dialog box, click the **Security** tab, and click **Custom level....**



4. In the pop-up **Security Settings - Internet Zone** dialog box, enter **User Authentication>Logon** and select **Automatic logon with current user name and password.**

Single Sign-On

When the user authenticates successfully for one time, system will obtain the user's authentication information. Then the user can access the Internet without authentication later.

SSO can be realized through three methods, which are independent from each other, and they all can achieve the "no-sign-on"(don't need to enter a user name and password) authentication.

Method	Installing Software or Script	Description
SSO Radius	---	After enabling SSO Radius function, system can receive the accounting packets that based on Radius standard protocol. System will obtain user authentication information, update online user information and manage user's login and logout according to the packets.
AD Scripting	Logonscript.exe	This method needs to install the script "Logonscript.exe" on the AD server. The triggered script can also send user information to StoneOS. This method is recommended if you have a higher accuracy requirement for statistical monitoring and don't mind to change the AD server.
Radius Snooping	---	The Remote Authentication Dial-In Up Service (RADIUS) is a protocol

Method	Installing Software or Script	Description
		that is used for the communication between NAS and AAA server. The RADIUS packet monitoring function analyzes the RADIUS packets that are mirrored to the device and the device will automatically obtain the mappings between the usernames of the authenticated users and the IP addresses, which facilitates the logging module for providing the auditing function for the authenticated users.
Agile controller		When Agile Controller is enabled, the system can receive packets sent by the Agile Controller server. The packets are sent when users log in to or log out of the server or when users update their information. The system obtains user authentication information, updates online user information, and manages users' login and logout according to the packets.
AD Polling	---	After enabling the AD Polling function, system will regularly query the

Method	Installing Software or Script	Description
		AD server to obtain the login user information and probe the terminal PC to verify whether the users are still online, thus getting correct authentication user information to achieve SSO. This method is recommended if you don't want to change the AD server.
SSO Monitor	---	After enabling SSO Monitor, StoneOS will build connection with the third-party authentication server through SSO-Monitor protocol, as well as obtain user online status and information of the group that user belongs to. System will also update the mapping information between user name and IP in real time for online user.
TS Agent	Hillstone Terminal Service Agent	This method needs to install and run Hillstone Terminal Service Agent in the Windows server. After the TS Agent is configured, when users log in the Windows server using remote desktop services, the Hillstone Terminal Service Agent will allocate

Method	Installing Software or Script	Description
		port ranges to users and send the port ranges and users information to the system. At the same time, the system will create the mappings of traffic IPs, port ranges and users, and achieve the "no-sign-on" authentication.

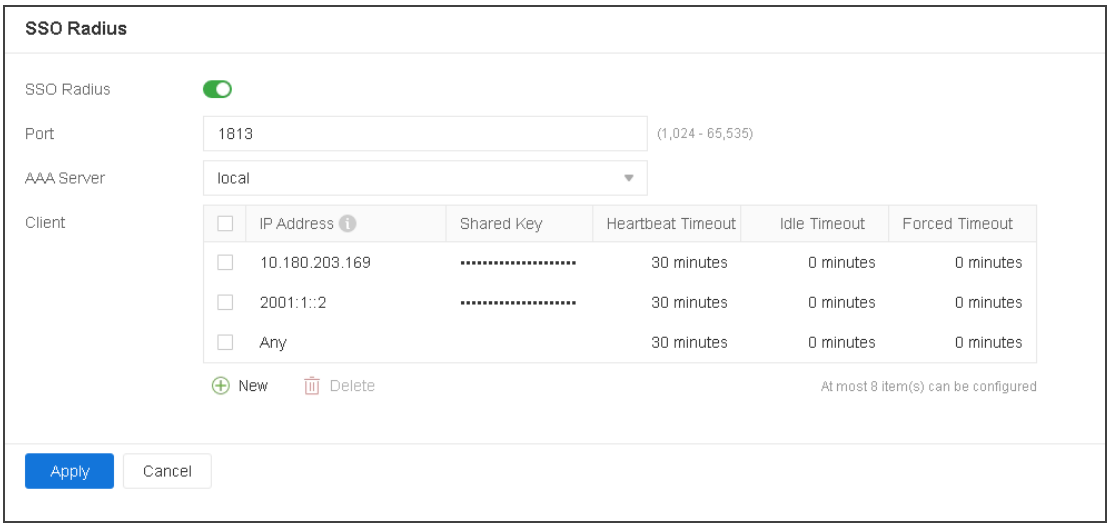
Enabling SSO Radius for SSO

After enabling SSO Radius function, system can receive the accounting packets that based on Radius standard protocol. System will obtain user authentication information, update online user information and manage user's login and logout according to the packets.

To configure the SSO Radius function, take the following steps:

1. Click **Object >SSO Server >SSO Radius** and enter **SSO Radius** page. By default, SSO Radius is disabled. After enabling SSO Radius, you should wait at least 20 seconds before disabling it, and vice versa.

2. Click the **Enable** button to enable the SSO Radius function.



3. Specify the Port to receive Radius packets for StoneOS (Don't configure port in non-root VSYS). The range is 1024 to 65535. The default port number is 1813.

4. Specify the AAA Server that user belongs to. You can select the configured Local, AD or LDAP server. After selecting the AAA server, system can query the corresponding user group and role information of the online user on the referenced AAA server, so as to realize the policy control based on the user group and role.

5. Specify the IP Address, Shared Secret and Idle Interval of SSO Radius client which is allowed to access system. You can configure up to 8 clients.

    - IP Address: Specify the IPv4 address or the IPv6 address (the IPv6 address is valid only when the system version is the IPv6 version) of SSO Radius client. If the address is specified as "any", it means that system receives the packets sent from any Radius client.

    - Shared Key: Specify the shared secret key of SSO Radius client. The range is 1 to 31 characters. System will verify the packet by the shared secret key, and parse the packet after verifying successfully. If system fails to verify the packet, the packet will

be dropped. The packet can be verified successfully only when SSO Radius client is configured the same shared secret key with system or both of them aren't configured a shared secret key.

- Heartbeat Timeout(minute): Configure the idle interval for the authentication information of Radius packet in the device. If there’s no update or delete packet of the user during the idle interval, the device will delete the user authentication information. The default value is 30. 0 means the user authentication information will never timeout. If heartbeat timeout and idle timeout is configured at the same time, the user will logout at the minimum time point between the heartbeat timeout and the idle timeout.
- Idle Timeout: Idle timeout refers to the longest time during which the authenticated user keeps his/her authenticated state in non-traffic state. When the configured idle timeout is exceeded, system will delete the authentication information of the user. The unit is minute. The range is from 0-1440. The default value is 0. If it is specified as 0, this function will be disabled, which means the authenticated user will not be kicked out in non-traffic state.
- Forced Timeout: When the online time of a user exceeds the configured force timeout time, system will kick out the user and force the user to log out. The range is 0 to 144000 minutes, and the default value is 600 minutes. If it is specified as 0, this function will be disabled.

6. Click **Apply** button to save all the configurations.

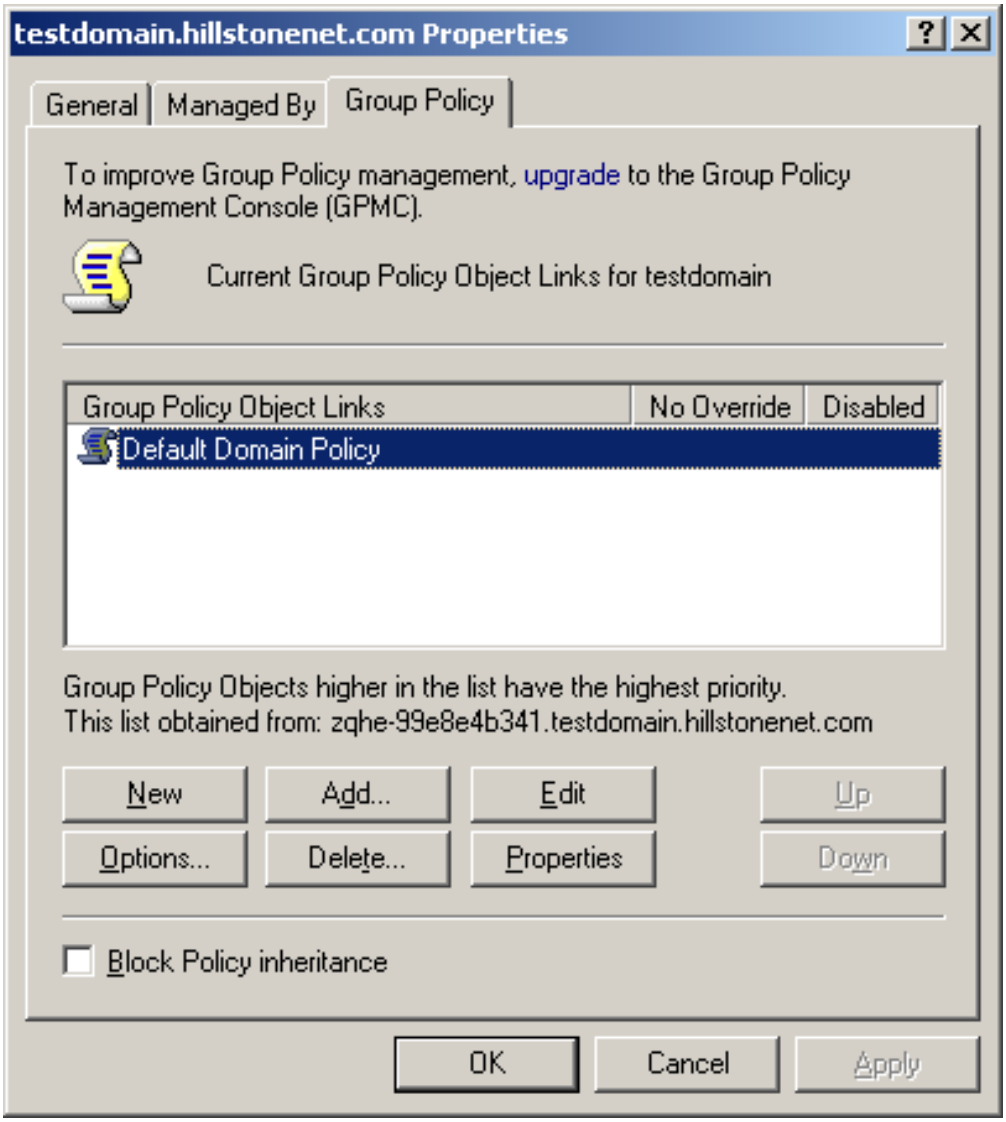
Using AD Scripting for SSO

Before using a script for SSO, make sure you have established your Active Directory server first. To use a script for SSO, take the following steps:

Step 1: Configuring the Script for AD Server

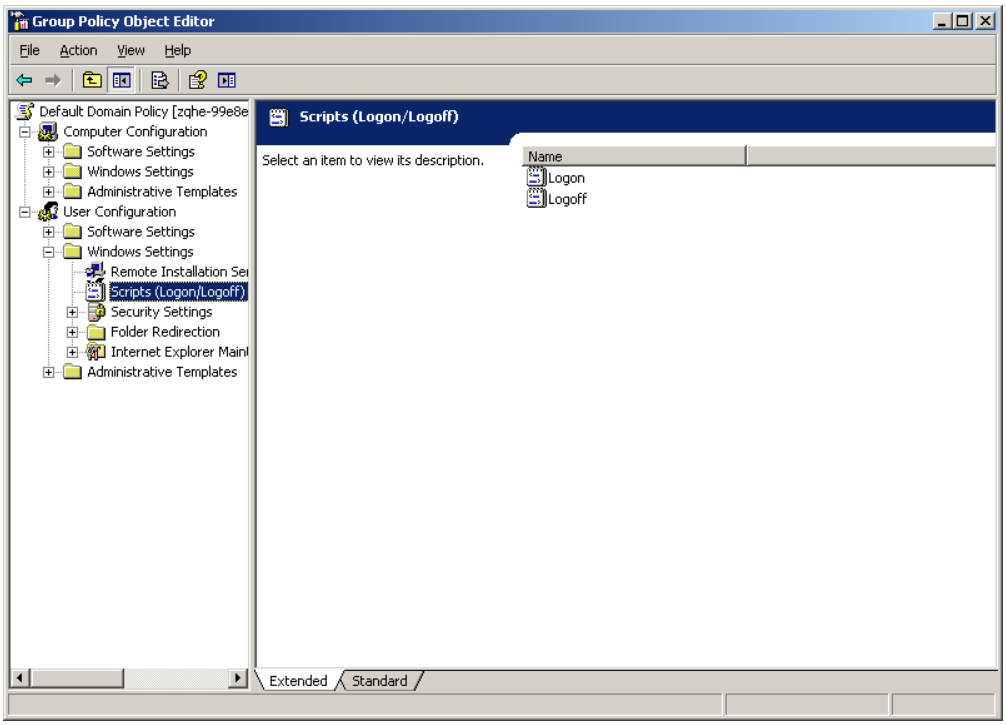
1. Open the AD Security Agent software(for detailed information of the software, see Using AD Agent Software for SSO). On the <AD Scripting> tab, click **Get AD Scripting** to get the script "Logonscript.exe" , and save it in a directory where all domain users can access.
2. In the AD server, enter **Start** menu, and select **Mangement Tools > Active Directory User and Computer**.

3. In the pop-up <Active Directory User and Computer> dialog box, right-click the domain which will apply SSO to select **Properties**, and then click <Group Policy> tab.

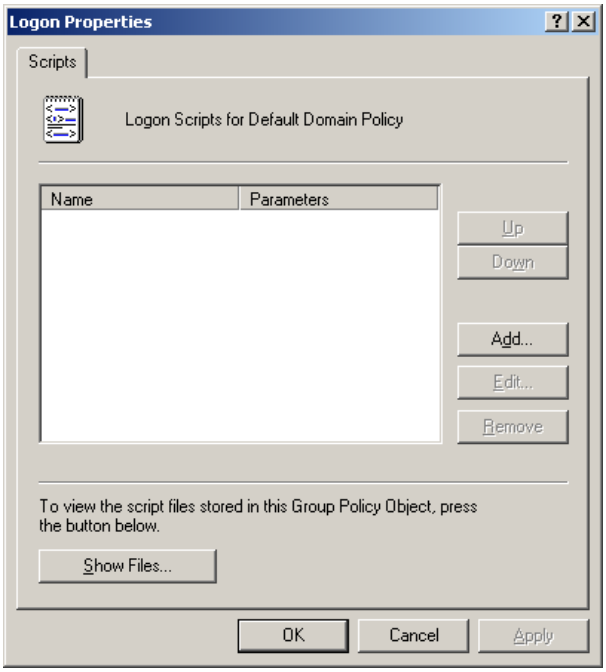


4. In the Group Policy list, double-click the group policy which will apply SSO. In the pop-up <Group Policy Object Editor>dialog box, select **User Configuration > Windows Settings>**

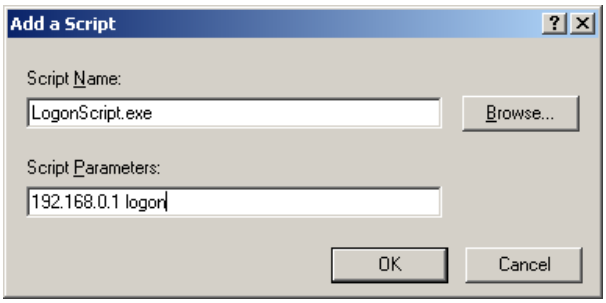
Script (Logon/Logout).



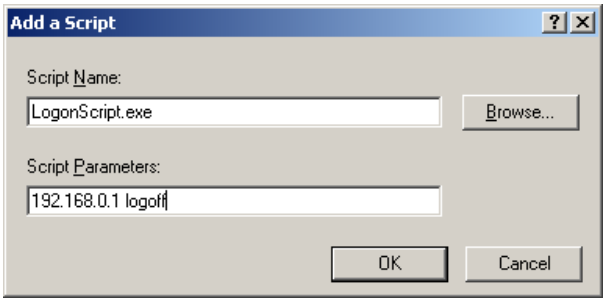
5. Double-click **Logon** on the right window, and click **Add** in the pop-up <logon properties> dialog box.



6. In the <Add a Script> dialog box, click **Browse** to select the logon script (logonscript.exe) for the Script Name; enter the authentication IP address of StoneOS and the text "logon" for the Script Parameters(the two parameters are separated by space). Then, click **OK**.



7. Take the steps of 5-6 to configure the script for logging out, and enter the text "logoff" in the step 6.



Notes: The directory of saving the script should be accessible to all domain users, otherwise, when a user who does not have privilege will not trigger the script when logs in or out.

Step 2: Configuring AD Scripting for StoneOS

After the AD Scripting is enabled, the user can log in Hillstone device simultaneously when logging in the AD server successfully. System only supports AD Scripting of Active Directory server.

To configure the AD Scripting function, take the following steps:

1. Click **Object> SSO Server > AD Scripting** to enter the AD Scripting page. The AD Scripting function is disabled by default.

2. Select the **Enable** button of AD Scripting to enable the function.

3. Specify the AAA Server that user belongs to. You can select the configured Local, AD or LDAP server. After selecting the AAA server, system can query the corresponding user group and role information of the online user on the referenced AAA server, so as to realize the policy control based on the user group and role.

4. Specify the Idle Interval, which specifies the longest time that the authentication user can keep online without any traffic. After the interval timeout, StoneOS will delete the user authentication information. The value range is 0 to 1440 minutes. 0 means always online.

5. Allow or disable users with the same name to log in depends on needs.

   - **Enable** : Click to permit the user with the same name to log in from multiple terminals simultaneously.
   - **Disable**: Click to permit only one user with the same name to log in, and the user logged in will be kicked out by the user logging in.

6. Click **Apply** to save the changes.

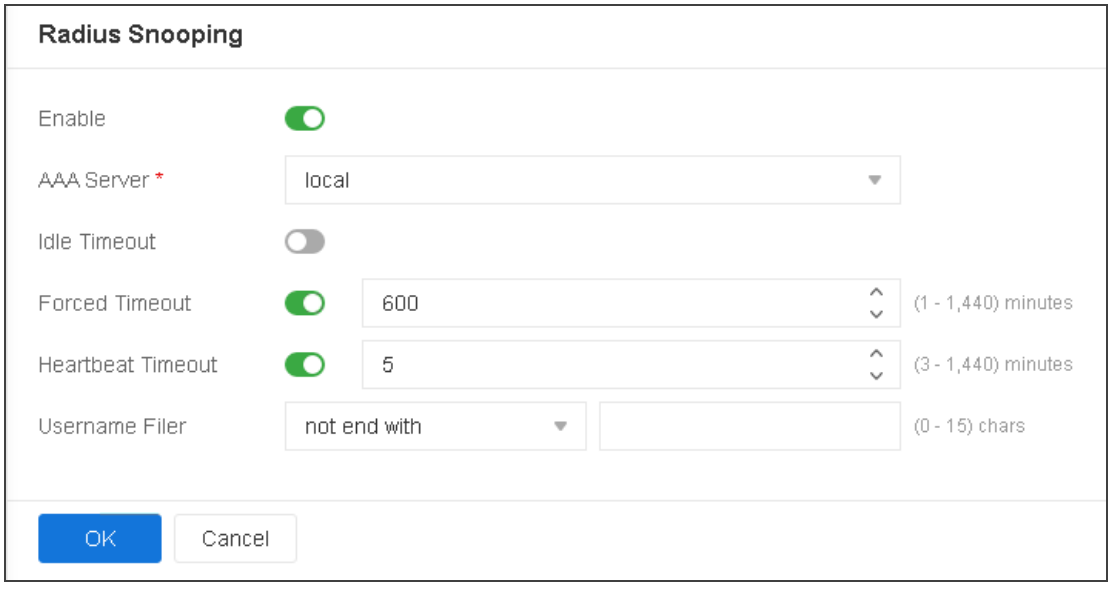
After completing the above two steps, the script can send the user information to StoneOS in real time. When users log in or out, the script will be triggered and send the user behavior to StoneOS.

Radius Snooping

The Remote Authentication Dial-In Up Service (RADIUS) is a protocol that is used for the communication between NAS and AAA server. The RADIUS packet monitoring function analyzes the RADIUS packets that are mirrored to the device and the device will automatically obtain the mappings between the usernames of the authenticated users and the IP addresses. Then the system generates user authentication information and adds it to the authenticated user list to control and audit user traffic.

To configure Radius Snooping, take the following steps:

1. Click **Object> SSO Server > Radius Snooping** to enter the Radius Snooping page. The Radius Snooping function is disabled by default.



2. Select the **Enable** button of Radius Snooping to enable the function.

3. Specify the AAA Server that user belongs to. You can select the configured Local, AD or LDAP server. After selecting the AAA server, system can query the corresponding user group and role information of the online user on the referenced AAA server, so as to realize the policy control based on the user group and role.

4. Specify the idle time. If the device does not receive the mirrored RADIUS packets within the specified time period, it will delete the mappings between the usernames and the IP addresses. The value ranges from 1 to 1440. By default, system will not delete the user authentication information if there is no traffic.

5. Specify the forced logout time. When the online time of a user exceeds the configured force timeout time, system will kick out the user and force the user to log out. The range is 0 (the function is disabled) to 1440 minutes, and the default value is 600 minutes.

6. Specify the heartbeat timeout value. When authentication is successful, the system will automatically reconfirm login information before the configured timeout value ends in order to maintain the login status. If configuring the idle time at the same time, you will log off from the system at the smaller value. The value range is 3 to 1440 minutes. The default value is 5 minutes.

7. Username Filter: The "not end with" filter condition indicates that usernames ended with a specific string are excluded. The system generates user authentication information only for usernames not excluded by the "not end with" filter condition. The value range of the string is from 1 to 15 characters.

8. Click **Apply** to save the changes.

Realizing SSO via Agile Controller

When Agile Controller is enabled, the system can receive packets sent by the Agile Controller server. The packets are sent when users log in to or log out of the server or when users update

their information. To realize SSO, the system obtains user authentication information, updates online user information, and manages the user's login and logout according to the packets.

To configure Agile Controller, take the following steps:

1. Click **Object > SSO Server > Agile Controller** to enter the Agile Controller page. By default, Agile Controller is disabled.

2. Click the **Enable** button to enable the Agile Controller function.

Configure the Agile Controller:

Option	Description
Port	Specifies the port for StoneOS to receive packets from the Agile Controller server (Port cannot be configured in non-root VSYS). The range is from 1024 to 65535. The default port number is 8001.
Forced Timeout	Specifies the timeout after which access for the authen-ticated user is forcibly terminated. The range is 5 to1440 minutes. The default timeout is 600 minutes.

Option	Description
AAA Server	Select the AAA Server that the user belongs to. You can select the configured Local, AD, or LDAP server. For more information, see AAA Server. After selecting the AAA server, the system can query the user group and role information associated with the username of the online user on the referenced AAA server, to realize the policy control based on the user group and role.
Query Rate	Specifies the query rate when the system actively sends query packets to the Agile Controller server to acquire the information of the online user associated with the source IP. The range is 5-40 times/second. The default value is 20 times/second.
Per-IP Query Interval	Specifies the query interval between each source IP when the system actively sends query packets to the Agile Controller server to acquire the information of the online user associated with the source IP. The range is 1-100 seconds. The default value is 20 seconds.
Maximum IP Queried Each Time	Specifies the maximum source IPs contained in a query packet when the system actively sends query packets to the Agile Controller server to acquire the information of the online user associated with the source IP. The range is 1-50. The default value is 50.
Query Address	Specifies the address range of the source IP to be queried when the system actively sends query packets to the

Option	Description
Range	Agile Controller server to acquire the information of the online user associated with the source IP. You can search and select the specified IP from the drop-down list. Click ⊕ to create a new IP.
Client	Click **New** to allow a new Agile Controller client. You can configure at most 24 clients. • Name: Specifies the name of the Agile Controller server. • IP Address: Specifies the IP address of the Agile Controller server. • Virtual Router: Specifies the virtual router that the Agile Controller server belongs to. • Shared Key: The system verifies the encrypted communication packets sent by the Agile Controller server by using the shared key. The system parses the packets only when the verification is successful. Otherwise, the system drops the packets. The Agile Controller client should be configured with the same shared key as the Agile Controller server. Otherwise, the packets cannot be successfully verified. The range is 1-31 characters. • Encryption: Specifies the encryption algorithm applied in the communication between the system

Option	Description
	and the Agile Controller server. The encryption algorithm can be 3DES or AES128. If this option is not specified, the system uses the AES128 algorithm by default. • Enable Active Query: With this checkbox selected, the system will actively query the information of the online users from the Agile Controller server.

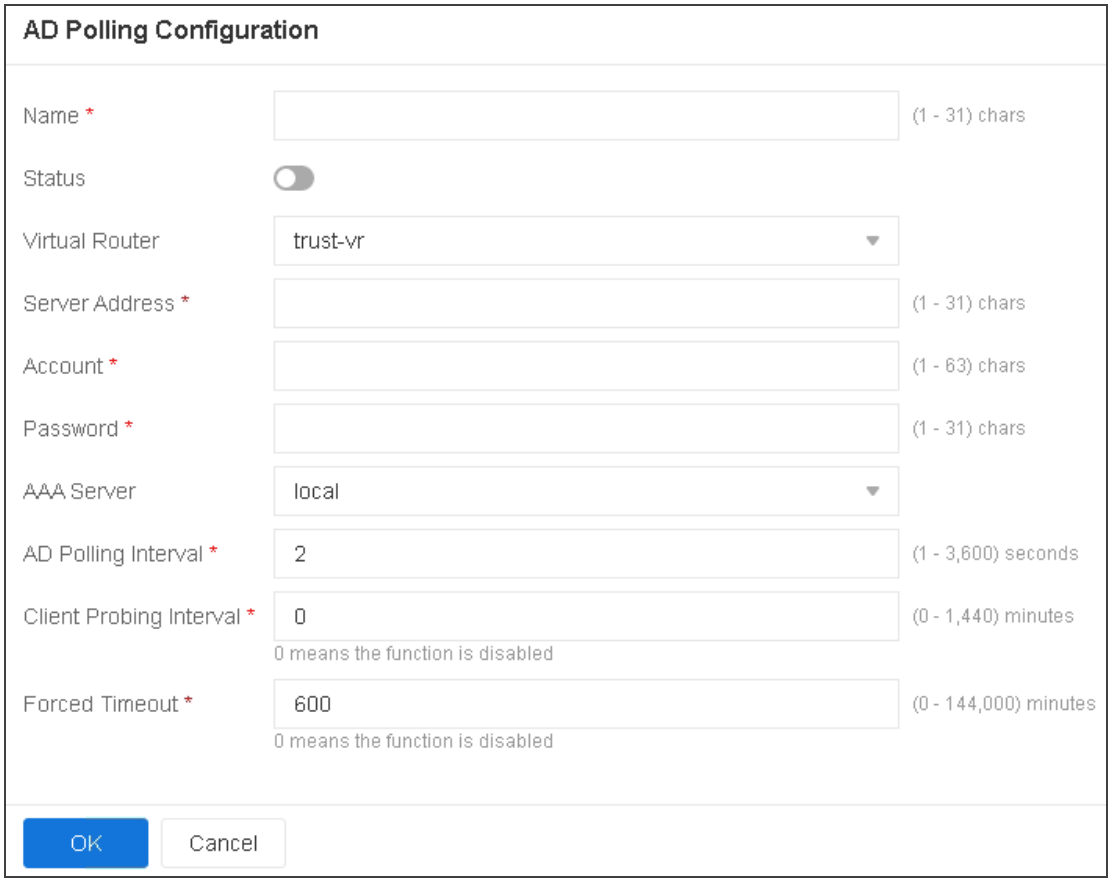
3. Click **OK** to complete the configuration.

Using AD Polling for SSO

When the domain user logs in the AD server, the AD server will generate login logs. After enabling the AD Polling function, system will regularly query the AD server to obtain the user login information and probe the terminal PCs to verify whether the users are still online, thus getting correct authentication user information to achieve SSO.

Before using AD Polling for SSO, you should make sure that the Active Directory server is set up first. To use AD Polling for SSO, take the following steps:

1. Click **Object >SSO Client >AD Polling** to enter the AD Polling page.
2. Click the ⊕ New button on the upper left corner of the page, and the **AD Polling Configuration** dialog box pops up.



In the AD Polling Configuration dialog box, configure the following:

Option	Description
Name	Specifies the name of the new AD Polling profile. The range is 1 to 31 characters
Status	Click **Enable** button to enable the AD Polling function. After enabling, system will query the AD server to obtain the user information and probe the terminal PC to verify whether the online users are online regularly. When queries for the first time, system will obtain the online user information on the AD server in the previous 8 hours . If

Option	Description
	fails to obtain the previous information, system will obtain the following online user information directly.
Server Address	Enter the IP address of authentication AD server in the domain. You can only select AD server. After specifying the authentication AD server, when the domain users log in the AD server, the AD server will generate the login logs. The range is 1 to 31 characters.
Virtual Router	Select the virtual router that the AD server belongs to in the drop-down list.
Account	Enter a domain user name to log in the AD server. The format is domain\username, and the range is 1 to 63 characters. The user is required to have permission to query security logs on the AD server, such as the user of Administrator whose privilege is Domain Admins on the AD server.
Password	Enter a password corresponding to the domain user name. The range is 1 to 31 characters.
AAA Server	Select the referenced AAA server in the drop-down list. You can select the configured Local, AD or LDAP server, see "AAA Server" on Page 1113. You are suggested to select the configured authentication AD server. After selecting the AAA server, system can query the corresponding user group and role information of the online user on the referenced AAA server, so as to realize the

Option	Description
	policy control based on the user group and role,.
AD Polling Interval	Configure the interval for regular AD Polling probing. System will query the AD server to obtain the online user information at interval. The range is 1 to 3600 seconds, and the default value is 2 seconds. You are suggested to configure 2 to 5 seconds to ensure to obtain online user information in real time.
Client Probing Interval	Configure the interval for regular client probing. System will probe whether the user is still online through WMI at interval, and kick out the user if cannot be probed. The range is 0 to 1440 minutes, and the default value is 0 minute(the function is disabled). You are suggested to configure a larger probing interval to save the system performance, if you have low requirements for the offline users.
Force Timeout	Configure the forced logout time. When the user's online time exceeds the configured timeout time, system will kick out the user and force the user to log out. The range is 0（the function is disabled） to 144000 minutes, and the default value is 600 minutes.

3. Click **OK** button to finish the configuration of AD Polling.

Notes:

- When system is restarted or the configuration of AD Polling (except the account, password and force timeout) is modified, system will clear the existed user information and obtain the user information according to the new configuration.
- To realize the AD Polling function, you need to enable the WMI of the PC where the AD server is located and the terminal PC. By default, the WMI is enabled. To enable WMI, you need to enter the **Control Panel >Administrative Tools> Services** and enable the WMI performance adapter.
- To enable WMI to probe the PC where the AD server is located and the terminal PCs, the RPC service and remote management should be enabled. By default, the RPC service and remote management is enabled. To enable the RPC service, you need to enter the **Control Panel >Administrative Tools> Services** and open the Remote Procedure Call and Remote Procedure Call Locator; to enable the remote management, you need to run the command prompt window (cmd) as administrator and enter the command **netsh firewall set service RemoteAdmin**.
- To enable WMI to probe the PC where the AD server is located and the terminal PCs, the PC should permit WMI function to pass through Windows firewall. Select **Control Panel >System and Security> Windows Firewall >Allow an APP through Windows Firewall**, in the **Allowed apps and features** list, click the corresponding check box of Domain for Windows Management Instrumentation (WMI) function.

- To use the offline function, you should make sure that the time of the PC where the AD server is located and the terminal PCs is the same. To enable the function of Synchronize with an Internet time server, select **Control Panel > Clock, Language, and Region > Date and Time**, and the Date and Time dialog box pops up. Then, click **Internet Time** tab, and check **Synchronize with an Internet time server**.

Using SSO Monitor for SSO

SSO Monitor can synchronize the online status of users stored on external servers to the firewall based on specified protocol packets, generate authenticated users on the firewall, and update the username-IP binding relationship of online users in real time. In addition, SSO Monitor can extract the user group of users from packets so that the users can avoid repetitive login process.

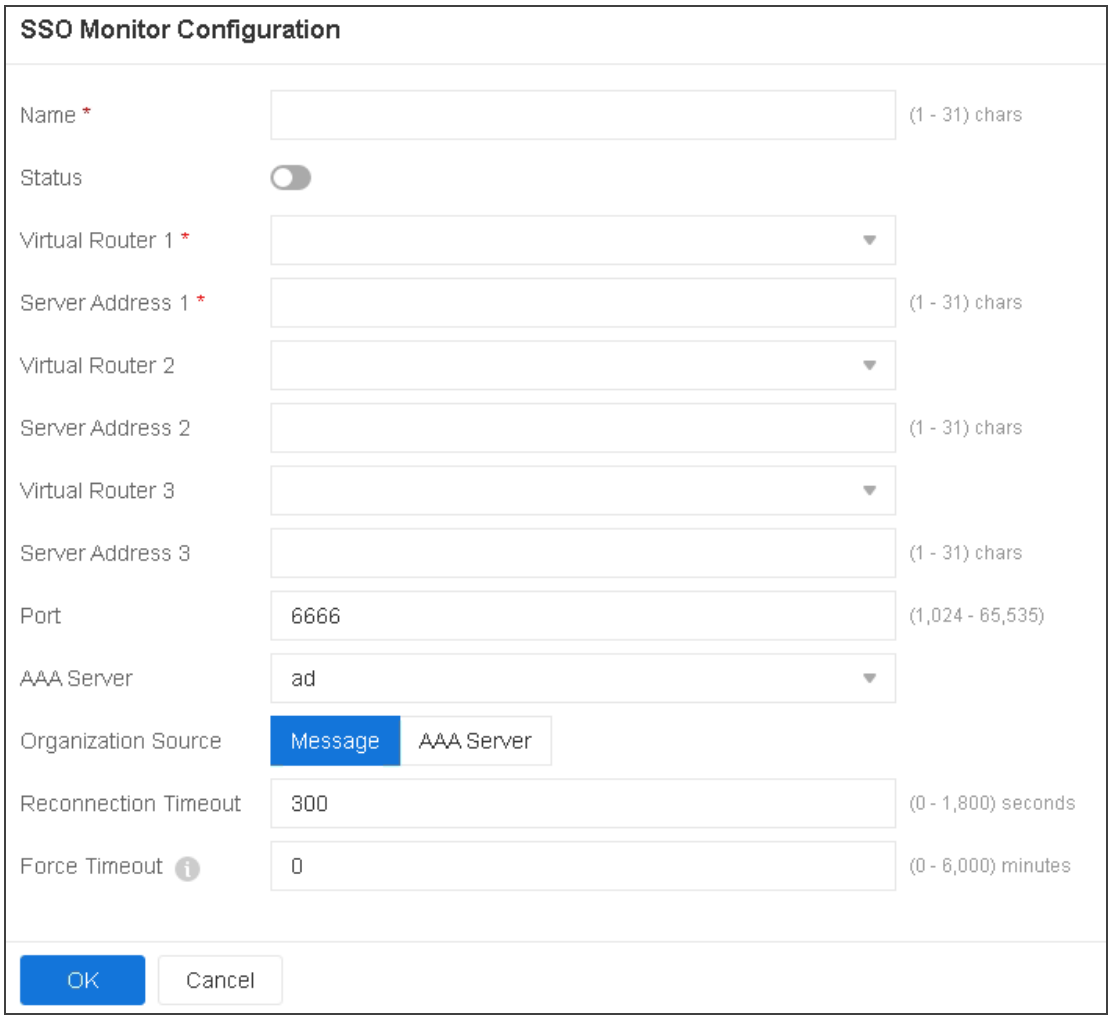
StoneOS does not restrict the form and type of external servers. A server of TCP connection that can synchronize user information to the firewall over the SSO Monitor protocol can be used as an external server, such as AD Agent software.

Notes: To use AD Agent software to obtain user information in version earlier than StoneOS 5.5R10, you can connect the AD agent by using SSO Monitor or configure the security agent in Active-Directory server configuration mode. In StoneOS 5.5R10 and later, the system no longer supports the security agent function. When the version is upgraded to StoneOS 5.5R10 or later, the configured security agent function is automatically converted to the SSO Monitor function to connect to the AD Agent software configuration. You can view the configuration on Object > SSO Client > SSO Monitor. The converted name of SSO Monitor is the same as that of the AD server.

To use SSO Monitor for SSO, take the following steps:

1. Click **Object >SSO Client > SSO Monitor** to enter **SSO Monitor** page.

2. Click the ⊕ New button and the **SSO Monitor Configuration** dialog box pops up.



In the SSO Monitor Configuration dialog box, configure the following:

Name	Specify the name of the new SSO Monitor. The range is 1 to 31 characters.
Status	Click **Enable** button to enable the SSO Monitor func-

	tion. After enabling the function, system will build connection with the third-party authentication server through SSO-Monitor protocol, as well as obtain user online status and information of group that user belongs to. The machine will generate authentication user according to the authentication information.
Server Address 1	Enter the IP address of the external server. The range is 1 to 31 characters. The external server needs to support sending user online status to the firewall by using the SSO-Monitor protocol. You need to configure at least one external server address 1, 2, or 3. If more than one address is configured, other addresses are used for redundant backup. If an address fails to be connected, the system connects to the next address. We recommend that you configure the addresses in the order of 1, 2, and 3.
Virtual Router 1	Select the virtual router to which the interface of the firewall used to communicate with the backed up external server address 1 belongs.
Virtual Router 2	Select the virtual router to which the interface of the firewall used to communicate with the backed up external server address 2 belongs.
Server Address 2	Enter the backed up external server address.

Virtual Router 3	Select the virtual router to which the interface of the firewall used to communicate with the backed up external server address 3 belongs.
Server Address 3	Enter the backed up external server address.
Port	Specifies the port number of the third-party authentication server. System will obtain user information through the port number. The default number is 6666. The range is 1024 to 65535.
AAA Server	Select the referenced AAA server in the drop-down list. You can select the configured Local, AD or LDAP server, see "AAA Server" on Page 1113 for configuration method. After selecting the AAA server, system can query the corresponding user group and role information of the online user on the referenced AAA server, so as to realize the policy control based on the user group and role.
Organization Source	Select the method to synchronize user organization structure with system, including Message and AAA Server. When Message is selected, StoneOS will use the user group of authentication information as the group that user belongs to. It's usually used in the scenario of the third-party authentication server saving user group. When AAA Server is selected, StoneOS will use the user organ-

	ization structure of AAA server as the group that user belongs to. It's usually used in the scenario of the third-party authentication server being authenticated by AAA server and the user organization structure being saved in the AAA server.
Reconnection Timeout	Configure the reconnection timeout. When StoneOS disconnects with the third-party authentication server due to timeout, system will wait during the disconnection timeout. If system still fails to connect within the configured time, it will delete online users. The range is 0 to 1800 seconds. The default value is 300. 0 means the user authentication information will never timeout.
Force Timeout	Specifies the force timeout of SSO Monitor, which is used to control the online duration of authenticated users. Note: If the external server connected to SSO Monitor is an AD Agent software, we do not recommend that you configure this parameter and the user online duration parameter on AD Agent at the same time.

3. Click **OK** button to finish SSO Monitor configuration.

Notes: You can configure different numbers of SSO Monitor on different servers. When the configured number exceeds the limit, system will pops up the alarm information.

Configuration Examples of Using SSO Monitor for SSO

AD Agent software can send user online status within the AD domain to the firewall by using packets of SSO-Monitor protocol. Therefore, AD Agent software can be used as an external server that connects SSO Monitor for SSO. In this example, AD Agent software is used to show you how to implement SSO by connecting SSO Monitor with AD Agent.

Install AD Agent software on a PC within the AD server or domain. When a user in the domain logs in to the Active-Directory server, AD Agent records the username, IP address, and time when the user was most recently online, and sends the mapping relationships between usernames and IP addresses to StoneOS. This avoids users from repeated logins and generates authenticated users on the firewall. The system can also implements user-based security statistics, log records, and online behavior auditing by using the obtained mapping relationships between usernames and IP addresses.

To use SSO Monitor for SSO, take the following steps:

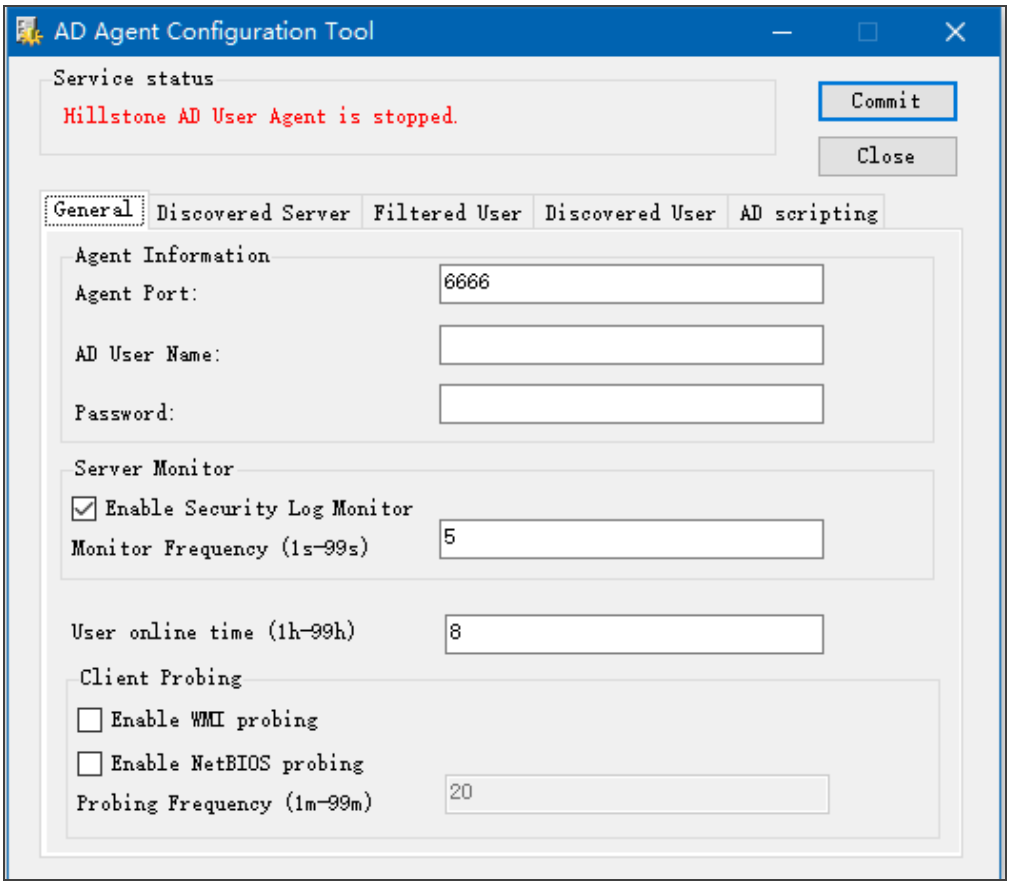
Step 1: Installing and Running AD Security Agent on a PC or Server

AD Security Agent can be installed on an AD server or a PC in the domain. If you install the software on an AD server, the communication only includes "AD Security Agent →StoneOS"; If you install the software on a PC in the domain, the communication includes both process in the following table. The default protocol and port used in the communication are described as follows:

Communication direction		AD Security Agent→AD Server	AD Security Agent→StoneOS
Protocol		TCP	TCP
Port	StoneOS	---	6666
	AD Security Agent	1935、1984	6666
	AD Server	445	---

To install the AD Security Agent to an AD server or a PC in the domain, take the following steps:

1. Click http://swupdate.hillstonenet.com:1337/sslvpn/download?os=windows-adagent to download an AD Security Agent software, and copy it to a PC or a server in the domain.
2. Double-click ADAgentSetup.exeto open it and follow the installation wizard to install it.
3. Start AD Security Agent through one of the two following methods:
   - Double-click the AD Agent Configuration Tool shortcut on the desktop.
   - Click **Start** menu, and select **All app > Hillstone AD Agent >AD Agent Configuration Tool**.
4. Click the <General> tab.



On the <General> tab, configure these basic options.

Option	Description
Agent Port	Enter agent port number. AD Security Agent uses this port to communicate with StoneOS. The range is 1025 to 65535. The default value is 6666. This port must be the same with the configured monitoring port in StoneOS, otherwise, the AD Security Agent and StoneOS cannot communicate with each other.
AD User Name	Enter user name to log in the AD server. If AD Security Agent is running on the other PCs of the domain, this user should have high privilege to query event logs in AD server, such as the user of Administrator whose privilege is Domain Admins on AD server.
Password	Enter the password that matched with the user name. If the AD Security Agent is running on the device where the AD server is located, the user name and password can be empty.
Server Monitor	
Enable Security Log Monitor	Select to enable the function of monitoring event logs on AD Security Agent. The default query interval is 5 seconds. The function must be enabled if the AD Security Agent is required to query user information.
Monitor Frequency	Specifies the polling interval for querying the event logs on different AD servers. The default value is 5 seconds.

Option	Description
	When finishing the query of a AD server, the AD Security Agent will send the updated user information to system.
User online time	Specifies the online duration of a user after successful SSO. After the user expires, it will be forced to log out. The range is 1 to 99 hours and the default value is 8 hours.
Client probing	
Enable WMI probing	Select the check box to enable WMI probing. • To enable WMI to probe the terminal PCs, the terminal PCs must open the RPC service and remote management. To enable the RPC service, you need to enter the **Control Panel >Administrative Tools> Services** and open the Remote Procedure Call and Remote Procedure Call Locator; to enable the remote management, you need to run the command prompt window (cmd) as administrator and enter the command **netsh firewall set service RemoteAdmin**. • WMI probing is an auxiliary method for security log monitor. which will probe all IPs in Discovered Users list. When the probed domain name does not match with the stored name, the stored name will

Option	Description
	be replaced by the probed name.
Probing Frequency	Specifies the interval of active probing action. The range is 1 to 99 minutes and the default value is 20 minutes.

5. On the <Discovered Server> tab, click **Auto Discover** to start automatic scanning the AD servers in the domain. Besides, you can click **Add** to input IP address of server to add it manually.

   When querying event logs in multiple AD servers, the query order is from top to bottom in the list.

6. On the <Filtered User> tab, type the user name need to be filtered into the **Filtered user** text box. Click **Add**, and the user will be displayed in the Filtered User list. You can configure 100 filtered users, which are not case sensitive.

7. Click the <Discovered User> tab to view the corresponding relationship between the user name and user address that has been detected.

   Tip: The user added into the Filtered User list will not be displayed in the Discovered User list.

8. On the <AD Scripting> tab, click **Get AD Scripting** to get the script "Logonscript.exe". (For introduction and installation of this script, refer to "Using AD Scripting for SSO" on Page 470) .

9. Click **Commit** to submit all settings and start AD Security Agent service in the mean time.

Notes: After you have committed, AD Agent service will be running in the background all the time. If you want to modify settings, you can edit in the **AD Agent Configuration Tool** and click **Commit**. The new settings can take effect immediately.

Step 2: Configuring AD server for StoneOS

To ensure that the AD Security Agent can communicate with StoneOS, take the following steps to configure the AD server:

1. Click **Object >AAA Server** to enter the AAA server page.
2. Choose one of the following two methods to enter the Active Directory server configuration page:
   - Click the New button on the upper left corner of the page, and choose **Active Directory Server** in the drop-down list.
   - Choose the configured AD server and click the Edit button on the upper left corner of the page.
3. For basic configuration of AD server, see Configuraing Active Directory Server.
4. Click **OK** to finish the related configuration of AD server.

Step 3: Enabling and Configuring SSO Monitor

To connect SSO Monitor to AD Agent, take the following steps:

1. Click **Object** > **SSO Client** > **SSO Monitor**.
2. Click **New**. On the **SSO Monitor Configuration** page, take note of the following items:
   a. Server Address 1: The server address needs to be the IP address of the device where AD Agent software resides;
   b. Port: The port needs to be the same as that configured in AD Agent software;
   c. AAA Server: The server needs to be the AD server configured in Step 2;

d. Organization Source: The source needs to be AAA Server. Force Timeout: We do not recommend that you configure this timeout and the timeout on AD Agent at the same time.

   For more information, see Using SSO Monitor for SSO.

3. Click **OK**.

After completing the above two steps, when domain user logs in the AD server, the AD Security Agent will send the user name, address and online time to the StoneOS and generates an authenticated user on the firewall.

Using TS Agent for SSO

The configurations of TS Agent for SSO include:

- Configuring the TS Agent server: Installing and running Hillstone Terminal Service Agent in Windows server.
- Configuring the TS Agent client: Configuring TS Agent parameters in StoneOS.

Step 1: Installing and running Hillstone Terminal Service Agent in Windows server

1. Click http://swupdate.hillstonenet.com:1337/sslvpn/download?os=windows-tsagent to download a Hillstone Terminal Service Agent installation program, and copy it to the Windows server.

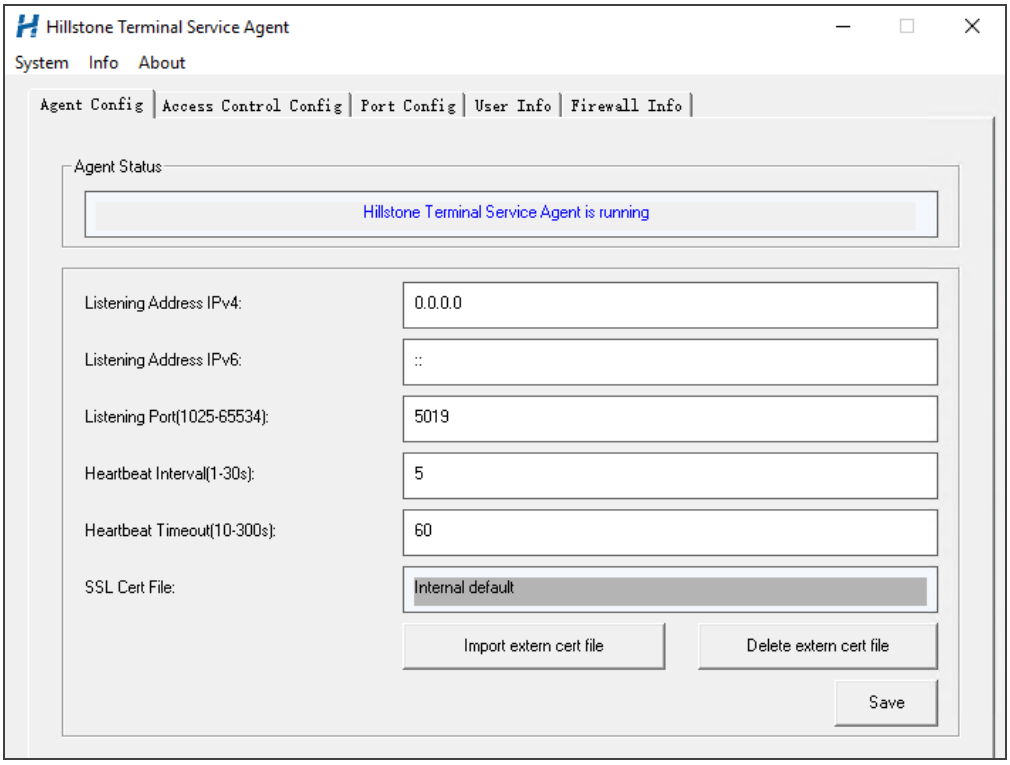
Notes:

- Windows Server 2008 R2, Windows Server 2016, and Windows Server 2019 are currently supported. Windows Server 2008 R2

Service Pack 1 and KB3033929 must be installed if Windows Server 2008 R2 is used.

- It's recommended to close the anti-virus software before installing Hillstone Terminal Service Agent in Windows server.

2. Double-click HSTSAgent.exe to open it and follow the installation wizard to install it.
3. Start Hillstone Terminal Service Agent through one of the two following methods:
   - Double-click the Hillstone Terminal Service Agent shortcut on the desktop.
   - Click **Start** menu, and select **All app > Hillstone Terminal Service Agent**.
4. Click the **Agent Config** tab.

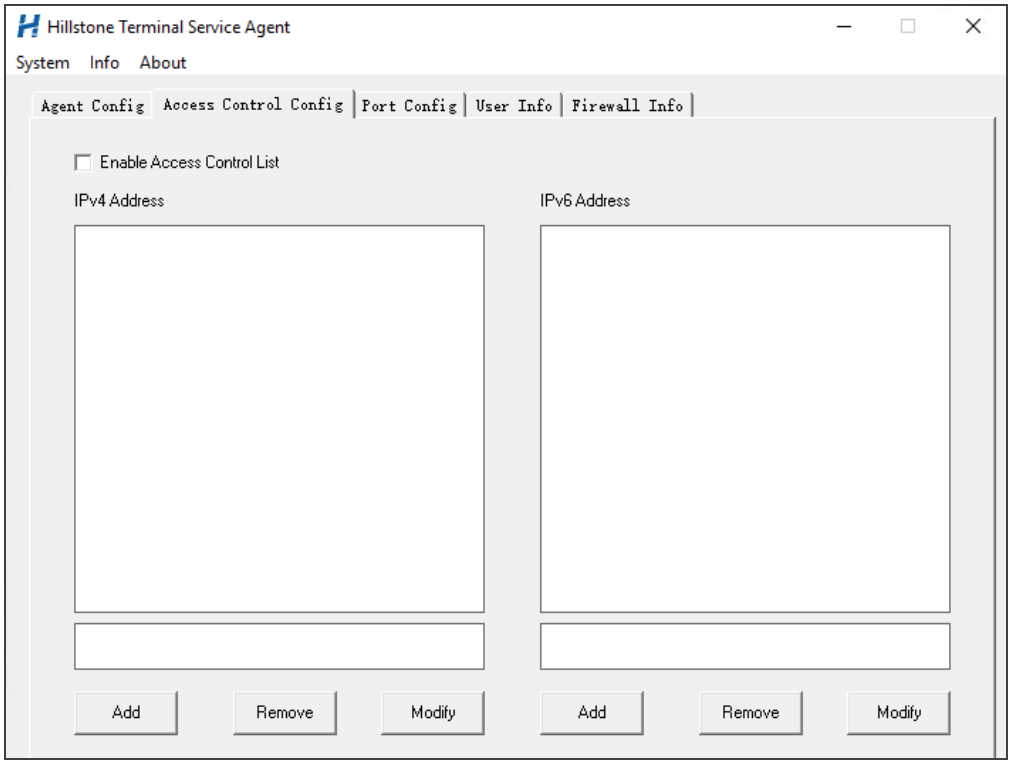


In the Agent Config tab, configure the following options.

Option	Description
Agent Status	Shows Hillstone Terminal Service Agent running status.
Listening Address IPv4	Specifies the IPv4 address to be listened. The default value is 0.0.0.0, which means listening all the IPv4 addresses.
Listening Address IPv6	Specifies the IPv6 address to be listened. The default value is ::, which means listening all the IPv6 addresses.
Listening Port	Specifies the listening port number. The range is 1025 to 65534. The default value is 5019. This port must be the same with the TS Agent server port configured in StoneOS, otherwise, the TS Agent client and the TS Agent server cannot communicate with each other.
Heartbeat Interval	Specifies the interval of sending heartbeat from the TS Agent client to the TS Agent server. The range is 1 to 30 seconds. The default value is 5 seconds.
Heartbeat Timeout	The TS Agent client will disconnect with the TS Agent server if it doesn't receive the heartbeat response from the server within the configured time. The range is 10 to 300 seconds. The default value is 60 seconds.
SSL Cert File	The TS Agent client synchronizes information with the TS Agent server through SSL connection. You can use the internal default SSL cert file or import external SSL cert file.

Option	Description
Import extern cert file	Click this button to import a new SSL cert file through the <Import extern cert file> dialog box. The encryption standard of the imported cert is PKCS12. The file is in .pfx format. To import the external cert file, you should create a PKI trust domain and import the CA certificate.
Delete extern cert file	Click this button to delete the external SSL cert file. After deletion, you need to restart the Hillstone Terminal Service Agent to make the default SSL cert file take effect. To restart the Hillstone Terminal Service Agent, click **Restart Agent Server** from the **System** drop-down menu.

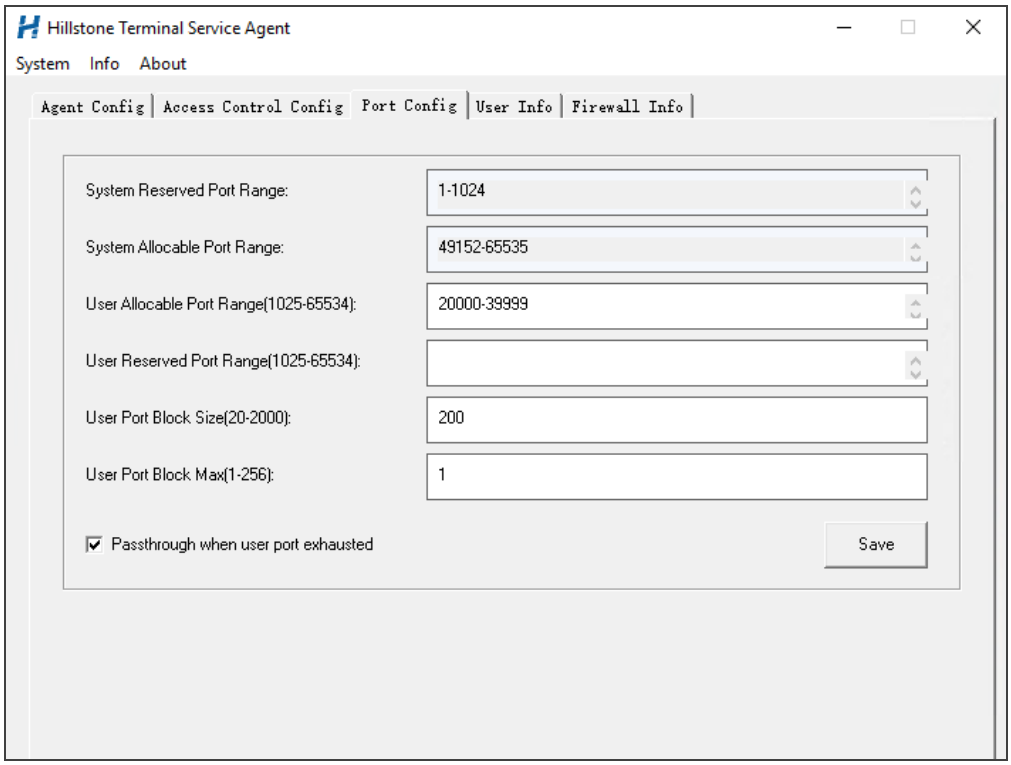
5. Click the **Access Control Config** tab.



In the Access Control Config tab, configure the following options.

Option	Description
Enable Access Control List	Select this check box to check if the newly accessed IP address of StoneOS is in the IPv4 address list or IPv6 address list below, if not, the access will be denied. This function is disabled by default.
IPv4 Address	When the access control list feature is enabled, IPv4 addresses that are not in the list will be access denied.
IPv6 Address	When the access control list feature is enabled, IPv6 addresses that are not in the list will be access denied.
Add	Enter an IP address in the text box above **Add**, and clicks **Add** to add the IP address into the IPv4 addresses list or IPv6 addresses list.
Remove	Select an IP address in the IPv4 addresses list or IPv6 addresses list, and clicks **Remove** to delete the IP address from the list.
Modify	Select an IP address in the IPv4 addresses list or IPv6 addresses list, modifies the address in the text box below, and then clicks **Modify** to add the address into the list.

6. Click the **Port Config** tab.

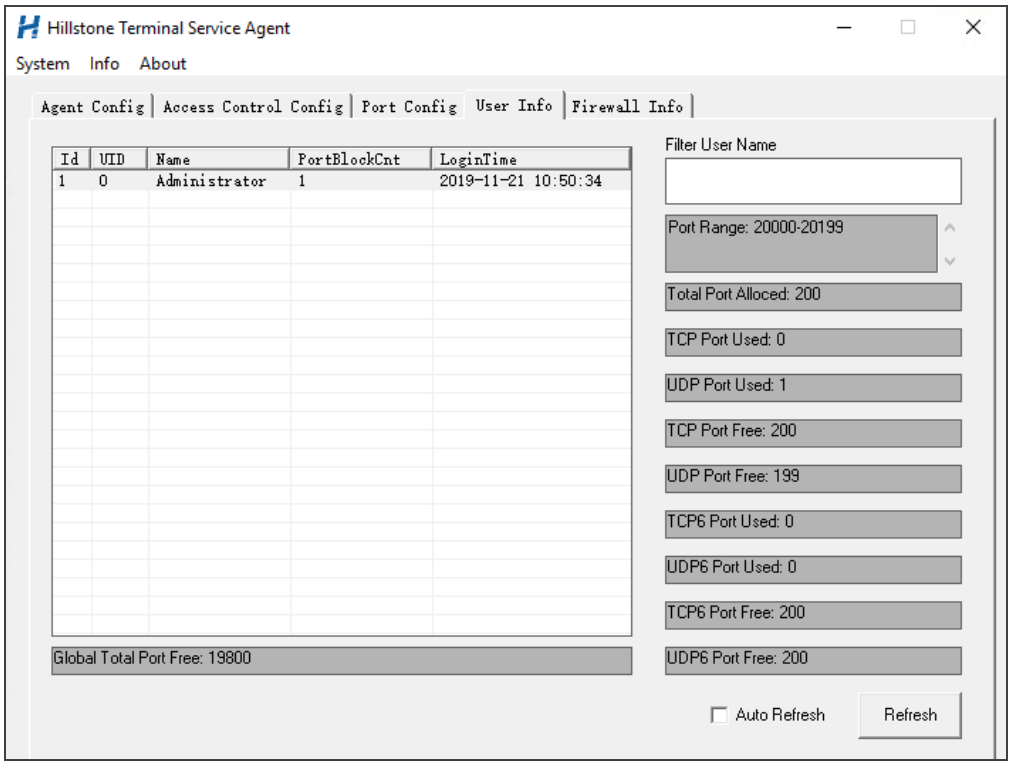


In the Port Config tab, configure the following options.

Option	Description
System Reserved Port Range	The range of ports reserved by the system, which is read from the system registry and cannot be modified.
System Allocable Port Range	The range of ports used by the system to dynamically allocate to users, which is read from the system registry and cannot be modified.
User Allocable Port Range	The total port range that can be allocated to the users. The range is 1025 to 65534. The default value is from 20000 to 39999. Only one port range can be configured

Option	Description
	each time, the minimum range size is the specified user port block size, and the maximum range size is 40960.
User Reserved Port Range	The user-defined reserved range of ports. The range is 1025 to 65534. The default value is NULL. You can configure more than one port ranges with each separated by a comma, such as 2000-3000,3500,4000-4200.
User Port Block Size	The number of ports allocated to the user each time. The range is 20 to 2000. The default value is 200.
User Port Block Max	The maximum number of port blocks allocated to each user. The range is 1 to 256. The default value is 1.
Passthrough when user port exhausted	Select the check box, and when the ports in the User Allocable Port Range are exhausted, system will allocate ports to users from the System Allocable Port Range. This option is checked by default.

7. Click the **User info** tab.

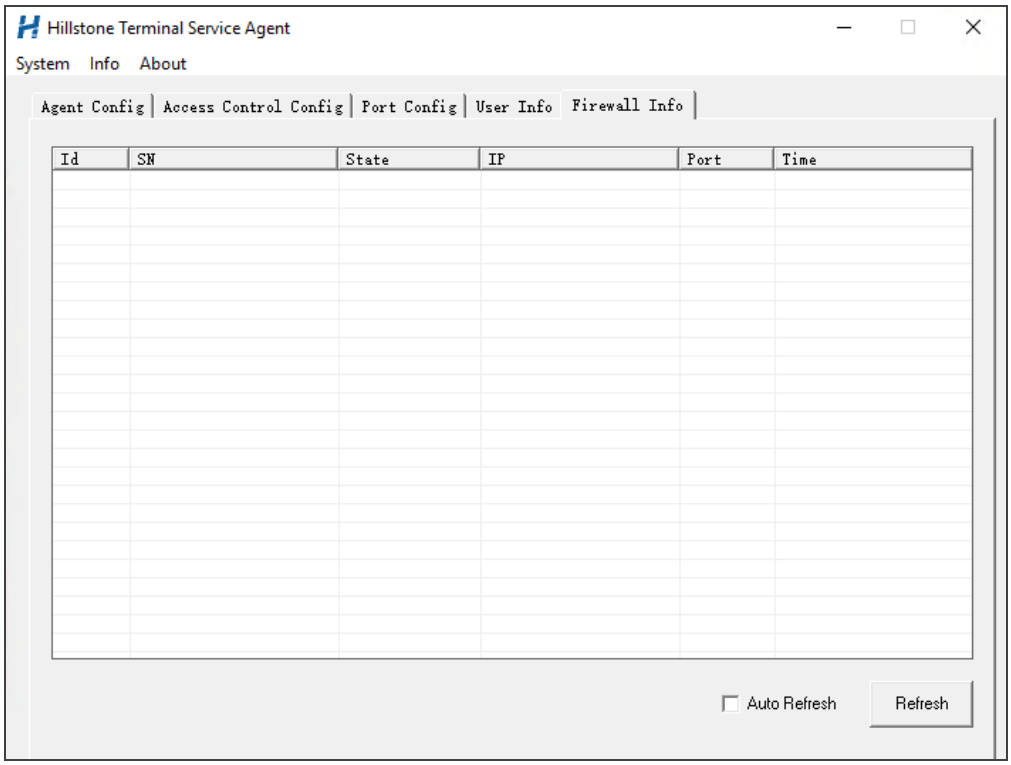


In the User Info tab, view information about users.

Option	Description
User Info. List	Shows the login user information, including ID, UID, user name, port block count and the login time. When users log in the TS Agent server using remote desktop services, Hillstone Terminal Service Agent will record the user info. in the list. It can record up to 2000 users info.
Filter User Name	Enter the user name in the text field, and click Refresh, the searched user info. will be

Option	Description
	displayed in the user info. list. The user name is case sensitive.
Global Total Port Free	The number of remaining ports available to the users.
Port Range	The port range already allocated to login users. After the user logs off, the system reclaims all the port ranges allocated to this user.
Total Port Alloced	Total number of ports allocated to the login users.
TCP/UDP/TCP6/UDP6 Port Used	The number of ports already used by users. After the user's connection to the Internet is disconnected, the system reclaims the ports.
TCP/UDP/TCP6/UDP6 Port Free	The number of ports available to the user when creating a new connection
Auto Refresh	Check the check box, the port statistics will be refreshed every 5 seconds.

8. Click the **Firewall Info** tab.



In the Firewall Info tab, view information about StoneOS.

Option	Description
Connected Device List	Displays StoneOS info. currently connected to TS Agent server, including ID, SN, connected status, IP address, port and time.
Auto Refresh	Check the check box, information of the connected devices will be refreshed every 5 seconds.

9. Configure related functions and view information using the Menu bar.

Menu bar options introduction.

System	
Restart agent server	Click this option to restart Hillstone Terminal Service Agent. When Hillstone Terminal Service Agent is being restarted, **Agent Status** on the **Agent Config** tab shows "Hillstone Terminal Service Agent is stopped". When the restart is completed, **Agent Status** on the **Agent Config** tab shows "Hillstone Terminal Service Agent is running".
Info	
Open log info	Click this option, you can perform following operations in the pop-up Log Info dialog box: • Check one or more check boxes in the Info Select section, corresponding logs will be displayed in the log info list. • Select a log in the log info list, the complete info. of this log will be displayed in the text box at the lower left corner. • Type the character string in the **Filter** text box, and click **Refresh**, the log info. containing the character string will be displayed in the log info list. • Check the ID of one ore more logs in the log info. list, and click **Delete** to delete selected logs. • Click **Export to text** to export the log info. as a text file.

System	
	• Click and drag the scroll slider at the lower left corner left or right to scroll through the log info. page quickly. The text field below displays the total number of log information, the total number of log information pages, and the current page.
Log enable set	Click this option, and check or uncheck the type of log info., system will record or not record corresponding type of log info. The system record the Event, Alarm and Config log info. by default.
Open debug info	Click this option, the SMP (Service Process Module) debug info. file and the KM (Kernel Module) debug info. file display in the pop-up Debug Info dialog box. You can perform following operations: • Double-click the file name to open the file. • Select the file name, and press the Delete key on your keyboard to delete the file.
SPM debug level set	Click this option, and check the level of the SMP debug info., system will record the info. at or above the selected level. The default level is Event. You can view the SMP debug info. in the Debug Info dialog box: the SMP debug info. at Critical and Error level display in the SPM error section; the SMP debug info. at other levels display in the SPM info section.

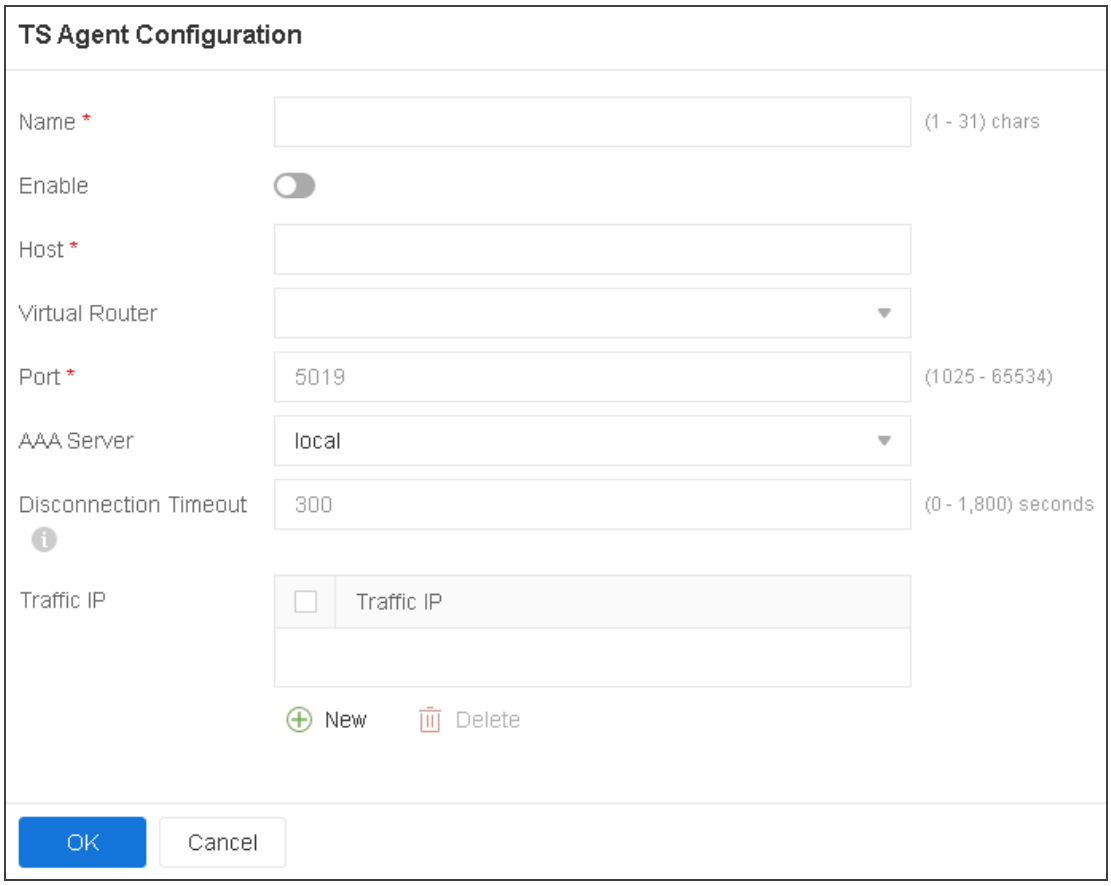
System	
KM debug level set	Click this option, and check the level of the KM debug info., system will record the info. at or above the selected level. The default level is Critical. You can view the KM debug info. in the Debug Info dialog box: the KM debug info. at Critical and Error level display in the KM error section; the KM debug info. at other levels display in the KM info section.
About	
About	Displays the information of version, copyright, etc.

Step 2: Configuring TS Agent parameters in StoneOS

To configure the TS Agent parameters in StoneOS, take the following steps:

1. Select **Object > SSO Client > TS Agent**.

2. Click **New**.



In the TS Agent Configuration dialog box, configure the following options.

Option	Description
Name	Specifies the name of the new TS Agent. The range is 1 to 31 characters.
Status	Select **Enable** button to enable the TS Agent function. After enabling, StoneOS will establish SSL connection with the TS Agent server, as well as obtain user and port range information. System will also update the mapping

Option	Description
	information of traffic IPs, port ranges and user names in real time for online users.
Host	Specifies the management address of the TS Agent server. It can be a domain name, or an IPv4 or IPv6 address.
Virtual Router	Select the virtual router that the TS Agent server belongs to in the drop-down list.
Port	Specifies the port number of the TS Agent server. The default number is 5019. The range is 1025 to 65534. This port number must be the same with the listening port number of Hillstone Terminal Service Agent, otherwise, the TS Agent client and the TS Agent server cannot communicate with each other.
AAA Server	Select the referenced AAA server in the drop-down list. You can select the configured Local, AD or LDAP server, see "AAA Server" on Page 1113. After selecting the AAA server, system can query the corresponding user group and role information of the online user on the referenced AAA server, so as to realize the policy control based on the user group and role.
Disconnection Timeout	When StoneOS disconnects with the TS Agent server, system will wait during the disconnection timeout. If system still fails to connect within the configured time,

Option	Description
	it will delete online user. The range is 0 to 1800 seconds. The default value is 300. 0 means delete the online user immediately.
Traffic IP	Specifies the traffic IP address, that is the network interface IP address of the TS Agent server. It cab be an IPv4 or IPv6 address. You can specify up to 4 IP addresses. Enter an IP address in the text field, and click **Add** to add the IP address into the Traffic IP list below. Check an IP address in the Traffic IP list, and click **Delete** to delete the IP address.

3. Click **OK** to finish the configuration of TS Agent.

After all the above configurations are finished, when users log in the TS Agent server using remote desktop services, the Hillstone Terminal Service Agent will allocate port ranges to users and send the port ranges and users information to the system. At the same time, the system will create the mappings of traffic IPs, port ranges and users.

802.1x

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

802.1X is a standard defined by IEEE for Port-based Network Access Control. It uses Layer-2 based authentication (protocol: EAPOL, Extensible Authentication Protocol over LAN) to verify the legality of the users accessing the network through LAN. Before authentication, the security device only allows the 802.1X message to pass through the port. After authentication, all of the normal traffic can pass through.

The AAA servers for 802.1x are Local server and Radius server. Other types of AAA servers like AD or LDAP server do not support 802.1x.

The authenticating process is the same with other authentication, please refer to "Chapter 7 Authentication" on Page 449.

Configuring 802.1x

A complete configuration for 802.1x authentication includes the following points:

- Prerequisite: Before configuration, you should already have the AAA server you want (only local or Radius server is supported for 802.1x). The AAA server has been added in the fire-wall system (refer to AAA server), and the interface or VLAN for authentication has been bound to a security zone (refer to interface or VLAN).
- Configuration key steps:
    1. Creating a 802.1x profile.
    2. Creating a security policy to allow accessing.
- In the user's PC, modify the network adapter's properties: If the computer is connected to the 802.1x interface, this computer should enable its authentication function on its LAN port

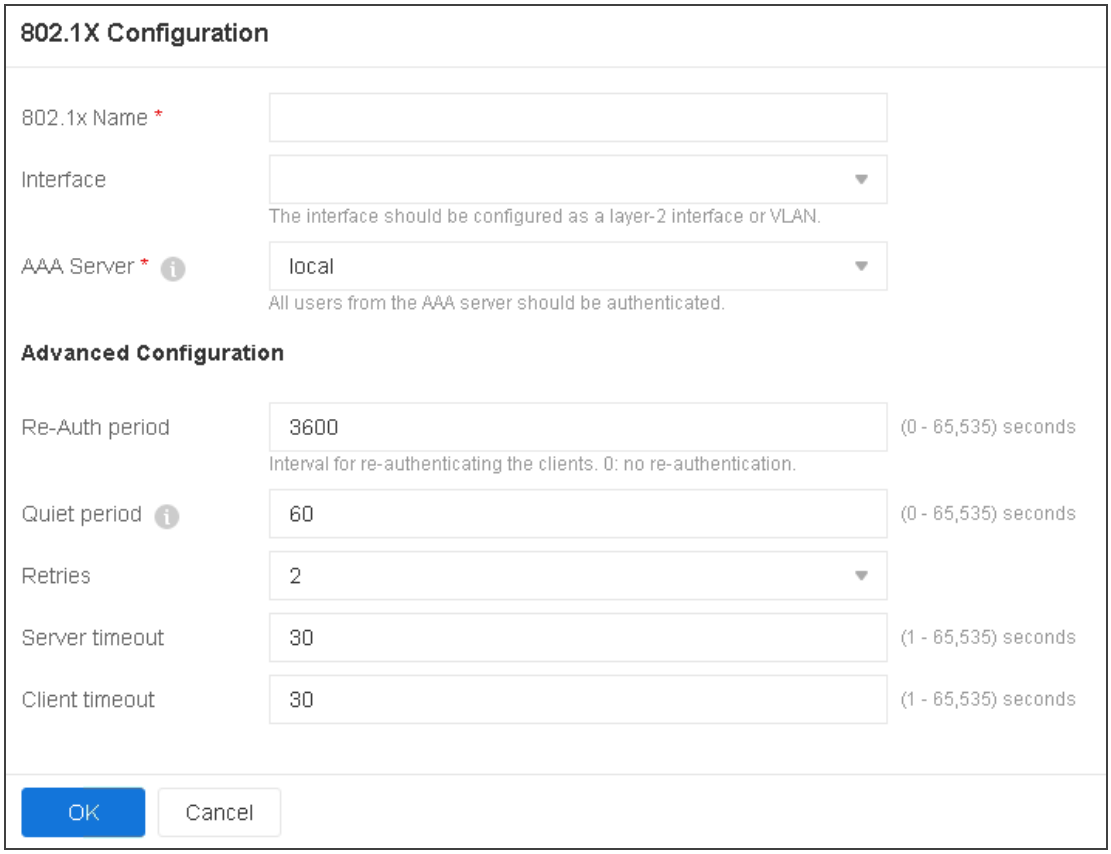
(right click **LAN** and select **Properties**, in the prompt, under the <Authentication> tab, select **MD5-Challenge** or **Microsoft: Protected EAP (PEAP)**, and click **OK** to confirm.)

Notes: Early versions of Windows have enabled 802.1x by default, but Windows 7 and Window 8 do not have this feature enabled. To enable 802.1x, please search online for a solution that suits your system.

Creating 802.1x Profile

To create a 802.1x profile, take the following steps:

1. Select **Network > 802.1X > 802.1X**.
2. Click **New** and a prompt appears.



Under the Basic tab and Advanced tab, enter values

Basic Configuration	
802.1x Name	Enter a name for the 802.1x profile
Interface	Select the interface for 802.1x authentication. It should be a Layer-2 interface or a VLAN interface.
AAA Server	Select the AAA server for 802.1x authentication. It should be a local server or a Radius server.
Access Mode	Select an access mode. If you select **Port** and one of the clients connected to 802.1x interface has passed authentication, all clients can access the Internet. If you select **MAC**, every client must pass authentication before using Internet.
Advanced Configuration	
Port authorized	If you select Auto, system will allow users who have successfully passed authentication to connect to network; If you select Force-unauthorized, system will disable the authorization of the port; as a result, no client can connect to the port, so there is no way to connect to the network.
Re-auth period	Enter a time period as the re-authentication time. After a user has successfully connected to the network, system will automatically re-auth the user's credentials. The range is from 0 to 65535 seconds. If the value is set to 0, this function is disabled.

Basic Configuration	
Quiet period	If the authentication fails, it will take a moment before system can process the authenticating request from the same client again. The range is 0 to 65535 seconds, and the default value is 60 seconds. If this value is set to 0, system will not wait, and will immediately process the request from the same client.
Retries	After sending an authentication request to the client and receives a response containing the expected data, the authenticator transmits the client's response data to the authentication server and waits for a response. If the authentication server does not answer, the authenticator will resend an authentication request to the client until receiving a response from the authentication server or exceeding the allowed maximum retry times. The range is 1 to 10 times, and the default is 2 times.
Sever timeout	After sending an authentication request to the client and receives a response containing the expected data, the authenticator transmits the client's response data to the authentication server and waits for a response. If the server does not answer the authenticator within a specified time, the authenticator will resend an authentication request to the client. The range is 1 to 65535 seconds, the default value is 30 seconds.
Client timeout	When the authenticator sends a request to ask the client

Basic Configuration	
	to submit his/her username, the client needs to respond within a specified period. If the client does not respond before timeout, system will resend the authentication request message. The range is 1 to 65535 seconds, and the default value is 30 seconds.

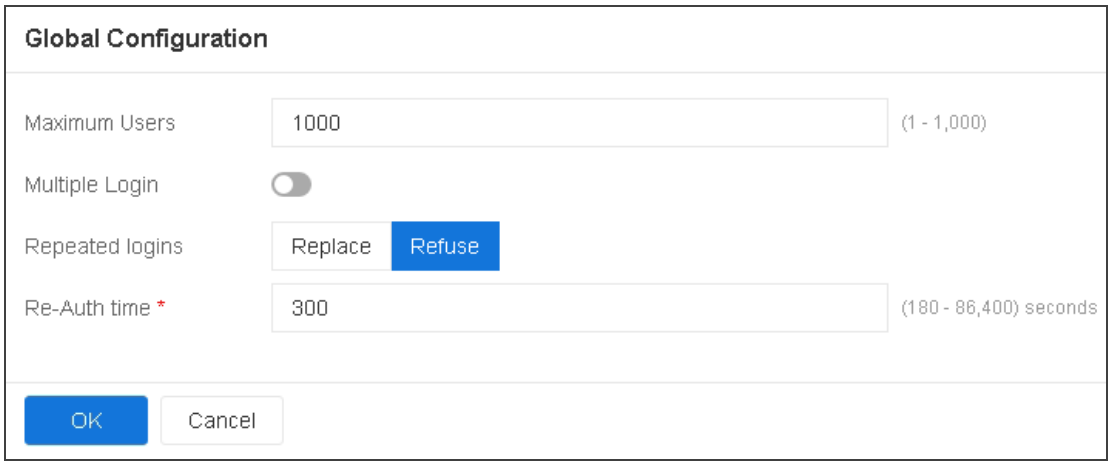
3. Click **OK**.

802.1x Global Configuration

Global parameters apply to all 802.1x profiles.

To configure global parameters, take the following steps:

1. Select **Network > 802.1X > Global Configuration**.



In the Global Configuration dialog box, specify the parameters that will be applicable for all

802.1x profiles.

Option	Description
Maximum Users	The maximum user client number for a authentication port.
Multiple logins	You may choose to allow or disable one account to login from different clients. • **Disable**: If you select Disable, one account can only login from one client simultaneously. Then, when you want to kick off the old login user, you should select **Replace**; if you want to disallow new login user, select **Refuse**. • **Enable**: If you select **Enable**, different clients can use one account to login. If you do not limit the login client number, select **Unlimited**; if you want to set up a maximum login number, select **Max attempts** and enter a value for maximum user client number.
Re-Auth time	Specify a time for authentication timeout value. If the client does not respond within the timeout period, the client will be required to re-enter its credentials. The range is 180 to 86400 seconds, the default value is 300 seconds.

2. Click **OK**.

Viewing Online Users

To view which authenticated users are online:

1. Select **Network > 802.1X > Online user**.

2. The page will show all online users. You can set up filters to view results that match your conditions.

PKI

PKI (Public Key Infrastructure) is a system that provides public key encryption and digital signature service. PKI is designed to automate secret key and certificate management, and assure the confidentiality, integrity and non-repudiation of data transmitted over the Internet. The certificate of PKI is managed by a public key by binding the public key with a respective user identity by a trusted third-party, thus authenticating the user over the Internet. A PKI system consists of Public Key Cryptography, CA (Certificate Authority), RA (Certificate Authority), Digital Certificate and related PKI storage library.

PKI terminology:

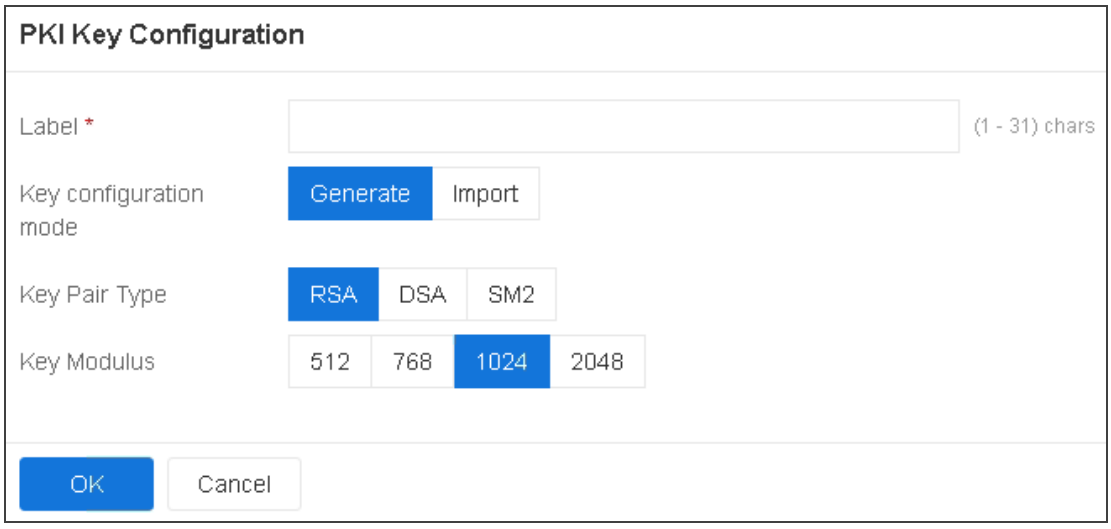
- Public Key Cryptography: A technology used to generate a key pair that consists of a public key and a private key. The public key is widely distributed, while the private key is only known to the recipient. The two keys in the key pair complement each other, and the data encrypted by one key can only be decrypted by the other key of the key pair.
- CA: A trusted entity that issues digital certificates to individuals, computers or any other entities. CA accepts requests for certificates and verifies the information provided by the applicants based on certificate management policy. If the information is legal, CA will sign the certificates with its private key and issue them to the applicants.
- RA: The extension to CA. RA forwards requests for a certificate to CA, and also forwards the digital certificate and CRL issued by CA to directory servers in order to provide directory browsing and query services.
- CRL: Each certificate is designed with expiration. However, CA might revoke a certificate before the date of expiration due to key leakage, business termination or other reasons. Once a certificate is revoked, CA will issue a CRL to announce the certificate is invalid, and list the series number of the invalid certificate.

PKI is used in the following two situations:

- IKE VPN: PKI can be used by IKE VPN tunnel.
- HTTPS/SSH: PKI applies to the situation where a user accesses a Hillstone device over HTTPS or SSH.
- "Sandbox" on Page 1542: Support the verification for the trust certification of PE files.

Creating a PKI Key

1. Select **System > PKI > Key**.
2. Click **New**.



In the PKI Key Configuration dialog, configure the following.

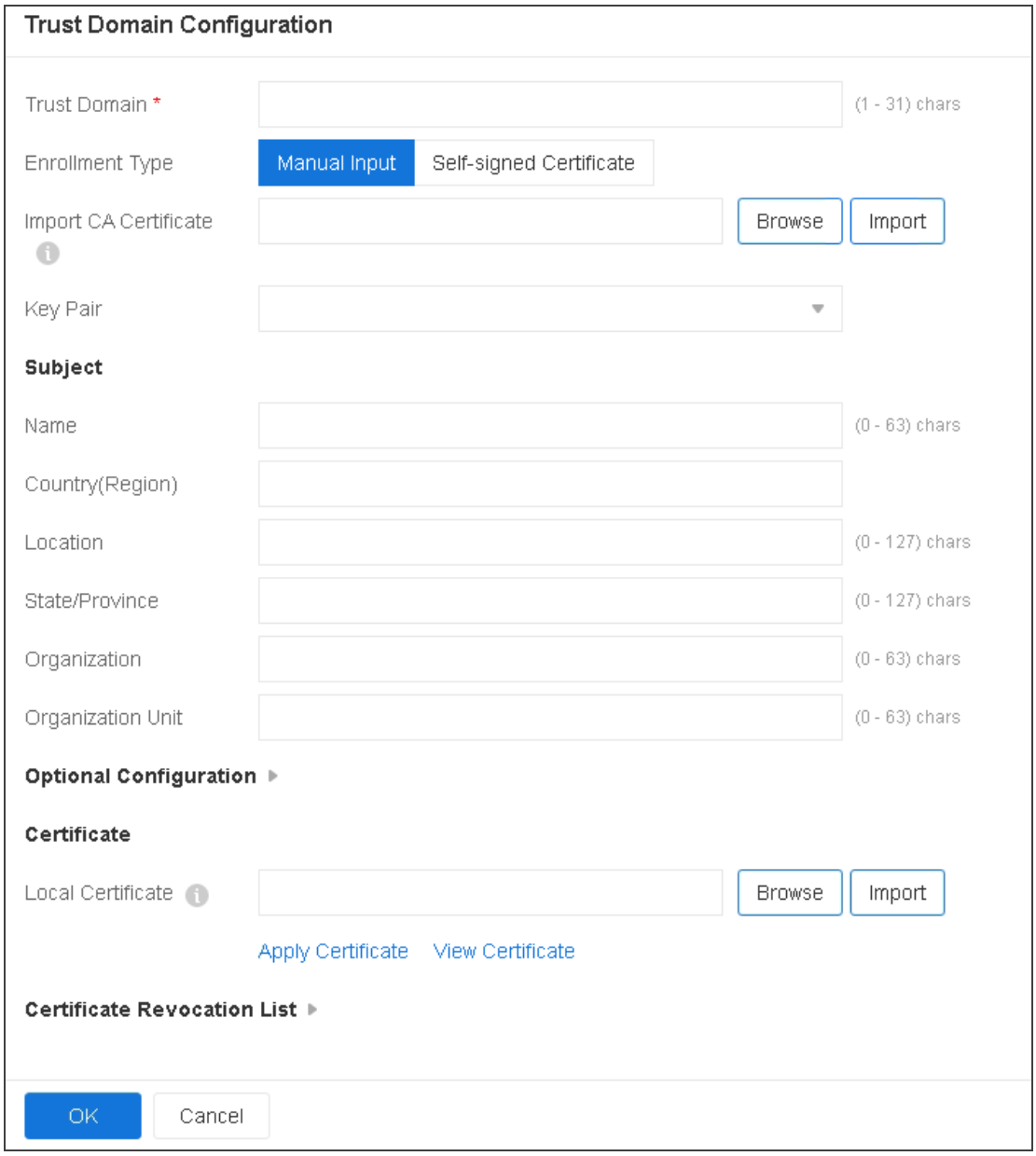
Option	Description
Label	Specifies the name of the PKI key. The name must be unique.
Key configuration mode	Specifies the generation mode of keys, which includes Generate and Import.

Option	Description
Key Pair Type	Specifies the type of key pair, either RSA、ECC, DSA or SM2.
Key Modulus	Specifies the modulus of the key pair. The modulus of RSA and DSA is 1024 (the default value), 2048, 512 or 768 bits, and the modulus of SM2 is 256.
EC group	Specifies the EC group of the key pair when you choose ECC. It includes P-256, P-384, P-521 elliptic curves. The default EC group is P-256.
Type	Specifies the type of key , including Encryption Key and Key Pair . • Encryption Key - Protects the signing key pair by digital envelope. If you select this option, you should specify the signing key pair when importing key. • Key Pair - If you select this option, you should specify the imported key pair type as RSA, DSA or SM2.
Import Key	Browse your local file system and import the key file.

3. Click **OK**.

Creating a Trust Domain

1. Select **System > PKI > Trust Domain**.
2. Click **New**.



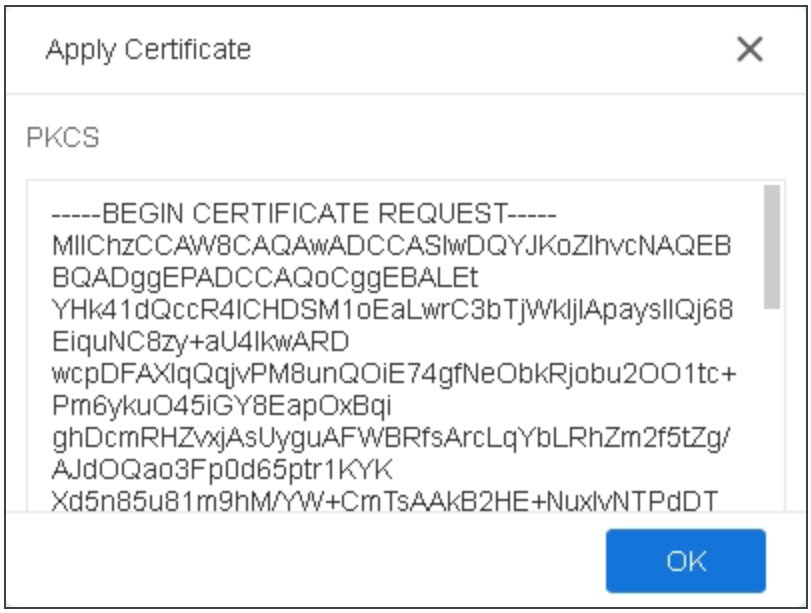
In the Basic Configuration tab, configure values for basic properties.

Option	Description
Basic	
Trust Domain	Enter the name of the new trust domain.
Enrollment Type	Use one of the two following methods: • Select **Manual Input**, and click **Browse** to find the certificate and click **Import** to import it into system. • Select **Self-signed Certificate**, and the certificate will be generated by the device itself.
Key Pair	Select a key pair.
Subject	
Name	Enter a name of the subject.
Country (Region)	Enter the name of applicant's country or region. Only an abbreviation of two letters are allowed, like CN.
Location	Optional. The location of the applicant.
State/Province	Optional. State or province name.
Organization	Optional. Organization name.
Organization Unit	Optional. Department name within applicant's organization.
Optional Configuration	
IP	Click **New** to specify the IP address to be added to the Subject Alternative Name list. Both IPv4 and IPv6 addresses are supported.

Option	Description
Basic	
DNS Name	Click **New** to specify the DNS name to be added to the Subject Alternative Name list. The value range is from 1 to 255 characters.

3. Click **Apply Certificate**, and a string of code will appear.

4. Copy this code and send it to CA via email.



5. When you receive the certificate sent from CA. Click **Browse** to import the certificate.

6. (Optional) In the CRL tab, configure the following.

Certification Revocation List	
Check	• No Check - System does not check CRL. This is the default option. • Optional - System accepts certificating from peer, no matter if CRL is available or not. • Force - System only accepts certificating from peer when CRL is available.
URL 1-3	The URL address for receiving CRL. At most 3 URLs are allowed, and their priority is from 1 to 3. • Select **http://** if you want to get CRL via HTTP. • Select **ldap://** if you want to get CRL via LDAP. • If you use LDAP to receive CRL, you need to enter the login-DN of LDAP server and password. If no login-DN or password is added, the trans-mission will be anonymous.
Auto Update	Update frequency of CRL list.
Manually Update	Get the CRL immediately by clicking **Obtain CRL**.

7. Click **OK**.

Importing/Exporting Trust Domain

To simplify configurations, you can export certificates (CA or local) and private key (in the format of PKSC12) to a computer and import them to another device.

To export a PKI trust domain, take the following steps:

1. Select **System > PKI > Trust Domain Certificate**.
2. Select a domain from drop-down menu.
3. Select the radio button of the item you want to export, and click **Export**.
   If you choose PKCS, you need to set up password.
4. Click **OK**, and select a storage path to save the item.

To import the saved trust domain to another device, take the following steps:

1. Log in the other device, select **System > PKI > Trust Domain Certificate**.
2. Select a domain from drop-down menu.
3. Select the radio button of the item you want to import, and click **Import**.
   If you choose PKCS, you need to enter the password when it was exported.
4. Click **Browse** and find the file to import.
5. Click **OK**. The domain file is imported.

Importing Trust Certification

System will not detect the PE file whose certification is trusted. To import trust certification of PE files, take the following steps:

1. Select **System > PKI > Trusted Root Certificate**.
2. Click **Import** and choose a certificate file in your PC.
3. Click **OK** and then the file will be imported.

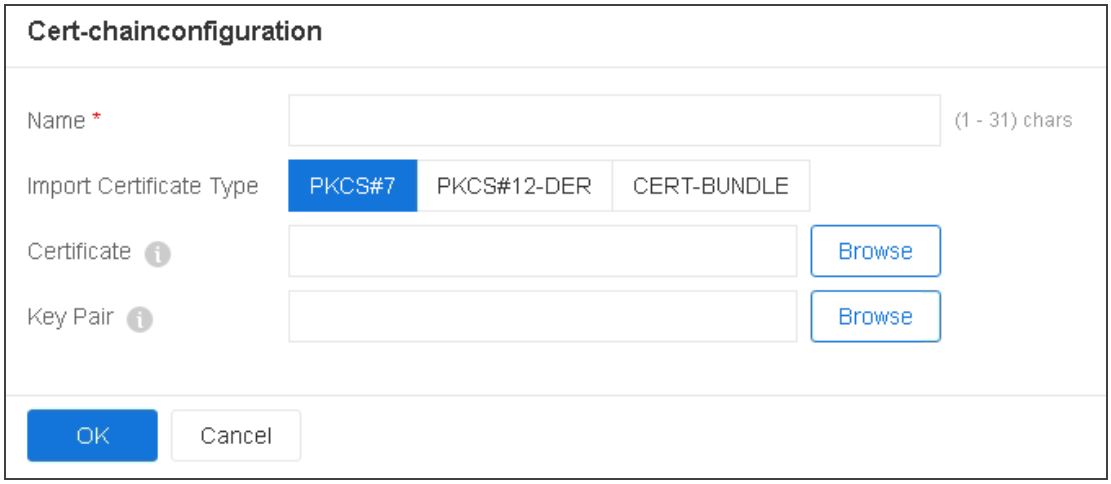
Configuring a Certificate Chain

A certificate chain consists of a root CA certificate, any intermediate CA certificates, and a CA-signed user certificate. Browsers consider that the certificate of the current user is valid and trusted only of each certificate in the certificate chain is valid. A root CA certificate lies in the top most position of the chain of trust hierarchy. Intermediate certificates branch off root certificates like branches of trees. They act as middle-men between the protected root certificates and the server certificates issued out to the public. There will always be at least one intermediate certificate in a chain, but there can be more than one.

Creating a Certificate Chain

To create a certificate chain, take the following steps:

1. Select **System > PKI > Cert-chain**.
2. Click **New**.



On the Cert-chain Configuration page, configure the following options:

Name	Specifies the name of the certificate chain, which can be 1 to 31 characters.
Import Certificate Type	Specifies the format of the certificate chain. Valid values: PKCS#7, PKCS#12, and CERT-BUNDLE. CERT-BUNDLE indicates PEM-formatted certificate chains.
Password	For certificate chains in the PKCS#12 format, you need to specify the password that is used for decryption.
Certificate	Click **Browse** and select a certificate chain file that you want to import from your PC. A certificate chain can contain at most 6 certificates. These certificates need to be able to complete a chain but there is no limitation on the order of these certificates.
Key Pair	If the type of the certificate chain is PKCS#7 or CERT-BUNDLE, you can import the private key of the last-level certificate used for encryption and decryption. Click **Browse** and select a private key file that you want to import from your PC.

3. Click **OK**.

Exporting a Certificate Chain

To export a certificate chain to your PC, take the following steps:

1. Select **System** > **PKI** > **Cert-chain**.
2. Select a certificate chain from the list.

3. Click **Export Cert-chain**. If the certificate chain is in the PKCS#12 format, you need to enter a password.

Configuring Certificate Validity Check

By default, the system sends an alarm per day a week before the certificate expires. When the certificate expires, the system records an event log at critical level.

To configure certificate validity check, take the following steps:

1. Select **System** > **PKI** > **Validity Check**.

   On the Validity Check page, configure the following options:

Validity Check	Turn on the switch to enable certificate validity check. By default, this function is enabled.
Validity Check Interval	Specifies the interval at which certificate validity is checked. Valid values: 1 to 100, in hours. Default value: 24.
The Pre-warning Time	Specifies the warning days before certificate expiration. Valid values: 1 to 1000, in hours. Default value: 168.

2. Click **OK**.

Online Users

To view the online authenticated users, take the following steps:

1. Select **Network >WebAuth > Online Users**.
2. The page will show all online users. You can set up filters to views results that match your conditions.

- User Name: Displays the name of online users.
- IP/MAC: Displays the IP or MAC address of online users.
- Interface: Displays the authentication interface of online users.
- Online Time: Displays the online time of online users.
- Authentication Type: Displays the authentication type of online users.
- Operation: Displays the executable operation of online users.

Chapter 8 VPN

System supports the following VPN functions:

- "IPSec VPN" on Page 533: IPSec is a security framework defined by the Internet Engineering Task Force (IETF) for securing IP communications. It is a Layer 3 virtual private network (VPN) technology that transmits data in a secure tunnel established between two endpoints.
- "SSL VPN" on Page 586: SSL provides secure connection services for TCP-based application layer protocols by using data encryption, identity authentication, and integrity authentication mechanisms.
- "L2TP VPN" on Page 682: L2TP is one protocol for VPDN tunneling. VPDN technology uses a tunneling protocol to build secure VPNs for enterprises across public networks. Branch offices and traveling staff can remotely access the headquarters' Intranet resources through a virtual tunnel over public networks.
- "VXLAN" on Page 696:Virtual extensible local area network (VXLAN) is a tunnel encapsulation technology for large layer 2 network expansion overe NOV3 that uses MAC-in-UDP encapsulation. VXLAN uses a 24-bit network segment ID, called VXLAN network identifier (VNI), to identify users. This VNI is similar to a VLAN ID and supports a maximum of 16M [(2^24 - 1)/1024^2] VXLAN segments. VXLAN uses MAC-in-UDP encapsulation to extend Layer 2 networks to ensure uninterrupted services during VM migration, the IP address of the VM must remain unchanged.
- "GRE VPN" on Page 698: Generic Routing Encapsulation (GRE) is a tunneling protocol that can encapsulate a wide variety of network layer protocols inside virtual point-to-point links over an Internet Protocol internetwork. StoneOS uses GRE over IPSEC feature to ensure the security of routing information passing between networks.

IPSec VPN

IPSec is a widely used protocol suite for establishing a VPN tunnel. IPSec is not a single protocol, but a suite of protocols for securing IP communications. It includes Authentication Headers (AH), Encapsulating Security Payload (ESP), Internet Key Exchange (IKE) and some authentication methods and encryption algorithms. IPSec protocol defines how to choose the security protocols and algorithms, as well as the method for exchanging security keys among communicating peers, while offering the upper layer protocols with network security services, including access control, data source authentication, data encryption, etc.

Basic Concepts

- Security association
- Encapsulation modes
- Establishing SA
- Using IPSec VPN

Security Association (SA)

IPSec provides encrypted communication between two peers which are known as IPSec ISAKMP gateways. Security Association (SA) is the basis and essence of IPSec. SA defines some factors of communication peers like the protocols, operational modes, encryption algorithms (DES, 3DES, AES-128, AES-192 and AES-256), shared keys of data protection in particular flows and the life cycle of SA, etc.

SA is used to process data flow in one direction. Therefore, in a bi-directional communication between two peers, you need at least two security associations to protect the data flow in both of the directions.

Encapsulation Modes

IPSec supports the following IP packet encapsulation modes:

- Tunnel mode - IPSec protects the entire IP packet, including both the IP header and the payload. It uses the entire IP packet to calculate an AH or ESP header, and then encapsulates the original IP packet and the AH or ESP header with a new IP header. If you use ESP, an ESP trailer will also be encapsulated. Tunnel mode is typically used for protecting gateway-to-gateway communications.
- Transport mode - IPSec only protects the IP payload. It only uses the IP payload to calculate the AH or ESP header, and inserts the calculated header between the original IP header and payload. If you use ESP, an ESP trailer is also encapsulated. The transport mode is typically used for protecting host-to-host or host-to-gateway communications.

Establishing SA

There are two ways to establish SA: manual and IKE auto negotiation (ISAKMP).

- Manually configuring SA is complicated as all the information will be configured by yourself and some advanced features of IPSec are not supported (e.g. timed refreshing), but the advantage is that manually configured SA can independently fulfill IPSec features without relying on IKE. This method applies to a situation with a small number of devices or an environment of static IP addresses.
- IKE auto negotiation method is comparatively simple. You only need to configure information of IKE negotiation and leave the rest jobs of creating and maintaining SA to the IKE auto negotiation function. This method is for medium and large dynamic networks. Establishing SA by IKE auto negotiation consists of two phases. The Phase 1 negotiates and creates a communication channel (ISAKMP SA) and authenticates the channel to provide confidentiality, data integrity and data source authentication services for further IKE communication; the Phase 2 creates IPSec SA using the established ISAKMP. Establishing SA in two phases can speed up key exchanging.

Using IPSec VPN

To apply VPN tunnel feature in the device, you can use policy-based VPN or route-based VPN.

- Policy-based VPN - Applies the configured VPN tunnel to a policy so that the data flow which conforms to the policy settings can pass through the VPN tunnel.
- Route-based VPN - Binds the configured VPN tunnel to the tunnel interface and define the next hop of static route as the tunnel interface.

Configuring an IPSec VPN

IKE auto negotiation method is comparatively simple. You only need to configure information of IKE negotiation and leave the rest jobs of creating and maintaining SA to the IKE auto negotiation function. This method is for medium and large dynamic network. Establishing SA by IKE auto negotiation consists of two phases. The Phase 1 negotiates and creates a communication channel (ISAKMP SA) and authenticates the channel to provide confidentiality, data integrity and data source authentication services for further IKE communication; the Phase 2 creates IPSec SA using the established ISAKMP. Establishing SA in two phases can speed up key exchanging.

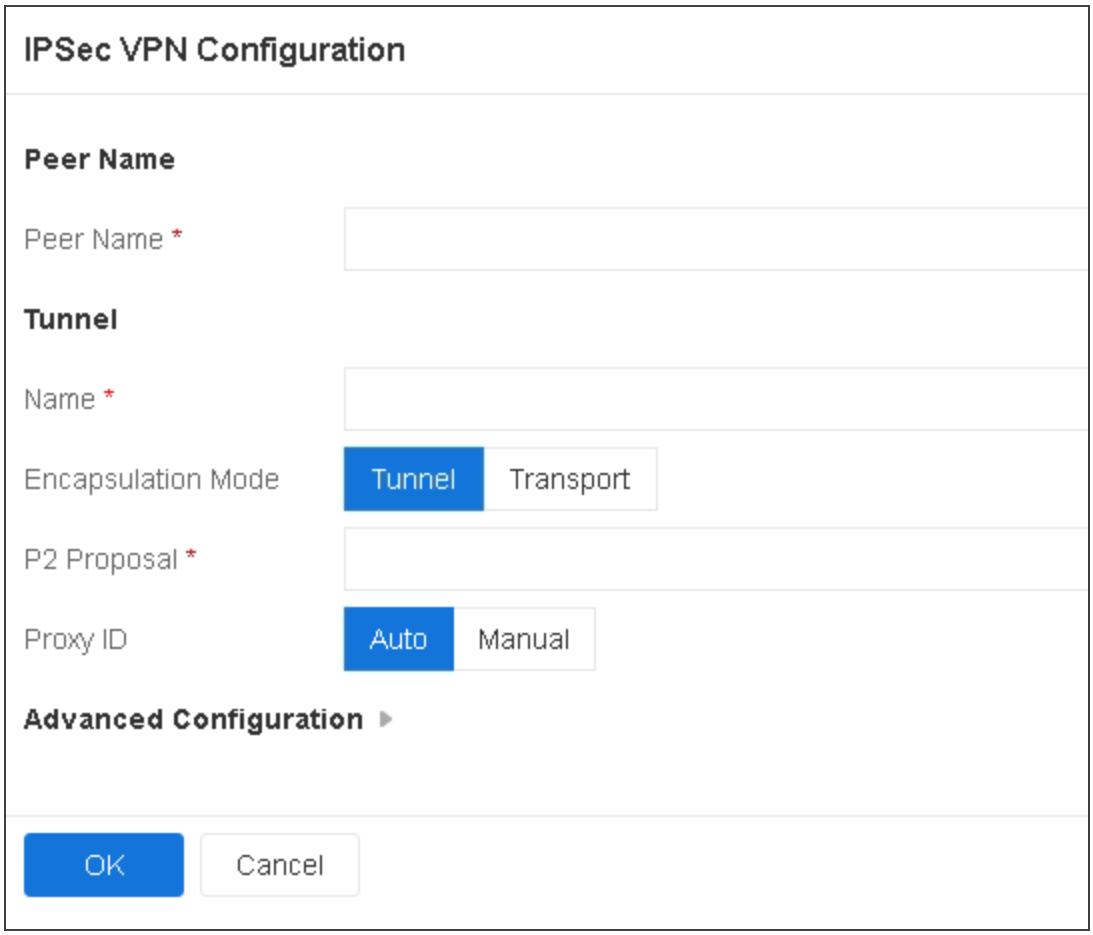
To configure an IPSec VPN, you need to confirm the Phase 1 proposal, the Phase 2 proposal, and the VPN peer. After confirming these three contents, you can proceed with the configuration of IKE VPN settings.

Configuring an IPSec VPN

To configure IPSec VPN, take the following steps:

1. Select **Network > VPN > IPSec VPN**.

2. In the IPSec VPN tab, click **New**.



In the Peer Name tab, configure the corresponding options.

Peer	
Peer Name	Specifies the name of the ISAKMP gateway. To create an ISAKMP gateway, click ⊕. For detailed information, refer to Configuring a VPN Peer.

In the Tunnel tab, configure the corresponding options.

Tunnel	
Name	Type a name for the tunnel.

Encapsulation Mode	Specifies the encapsulation mode, including tunnel mode and transport mode. The default is tunnel mode.
P2 Proposal	Specifies the P2 proposal for tunnel. To create a P2 proposal, click ⊕. For detailed information, refer to Configuring a Phase 2 Proposal.
Proxy ID	Users need to specify the IKE phase 2 ID to distribute and limit IPSec VPN traffic. Phase 2 ID consists of a local network segment, a remote network segment, and the service. During the configuration, you need to configure phase 2 IDS on the local and remote devices. Then, the local and remote devices negotiate to create an IKE IPSec tunnel. You can specify one or more phase 2 IDs to create one or more IKE IPSec tunnels. The system distributes and limits tunnel traffic according to the phase 2 ID of each tunnel. If you do not need to distribute or limit IPSec VPN traffic, you do not need to configure this parameter. For details about how to enable IPSec VPN traffic distribution and Limitation function, see Check ID. Specifies ID of Phase 2 for the tunnel which can be Auto or Manual. • Auto - The Phase 2 ID is automatically designated. • Manual - The Phase 2 ID is manually designated. Manual configuration of P2 ID includes the following options: • Local IP/Netmask - Specifies the IP/

	mask of the local network segment in phase 2. • Remote IP/Netmask - Specifies the IP/mask of the remote network segment(peer device) in phase 2. • Service - Specifies the service or protocol name of the traffic that can be transmitted by IKE IPSec tunnels in phase 2. **Note**: By default, the Phase 2 IDs of the local and peer device need to be configured accordingly. If the IDs configured on the two device cannot match, the negotiation will fail. In this case, if you enable the Accepting All Proxy ID function on the responder's device, the negotiation succeeds. For details about how to enable **Accepting All Proxy ID** function, see Accepting All Proxy ID

3. If necessary, click the **Advanced Configuration** tab to configure some advanced options.

In the Advanced Configuration tab, configure the corresponding options.

Advanced	
DNS1/2/3/4	Specifies the IP address of the DNS server allocated to the client by the PnPVPN server. You can define one primary DNS server and three backup DNS servers.
WINS1/2	Specifies the IP address of WINS server allocated to the client by the PnPVPN server. You can define one primary WINS server and a backup WINS server.
Enable Idle Time	Select the **Enable** check box to enable the idle time function. By default, this function is disabled. This

Advanced	
	time length is the longest time the tunnel can exist without traffic passing through. When the time is over, SA will be cleared.
DF-Bit	Select the check box to allow the forwarding device to execute IP packet fragmentation. The options are: • Copy - Copies the IP packet DF options from the sender directly. This is the default value. • Clear - Allows the device to execute packet fragmentation. • Set - Disallows the device to execute packet fragmentation.
Anti-Replay	Anti-replay is used to prevent hackers from attacking the device by resending the sniffed packets, i.e., the receiver rejects the obsolete or repeated packets. By default, this function is disabled. • Disable - Disables this function. • 32 -Specifies the anti-replay window as 32. • 64 - Specifies the anti-replay window as 64. • 128 - Specifies the anti-replay window as 128. • 256 - Specifies the anti-replay window as 256. • 512 - Specifies the anti-replay window as 512.
UDP Check-	Click the checkbox to enable/disable calculating the

Advanced	
sum	checksum of UDP packet. By default, this function is disabled.
Commit Bit	Select the **Enable** check box to make the corresponding party configure the commit bit function, which can avoid packet loss and time difference. However, commit bit may slow the responding speed.
Accept-all-proxy-ID	This function needs to be configured on the responder device of IKE tunnel negotiation. After it is enabled, the responder device will accept the second-phase ID configured by the peer (negotiation initiator) and set its phase 2 ID according to the peer. In this way, the two ends of the IKE tunnel can successfully negotiate. This function is often used in scenarios where the responder device cannot perceive or is not interested in the initiator's Phase 2 ID. **Note**: When multiple Phase 2 IDs are configured on the responder device (that is, multiple IKE tunnels are configured), you need to disable this function. Otherwise, only one tunnel can be negotiated.
Check ID	Select the **Enable** check box to enable the check ID function(distribute or limit the IPsec VPN traffic). By default, this function is disabled. Before configuring, ensure that the phase 2 ID has been configured and phase 2 negotiations has been successful. After this function is enabled, the device filters the inbound and outbound traffic of the IKE tunnel according to phase 2 ID and then distributes and limits the inbound and outbound traffic. Traffic

Advanced	
	that does not match phase 2 IDs is discarded. Details are as follows: • **Distribution**: Based on the configuration of Phase 2 IDs, the traffic distribution function can distribute the traffic at the IKE tunnel ingress interface when the traffic flow into the IKE tunnel. If the elements of source IP address, destination IP address, and the type of the traffic can match the configuration of a certain Phase 2 ID, this kind of traffic will flow into the corresponding IKE tunnel for encapsulation and sending. If the traffic cannot match any Phase 2 IDs, it will be dropped. • **Limitation**: Based on the configuration of Phase 2 IDs, the traffic limitation function can limit the traffic at the IKE tunnel egress interface when the traffic flows out of the IKE tunnel. After the traffic was de-encapsulated, StoneOS checks the elements of source IP address, destination IP address, and the type of the traffic to see whether this kind of traffic matches a certain Phase 2 ID or not. If matched, the traffic will be dealt with. If not matched, the traffic will be dropped.
Auto Connect	Select the **Enable** check box to enable the auto connection function. By default, this function is disabled. The device has two methods of establishing SA: auto

Advanced	
	and intrigued traffic mode. When it is auto mode, the device will check SA status every 60 seconds and initiate negotiation request when SA is not established; when it is in intrigued traffic mode, the tunnel will send negotiation request only when there is traffic passing through the tunnel. By default, the intrigued traffic mode is enabled. **Note**: Auto connection works only when the peer IP is static and the local device is the initiator.
Tunnel Route	This item can be modified only after this IKE VPN is created. Click **Choose** to add one or more tunnel routes in the appearing Tunnel Route Configuration dialog box. You can add up to 128 tunnel routes.
Description	Type the description for the tunnel.
Tunnel State Notify	Select the **Enable** check box to enable the tunnel state notification function. With this function enabled, for route-based VPN, system will inform the routing module about the information of the disconnected VPN tunnel and update the tunnel route once any VPN tunnel disconnection is detected; for policy-based VPN, system will inform the policy module about the information of the disconnected VPN tunnel and update the tunnel policy once any VPN tunnel disconnection is detected.
VPN Track	Select the **Enable** check box to enable the VPN track function. The device can monitor the connectivity status of the specified VPN tunnel, and also allows backup or load sharing between two or more VPN tunnels. This function is applicable to both route-based

Advanced	
	and policy-based VPNs. The options are: • Track Interval - Specifies the interval of sending Ping packets. The unit is second. • Threshold - Specifies the threshold for determining the track failure. If system did not receive the specified number of continuous response packets, it will identify a track as failure, i.e., the target tunnel is disconnected. • Src Address - Specifies the source IP address that sends Ping packets. • Dst Address - Specifies the IP address of the tracked object.
Smart Link	Select the smart link profile from the Smart Link drop-down list. For more information, see Configuring the Smart Link. Smart link and VPN Track cannot be configured simultaneously. **Note:** Only when the type of the peer IP is static support Smart Link.

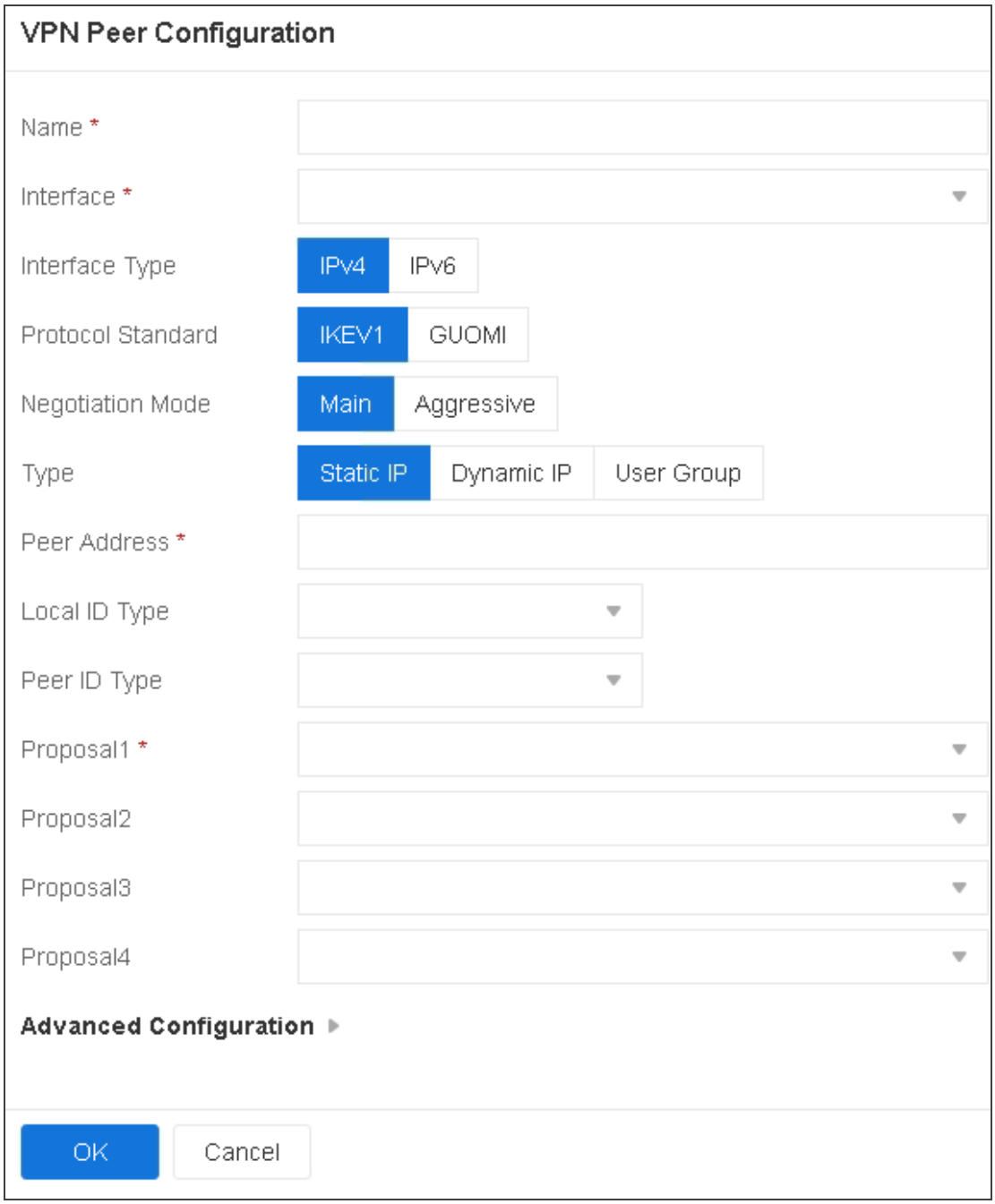
4. Click **OK** to save the settings.

Configuring a VPN Peer

To configure a VPN peer, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. In the IPSec VPN tab, click **New**.

3. In the IPSec VPN Configuration page, select Peer Name drop-down list and click ⊕.



In the VPN Peer Configuration dialog box, configure the corresponding options.

Basic Configuration	
Name	Specifies the name of the ISAKMP gateway.
Interface	Specifies interface bound to the ISAKMP gateway.
Interface Type	Select the interface type, including IPv4 or IPv6. Only the IPv6 firmware supports to configure IPv6 type interface.
Protocol Standard	Specifies the protocol standard, including IKEv1 and GUOMI . The default protocol standard is IKEv1. If you select GUOMI, specify the version: • v1.0: the version is 1.0. • v1.1: the version is 1.1. • Default: the initiator can negotiate with the peer when the initiator version is v1.0 or v1.1. Note: If you specify the version as 1.0 or 1.1, the version of the two peers which negotiate with each other should be the same, or system will fail to negotiate.
Negotiation Mode	Specifies the mode of IKE negotiation. There are two IKE negotiation modes: **Main** and **Aggressive**. The main mode is the default mode. The aggressive mode cannot protect identity. You have no choice but use the aggressive mode in the situation where the IP address of the center device is static and the IP address of client device is dynamic.
Type	Specifies the type of the peer IP. If the peer IP is static, type the IP address into the **Peer IP** box; if

Basic Configuration	
	the peer IP type is user group, select the AAA server you need from the **AAA Server** drop-down list.
Local ID	Specifies the local ID. System supports five types of ID: FQDN, U-FQDN, Asn1dn (only for license), KEY-ID and IP. Select the ID type you want, and then type the content for this ID into the **Local ID** box or the **Local IP** box.
Peer ID	Specifies the peer ID. System supports five types of ID: FQDN, U-FQDN, Asn1dn (only for license), KEY-ID and IP. Select the ID type you want, and then type the content for this ID into the **Peer ID** box or the **Peer IP** box.
Proposal1/2/3/4	Specifies a P1 proposal for ISAKMP gateway. Select the suitable P1 proposal from the **Proposal1** drop-down list. You can define up to four P1 proposals for an ISAKMP gateway. To create a P1 proposal, click ⊕. For detailed information, refer to Configuring a Phase 1 Proposal.
Pre-shared Key	If you choose to use pre-shared key to authenticate, type the key into the box.
Self-signed Trust Domain	If you choose to use RSA signature or DSA signature, select a trust domain.
Peer Trust Domain	Configure the trust domain of peer certification. The peer certification is used for data encryption and authentication in the negotiation. The initiator should import the peer certification first. Only GUOMI v1.0 supports this option.

Basic Configuration	
Encryption Trust Domain	Configure the trust domain of encryption certification. The encryption certification is used for data encryption in the negotiation. Only GUOMI v1.1 supports this option.

4. If necessary, click the **Advanced Configuration** tab to configure some advanced options.

In the Advanced Configuration tab, configure the corresponding options.

Advanced Configuration	
Connection Type	Specifies the connection type for ISAKMP gateway. • Bidirectional - Specifies that the ISAKMP gateway serves as both the initiator and responder. This is the default value. • Initiator - Specifies that the ISAKMP gateway serves as the only initiator. • Responder - Specifies that the ISAKMP gateway serves as the only responder.
NAT Traversal	This option must be enabled when there is a NAT device in the IPSec or IKE tunnel and the device implements NAT. By default, this function is disabled.
Any Peer ID	Makes the ISAKMP gateway accept any peer ID and not check the peer IDs.
Generate Route	Select the **Enable** check box to enable the auto routing function. By default, this function is disabled. This function allows the device to automatically add routing entries which are from the center device to the branch, avoiding the problems caused by manual configured

Advanced Configuration	
	routing.
DPD	Select the **Enable** check box to enable the DPD (Delegated Path Discovery) function. By default, this function is disabled. After the DPD function is enabled, the system will periodically send DPD requests to the peer in a specified time to detect whether the ISAKMP gateway exists. • DPD mode - Specify the DPD mode. • **periodic** - In this mode, the system continuously sends DPD requests to the peer at a specified interval. If no response packet is received from the peer within a DPD detection period, the system determines that the peer does not exist. DPD detection period=DPD Interval * DPD Retries. • **on-demand** - In this mode, the device does not send DPD requests if it receives no IPSec traffic. If the device receives IPSec traffic and needs to forward it, the system queries when the last receipt of the peer IPSec traffic happens. If the interval is shorter than the DPD detection period, it indicates that the peer ISAKMP gateway

Advanced Configuration	
	exists. In this case, the device does not send DPD detection requests. If the interval exceeds the DPD detection period, it indicates that the device needs to send DPD requests to detect the existence of the peer ISAKMP gateway. If the device does not receive the response packet during the DPD detection period, the system ages SA information in phase 1 and phase 2 and initiates a new IPSec negotiation. • DPD Interval - The interval of sending DPD request to the peer. The value range is 1 to 10 seconds. The default value is 10 seconds. • DPS Retries - The times of sending DPD request to the peer. The device will keep sending discovery requests to the peer until it reaches the specified times of DPD reties. If the device does not receive response from the peer after the retry times, it will determine that the peer ISAKMP gateway is down. The value range is 1 to 10 times. The default value is 3.
Description	Type the description for the ISAKMP gateway.
XAUTH Server	Select **Enable** to enable the XAUTH server in the

Advanced Configuration	
	device. Then select an address pool from the drop-down list. After enabling the XAUTH server, the device can verify the users that try to access the IPSec VPN network by integrating the configured AAA server. You can select a configured IPSec-XAUTH address pool from the drop-down list. It is optional. When a client successfully connects to the XAUTH server, the server will take an IP address from the address pool and other parameters (like DNS server address or WIN server address) and assign them to the client. For more information about the IPSec-XAUTH address pool, see "VPN > IPsec Protocol > Configuring an IPsec VPN > XAUTH".

5. Click **OK** to save the settings.

Editing a VPN Peer

To edit a VPN peer, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. In the IPSec VPN tab, click **New**.
3. In the IPSec VPN Configuration page, select Peer Name drop-down list and click  .

Deleting a VPN Peer

To delete a VPN peer, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. In the IPSec VPN tab, click **New**.

3. In the IPSec VPN Configuration page, select Peer Name drop-down list and click  .

Copying a VPN Peer

You can quickly create a VPN peer by copying an existing one.

To copy a VPN peer, take the following steps:

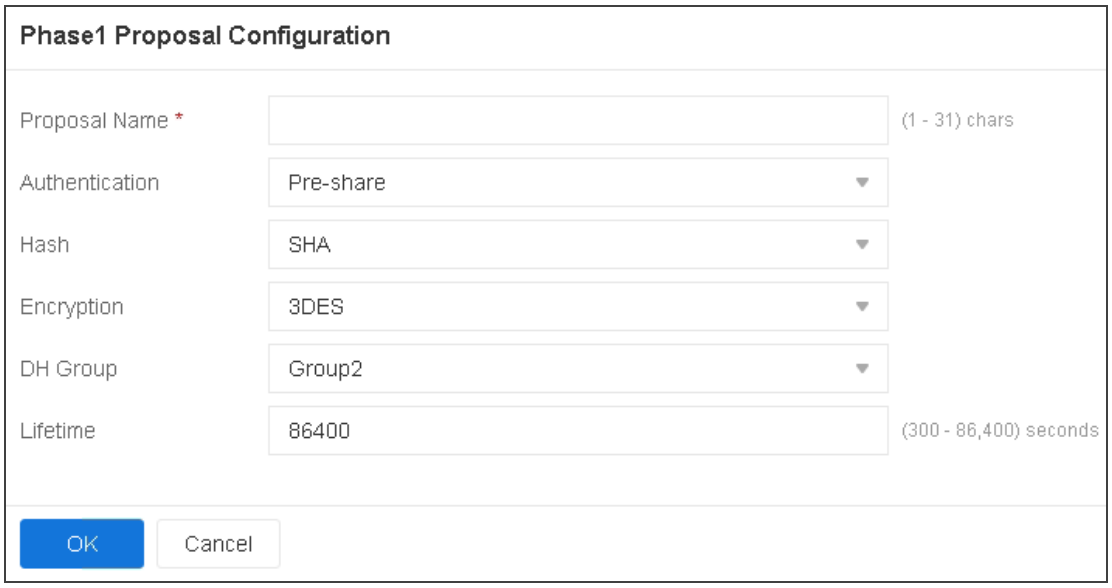
1. Select **Network > VPN > IPSec VPN**.
2. In the IPSec VPN tab, click **New**.
3. In the IPSec VPN Configuration page, select Peer Name drop-down list. Select the Peer that you want to copy and click  . In the VPN Peer Configuration page, configure the parameters as required. The name of the peer cannot be the same as an existing one.
4. Click **OK**.

Configuring a Phase 1 Proposal

The P1 proposal is used to negotiate the IKE SA. To configure a P1 proposal, take the following steps:

1. In the IPSec VPN Configuration page, select Peer Name drop-down list and click  .

2. In the VPN Peer Configuration page, select Proposal 1drop-down list and click ⊕.



In the Phase1 Proposal Configuration page, configure the corresponding options.

Option	Description
Proposal Name	Specifies the name of the Phase1 proposal.
Authentication	Specifies the IKE identity authentication method. IKE identity authentication is used to verify the identities of both communication parties. There are three methods for authenticating identity: pre-shared key, RSA signature, DSA signature and GM-DE. The default value is pre-shared key. For pre-shared key method, the key is used to generate a secret key and the keys of both parties must be the same so that it can generate the same secret keys.
Hash	Specifies the authentication algorithm for Phase1. Select the algorithm you want to use. • MD5 – Uses MD5 as the authentication

Option	Description
	algorithm. Its hash value is 128-bit. • SHA – Uses SHA as the authentication algorithm. Its hash value is 160-bit. This is the default hash algorithm. • SHA-256 – Uses SHA-256 as the authentication algorithm. Its hash value is 256-bit. • SHA-384 – Uses SHA-384 as the authentication algorithm. Its hash value is 384-bit. • SHA-512 – Uses SHA-512 as the authentication algorithm. Its hash value is 512-bit. • SM3 – Use the state password SM3 as the authentication algorithm. Its hash value is 256-bit. It is used for the digital signature and authentication, the generation and authentication of message authentication code, and the generation of random digit, which can meet the security requirement of multiple password applications.
Encryption	Specifies the encryption algorithm for Phase1. • 3DES - Uses 3DES as the encryption algorithm. The key length is 192-bit. This is the default encryption algorithm. • DES – Uses DES as the encryption algorithm.

Option	Description
	The key length is 64-bit. • AES – Uses AES as the encryption algorithm. The key length is 128-bit. • AES-192 – Uses 192-bit AES as the encryption algorithm. The key length is 192-bit. • AES-256 – Uses 256-bit AES as the encryption algorithm. The key length is 256-bit. • SM1 – Uses the state password SM1 as the encryption algorithm. The key length is 128-bit. Only the state password device supports SM1. • SM4 – Uses the state password SM4 as the encryption algorithm. The key length is 128-bit.
DH Group	Specifies the DH group for Phase1 proposal. • Group1 – Uses Group1 as the DH group. The key length is 768-bit (MODP Group). • Group2 – Uses Group2 as the DH group. The key length is 1024-bit (MODP Group). Group2 is the default value. • Group5 – Uses Group5 as the DH group. The key length is 1536-bit (MODP Group). • Group14 – Uses Group14 as the DH group.

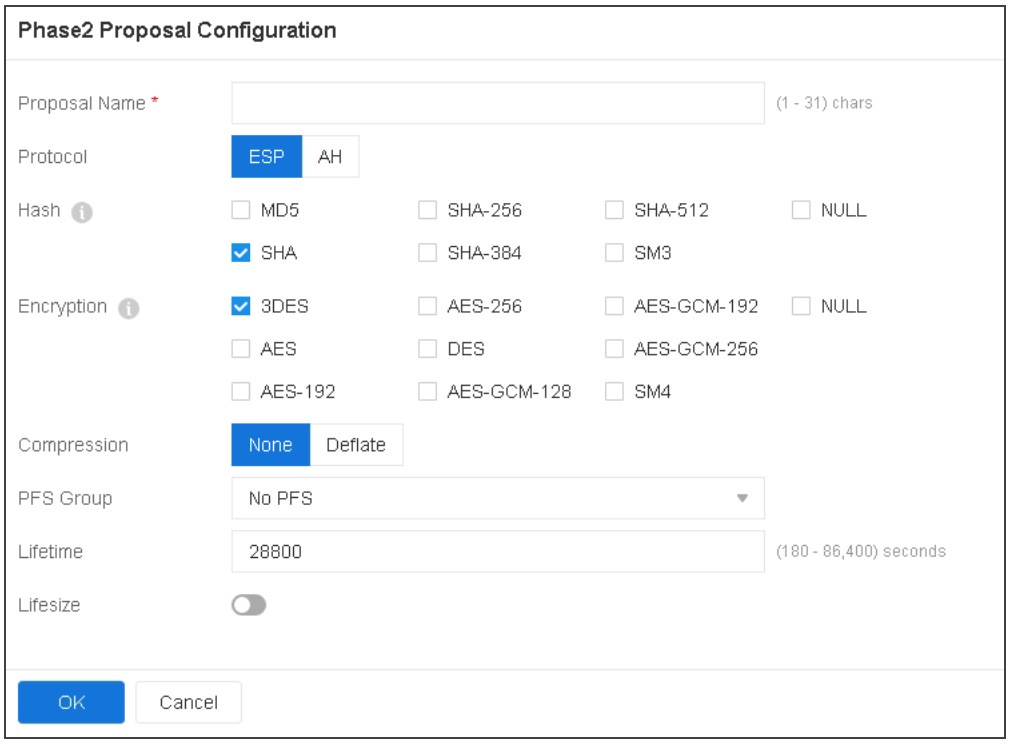
Option	Description
	The key length is 2048-bit (MODP Group). • Group15 – Uses Group5 as the DH group. The key length is 3072-bit (MODP Group). • Group16 – Uses Group16 as the DH group. The key length is 4096-bit (MODP Group). • Group18 – Uses Group18 as the DH group. The key length is 8192-bit (MODP Group). • Group19 - Uses Group 19 as the DH group. The key length is 256 bits (ECP Group). • Group20 - Uses Group 20 as the DH group. The key length is 384 bits (ECP Group). • Group21 - Uses Group 21 as the DH group. The key length is 521 bits (ECP Group). • Group24 - Uses Group 24 as the DH group. The key length is 2048 bits (MODP Group with 256-bit Prime Order Subgroup).
Lifetime	Specifies the lifetime of SA Phase1. The value range is 300 to 86400 seconds. The default value is 86400. Type the lifetime value into the Lifetime box. When the SA lifetime runs out, the device will send a SA P1 deleting message to its peer, notifying that the P1 SA has expired and it requires a new SA negotiation.

3. Click **OK** to save the settings.

Configuring a Phase 2 Proposal

The P2 proposal is used to negotiate the IPSec SA. To configure a P2 proposal, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. In the IPSec VPN tab, click **New**.
3. In the IPSec VPN Configuration page, select P2 Proposal drop-down list and click ⊕.



In the Phase2 Proposal Configuration dialog box, configure the corresponding options.

Option	Description
Proposal Name	Specifies the name of the Phase2 proposal.
Protocol	Specifies the protocol type for Phase2. The options are ESP and AH. The default value is ESP.
Hash	Specifies the authentication algorithm for Phase2. Select

Option	Description
	the algorithm you want to use. • MD5 – Uses MD5 as the authentication algorithm. Its hash value is 128-bit. • SHA – Uses SHA as the authentication algorithm. Its hash value is 160-bit. This is the default hash algorithm. • SHA-256 – Uses SHA-256 as the authentication algorithm. Its hash value is 256-bit. • SHA-384 – Uses SHA-384 as the authentication algorithm. Its hash value is 384-bit. • SHA-512 – Uses SHA-512 as the authentication algorithm. Its hash value is 512-bit. • SM3 – Uses the state password SM3 as the authentication algorithm. Its hash value is 256-bit. It is used for the digital signature and authentication, the generation and authentication of message authentication code, and the generation of random digit, which can meet the security requirement of multiple password applications. • Null – No authentication.
Encryption	Specifies the encryption algorithm for Phase2. • 3DES - Uses 3DES as the encryption algorithm.

Option	Description
	The key length is 192-bit. This is the default encryption algorithm. • DES – Uses DES as the encryption algorithm. The key length is 64-bit. • AES – Uses AES as the encryption algorithm. The key length is 128-bit. • AES-192 – Uses 192-bit AES as the encryption algorithm. The key length is 192-bit. • AES-256 – Uses 256-bit AES as the encryption algorithm. The key length is 256-bit. • AES-GCM-128 – Uses 128-bit AES-GCM as the encryption algorithm. The key length is 128-bit. • AES-GCM-192 – Uses 192-bit AES-GCM as the encryption algorithm. The key length is 192-bit. • AES-GCM-256 – Uses 256-bit AES-GCM as the encryption algorithm. The key length is 256-bit. • SM1 – Uses the state password SM1 as the encryption algorithm. The key length is 128-bit. Only the state password device supports SM1. • SM4 – Uses the state password SM4 as the encryption algorithm. The key length is 128-bit.

Option	Description
	• Null – No authentication.
Compression	Specifies the compression algorithm for Phase2. By default, no compression algorithm is used.
PFS Group	Specifies the PFS function for Phase2. PFS is used to protect DH algorithm. • No PFS - Disables PFS. This is the default value. • Group1 – Uses Group1 as the DH group. The key length is 768-bit (MODP Group). • Group2 – Uses Group2 as the DH group. The key length is 1024-bit (MODP Group). • Group5 – Uses Group5 as the DH group. The key length is 1536-bit (MODP Group). • Group14 – Uses Group14 as the DH group. The key length is 2048-bit (MODP Group). • Group15 – Uses Group15 as the DH group. The key length is 3072-bit. • Group16 – Uses Group16 as the DH group. The key length is 4096-bit (MODP Group). • Group18 – Uses Group18 as the DH group. The key length is 8192-bit (MODP Group). • Group19 - Uses Group 19 as the DH group. The key length is 256 bits (ECP Group).

Option	Description
	• Group20 - Uses Group 20 as the DH group. The key length is 384 bits (ECP Group). • Group21 - Uses Group 21 as the DH group. The key length is 521 bits (ECP Group). • Group24 - Uses Group 24 as the DH group. The key length is 2048 bits (MODP Group with 256-bit Prime Order Subgroup).
Lifetime	You can evaluate the lifetime by two standards which are the time length and the traffic volume. Type the life-time length of P2 proposal into the box. The value range is 180 to 86400 seconds. The default value is 28800.
Lifesize	Select **Enable** to enable the P2 proposal traffic-based lifetime. By default, this function is disabled. After selecting Enable, specifies the traffic volume of lifetime. The value range is 1800 to 4194303 KBs. The default value is 1800. Type the traffic volume value into the box.

4. Click **OK** to save the settings.

Configuring the Smart Link

When there are multiple communication links between branches and the headquarter data center, you can configure Smart Link on branch firewalls to realize dynamic switch between IPSec links. Each link has a unique ID. With the Smart Link function, the system selects the link by order to negotiate the IPSec tunnel. To view or adjust the link order, go to **Network** > **VPN** > **IPSec VPN**. In the initial state, the system selects the top link to negotiate an IPSec tunnel. When the IPSec tunnel is established, the system sends detection packets to detect link quality. If the packet loss rate or latency exceeds the specified threshold, the system would switch the current link to the next one to establish a new IPSec tunnel.

To configure the smart link, take the following steps:

1. Select **Network** > **VPN** > **IPSec VPN**.
2. Select the **IPSec VPN** tab
3. Click **New** to go to the **IPSec VPN Configuration** page.
4. Click the **Smart Link** drop-down list and then click + to expand the **Smart Link Configuration** section.

Configure the following options.

Smart Link Configuration	
Name	Specifies the name of the smart link profile. You can enter up to 31 characters.
Link for Negotiation	Click **New** to configure the link's local interface and peer IP address. Click **Batch Add** to add links in batches. One smart link profile supports up to three local interfaces and ten peer IP addresses (30 links in total). You can configure both IPv4 and IPv6 addresses for the link to negotiate an IPSec tunnel. But one smart link profile only supports one IP type (either IPv4 or IPv6). New links are arranged from top to bottom based on the configuration sequence.
Link Detection	Click the button to enable Link Detection. This function is enabled by default.
Source Address	Specifies the source IP address of the detection packets.If this field is not specified, the IP address of the IPSec tunnel's local interface is used as the source IP

Smart Link Configuration	
	address of the detection packets. By default, this field is blank.
Destination Address	Specifies the destination IP address of the detection packets.If this field is not specified, the IP address of the IPSec tunnel's peer interface is used as the destination IP address of the detection packets. By default, this field is blank.
Detection Interval	Specifies the interval to send detection packets. The value range is from 1 to 5 seconds. The default value is 3 seconds.
Total Number of Detection Packets	Specifies the total number of detection packets sent in a detection period. The value range is from 1 to 30. The default value is 10.
Link Quality Parameters	Select the link quality parameter and configure its threshold. After a detection period, the system calculates the link's latency and packet loss rate, and compares the value to the threshold. The system will switch the current link to the next one if either parameter exceeds its threshold. The value range of latency is from 100 to 3000 milliseconds. The default value is 500. The value range of packet loss rate is from 1 to 100 percent. The default value is 30.
Cycle Switching Times	Specifies the threshold for the cycle switching times. The value range is from 0 to 5. The default

Smart Link Configuration	
	value is 5. The value 0 indicates that there is no limit to the cycle switching times. When all links are switched in turn, it is called a switch cycle. If the cycle switching times exceed the threshold, the system will no longer detect and switch links and will switch the current link to the one with the best quality.
Quiet Time of Switch	Specifies the silence period after the cycle switching times exceed the threshold. If the cycle switching times exceed the threshold, the system will no longer detect and switch links. The default silence period is 600 seconds. When the silence period expires, the system starts to detect the quality of the active link again. The value range is from 600 to 1800 seconds.

To manage IPSec links, take the following steps:

1. Select **Network** > **VPN** > **IPSec VPN**.
2. Select the **IPSec VPN** tab
3. Expand the selected IPSec VPN to view all the configured IPSec links, including the one currently in Active state. You can also view latency and packet loss rate of each link.
4. Click the up and down arrow in the Operation column to adjust the sequence of the links. Click the **Active** button to activate the specified link for immediate IPSec tunnel negotiation.

Editing an IPSec VPN

To edit an IPSec VPN, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. Select the IPSec VPN entries to be edited in the IPSec VPN list. Click **Edit** and modify the configurations in the IPSec VPN Configuration page.

Deleting an IPSec VPN

To delete an IPSec VPN, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. In the IPSec VPN tab, select the IPSec VPN you want to delete.
3. Click **Delete**.

If an IPSec VPN is associated with a tunnel interface, security policy, GRE VPN or L2TP VPN, to delete it, you need to unreference/delete the associated items first. You can navigate to related modules to unreference/delete the associated items or unreference/delete them directly in the IPSec VPN tab:

1. Select the IPSec VPN to be deleted and click **Delete**.
2. A prompt is displayed, asking whether to unreference/delete all the associated items of the IPSec VPN. Click **Delete** to unreference/delete all associated items and the selected IPSec VPN; Click **Cancel** to return to the IPSec VPN tab; Click **View Details** to switch to the Referenced by page.
3. In the Referenced by page, click the security policy ID, tunnel interface name, GRE VPN name or L2TP VPN name in the "Object" column to view the configuration information of each associated item. Click **Unreference** or **Delete** in the "Operation" column to unreference/delete each associated item respectively.

Tips: When any of the selected IPSec VPN entries has an associated item, the IPSec VPN entries cannot be deleted in batches. When you delete an IPSec VPN entry with associated items, the sys-

tem supports deletion of 5000 associated items at most. If the number of associated items exceeds 5000, you need to perform the IPSec VPN deletion again.

Notes:

- When any of the selected IPSec VPN entries has an associated item, the IPSec VPN entries cannot be deleted in batches.
- When you delete an IPSec VPN entry with associated items, the system supports deletion of 5000 associated items at most. If the number of associated items exceeds 5000, you need to perform the IPSec VPN deletion again.

Enabling or Disabling an IPSec VPN

To enable or disable an IPSec VPN, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. In the IPSec VPN Configuration tab, select one or more IPSec VPN from the IPSec VPN list.
3. Click **Enable** or **Disable**. The enabled status is displayed as  .

Copying an IPSec VPN

You can quickly create an IPSec VPN by copying an existing one.

To copy an IPSec VPN, take the following steps:

1. Select **Network > VPN > IPSec VPN**.

2. In the IPSec VPN Configuration tab, select the IPSec VPN that you want to copy and click **Copy**. In the IPSec VPN Configuration page, configure the parameters as required. The name of the tunnel cannot be the same as an existing one.

3. Click **OK**.

Viewing IPSec VPN Entry

To view an IPSec VPN entry of specified filter condition, take the following steps:

1. Select **Network > VPN > IPSec VPN**.

2. In the IPSec VPN tab, enter the name of the IPSec VPN entry or the peer name in the text boxes at the top of the toolbar to view the IPSec VPN entry under the specified conditions.

3. Click the value in the "Referenced by" column to view the details of the configuration items associated with an IPSec VPN entry.

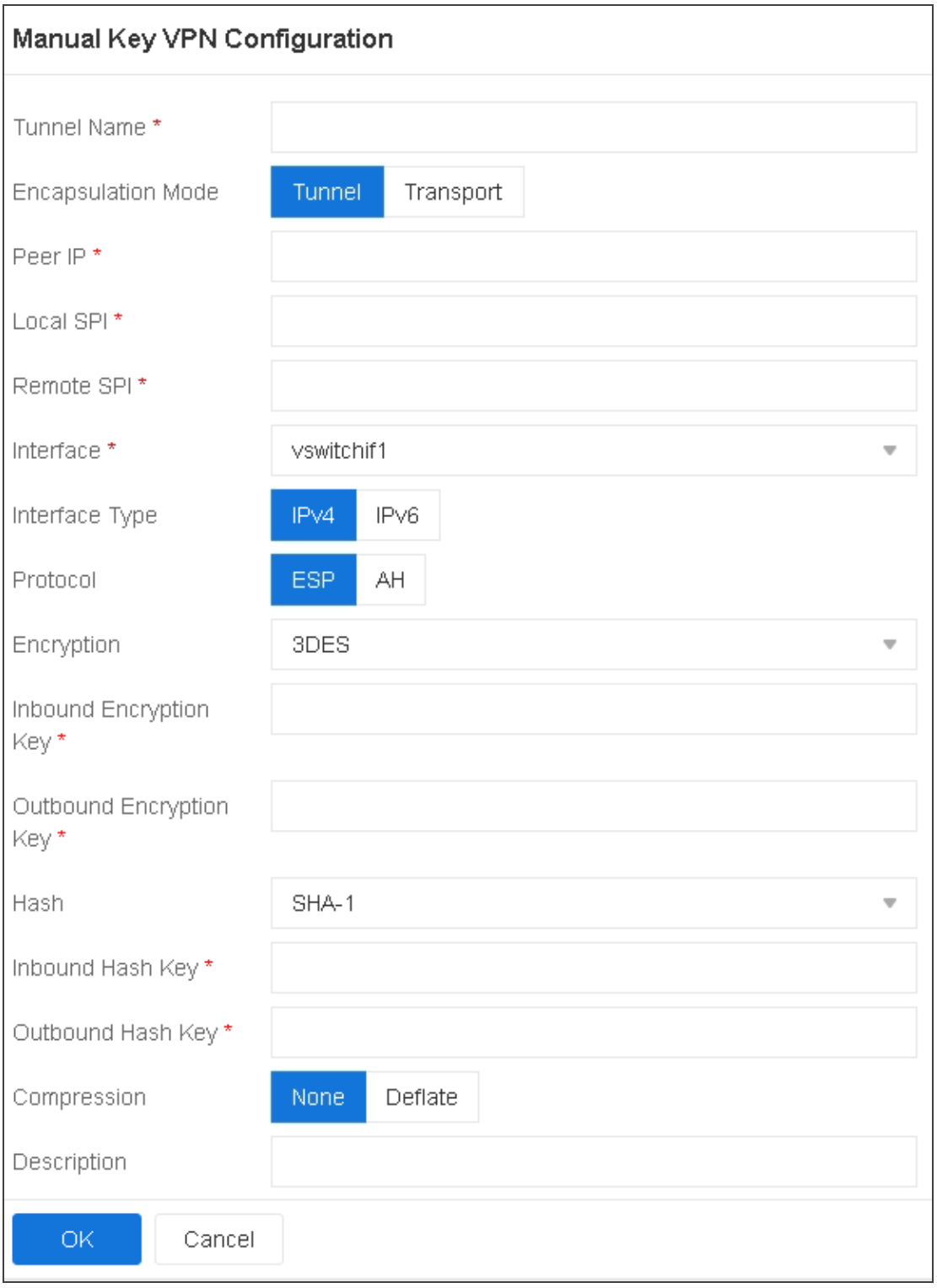
Configuring a Manual Key VPN

Manually configuring SA is complicated as all the information will be configured by yourself and some advanced features of IPSec are not supported (e.g. timed refreshing), but the advantage is that manually configured SA can independently fulfill IPSec features without relying on IKE. This method applies to a situation with a small number of devices or an environment of static IP addresses.

To create a manual key VPN, take the following steps:

1. Select **Network > VPN > IPSec VPN**.

2. In the Manual Key VPN Configuration section, click **New**.



In the Manual Key VPN Configuration dialog box, configure the corresponding options.

Basic Configuration	
Tunnel Name	Specifies the name of manually created key VPN.
Encapsulation Mode	Specifies the encapsulation mode, including Tunnel and Transport. The tunnel mode is the default mode.
Peer IP	Specifies the IP address of the peer.
Local SPI	Type the local SPI value. SPI is a 32-bit value transmitted in AH and ESP header, which uniquely identifies a security association. SPI is used to seek corresponding VPN tunnel for decryption.
Remote SPI	Type the remote SPI value. **Note**: When configuring an SA, you should configure the parameters of both the inbound and outbound direction. Furthermore, SA parameters of the two ends of the tunnel should be totally matched. The local inbound SPI should be the same with the outbound SPI of the other end; the local outbound SPI should be the same with the inbound SPI of the other end.
Interface	Specifies the egress interface for the manual key VPN. Select the interface you want from the **Interface** drop-down list.
Interface Type	Select the interface type, including IPv4 or IPv6. Only the IPv6 firmware supports to configure IPv6 type interface.
Encryption	
Protocol	Specifies the protocol type. The options are ESP and AH. The default value is ESP.
Encryption	Specifies the encryption algorithm.

Basic Configuration	
	• None – No authentication. • 3DES – Uses 3DES as the encryption algorithm. The key length is 192-bit. This is the default encryption algorithm. • DES – Uses DES as the encryption algorithm. The key length is 64-bit. • AES – Uses AES as the encryption algorithm. The key length is 128-bit. • AES-192 – Uses 192-bit AES as the encryption algorithm. The key length is 192-bit. • AES-256 – Uses 256-bit AES as the encryption algorithm. The key length is 256-bit.
Inbound Encryption Key	Type the encryption key of the inbound direction. You should configure the keys of both ends of the tunnel. The local inbound encryption key should be the same with the peer's outbound encryption key, and the local outbound encryption key should be the same with the peer's inbound encryption key.
Outbound Encryption Key	Type the encryption key of the outbound direction.
Hash	Specifies the authentication algorithm. Select the algorithm you want to use. • None – No authentication.

Basic Configuration	
	• MD5 – Uses MD5 as the authentication algorithm. Its hash value is 128-bit. • SHA-1 – Uses SHA as the authentication algorithm. Its hash value is 160-bit. This is the default hash algorithm. • SHA-256 – Uses SHA-256 as the authentication algorithm. Its hash value is 256-bit. • SHA-384 – Uses SHA-384 as the authentication algorithm. Its hash value is 384-bit. • SHA-512 – Uses SHA-512 as the authentication algorithm. Its hash value is 512-bit.
Inbound Hash Key	Type the hash key of the inbound direction. You should configure the keys of both ends of the tunnel. The local inbound hash key should be the same with the peer's outbound hash key, and the local outbound hash key should be the same with the peer's inbound hash key.
Outbound Hash Key	Type the hash key of the outbound direction.
Compression	Select a compression algorithm. By default, no compression algorithm is used.
Description	
Description	Type the description for the manual key VPN.

3. Click **OK** to save the settings.

Deleting a Manual Key VPN

To delete a manual key VPN, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. In the Manual Key VPN Configuration tab, select the manual key VPN you want to delete.
3. Click **Delete**.

If a manual key VPN is associated with a tunnel interface, security policy, GRE VPN or L2TP VPN, to delete it, you need to unreference/delete the associated items first. You can navigate to related modules to unreference/delete the associated items or unreference/delete them directly in the Manual Key VPN Configuration tab:

1. Select the manual key VPN entry to be deleted and click **Delete**.
2. A prompt is displayed, asking whether to unreference/delete all the associated items of the manual key VPN entry. Click **Delete** to unreference/delete all the associated items and the selected manual key VPN; Click **Cancel** to return to the Manual Key VPN Configuration tab; Click **View Details** to switch to the Referenced by page.
3. In the Referenced by page, click the security policy ID, tunnel interface name, GRE VPN name or L2TP VPN name in the "Object" column to view the configuration information of each associated item. Click **Unreference** or **Delete** in the "Operation" column to unreference/delete each associated item respectively.

Notes:

- When any of the selected manual key VPN entries has an associated item, the manual key VPN entries cannot be deleted in batches.

- When you delete a manual key VPN entry with associated items, the system supports deletion of 5000 associated items at most. If the number of associated items exceeds 5000, you need to perform the manual key VPN deletion again.

Viewing Manual Key VPN Entry

To view a manual key VPN of specified filter condition, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. In the Manual Key VPN Configuration section, enter the name of the manual key VPN entry in the text box at the top of the toolbar to view the manual key VPN entry under the specified conditions.
3. Click the value in the "Referenced by" column to view the details of the configuration items associated with a manual key VPN entry.

Viewing IPSec VPN Monitoring Information

By using the ISAKMP SA table, IPSec SA table, and Dial-up User table, IPSec VPN monitoring function can show the SA negotiation results of IPSec VPN Phase1 and Phase2 as well as information of dial-up users.

To view the VPN monitoring information, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. In the IPSec VPN page, click **IPSec VPN Monitor** . You can view IPSec VPN monitoring information in ISAKMP SA, IPSec SA and Dial-up User tabs. In the ISAKMP SA page, you can specify the peer name in the "Peer" drop-down menu and filter the monitoring information by the peer name; in the IPSec SA page, you can specify the VPN name in the "VPN Name" drop-down menu and filter the monitoring information by the VPN name.

Options in these tabs are described as follows:

ISAKMP SA

Option	Description
Peer	Displays the peer name.
Cookie	Displays the negotiation cookies which are used to match SA Phase 1.
Status	Displays the status of SA Phase1.
Peer	Displays the IP address of the peer.
Port	The port number used by the SA Phase1. 500 indicates that no NAT has been found during the SA Phase 1; 4500 indicates that NAT has been detected.
Algorithm	Displays the algorithm of the SA Phase1, including authentication method, encryption algorithm and verification

Option	Description
	algorithm.
Lifetime	Displays the lifetime of SA Phase1. The unit is second.

IPSec SA

Option	Description
ID	Displays the tunnel ID number which is auto assigned by the system.
VPN Name	Displays the name of VPN.
Direction	Displays the direction of VPN.
Peer	Displays the IP address of the peer.
Port	The port number used by the SA Phase2.
Algorithm	The algorithm used by the tunnel, including protocol type, encryption algorithm, verification algorithm and depression algorithm.
SPI	Displays the local SPI and the peer SPI. The direction of inbound is local SPI, while outbound is peer SPI.
CPI	Displays the compression parameter index (CPI) used by SA Phase2.
Lifetime (s)	Displays the lifetime of SA Phase2 in seconds, i.e. SA Phase2 will restart negotiations after X seconds.
Lifetime (KB)	Displays the lifetime of SA Phase2 in KB, i.e. SA Phase2 will restart negotiations after X kilobytes of data flow.
Status	Displays the status of SA Phase2.

Option	Description
Traffic	Displays the cumulative value of the inbound and outbound traffic of the tunnel.
Protect Network	Displays the protect network of the tunnel.
Duration (second)	Displays the duration starting from the latest successful SA negotiation of Phrase 2 to the current time. The duration is measured by second.
Sending/Receiving Rate (KB/s)	Displays the real-time sending/ receiving rate when the tunnel sends/receives packets. Outbound packets are associated with the sending rate while inbound packets are associated with the receiving rate. The unit is KB/s.
Last Setup Time	Displays the last setup time of the latest SA negotiation of Phrase 2.
Last Teardown Time	Displays the time when the latest SA teardown of Phrase 2 occurs.
Teardown Reason	Displays the reasons for the latest SA teardown of Phrase 2: • a disconnection request is received from the peer • an idle connection timeout occurred • configuration changed • VPN is manually cleared • a DPD timeout occurred • VPN track failed • an SPI inconsistency error occurred

Option	Description
	• a lifetime timeout occurred
Teardowns Today	Displays the counts of SA teardown of Phrase 2 from 0:00 on the current day to the current time. The system starts counting the SA teardowns of Phrase 2 as early as 0:00 on the day and has to stop counting before 0:00 on the next day. After 0:00 on the next day, the previous counts are cleared to 0.

Dial-up User

Option	Description
Peer	Displays the statistical information of the peer user. Select the peer you want from the Peer drop-down list.
User ID	Displays the IKE ID of the user selected.
IP	Displays the corresponding IP address.
Encrypted Packets	Displays the number of encrypted packets transferred through the tunnel.
Encrypted Bytes	Displays the number of encrypted bytes transferred through the tunnel.
Decrypted Packets	Displays the number of decrypted packets transferred through the tunnel.
Decrypted Bytes	Displays the number of decrypted bytes transferred through the tunnel.

Configuring PnPVPN

IPSec VPN requires sophisticated operational skills and high maintenance cost. To relieve network administrators from the intricate work, system provides an easy-to-use VPN technology - PnPVPN (Plug-and-Play VPN). PnPVPN consists of two parts: PnPVPN Server and PnPVPN Client.

- PnPVPN Server: Normally deployed in the headquarters and maintained by an IT engineer, the PnPVPN Server sends most of the configuration commands to the clients. The device usually works as a PnPVPN Server and one device can serve as multiple servers.
- PnPVPN Client: Normally deployed in the branch offices and controlled remotely by a headquarters engineer, the PnPVPN Client can obtain configuration commands (e.g. DNS, WINS, DHCP address pool, etc.) from the PnPVPN Server with simple configurations, such as client ID, password, and server IP settings.

The device can serve as both a PnPVPN Server and a PnPVPN Client. When working as a PnPVPN Server, the maximum number of VPN instance and the supported client number of each device may vary according to the platform series.

PnPVPN Workflow

The workflow for PnPVPN is as follows:

1. The client initiates a connection request and sends his/her own ID and password to the server.
2. The server verifies the ID and password when it receives the request. If the verification succeeds, the server will send the configuration information, including DHCP address pool, DHCP mask, DHCP gateway, WINS, DNS and tunnel routes, etc,. to the client.
3. The client distributes the received information to corresponding functional modules.

4. The client PC automatically gains an IP address, IP mask, gateway address and other network parameters and connects itself to the VPN.

PnPVPN Link Redundancy

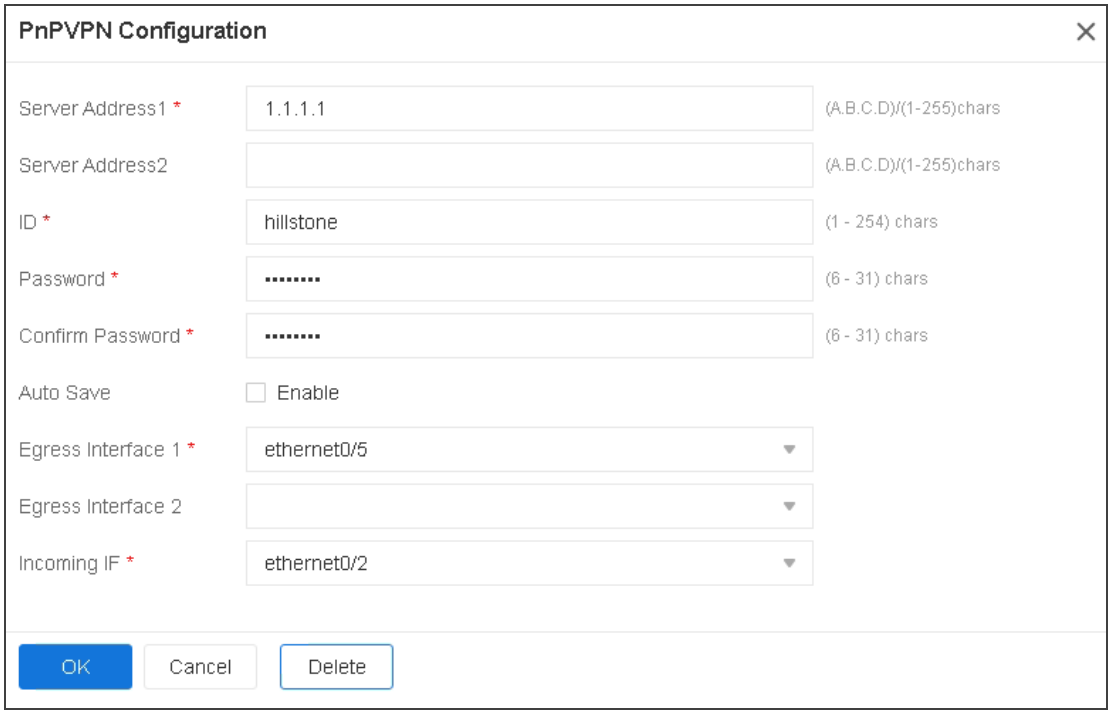
The PnPVPN server supports dual VPN link dials for a PnPVPN client, and automatically generates the routing to the client. Also, it can configure the VPN monitor for the client. Two ISAKMP gateways and two tunnel interfaces need to be configured in the server. The two VPN tunnels need to refer different ISAKMP gateways and be bound to different tunnel interfaces.

The client supports to configure dual VPN dials and redundant routing. When the two VPN tunnels are negotiating with the server, the client generates routes with different priority according to the tunnel routing configuration at the server side. The high priority tunnel acts as the master link and the tunnel with low priority as the backup link, so as to realize redundant routing. The master VPN tunnel will be in the active state first. When master tunnel is interrupted, the client will use the backup tunnel to transfer the data. When the master tunnel restores to be normal, it will transfer the data again.

Configuring a PnPVPN Client

To configure a PnPVPN client, take the following steps:

1. Select **Network > VPN > IPSec VPN**.
2. At the top right corner of the IKE VPN Configuration section, click **Configuration**, selcet **PnPVPN Configuration** from the drop-down list.



In the PnPVPN Configuration dialog box, configure the following options.

Option	Description
Server Address1	Type the IP address of PnPVPN Server into the box. PnPVPN client supports dual link dials to the server side. This option is required.
Server Address2	Type the IP address of PnPVPN Server into the box. The server address 1 and the server address 2 can be the same or different. It is optional.
ID	Specifies the IKE ID assigned to the client by the server.
Password	Specifies the password assigned to the client by the server.
Confirm Password	Enter the password again to confirm.
Auto Save	Select Enable to auto save the DHCP and WINS information released by the PnPVPN Server.

Option	Description
Egress Interface 1	Specifies the interface connecting to the Internet. This option is required.
Egress Interface 2	Specifies the interface connecting to the Internet. The IF1 and the IF2 can be the same or different. It is optional.
Incoming IF	Specifies the interface on the PnPVPN Client accessed by the Intranet PC or the application servers.

3. Click **OK** to save the settings.

Notes:

- Server Addresses1 and Egress IF1 both need to be configured. If you want to configure a backup link, you need to configure both the Server Address2 and Egress IF2.
  - If the server addresses or the Egress IFs are different, two separate VPN links will be generated.
  - The configuration of the two servers can be configured on one device, and can also be configured on two different devices. If you configure it on two devices, you need to configure AAA user on the two devices. The DHCP configuration for the AAA user should be the same, otherwise it might cause that the client and server negotiate successfully, but the traffic is blocked.

Configuring IPSec-XAUTH Address Pool

XAUTH server assigns the IP addresses in the address pool to users. After the client has established a connection to the XAUTH server successfully, the XAUTH server will choose an IP address along with other related parameters (such as DNS server address, WINS server address, etc) from the address pool, and will assign them to the client.

XAUTH server provides fixed IP addresses by creating and implementing IP binding rules that consist of a static IP binding rule and an IP-role binding rule. The static IP binding rule binds the client user to a fixed IP address in the address pool. Once the client has established a connection successfully, system will assign the binding IP to the client. The IP-role binding rule binds the role to a specific IP range in the address pool. Once the client has established a connection successfully, system will assign an IP address within the IP range to the client.

When the XAUTH server is allocating IP addresses in the address pool, system will check the IP binding rule and determine how to assign IP addresses to the client based on the specific checking order below:

1. Check if the client is configured with any static IP binding rule. If so, assign the binding IP address to the client; otherwise, check the other configuration. Note if the binding IP address is in use, the user will be unable to log in.

2. Check if the client is configured with any IP-role binding rule. If so, assign an IP address within the binding IP range to the client; otherwise, the user will be unable to log in.

Notes: The IP addresses defined in the static IP binding rule and IP-role binding rule should not be overlapped.

To configure the IPSec-XAUTH address pool, take the following steps:

1. Select **Network > VPN > IPSec VPN**.

2. At the top-right corner, Select **IPSec-XAUTH Address Pool.**.

3. In the XAUTH Address Pool Configuration dialog box, click **New**.

In the Basic Configuration tab, configure the corresponding options.

Option	Description
Address Pool Name	Specifies the name of the address pool.
Start IP	Specifies the start IP of the address pool.
End IP	Specifies the end IP of the address pool.
Reserved Start IP	Specifies the reserved start IP of the address pool.
Reserved End IP	Specifies the reserved end IP of the address pool.
Netmask	Specifies the netmask of the IP address.
DNS1/2	Specifies the DNS server IP address for the address pool. It is optional. At most two DNS servers can be configured for one address pool.
WINS1/2	Specifies the WIN server IP addresses for the address pool. It is optional. Up to two WIN servers can be configured for one address pool.

In the IP User Binding tab, configure the corresponding options.

Option	Description
User	Type the user name into the **User** box.
IP	Type the IP address into the **IP** box.
Add	Click **Add** to add the item that binds the specified user to the IP address.

In the IP Role Binding tab, configure the corresponding options.

Option	Description
Role	Select a role from the **Role**drop-down list.
Start IP	Type the start IP address into the **Start IP**

Option	Description
	box.
End IP	Type the end IP address into the **End IP** box.
Add	Click **Add** to add the item that binds the specified role to the IP address range.
Up/Down/Top/Bottom	Move the selected IP-role binding rule . For the user that is bound to multiple roles that are also configured with their corresponding IP-role binding rules, system will query the IP-role binding rules in order, and assign an IP address based on the first matched rule.

4. Click **OK** to save the settings.

SSL VPN

The device provides an SSL based remote access solution. Remote users can access the intranet resource safely through the provided SSL VPN.

SSL VPN consists of two parts: SSL VPN server and SSL VPN client. The device configured as the SSL VPN server provides the following functions:

- Accept client connections.
- Allocate IP addresses, DNS server addresses, and WIN server addresses to SSL VPN clients.
- Authenticate and authorize clients.
- Perform host checking to client.
- Decrypting and forwarding encrypted packet from the client.

By default, the concurrent online client number may vary on different platform series. You can expand the supported number by purchasing the corresponding license.

After successfully connecting to the SSL VPN server, the SSL VPN client secures your communication with the server. The following SSL VPN clients are available:

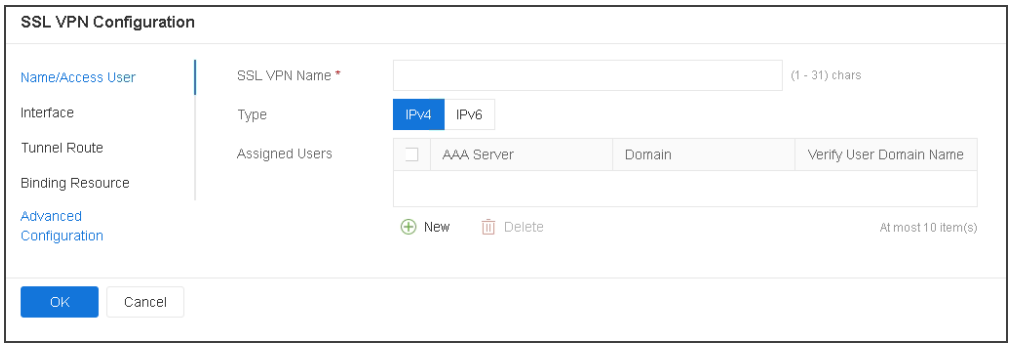
- "Hillstone Secure Connect Client for Windows" on Page 629
- "Hillstone Secure Connect Client for Android" on Page 646
- "Hillstone Secure Connect Client for iOS" on Page 654
- "Hillstone Secure Connect Client for macOS" on Page 660
- "Hillstone Secure Connect Client for Linux" on Page 671

Configuring an SSL VPN

To configure an SSL VPN, take the following steps:

1. Select **Network > VPN > SSL VPN**.

2. In the SSL VPN page, click **New**.



In the Name/Access User tab, configure the corresponding options.

Option	Description
SSL VPN Name	Type the name of the SSL VPN instance.The length is 1 to 64 characters.
Type	Select IPv4 or IPv6 to specify the service type of the SSL VPN instance. This option can only be configured when the version is IPv6.
Assigned Users (at most 10 items)	
AAA Server	Select an AAA server from the **AAA Server** drop-down list. You can click **View AAA Server** to view the detailed information of this AAA server.
Domain	Type the domain name into the **Domain** box. The domain name is used to distinguish the AAA server.The length is 1 to 31 characters.
Verify User Domain Name	After enabling this function, system will verify the user-name and its domain name.
Add	Click **Add** to add the assigned users. You can repeat to add more items.

In the Interface tab, configure the corresponding options.

Access Interface	
Egress Interface	Select the interface from the drop-down list as the SSL VPN server interface. This interface is used to listen to the request from the SSL VPN client. At most 8 interfaces can be selected.
Service Port	Specifies the SSL VPN service port number.The value range is 1 to 65535.
Tunnel Interface	
Tunnel Interface	Specifies the tunnel interface used to bind to the SSL VPN tunnel. Tunnel interface transmits traffic to/from SSL VPN tunnel. • Select a tunnel interface from the drop-down list, and then click **Edit** to edit the selected tunnel interface. • Click **New** in the drop-down list to create a new interface.
Information	Shows the zone, IP address, and netmask or prefix length of the selected tunnel interface.
Address Pool	
Address Pool	Specifies the SSL VPN address pool. • Select an address pool from the drop-down list, and then click **Edit** to edit the selected address pool. • Click **New** in the drop-down list to create a new address pool.

	When configuring IPv6 SSL VPN, this option specifies the IPv6 SSL VPN address pool.
Information	Shows the start IP address, end IP address, and mask of the address pool.

In the Tunnel Route tab, configure the following options.

Tunnel Route	
Specify the destination network segment that you want to access through SCVPN tunnel. The specified destination network segment will be distributed to the VPN client, then the client uses it to generate the route to the specified destination. A maximum of 128 tunnel routes based on network segments can be added for an SSL VPN instance.	
New	Click **New** to add this route. You can repeat to add more items.
IP	Type the destination IP address.
Mask	Type the netmask of the destination IP address.
Metric	Type the metric value.
Delete	Click **Delete** to delete the selected route.
Enable Domain Route	
Specify the destination domain name that you want to access through SCVPN tunnel. After clicking the **Enable** button, system will distribute the specified domain names to the VPN client, and the client will generate the route to the specified destination according to the resolving results from the DNS.	
Maximum	The maximum numbers of routes that can be generated after obtaining the resolved IP addresses of the domain name. The value ranges from 1 to 10000.

	The default value is 1000.
New	Click **New** to add the domain name to the list and you can add up to 64 domain names.
Domain	Specify the URL of the domain name. The URL cannot exceed 63 characters and it cannot end with a dot (.). Both wildcards and a single top level domain, e.g. **com** and **.com** are not supported.
Delete	Click **Delete** to delete the selected domain name.

In the Binding Resource tab, configure the binding relationship between user groups, roles and resources.

Binding Resource	
New	Click **New** to add binding entries for resources and user groups, roles to the list below. You can repeat to add more items.
Name	Selects an existing resource name from the drop-down list. The range is 1 to 63 characters.
Type	Selects the binding type from the drop-down list. It can be a type of user group or role.
Resource List	Selects an existing resource name from the drop-down list. The range is 1 to 63 characters.
User Group/role	Selects an existing user group/role from the drop-down list. Click ⊕ to add a user group or a role. Select the AAA servers where user groups reside from the drop-down list. Currently, only the local authentication server and the RADIUS server are available.

	Note: • A user group/role can be bound with multiple resources, and a resource can also be bound with multiple user groups/roles. • Only 256 binding entries can be configured in an SSL VPN instance.
AAA Server	Select the AAA servers where user groups reside from the drop-down list. Currently, only the local authentication server and the RADIUS server are available.
Delete	Click **Delete** to delete the selected item.

3. If necessary, click **Advanced Configuration** to configure the advanced functions, including parameters, client, host security, SMS authentication, and optimized path.

   In the Parameters tab, configure the corresponding options.

Security Kit	
SSL Version	Specifies the SSL protocol version. The default is TLSv1.2. **Any** indicates one of TLSv1, TLSv1.1, TLSv1.2 protocol will be used. If tlsv1.2 or any is specified to the SSL protocol in SSL VPN server, you need to convert the certificate that you are going to import to the browser or certificate in the USB Key to make it support the tlsv1.2 protocol before the digital certificate authentication via SSL VPN client, so that the SSL VPN server can be connected successfully when the Username/Password + Digital Certificate or Digital Certificate Only authentication method is selected.

	Prepare a PC with Windows or Linux system which has been installed with OpenSSL 1.0.1 or later before processing the certificate. We will take the certificate file named oldcert.pfx as an example, the procedure is as follows: 1. In the OpenSSL software interface, enter the following command to convert a certificate in .pfx format to a certificate in .pem format. **openssl pkcs12 –in oldcert.pfx –out cert.pem** 2. Enter the following command to convert the certificate in .pem format to a .pfx format certificate that supports tlsv1.2 protocol. **openssl pkcs12 –export –in cert.pem –out newcert.pfx –CSP "Microsoft Enhanced RSA and AES Cryptographic Provider"** 3. Import the newly generated .pfx format certificate into your browser or USB Key. After the above operation, you have to log into SSL VPN server with SSL VPN client whose version is 1.4.6.1239 or later.
Trust Domain	Specifies the trust domain. When the GMSSLv1.0 protocol is used, the specified PKI trust domain needs to include the SM2 signature certificate and its private key for the GMSSL negotiation.
Encryption Trust	When using the GMSSLv1.0 protocol, you must config this option. The specified encryption PKI trust domain

Domain	needs to include the SM2 encryption certificate and its private key for the GMSSL negotiation.
Encryption	Specifies the encryption algorithm of the SSL VPN tunnel. The default value is AES. **NULL** indicates no encryption. When using the GMSSLv1.0 protocol, you're recommended to select SM4 for the encryption algorithm.
Hash	Specifies the hash algorithm of the SSL VPN tunnel. The default value is MD5. **NULL** indicates no hash. When using the GMSSLv1.0 protocol, you're recommended to select SM3 for the hash algorithm.
Compression	Specifies the compression algorithm of the SSL VPN tunnel. By default, no compression algorithm is used.
Client Connection	
Allow Download Client from Browser	Click **Enable** to allow downloading When this function is disabled, you can only download the SSL VPN client from www.hillstonenet.com.cn. Note： The way to download SSL VPN via the browser WebUI is :"https://IP-Address:Port-Number", the "IP-Address" is the address of "Access Interface" ; The "Port-Number" is the service port number here.
Idle Time	Specifies the time that a client stays online without any traffic with the server. After waiting for the idle time, the server will disconnect from the client. The value range is 1 to 1500 minutes. The default value is 30.
Multiple Login	This function permits one client to sign in more than one place simultaneously. Select the **Enable** check box to enable the function.
Multiple	Type the number of simultaneous login with the same

Login Times	user name into the **Multiple Login Times** box. The value range is 0 to 99,999,999. The value of 0 indicates no limitation. The default value is 0.
Advanced Parameters	
Anti-Replay	The anti-replay function is used to prevent replay attacks. The default value is 32.
DF-Bit	Specifies whether to permit packet fragmentation on the device forwarding the packets. The actions include: • Set - Forbids packet fragmentation. • Copy - Copies the DF value from the destination of the packet. It is the default value. • Clear - Permits packet fragmentation.
Port (UDP)	Specifies the UDP port number for the SSL VPN connection. The value range is 1 to 65535.
Port (TCP)	Specifies the TCP port number for the SSL VPN connection. The value range is 1 to 65535.

In the Client tab, configure the corresponding options.

Client Configuration	
Change Password URL	Specifies the URL address that can redirect to the specified URL page from the client to modify the password. The length is 0 to 255 characters.
Forgot Password URL	Specifies the URL address that can redirect to the specified URL page from the client to reset the password. The length is 0 to 255 characters. **Notes**: This configuration takes effect only after

	Change Password function is enabled on the local server.
Redirect URL	This function redirects the client to the specified redirected URL after a successful authentication. Type the redirected URL into the box. The value range is 0 to 255 characters. HTTP (http://) and HTTPS (https://) URLs are supported. Based on the type of the URL, the corresponding fixed format of URL is required. Take the HTTP type as the example: • For the UTF-8 encoding page - The format is URL+username=$USER&password=$PWD, e.g., http://www.- abc.- com/oa/- login.do?username=$USER&password=$PWD • For the GB2312 page - The format is URL+user-name=$GBUSER&password=$PWD, e.g., http://www.- abc.- com/oa/- login.- do?username=$GBUSER&password=$PWD • Other pages: - Type the URL directly, e.g., http://www.abc.com
Title	Specifies the description for the redirect URL. The

	value range is 0 to 31 characters. This title will appear as a client menu item.
Delete privacy data after disconnection	Select **Enable** to delete the corresponding privacy data after the client's disconnection.
Digital Certificate Authentication	
Authentication	Click **Enable** to enable this function. There are two options available: • Username/Password + Digital Certificate - To pass the authentication, you need to have the correct file certificate, or the USB Key that stores the correct digital certificate, and also type the correct username and password. The USB Key certificate users also need to type the USB Key password. • Digital Certificate only - To pass the authentication, you need to have the correct file certificate, or the USB Key that stores the correct digital certificate. The USB Key certificater users also need to type the USB Key password. No username or user's password is required. When **Digital Certificate only** is selected: • System can map corresponding roles for the authenticated users based on the CN or OU field

	of the USB Key certificate. For more information about the role mapping based on CN or OU, see "Role" on Page 1160. • System does not allow the local user to change the password. • System does not support SMS authentication. • The client will not re-connect automatically if the USB Key is removed.
USB KEY Download URL	When USB Key authentication is enabled, you can download the UKey driver from this URL. The length is 0 to 63 characters.
Trust Domain Subject&Username Checking CN Matching OU Matching	To configure the trust domain and the subject & username checking function: 1. From the Trust domain drop-down list, select the PKI trust domain that contains the CA (Certification Authority) certificate. If the client's certificate is the only one that matches to any CA certificate of the trust domain, then the authentication will succeed. 2. If necessary, select the **Subject&Username Checking** check box to enable the subject & username check function. After enabling it, when the user is authenticated by the USB Key certificate, system will check whether the

	subject CommonName in the client certificate is the same as the name of the login user. You can also enter the strings in the **CN Match** box and the **OU** box to determine whether matches them. 3. Click **Add**. The configured settings will be displayed in the list below. To delete an item, select the item you want to delete from the list, and then click **Delete**.

In the Two-Step verification tab, configure the corresponding options.

Option	Description
Two-Step Verification	Click **Two-Step Verification** to enable the function. Two-Step Verification means that when an SSL VPN user logs in by providing a "username/password" or a "username/password+Digital Certificate", the Hillstone device will implement the two-step verification by means of SMS Authentication, Token Authentication or Email Authentication after the username and password is entered. The user must enter the random verification code received in order to log into SSL VPN and access intranet resources.
Type	Specifies the type of Two-Step Verification, including SMS Authentication, Token Authentication and Email Authentication: • SMS Authentication: Click **SMS Modem** or **SMS Gateway** to specify the authentication

	type, and configure corresponding options below as needed. • Token Authentication: Enter prompt message as needed. The length is 0 to 255 characters. • Email Authentication: Configure corresponding options below as needed.
SMS Authentication	
SMS Authentication	Select the **SMS Authentication** to enable the function. And select the **SMS Modem** or **SMS Gateway** to specify the SMS authentication type.
SMS Gateway Name	Select the SMS gateway name from drop-down list. For more information about SMS Gateway, see "SMS Gateway" on Page 1895.
Lifetime of SMS Verification Code	Specifies the lifetime of the SMS authentication code. The range is 1 to 10 minutes. The default value is 10.
Sender Name	Specifies a message sender name to display in the message content. The range is 0 to 63 characters. **Notes:** Due to the limitation of UMS enterprise information platform, when the the SMS gateway authentication is enabled, the sender name will be displayed on the name of the UMS enterprise information platform.

Verification Code Length	Specifies the length of the SMS verification code. The value range is 4 to 8. The default value is 8.
SMS Temple	Specifies the SMS verification content. The input must contain " $ VRFYCODE" (This parameter is used to get the verification code). "$USERNAME" and "EXPIRATION" are optional. The value range is 9 to 500 characters.
Sign Name	If an ALIYUNSMS service provider name is specified for the "SMS Gateway Name" option, the sign name must be entered in this field and will be displayed in the message content. The range is 1 to 63 characters. This parameter should be the same with the sign name applied in the SMS of Alibaba Cloud.
Template Code	If an ALIYUNSMS service provider name is specified for the "SMS Gateway Name" option, the code of the SMS template must be entered in this field. The range is 1 to 30 characters. This parameter should be the same with the template code applied in the SMS of Alibaba Cloud.
Email Authentication	
Mail Server	Specifies the existing Email server which the Email address that used to send the verification code is configured on. The range is 1 to 31 characters. For more information about the configuration of Mail Server, see "Mail Server" on Page 1891.
Lifetime of Email Veri-	Specifies the lifetime of the Email verification code. The range is 1 to 10 minutes. The default

fication Code	value is 10. Each Email verification code has a period of validity. If the user neither types the verification code within the period nor applies for a new code, SSL VPN server will disconnect the connection.
Sender Name	Specifies a verification code sender name to display in the Email content. The range is 0 to 63 characters. In order to prevent the mail from being identified as spam, it's recommended that users to configure the sender name.
Verification Code Length	Specifies the length of the Email verification code. The value range is 4 to 8. The default value is 8.
Email Verification Content	Specifies the Email verification content. The input must contain " $ USERNAME" (This parameter is used to get the username) and " $ VRFYCODE" (This parameter is used to get the verification code). The length is 18 to 128 characters. The default content is "SCVPN user < $ USERNAME> email verification code: $ VRFYCODE. Do not reveal to anyone! If you did not request this, please ignore it.".

In the Host Compliance Check/Binding tab, configure the corresponding options.

Host Compliance Check	
Creates a host compliance check rule to perform the host compliance check function. Before creating a host compliance check rule, you must first configure the host compliance check profile in "Configuring a Host Compliance Check Profile" on Page 623.	
Role	Specifies the role to which the host compliance check rule will be applied. Select the role from the

	Role drop-down list. **Default** indicates the rule will take effect to all the roles.
Host Compliance Check	Specifies the compliance check profile. Select the profile from the **Host Compliance Check** drop-down list.
Exception handling method	Specifies the exception handling method. • Guest Role: Select the guest role from the **Guest Role** drop-down list. The user will get the access permission of the guest role when the host checking fails. If —— is selected, system will disconnect the connection when the host compliance check fails. • Redirect URL: Click the **Redirect URL** radio button, and then type the URL into the text-box. When the host checking fails, the browser jump to the specified URL and guide the user to download the software required for host security detection and disconnect the client. If this option is not configured, the client will be disconnected.
Guest Role	Select the guest role from the **Guest Role** drop-down list. The user will get the access permission of the guest role when the host checking fails. If **Null** is selected, system will disconnect the connection when the host compliance check fails.

Periodic Check	Specify the host compliance check period. System will check the status of the host automatically according to the host compliance check profile in each period.
Add	Click **Add**. The configured settings will be displayed in the table below.
Delete	To delete an item, select the item you want to delete from the list, and then click **Delete**.
Host Binding	
Enable Host Binding	Click **Enable** to enable is this function. By default, one user can only log in one host. You can change the login status by configuring the following options. • Allow one user to login through multiple hosts. • Allow multiple users to login on one host. • Automatically add the user-host ID entry into the binding list at the first login. **Note**: To use the host binding function, you still have to configure it in the host binding configuration page. For more information about host binding, see "Host Binding" on Page 615.

In the Optimized Path tab, configure the corresponding options.

Option	Description
Optimal path detection can automatically detect which ISP service is better, giving remote users a better user experience.	

No Check	Do not detect.
Client	The client selects the optimal path automatically by sending UDP probe packets.
The device	When the client connects to the server directly without any NAT device, this is the detection process: 1. The server recognizes the ISP type of the client according to the client's source address. 2. The server sends all of the sorted IP addresses of the egress interfaces to the client. 3. The client selects the optimal path. When the client connects to the server through a NAT device, this is the detection process: 1. The server recognizes the ISP type of the client according to the client's source address. 2. The server sends all of the sorted NAT IP addresses of the external interfaces to the client. 3. The client selects the optimal path.
NAT Mapping	If necessary, in the NAT mapping address and port section, specify the mapped public IPs and ports of

Address and Port	the server referenced in the DNAT rules of the DNT device. When the client connects to the server through the DNAT device, the NAT device will translate the destination address of the client to the server's egress interface address. Type the IP address of the NAT device's external interface and the HTTPS port number (You are not recommended to specify the HTTPS port as 443, because 443 is the default HTTPS port of WebUI management). You can configure up to 4 IPs.

4. Click **Done** to save the settings.

To view the SSL VPN online users, take the following steps:

1. Select **Configure > Network > SSL VPN**.
2. Select an SSL VPN instance.
3. View the detailed information of the online users in the table. You can also click 

to add filter conditions (Online Users, User group, Host Binding ID) to view the detailed information of SSL VPN online users that meet the filter conditions.

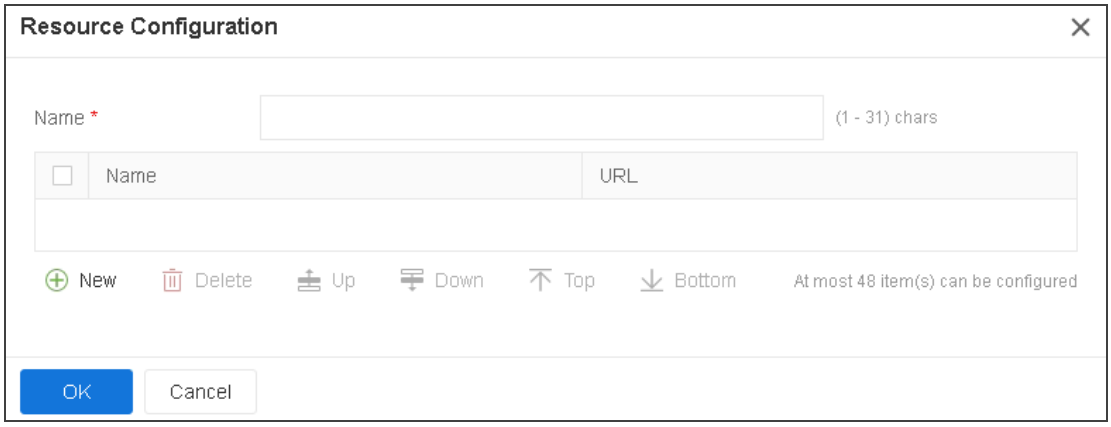
Configuring Resource List

Resource list refers to resources configured in system that can be easily accessible by users. Each resource contains multiple resource items. The resource item is presented in the form of a resource name followed by resource item name in your default browser page. After the SSL VPN user is authenticated successfully, the authentication server will send the user group information of the user to the SSL VPN server. Then, according to the binding relationship between the user group and resources in the SSL VPN instance, the server will send a resource list in which the user can access to the client. After that, the client will analyze and make the IE browser in system pop up a page to display the received resource list information, so that the user can access the private network resource directly by clicking the resource item name. The resource list page pops

up only after the authentication is passed. If a user does not belong to any user group, the browser will not pop up the resource list page unless authentication is passed.

To configure resource list for SSL VPN:

1. Select **Network > VPN > SSL VPN**.
2. Click **Configuration > Resources List** at the top-right corner.
3. Click **New**.



In the Resources Configuration dialog box, configure the corresponding options.

Option	Description
Name	Enters a name for the new resource. The range is 1 to 63 characters.
Resource Item	
Name	Enters a name for a new resource item. Names of resource items in different resources can not be the same. The range is 1 to 95 characters
URL	Enters a URL for a new resource item.
Add	Click **Add**to add this binding item to the

	list below. **Note**: The maximum configurable resourse entries of different platforms vary in three levels: 200 entries, 500 entries, and 1000 entries.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.
Up/Down/Top/Bottom	You can move the location for items at your own choice to adjust the presentation sequence accordingly.

4. Click **OK**, the new resource will be displayed in the resource list.

   At most 3 resource items can be displayed in the resource list for each resource, and the other items will be displayed as "...". You can click **Edit** or **Delete** button to edit or delete the selected resource.

Notes:

- Less than 256 resource lists can be configured.
- The maximum number of resource entries that can be configured on different platforms is different. Please refer to the actual situation.
- SSL VPN client versions that allow you to configure the resource list are as follows: SSL VPN Windows client 1.4.6.1238 or later versions, iOS 2.0.6 or later versions, and Android 4.6 or later versions.

Configuring an Address Pool

The servers allocate the IPs in the address pools to the clients. After the client connects to the server successfully, the server will fetch an IP address along with other related parameters (e.g.,

DNS server address, and WIN server address) from the address pool and then allocate the IP and parameters to the client.

You can create an IP binding rule to meet the fixed IP requirement. The IP binding rule includes the IP-user binding rule and the IP-role binding rule. The IP-user binding rule binds the client to a fixed IP in the configured address pool. When the client connects to the server successfully, the server will allocate the binding IP to the client. The IP-role binding rule binds the role to an IP range in the configured address pool. When the client connects to the server successfully, the server will select an IP from the IP range and allocate the IP to the client.

After the client successfully connects to the server, the server will check the binding rules in a certain order to determine which IP to allocate. The order is shown as below:

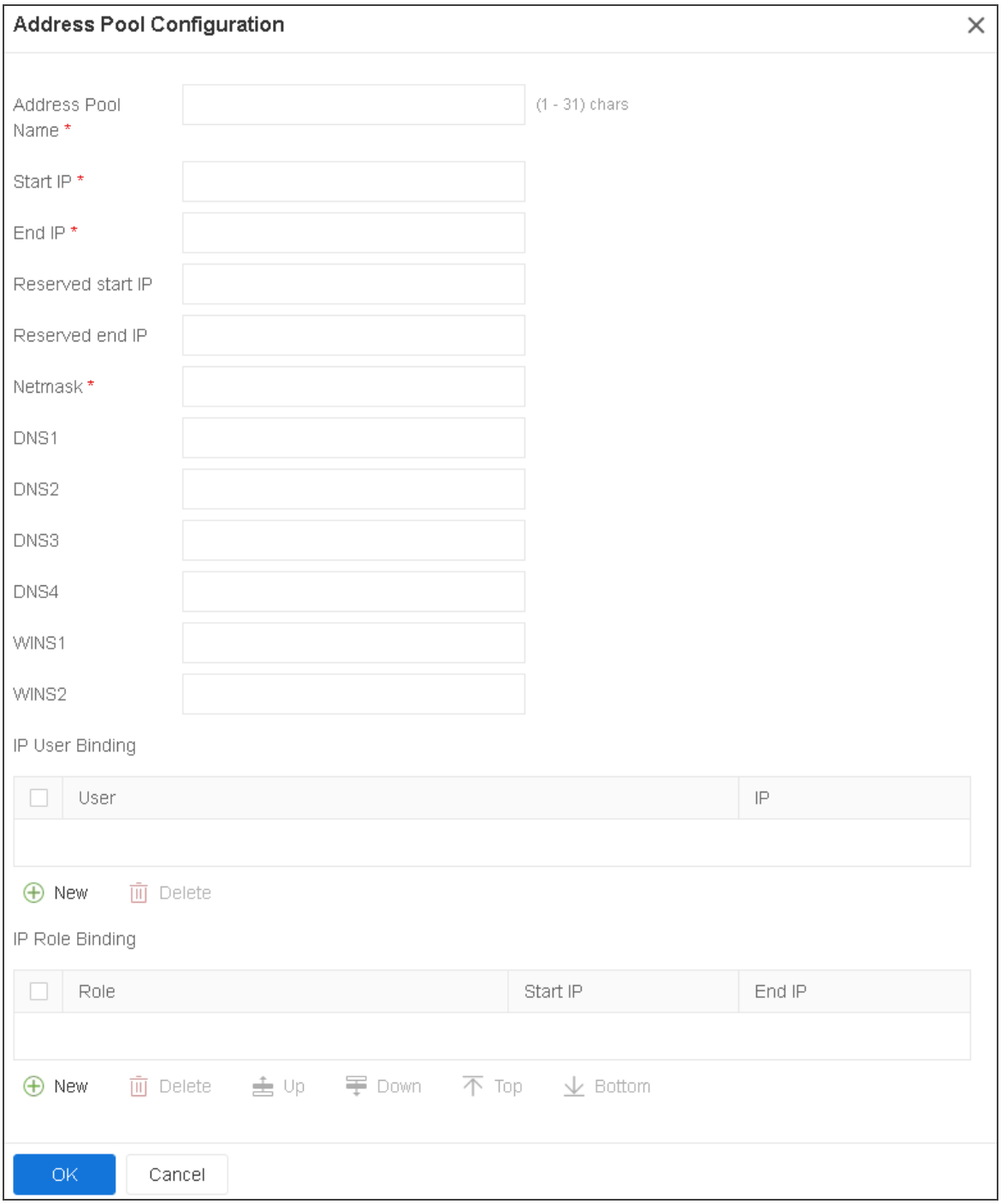
- Check whether the IP-user binding rule is configured for the client. If yes, allocate the bound IP to the client; if no, the server will select an IP which is not bound or used from the address pool, then allocate it to the client.
- Check whether the IP-role binding rule is configured for the client. If yes, get an IP from the IP range and allocate to the client; if no, the server will select an IP which is not bound or used from the address pool, then allocate it to the client.

Notes: IP addresses in the IP-user binding rule and the IP address in the IP-role binding rules should not overlap.

To configure an address pool, take the following steps:

1. Select **Object > Access Address Pool**.
2. Select the **IPv4** or **IPv6** tab, this option can only be configured in the IPv6 version.

3. Click **New**.



In the Access Address Pool Configuration tab, configure the following options.

Option	Description
Access Address Pool Name	Specifies the name of the address pool.
Start IP	Specifies the start IP of the address pool.
End IP	Specifies the end IP of the address pool.
Reserved start IP	Specifies the reserved start IP of the address pool.
Reserved end IP	Specifies the reserved end IP of the address pool.
Netmask	Specifies the netmask in the dotted decimal format.
Prefix Length	Specifies the prefix for this IPv6 address range. The range is 111 to 128.
DNS1/2/3/4	Specifies the DNS server IP address for the address pool. It is optional. 4 DNS servers can be configured for one address pool at most.
WINS1/2	Specifies the WIN server IP addresses for the address pool. It is optional. Up to 2 WIN servers can be configured for one address pool. This option can only be configured when the created IPv4 address pool.

In the IP User Binding tab, configure the corresponding options.

Option	Description
User	Type the user name into the **User** box.

IP	Type the IP address into the **IP** box.
New	Click **New** to add an IP user binding rule.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.

In the IP Role Binding tab, configure the corresponding options.

Option	Description
Role	Type the role name into the **Role** box.
Start IP	Type the start IP address into the **Start IP** box.
End IP	Type the end IP address into the **End IP** box.
New	Click **New**to add an IP role binding rule.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.
Up/Down/Top/Bottom	System will query IP role binding rules by turn, and allocate the IP address according to the first matched rule. You can move the location up or down at your own choice to adjust the matching sequence accordingly.

4. Click **OK** to save the settings.

Secure Connect Client Management

End users can download Secure Connect clients at the following addresses:

- Client download address on the device: https://IP-Address:Port-Number. The "IP-Address" and "Port-Number" refer to the IP address of the egress interface and HTTPS port number

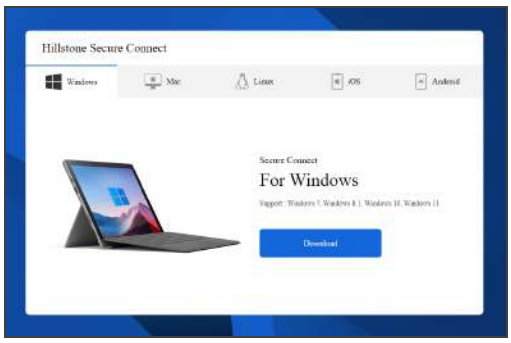
specified in the configuration of the SSL VPN or ZTNA instance.

- Client download address provided by Hillstone Networks Official Website https://www.hillstonenet.com/more/services/product-downloads/.

By default, the two addresses use the same download source, and the downloaded Secure Connect client is also the same.

Customizing Secure Connect Download Page

You can customize the title and background of the download address on the device. The default download page is shown as below:



To customize the Secure Connect download page, take the following steps:

1. Select **System > Secure Connect Client Management**.
2. In the "Configure Secure Connect Client Download Page" area, click **Upload Background Picture > Browse** to select the background picture. The picture needs to be PNG format. The recommended resolution is 1920px*1080px. The size cannot exceed 2MB.
3. Click **Upload** to upload the background picture to system. After uploading successfully, you will have completed the background picture modification.
4. Enter the title in the **Download Page Tittle** box to customize the title of the download page. The length is 1 to 63 characters.

5. Click **OK** to save the settings. Clicking **Cancel** will only affect the authentication page title modification.

If you want to restore the default picture, click **Restore Default Background** . Then click **OK**.

Customizing Client Download Source

By default, the client download source on the device is the same with that on Hillstone Networks Official Website. In the application scenario where you want end users to download and use specific Secure Connect clients, such as a client of the specified version or a customized client, you can import the client into the system to overwrite the default download source on the device. You can import Windows, macOS and Linux type clients.

To import the client, take the following steps:

1. Select **System > Secure Connect Client Management**.
2. In the "Secure Connect Client List" area, locate the type of client to be imported and click **Upload**.
3. In the "Upload Secure Connect Client for Windows/macOS/Linux" dialog box, click **Browse** and select the client file to be imported, and click **Upload**. The file name should be in the "xxx_version_check.exe/run/dmg/pkg" format. "xxx" indicates the file name; "version"indicates the client version, starting with the letter "v"; "exe" is the extension for Windows type client file; "run" is the extension for Linux type client file; "dmg" and "pkg" are the extensions for macOS type client file. The file size cannot exceed 100MB. An example is "secure-connect_v1.4.9.2000_1a6755fe.exe".

4. After uploading, the download source for this client will change from "Offical" to "Local" in the "Secure Connect Client List".
5. Click **Download** to check the downloaded client is the imported one.
6. Click **Delete** to delete the imported client. After the imported client is deleted, the download source will be resorted to "Official".

Host Binding

The host binding function verifies that the hosts are running the SSL VPN clients according to their host IDs and user information. The verification process is:

1. When an SSL VPN user logs in via the SSL VPN client, the client will collect the host information of main board serial number, hard disk serial number, CUP ID, and BIOS serial number.
2. Based on the above information, the client performs the MD5 calculation to generate a 32-digit character, which is named host ID.
3. The client sends the host ID and user/password to the SSL VPN server.
4. The SSL VPN server verifies the host according to the entries in the host unbinding list and host binding list, and deals with the verified host according to the host binding configuration.

The host unbinding list and host binding list are described as follows:

- Host unbinding list: The host unbinding list contains the user-host ID entries for the first-login users.
- Host binding list: The host binding list contains the user-host ID entries for the users who can pass the verification. The entries in the host unbinding list can be moved to the host binding list manually or automatically for the first login. When a user logs in, the SSL VPN server will check whether the host binding list contains the user-host ID entry of the login user. If there is a matched entry in the host binding list, the user will pass the verification and the sever will go on checking the user/password. If there is no matched entry for the login user, the connection will be disconnected.

Note: For hosts deployed on virtual platforms, the host ID might not be unique. Therefore, the host binding function might not work properly.

Configuring Host Binding

Configuring host binding includes host binding/unbinding configurations, super user configurations, shared host configurations, and user-host binding list importing/exporting.

Configuring Host Binding and Unbinding

To add a binding entry to the host binding list, take the following steps:

1. Select **Network > VPN > SSL VPN**.
2. At the top right corner, click **Host Compliance Binding** to visit the Host Compliance Check-/Binding page.
2. With the Binding and Unbinding tab active, select the entries you want to add to the Host Unbinding List. You can also click 

to add filter conditions (User, Host ID) to view the detailed information of entries that meet the filter conditions.
3. Click **Add** to add the selected entries to the Host Binding List.

To delete a binding entry from the host binding list, take the following steps:

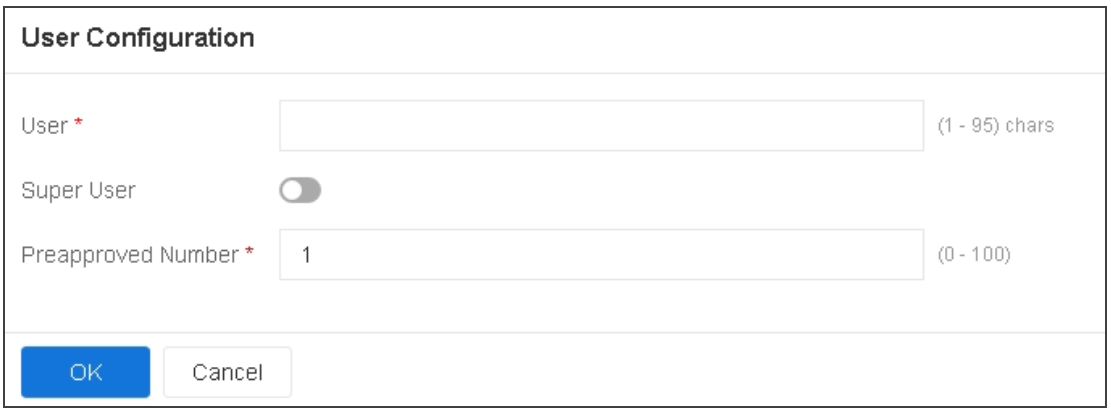
1. Select **Network > VPN > SSL VPN**.
2. At the top right corner, click **Host Compliance Binding** to visit the Host Compliance Binding page.
3. With the Binding and Unbinding tab active, select the entries you want to delete from the Host binding List. You can also click 

to add filter conditions (User, Host ID) to view the detailed information of entries that meet the filter conditions.
4. Click **Unbinding** to remove the selected entries from this list.

Configuring a Super User

The super user won't be controlled by the host checking function, and can log into any host. To configure a super user, take the following steps:

1. Select **Network > VPN > SSL VPN**.
2. At the top right corner, click **Host Compliance Binding** to visit the Host Binding page.
3. With the User Privilege List tab active, click **New**.



In the New dialog box, configure the corresponding options.

Option	Description
User	Specifies the name of the user. The length is 1 to 95 characters.
Super User	Select the **Enable** check box to make it a super user.
Preapproved Number	If system allows one user to login from multiple hosts, and the option of automatically adding the user-host ID entry into the host binding list at the first login is enabled, then by default system only records the user and first login host ID entry to the host binding list. For example, if the user logs in from other hosts, the user and host ID will be added to the host unbinding list. This preapproved number specifies the maximum number of user-host ID entries for one user in the host binding list.

4. Click **OK** to save the settings.

Configuring a Shared Host

Clients that log in from the shared host won't be controlled by the host binding list. To configure a shared host, take the following steps:

1. Select **Network > VPN > SSL VPN**.
2. At the top right corner, click **Host Compliance Binding** to visit the Host Binding page.

3. With the Host ID Privilege List tab active, click **New**.

In the New dialog box, configure the corresponding options.

Option	Description
Host ID	Type the host ID into the Host ID box.
Shared Host	Select the **Enable** check to make it a shared host. By default, this check box is selected.

4. Click **OK** to save the settings.

Importing/Exporting Host Binding List

To import the host binding list, take the following steps:

1. Select **Network > VPN > SSL VPN**.
2. At the top right corner, click **Host Compliance Binding** to visit the Host Binding page.
3. With the Binding and Unbinding tab active, click **Import**.
4. Click **Browse** to find the binding list file and click **Upload**.

To export the host binding list, take the following steps:

1. Select **Network > VPN > SSL VPN**.
2. At the top right corner, click **Host Compliance Binding** to visit the Host Checking/Binding page.

3. With the Binding and Unbinding tab active, click **Export**.

4. Select a path to save the host binding list.

Host Compliance Check

The host compliance check function checks the security status of the hosts running SSL VPN clients, and according to the check result, the SSL VPN server will determine the security level for each host and assign corresponding resource access right based on their security level. It a way to assure the security of SSL VPN connection. The checked factors include the operating system, IE version, and the installation of some specific software.

The factors to be checked by the SSL VPN server are displayed in the list below:

Factor	Description
Operating system	• Operating system, e.g., Windows 2000, Windows 2003, Windows XP, Windows Vista, Windows 7m Windows 8, etc. • Service pack version, e.g., Service Pack 1 • Windows patch, e.g., KB958215, etc.
	• Whether the Windows Security Center and Automatic Updates are enabled. • Whether the installation of AV software is compulsory, and whether the real-time monitor and the auto update of the signature database are enabled. • Whether the installation of anti-spyware is compulsory, and whether the real-time monitor and the online update of the signature database are enabled. • Whether the personal firewall is installed, and whether the real-time protection is enabled.
	Whether the IE version and security level reach the specified requirements.

Factor	Description
Other configurations	Whether the specified processes are running.
	Whether the specified services are installed.
	Whether the specified services are running.
	Whether the specified registry key values exist.
	Whether the specified files exist in the system.

Role Based Access Control and Host Compliance Check Procedure

Role Based Access Control (RBAC) means that the permission of the user is not determined by his user name, but his role. The resources can be accessed by a user after the login is determined by his corresponding role. So role is the bridge connecting the user and permission.

The SSL VPN host checking function supports RBAC. And the concepts of primary role and guest role are introduced in the host checking procedure. The primary role determines which host compliance check profile (contains the host checking contents and the security level) will be applied to the user and what access permission can the user have if he passes the host checking. The guest role determines the access permissions for the users who fail the host checking.

The host compliance check procedure is shown as below

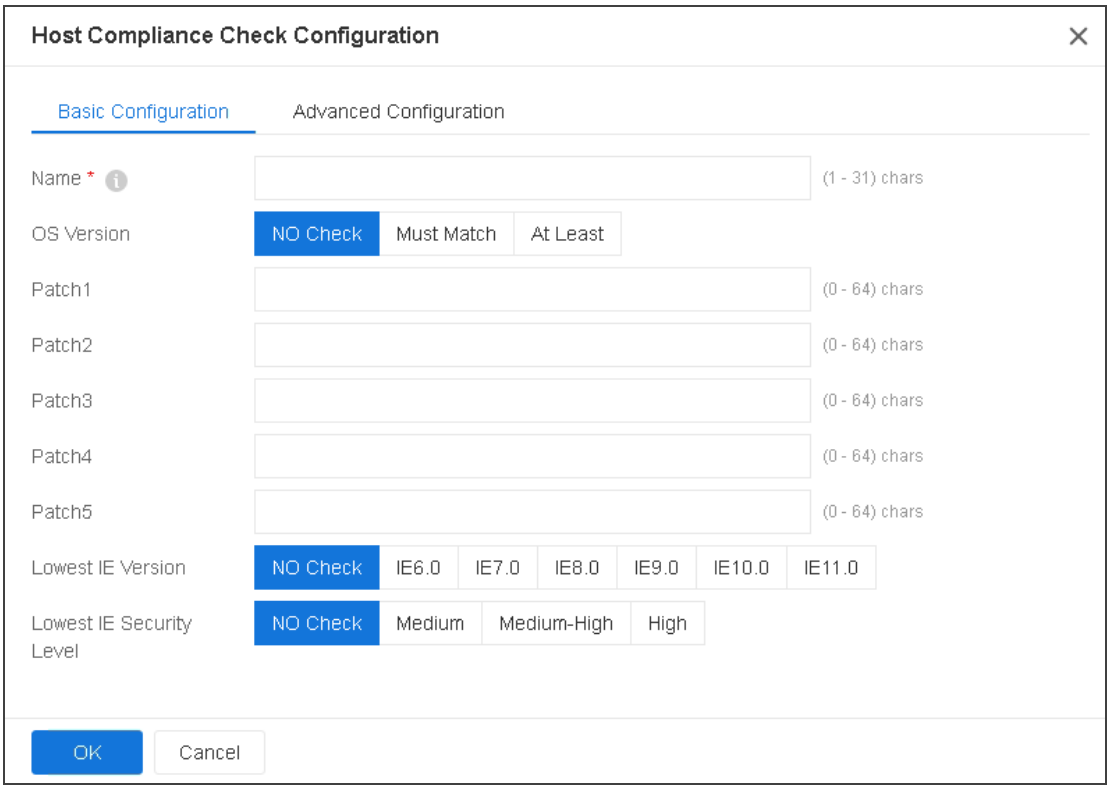
1. The SSL VPN client sends request for connection and passes the authentication.
2. The SSL VPN server sends the host checking profile to the client.
3. The client checks the host security status according to the items in the host checking profile. If it fails the host compliance check, system will be notified of the checking result.
4. The client sends the checking result back to the server.
5. The server disconnects the connection to the failed client or gives the guest role's access permission to the failed client.

The host compliance check function also supports dynamic access permission control. On one side, when the client's security status changes, the server will send a new host checking profile to the client to make him re-check; on the other side, the client can perform security checks periodically. For example, if the AV software is disabled and is detected by the host checking function, the role assigned to the client may change as will the access permissions.

Configuring a Host Compliance Check Profile

To configuring host compliance check profile, take the following steps:

1. Select **Network > VPN > SSL VPN**.
2. At the top right corner, click **Configuration** ,select **Host Compliance Check** from the drop-down list to visit the Host Compliance Check page.
3. In the Host Compliance Check tab, click **New** to create a new host checking rule.



In the Basic Configuration tab, configure the corresponding options.

Option	Description
Name	Specifies the name of the host checking profile.
OS Version	Specifies whether to check the OS version on the client host. Click one of the following options: • No Check: Do not check the OS version. • Must Match: The OS version running on the client host must be the same as the version specified here. Select the OS version and service pack version from the drop-down lists respectively. • At Least: The OS version running on the client host should not be lower than the version specified here. Select the OS version and service pack version from the drop-down lists respectively.
Patch1/2/3/4/5	Specifies the patch that must be installed on the client host. Type the patch name into the box. Up to 5 patches can be specified.
Lowest IE Version	Specifies the lowest IE version in the Internet zone on the client host. The IE version running on the client host should not be lower than the version specified here.
Lowest IE Security Level	Specifies the lowest IE security level on the client host. The IE security level on the host should not be lower than the level specified here.

In the Advanced Configuration tab, configure the corresponding options.

Option	Description
Security Center	Checks whether the security center is enabled on the client host.
Auto Update	Checks whether the Windows auto update function is enabled.
Anti-Virus Software	Checks the status and configurations of the anti-virus software: • Installed: The client host must have the AV software installed. • Monitor: The client host must enable the real-time monitor of the AV software. • Virus Signature DB Update: The client host must enable the signature database online update function.
Anti-Spyware Software	Checks the status and configurations of the anti-spyware software: • Installed: The client host must have the anti-spyware installed. • Monitor: The client host must enable the real-time monitor of the anti-spyware. • Signature DB Update: The client host must enable the signature database online update function.
Firewall	Checks the status and configurations of the firewall:

	• Installed: The client host must have the personal firewall installed. • Monitor: The client host must enable the real-time monitor function of the personal firewall.
Registry Key Value	
Key1/2/3/4/5	Checks whether the key value exists. Up to 5 key values can be configured. The check types are: • No Check: Do not check the key value. • Exist: The client host must have the key value. Type the value into the box. • Do not Exist: The client cannot have the key value. Type the value into the box.
File Path Name	
File1/2/3/4/5	Checks whether the file exists. Up to 5 files can be configured. The check types are: • No Check: Do not check file. • Exist: The client host must have the file. Type the value into the box. • Do not Exist: The client cannot have the file. Type the value into the box.
Name of Running Process	

Process1/2/3/4/5	Checks whether the process is running. Up to 5 processes can be configured. The check types are: • No Check: Do not check the process. • Exist: The client host must have the process run. Type the process name into the box. • Do not Exist: The client cannot have the process run. Type the process name into the box.
Name of Installed Service	
Service1/2/3/4/5	Checks whether the service is installed. Up to 5 services can be configured. The check types are: • No Check: Do not check the service. • Exist: The client host must have the service installed. Type the service name into the box. • Do not Exist: The client host cannot have the service installed. Type the service name into the box.
Name of Running Service	
Service1/2/3/4/5	Checks whether the service is running. Up to 5 services can be configured. The check types are:

	• No Check: Do not check the service. • Exist: The client host must have the service run. Type the service name into the box. • Do not Exist: The client host cannot have the service run. Type the service name into the box.

4. Click **OK** to save the settings.

Hillstone Secure Connect Client for Windows

The SSL VPN/ZTNA client for Windows is Hillstone Secure Connect. It can run in the following operating systems:

- Windows7/Windows8.1/Windows10/Windows11
- Windows server 2008 R2/Windows server 2012/Windows server 2012 R2/Windows server 2016/Windows server 2019/Windows server 2022

The encrypted data can be transmitted between the client and the device after a connection has been established successfully. The functions of the client are:

- Get interface and route information from the PC on which the client is running.
- Show the connecting status, statistics, interface information, and route information.
- Show log messages.
- Upgrade the client software.
- Resolve the resource list information received from the server.
- Collect and report endpoint device status information.

System supports IPv4 and IPv6 Secure Connect Windows clients.

This section mainly describes how to download, install, start, uninstall the Secure Connect Windows client, and gives instructions on how to use its GUI and menu. The device side supports the following authentication methods:

- Username/Password
- Username/Password + Digital Certificate (including USB Key certificate and file certificate)
- Digital Certificate (including USB Key certificate and file certificate) only

System supports IPv4 and IPv6 Secure Connect Windows clients.

Downloading and Installing the Client

Take either of the following methods to download and install the Secure Connect Windows client:

- Visit Hillstone Networks Official Website https://www.hillstonenet.com/more/services/product-downloads/.
- Visit https://IP-Address:Port-Number on the device side. In the URL, IP-Address and Port-Number refer to the IP address and HTTPS port number of the egress interface specified in the SSL VPN/ZTNA instance.

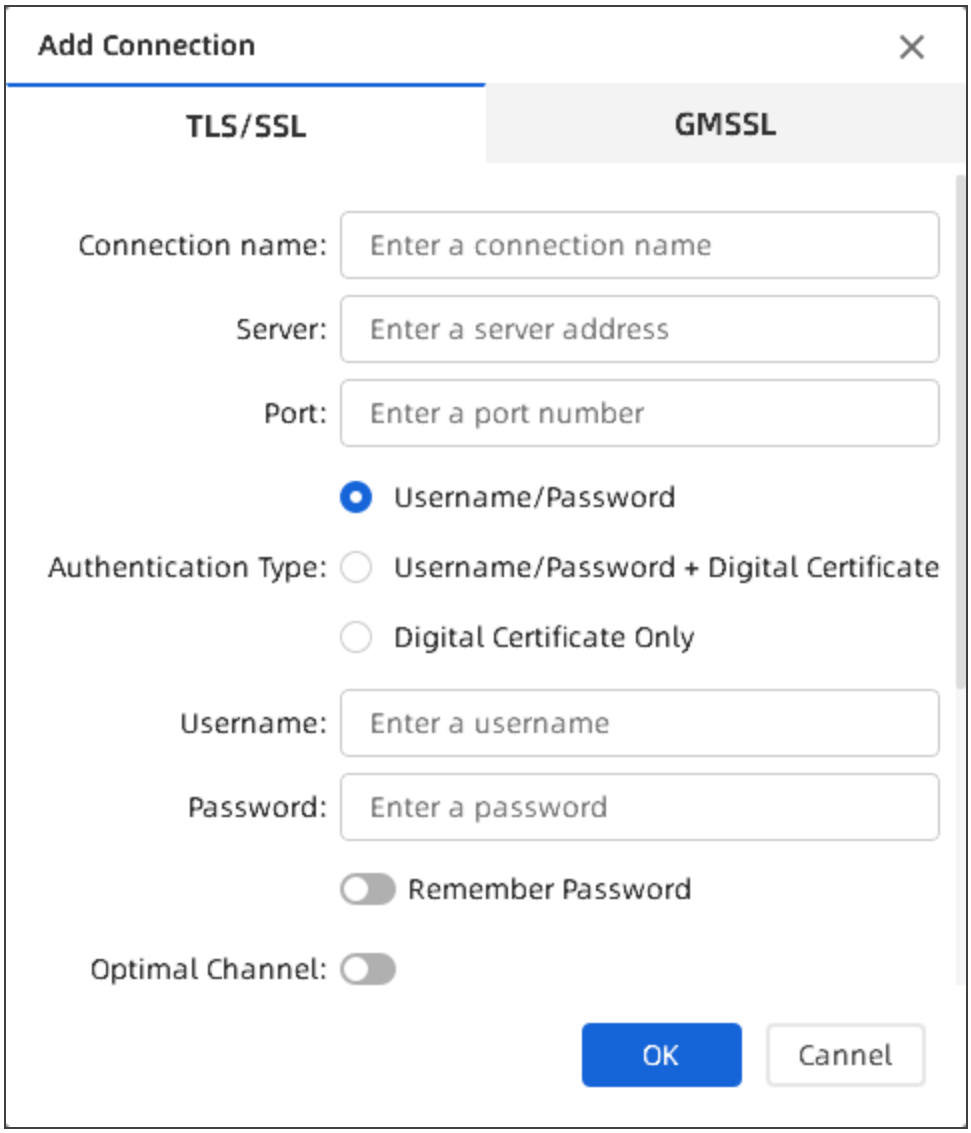
A virtual network adapter will be installed on your PC together with the Secure Connect Windows client. It is used to transmit encrypted data between the device and the client.

Starting Up and Connecting

After the Secure Connect Windows client is installed successfully, take the following steps to start and log in the client:

1. Double-click the shortcut of Hillstone Secure Connect on your desktop, or from the Start menu, choose **All Programs > Hillstone Secure Connect > Hillstone Secure Connect**. The client main page is displayed.

2. Click **Add Connection**. The following dialog box is displayed.



Enter the connection information.

Option	Description
TLS/SSL	Select this tab to use the TLS/SSL protocol.
GMSSL	Select this tab to use the GMSSL protocol.
Connection	Enter the connection name.

Option	Description
Name	
Server	Enter the IP address of SSL VPN or ZTNA server.
Port	Enter the HTTPS port number of SSL VPN or ZTNA server.
Authentication Type	Select the authentication type. "User name/Password", "User name/Password + Digital certificate" and "Only Digital certificate" are supported. For digital certificate authentication, software certificates and USB-Key certificates are supported.
Username	Enter the name of the login user. When Auth type is specified as "User name/Password" or "User name/Password + Digital certificate", the client user name and password should be entered.
Password	Enter the password of the login user. If local authentication server is configured on the device, the user name and password should be configured in advance on the device.
Remember Password	After this option is selected, you do not need to enter the user's password at the next-time connection.
Digital certificate	When the authentication type is "User name/Password + Digital certificate" or "Only Digital certificate", click this option to enter the dialog box for selecting a certificate. The selected certificate will be sent to the

Option	Description
	device for authentication.
Select Digital Certificate	Options in the "Select Digital Certificate" dialog box are described as follows: • Default System Certificate: Click this radio button to allow the device to use the Hillstone UKey certificate as the system default certificate. This is the default setting. • USBKey Certificate: Click this radio button and select a USB-Key certificate from the current certificate list. The USB Key should be inserted into the USB interface of the PC in advance. You can use the USB Key deployment tool named SelectUSBKey to set the third-party certificate as the default certificate. For more information, refer to Third-Party USB Key. • File Certificate: Click this radio button and select a file certificate from the current certificate list. The file certificate should be imported into the PC in advance. • Certificate list: Display the existing certificate in the system. Click **Refresh** icon to update the list.
GMSSL certificate	Options in the "GMSSL certificate" dialog box are described as follows:

Option	Description
	• Device Name: Select the current USB Token device name in the drop-down list. The USB Token device should be inserted into the USB interface of the PC in advance. • Application Name: The application is a structure that contains a container, a device authentication key, and a file. Select the specified application name in the drop-down list. • Container Name: The container is the unique storage space in the USB Token device to save the key. It is used to store the encryption key pair, the encryption certificate corresponding to the encryption key pair, the signature key pair, and the signature certificate corresponding to the signature key pair. Select the name of the specified container in the drop-down list. • Signature certificate: Display the name of the SM2 signature certificate in the specified container. • Encryption certificate: Display the name of the SM2 encryption certificate in the specified container.
PIN	Enter the PIN code of the USB Key when the authen-

Option	Description
	tication type is "User name/Password + Digital certificate" or "Only Digital certificate".
Remember PIN	After this option is enabled, you do not need to enter the PIN at the next-time connection.
Optimal Channel	Set whether to enable optimal path detection function. For more information about optimal path detection, see Selecting an Optimal Path. It is disabled by default.
Gateway Detection	Set whether to enable the gateway detection function, which applies in the ZTNA access scenario. If the ZTNA device has backup gateway configured, ZTNA users can enable gateway detection on ZTNA clients. When a user logs in, the ZTNA client will obtain the backup gateway list, detect the link quality of each gateway and establish a connection to the one with the best link quality. After the connection is established, the ZTNA client will detect and update the link quality of all gateways every 30 minutes. If a connection or login failure occurs, the ZTNA client will switch to connect the gateway with the best link quality. It is enabled by default.
Preferred Gateway	After gateway detection is enabled, the ZTNA client will obtain the backup gateway list during user login. At this time, users can manually select a preferred gateway. By default, the preferred gateway is not set. If it is set,

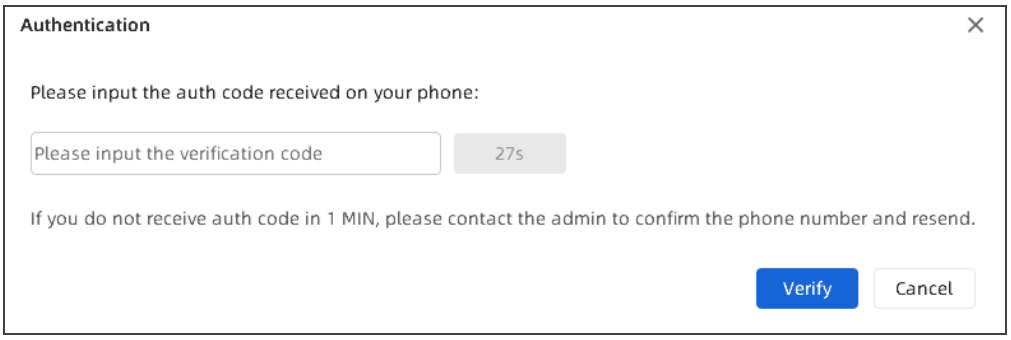
Option	Description
	the ZTNA client will preferentially connect it when the user logs in via this client again. If the connection fails, the ZTNA client will switch to connect the gateway with the best link quality.
SPA	Set whether to enable the SPA function, which applies in the ZTNA access scenario. If the ZTNA device has SPA enabled and is configured with hidden IP address and port number, ZTNA users also need to enable SPA on ZTNA clients. When a user logs in via the ZTNA client, the user needs to pass single packet authorization before establishing a connection to the ZTNA device. When SPA is disabled or is enabled but not configured with hidden IP address and port number on the ZTNA device, the ZTNA device will no perform single packet authorization on the clients no matter whether SPA is enabled on clients. • Enable: When SPA is enabled, the knock port should be manually specified. • Disable: When SPA is disabled, ZTNA clients will not knock when logging in. • Auto: No matter whether SPA is enabled on the ZTNA device, clients consider that the ZTNA device requires single packet authorization and knocks on the default knock port number. This is the default option.

Option	Description
Stability Optimization	Set whether to use TCP for data transmission. This function applies in the SSL VPN access scenario. It is disabled by default. To use it, make sure the device side has the TCP port configured. It is disabled by default.
Verify Server Cert	Click **Enable** button to verify the certificate of the server when establishing the connection. To add trusted certificates, please refer to General Configuration.

Tips: If the password control function and the change password function are enabled on the device, for example: the system will remind the user to change the password before and after the password expires, and verify the historical password to ensure that the new password is different from the previous password. For more information about password control function, refer to Configuring a Local AAA Server.

3. After the connection information configuration is completed, click **OK**. The system will save a login entry. If needed, you can repeat the previous steps to add more login entries.
4. On the client main page, the configured connection information has been saved as a login entry. Click **Connect**. The client will attempt to establish a connection to the device.
5. If SMS authentication is enabled, type the authentication code into the box in the SMS Auth dialog (as shown below) and click **Verify**. If you have not received the authentication

code within one minute, you can re-apply by clicking **Resend**.



6. If token authentication is enabled on the device side, the token Authentication dialog will appear. You need to pass the token authentication.

    - After passing the authentication, you have three chances to type the authentication code. If you give incorrect authentication code three times in succession, the connection will be disconnected automatically.
    - You have three chances to apply the authentication code, and the sending interval is one minute. Re-applying authentication code will void the old code, thus you must provide the latest code to pass the authentication.

7. If Email authentication is enabled on the device side, the Email Authentication dialog will appear. You need to pass the Email authentication.

    - After passing the authentication, you have three chances to type the authentication code. If you give incorrect authentication code three times in succession, the connection will be disconnected automatically.
    - You have three chances to apply the authentication code, and the sending interval is one minute. Re-applying authentication code will void the old code, thus you must provide the latest code to pass the authentication.

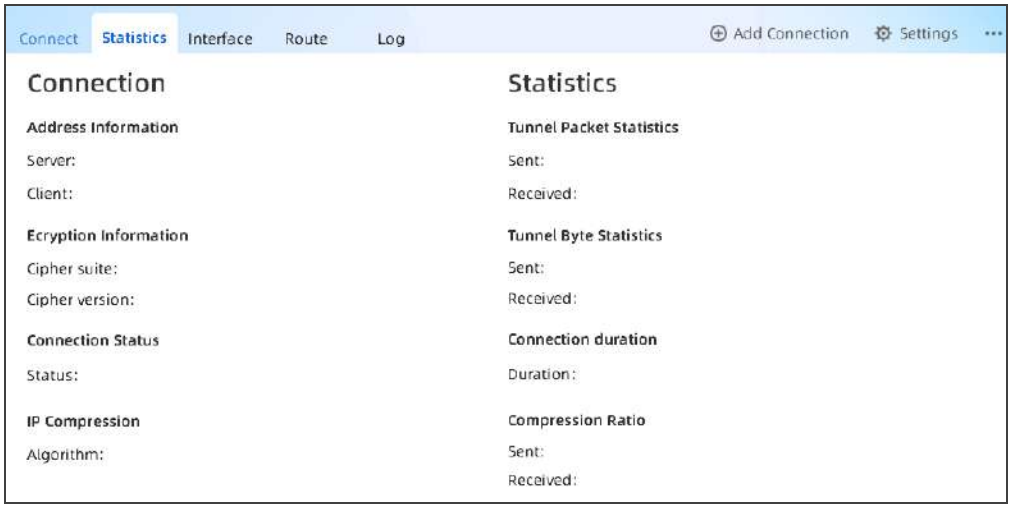
Finishing the above steps, the client will connect to the server automatically. After the connection has been established successfully, the icon ( ) will be displayed in the notification area. And the encrypted communication between the client and server can be implemented now.

Editing and Deleting Login Entry

To edit or delete a login entry, place the cursor on the login entry. Click the icon to edit the entry; and the icon to delete the entry.

Viewing Connection and Statistics Information

On the client main page, click the **Statistics** tab to view connection and statistics information.

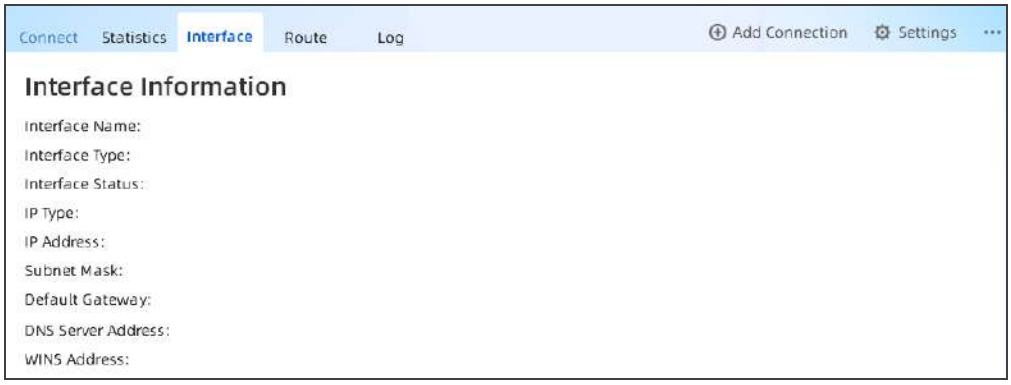


Address Information: Shows the IP addresses	
Server	The IP address of the connected SSL VPN/ZTNA server.
Client	The IP address of the client.
Encryption Information: Shows the encryption information.	
Cipher suite	The encryption algorithm and authentication algorithm used by SSL VPN/ZTNA.
Cipher version	The SSL version used by SSL VPN/ZTNA.

Address Information: Shows the IP addresses	
Connection Status	
Status	The current connecting state between the client and server.
IP Compress	
Algorithm	Shows the compression algorithm used by SSL VPN/ZTNA.
Tunnel Packet Statistics	
Send	The number of sent packets through the encryption tunnel.
Received	The number of received packets through the encryption tunnel.
Tunnel Byte Statistics	
Send	Bytes sent through the tunnel.
Received	Bytes received through the tunnel.
Connection duration	
Duration	Time period during which the client is online.
Compression Ratio	
Send	Length ratio of sent data after compression.
Received	Length ratio of received data after compression.

Viewing Interface and Routing Information

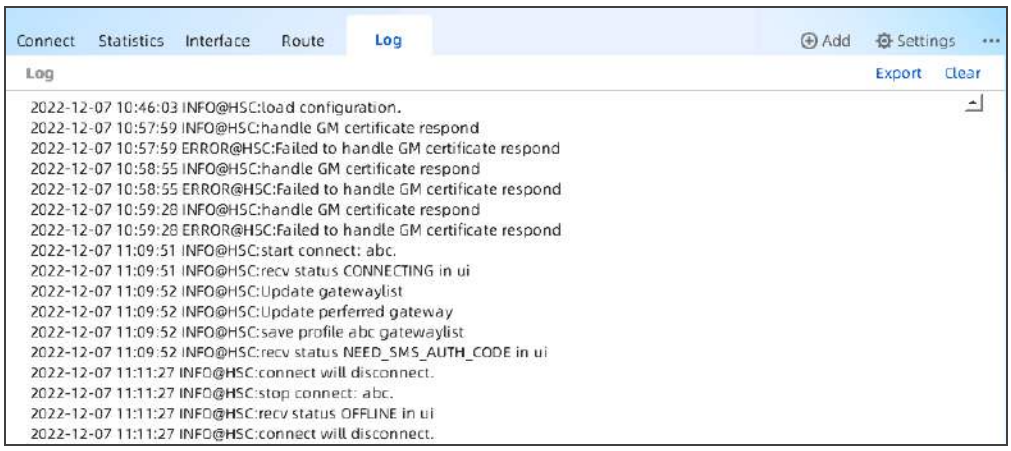
On the client main page, click the **Interface** tab to view interface information; click the **Route** tab to view routing information.



Option	Description
Interface Name	The name of the interface used to send encrypted data.
Interface Type	The type of the interface used to send encrypted data.
Interface Status	The status of the interface used to send encrypted data.
IP Type	The IP address type of the interface used to send encrypted data.
IP Address	The IP address (allocated by the device) of the interface used to send encrypted data.
Subnet Mask	The subnet mask of the interface used to send encrypted data.
Default Gateway	The default gateway address of the interface used to send encrypted data.
DNS Server Address	The address of the DNS server used by the client.
WINS Address	The address of the WINS server used by the client.

Viewing Log Information

On the client main page, click the **Log** tab to view log information.



Click ••• and select "Log Level" to set the level of logs to be displayed.

Third-party USB Key

Hillstone UKey certificate is the default certificate for the USB Key authentication. When authenticating with Hillstone UKey certificate, the client will select the Hillstone UKey certificate automatically and send it to the server, and the server will perform the authentication with the default certificate. This authentication process is transparent to the authenticated clients, i.e., the client need not to choose the certificate. If the third-party USB Key is used, you can set the third-party certificate as the default certificate to simplify the authentication process by using the tool named SelectUSBKey.

To set the third-party certificate to the default certificate, first you have to export the CSP Name of the USB Key in form of a registry file, and then add the exported file content to the registry of the client PC.

To export the CSP Name of the USB Key, take the following steps:

1. Install the driver of the third-party USB Key.
2. Insert the third-party USB Key.

3. Double click SelectUSBKey.exe, and the Select Default Certificate dialog is shown as below:

   Export: Exports the CSP Name of the USB Key in form of a registry file.

   Update: Refreshes the certificate list.

   Close: Closes the dialog.

4. Select the certificate you want from the certificate list, and then click **Export**.

After exporting the CSP Name of the USB Key, double click the exported file, and then add the content to the registry of the client PC. When authenticating with the third-party certificate, the client will automatically select the third-party USB Key certificate and send it to the server.

Client Menu

Right-click the green icon of the client, the client menu appears. Descriptions of the menu items:

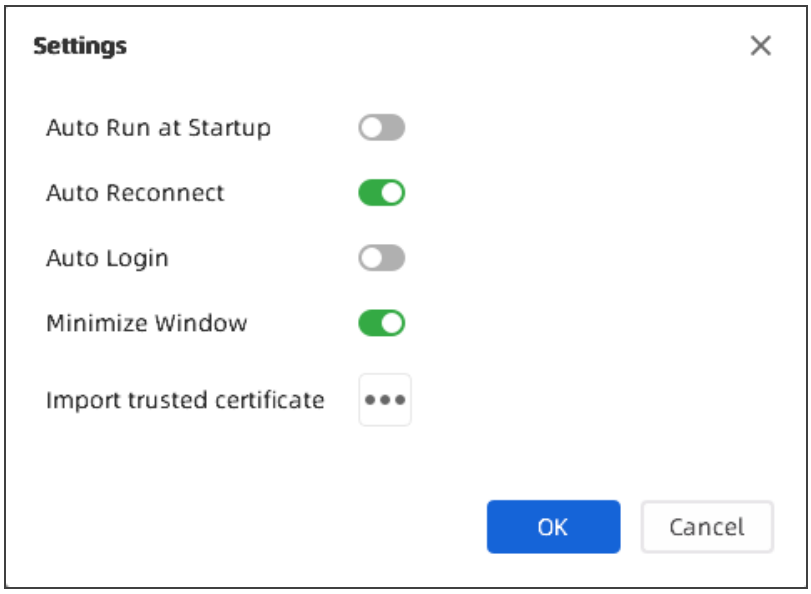
- **Change Password**: Displays the dialog for changing password.
- **Redirect URL**: When the device end has a redirect URL configured, users can click this menu to quickly jump to this URL address.
- **Resource List**: When accessing the SCVPN service, user can click this menu to open the browser page displaying internal resources.
- **Application Resource List**: When a user successfully connects to a ZTNA service using the Secure Connect client, this menu is displayed. After the user logs in, a ZTNA portal page will be displayed. The user can click this menu to display the latest ZTNA portal page to view the application resource access privilege after it is closed. The portal page displays the application resources that the user is granted access and is not granted access. For those that the user is not granted access, the user can attempt to acquire the access privilege by adjusting the access terminal configurations. The application resources that the user is denied from accessing will not be displayed on the portal page. If a user is denied from accessing any application

resources, the portal page displays a message indicating that no Web resources are available to the user.

- **Show Window**: When Secure Connect client window is minimized, click this menu item to display the client main page.
- **Quit**: Click **Quit** to close the client.

General Configuration

Click **Settings** on the client main page.



- **Startup and automatic run**: Enable this option to automatically run the client when the PC is starting.
- **Automatic reconnect**: Enable this option to automatically reconnect to the SSL VPN/ZTNA server when the connection is hung up.
- **Automatic login**: Enable this option to allow the specified user to login automatically when the client is starting. Select the auto login user from the drop-down list.

- **Minimize window**: Enable this option to allow the client window to be minimized.
- **Import trusted certificate**: After the Verify Server Cert function is enabled when establishing a connection, click button, and click **Import** on the<Trusted certificate>page to import the authentication certificate for the server. Click **Delete** to delete the trusted certificate in the list

Uninstalling the Client

To uninstall the client on your PC, from the Start menu, click **All Programs > Hillstone Secure Connect > Uninstall**.

Hillstone Secure Connect Client for Android

The SSL VPN/ZTNA client for Android is Hillstone Secure Connect. It can run in Android 8.x/Android 9.x/Android 10.x/Android 11.x/Android 12.x/Android 13.x/HongmengOS 2.0. The functions of Secure Connect Android client contain the following items:

- Obtain the interface information of the Android OS.
- Display the connection status with the device, traffic statistics, interface information, and routing information.
- Display the log information of the application.
- Collect and report endpoint status information.

Downloading and Installing the Client

To download and install the Secure Connect Android client, take the following steps:

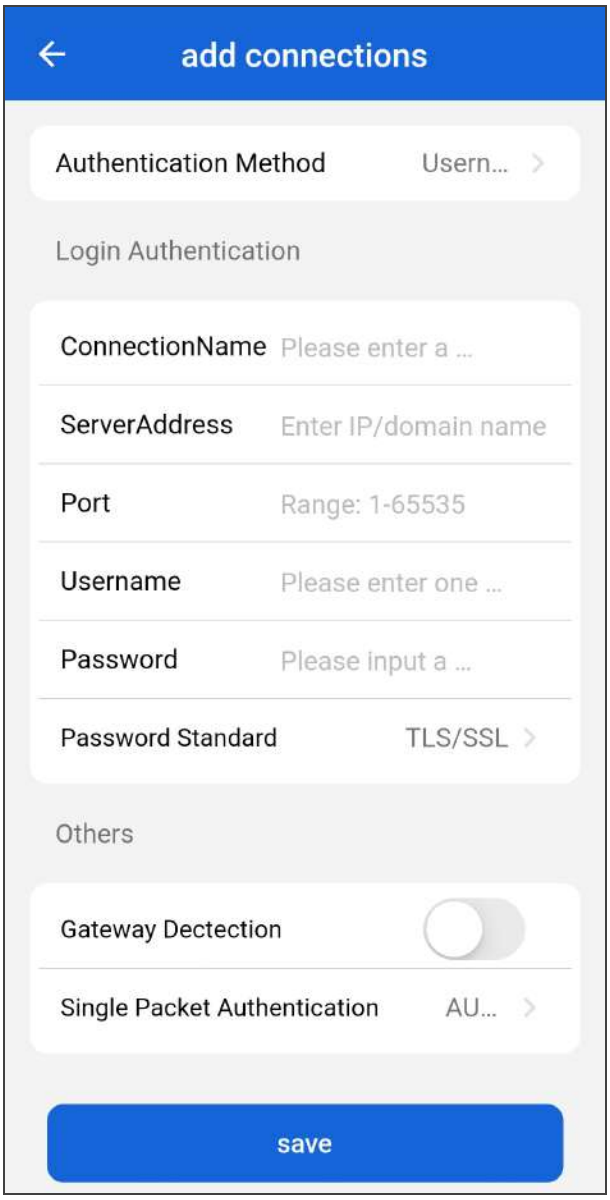
1. Visit https://www.hillstonenet.com/more/services/product-downloads/ to download the installation file of the client, or https://IP-Address:Port-Number on the device side. In the URL, IP-Address and Port-Number refer to the IP address and HTTPS port number of the egress interface specified in the SSL VPN/ZTNA instance.
2. Use the Android device to scan the QR code of the Secure Connect Android client.
3. Open the URL and download the Hillstone-Secure-Connect-Versione_Number.apk file.
4. After downloading successfully, find this file in the Android device.
5. Click it and the installation starts.
6. Read the permission requirement.
7. Click **Install**.

Starting Up and Connecting

After the Secure Connect Windows client is installed successfully, take the following steps to start and log in the client:

1. Double-click the Hillstone Secure Connect icon on the desktop and enter the client main page.

2. In the "Home" tab, click "+" and enter the "Add Connection" page.



Enter the connection information.

Option	Description
Authentication Method	Select the authentication method. "User name/-password", "User name/password + Digital Certificate" and "Digital Certificate" are supported.
Connection Name	Enter the connection name.
Server Address	Enter the IP address of SSL VPN or ZTNA server.
Port	Enter the HTTPS port number of SSL VPN or ZTNA server.
Username	Enter the name of the login user. When authentication method is specified as "User name/password" or "User name/password + Digital Certificate", the client user name and password should be entered.
Password	Enter the password of the login user. If local authentication server is configured on the device, the user name and password should be configured in advance on the device.
PIN	Enter the PIN code of the USB Key when the authentication type is "User name/password + Digital certificate" or "Digital certificate".
Password Standard	Select the SSL protocol type: • TLS/SSL: indicates the TLS/SSL protocol.

Option	Description
	• GMSSL: indicates the GUOMI SSL protocol.
Select Certificate	Select the digital certificate that has been imported into the Android device in advance.
Gateway Detection	Set whether to enable the gateway detection function, which applies in the ZTNA access scenario. If the ZTNA device has backup gateway configured, ZTNA users can enable gateway detection on ZTNA clients. When a user logs in, the ZTNA client will obtain the backup gateway list, detect the link quality of each gateway and establish a connection to the one with the best link quality. After the connection is established, the ZTNA client will detect and update the link quality of all gateways every 30 minutes. If a connection or login failure occurs, the ZTNA client will switch to connect the gateway with the best link quality.
Optimal Gateway	After gateway detection is enabled, the ZTNA client will obtain the backup gateway list during user login. At this time, users can manually select a preferred gateway. By default, the preferred gateway is not set. If it is set, the ZTNA client will preferentially connect it when the user logs in via this client again. If the connection fails, the ZTNA client will switch to connect the gateway with the best link quality.
Single Packet	Set whether to enable the SPA function, which

Option	Description
Authentication	applies in the ZTNA access scenario. If the ZTNA device has SPA enabled and is configured with hidden IP address and port number, ZTNA users also need to enable SPA on ZTNA clients. When a user logs in via the ZTNA client, the user needs to pass single packet authorization before establishing a connection to the ZTNA device. When SPA is disabled or is enabled but not configured with hidden IP address and port number on the ZTNA device, the ZTNA device will no perform single packet authorization on the clients no matter whether SPA is enabled on clients. • On: When SPA is enabled, the knock port should be manually specified. By default, SPA is enabled. • Off: When SPA is disabled, ZTNA clients will not knock when logging in. • Auto: No matter whether SPA is enabled on the ZTNA device, clients consider that the ZTNA device requires single packet authorization and knocks on the default knock port number.

Tips: If the password control function and the change password function are enabled on the device, for example: the system will remind the user to change the password before and after the password expires, and verify the historical

password to ensure that the new password is different from the previous password. For more information about password control function, refer to Configuring a Local AAA Server.

3. After the connection information configuration is completed, click **OK**. The system will save a login entry. If needed, you can repeat the previous steps to add more login entries.
4. On the client main page, the configured connection information has been saved as a login entry. Select it and click **Connection Status** to start the connection.
5. If SMS authentication, token authentication or email authentication is enabled, you need to enter the corresponding authentication code to complete the authentication.

After the client connects to the SSL VPN/ZTNA server, the encrypted communication between the client and server can be implemented now.

Editing and Deleting Login Entry

To edit a login entry, click the icon;

To delete a login entry, press it and drag it to the right.

Viewing Connection Information

Click "Information" tab on the client main page to view connection statistics, interface and routing information.

Option	Description
Server Address	IP address of the connected SSL VPN/ZTNA server.
Port	Port number of the connected SSL VPN/ZTNA server.

Option	Description
User Name	Login user name of the connected SSL VPN/ZTNA server.
Connection Duration	Time period during which the client is online.
Receive Bytes	Received bytes through the encryption tunnel.
Send Bytes	Sent bytes through the encryption tunnel.
Receive Packets	Number of received packets through the encryption tunnel.
Send Packets	Number of sent packets through the encryption tunnel.
Receive Compression Rate	Length ratio of received data after compression.
Send Compression Rate	Length ratio of sent data after compression.

Interface statistics:

Option	Description
Interface Name	The name of the interface used to send encrypted data.
Interface Type	The type of the interface used to send encrypted data.
Interface State	The status of the interface used to send encrypted data.
Physical Address	The MAC address of the interface used to send encrypted data.
IP Address Type	The IP address type of the interface used to send encrypted data.
Network Address	The IP address (allocated by the device) of the interface used to send encrypted data.
Subnet Mask	The subnet mask of the interface used to send encrypted data.
Default Gateway	The default gateway address of the interface used to send encrypted data.

Option	Description
DNS Address	The address of the DNS server used by the client.

Hillstone Secure Connect Client for iOS

The SSL VPN/ZTNA client for iOS is Hillstone Secure Client. It supports iOS 12.x/iOS 13.x/iOS 14.x/iOS 15.x/iOS 16.x versions. The Secure Connect iOS client mainly has the following functions:

- Simplify the tunnel creation process between the iOS device and the Hillstone device
- Display the connection status between the iOS device and the Hillstone device
- Display the log information
- Collect and report endpoint device status information.

Downloading and Installing the Client

You can take either of the following methods to download and install the Secure Connect iOS client:

- Search Hillstone Secure Client(beta) in the App Store.
- Visit https://www.hillstonenet.com/more/services/product-downloads/, locate the QR code for iOS client, use the iOS device to scan the code and then jump to App Store for downloading and installation.
- Visit https://IP-Address:Port-Number on the device side. In the URL, IP-Address and Port-Number refer to the IP address and HTTPS port number of the egress interface specified in the SSL VPN/ZTNA instance

Starting Up and Connecting

After the client is installed successfully, for the first time login, take the following steps to start and log in the client:

1. Double-click the Hillstone Secure Connect icon on the desktop and enter the client main page.

2. In the "Home" tab, click "+" and enter the "Add Connection" page.

   Enter the connection information.

Option	Description
Connection Name	Enter the connection name.
Server Address	Enter the IP address of SSL VPN or ZTNA server.
Port	Enter the HTTPS port number of SSL VPN or ZTNA server.
User name	Enter the name of the login user
Password	Enter the password of the login user. If local authentication server is configured on the device, the user name and password should be configured in advance on the device.
Password Standard	Select the SSL protocol type: • TLS/SSL: indicates the TLS/SSL protocol. • GMSSL: indicates the GUOMI SSL protocol.
Gateway Detection	Set whether to enable the gateway detection function, which applies in the ZTNA access scenario. If the ZTNA device has backup gateway configured, ZTNA users can enable gateway detection on ZTNA clients. When a user logs in, the ZTNA client will obtain the

Option	Description
	backup gateway list, detect the link quality of each gateway and establish a connection to the one with the best link quality. After the connection is established, the ZTNA client will detect and update the link quality of all gateways every 30 minutes. If a connection or login failure occurs, the ZTNA client will switch to connect the gateway with the best link quality.
Optimal Gateway	After gateway detection is enabled, the ZTNA client will obtain the backup gateway list during user login. At this time, users can manually select a preferred gateway. By default, the preferred gateway is not set. If it is set, the ZTNA client will preferentially connect it when the user logs in via this client again. If the connection fails, the ZTNA client will switch to connect the gateway with the best link quality.
Single Packet Authentication	Set whether to enable the SPA function, which applies in the ZTNA access scenario. If the ZTNA device has SPA enabled and is configured with hidden IP address and port number, ZTNA users also need to enable SPA on ZTNA clients. When a user logs in via the ZTNA client, the user needs to pass single packet authorization before establishing a connection to the ZTNA device. When SPA is disabled or is enabled but not configured with hidden IP address and port number on the ZTNA device, the ZTNA device will no perform single packet author-

Option	Description
	ization on the clients no matter whether SPA is enabled on clients. • On: When SPA is enabled, the knock port should be manually specified. By default, SPA is enabled. • Off: When SPA is disabled, ZTNA clients will not knock when logging in. • Auto: No matter whether SPA is enabled on the ZTNA device, clients consider that the ZTNA device requires single packet authorization and knocks on the default knock port number.

Tips: If the password control function and the change password function are enabled on the device, for example: the system will remind the user to change the password before and after the password expires, and verify the historical password to ensure that the new password is different from the previous password. For more information about password control function, refer to Configuring a Local AAA Server.

3. After the connection information configuration is completed, click **OK**. The system will save a login entry. If needed, you can repeat the previous steps to add more login entries.
4. On the client main page, the configured connection information has been saved as a login entry. Select it and click **Connection Status** to start the connection.

5. If SMS, token or email authentication is enabled, type the corresponding code to complete the authentication.
6. After login, the iOS device will start the VPN configuration deployment automatically. In the **Would Like to Add VPN Configurations** page, click **Allow**.
7. Enter your passcode. The passcode is the one for unlocking your iOS screen. With the correct passcode entered, the iOS device starts to install the profile.
8. After the installation is complete, start **Settings** of the iOS device and navigate to **VPN**.
9. Select the configured connection name and click the **Connect** button.
10. After the client connects to the SSL VPN/ZTNA server, the encrypted communication between the client and server can be implemented now.

Notes: For subsequent logins, you do not need to perform the VPN configuration deployment steps. You can log in the client and start the connection directly.

Editing and Deleting Login Entry

To edit a login entry, click the icon;

To delete a login entry, press it and drag it to the right.

Viewing Connection Information

Click "Information" tab on the client main page to view connection statistics, interface and routing information.

Option	Description
Server Address	IP address of the connected SSL VPN/ZTNA server.

Option	Description
Port	Port number of the connected SSL VPN/ZTNA server.
User Name	Login user name of the connected SSL VPN/ZTNA server.
Connection Duration	Time period during which the client is online.
Receive Bytes	Received bytes through the encryption tunnel.
Send Bytes	Sent bytes through the encryption tunnel.
Receive Packets	Number of received packets through the encryption tunnel.
Send Packets	Number of sent packets through the encryption tunnel.
Receive Compression Rate	Length ratio of received data after compression.
Send Compression Rate	Length ratio of sent data after compression.

Interface statistics:

Option	Description
Interface Name	The name of the interface used to send encrypted data.
Interface Type	The type of the interface used to send encrypted data.
Interface State	The status of the interface used to send encrypted data.
Physical Address	The MAC address of the interface used to send encrypted data.
IP Address Type	The IP address type of the interface used to send encrypted data.
Network Address	The IP address (allocated by the device) of the interface used to send encrypted data.
Subnet Mask	The subnet mask of the interface used to send encrypted data.
Default Gateway	The default gateway address of the interface used to send encrypted data.

Option	Description
DNS Address	The address of the DNS server used by the client.

Hillstone Secure Connect Client for macOS

The SSL VPN/ZTNA client for macOS is Hillstone Secure Connect. It can run in macOS 10.13/macOS 10.14/macOS 10.15/macOS 11.0/macOS 12.0/macOS 13.0 versions. The encrypted data can be transmitted between the client and the SSL VPN/ZTNA server after a connection has been established successfully. The functions of the client are:

- Establish the encrypted connection with the SSL VPN/ZTNA server.
- Show the connection status, traffic statistics, and route information.
- Show log messages.
- Collect and report endpoint device status information.

Downloading and Installing the Client

To download and install the Secure Connect macOS client, take the following steps:

1. Visit Hillstone Networks Official Website https://www.hillstonenet.com/more/services/product-downloads/ or https://IP-Address:Port-Number on the device side. In the URL, IP-Address and Port-Number refer to the IP address and HTTPS port number of the egress interface specified in the SSL VPN/ZTNA instance.

2. After downloading the installation file, double-click it. In the pop-up, drag the Secure Connect macOS client to the **Applications** folder to perform the installation.

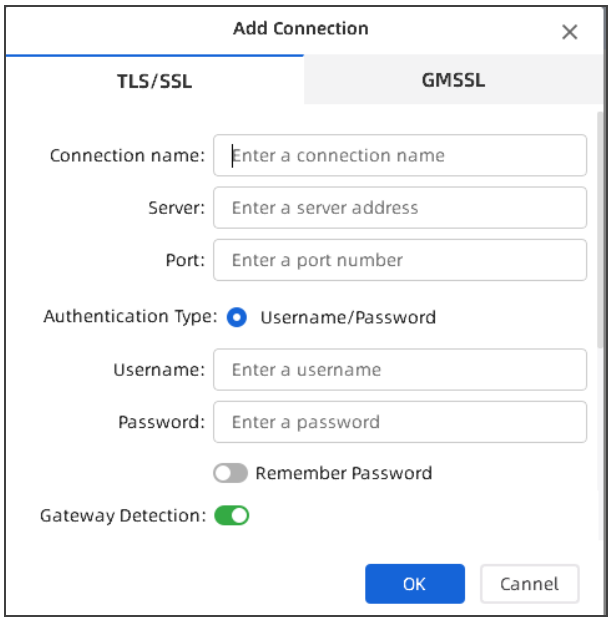
Notes: To open the installation file, you must have the administrator permission and select **Anywhere in System Preferences > Security & Privacy > General > Allow apps downloaded from**.

Starting Up and Connecting

After the Secure Connect macOS client is installed successfully, take the following steps to start and log in the client:

1. Select **Launchpad > Hillstone Secure Connect**. The client starts.

2. Click **Add**. The following dialog box is displayed.



Enter the connection information.

Option	Description
TLS/SSL	Select this tab to use the TLS/SSL protocol.
GMSSL	Select this tab to use the GMSSL protocol.
Connection Name	Enter the connection name.
Server	Enter the IP address of SSL VPN or ZTNA server.
Port	Enter the HTTPS port number of SSL VPN or ZTNA server.
Authentication Type	The authentication type is username/password.
Username	Enter the name of the login user.

Option	Description
Password	Enter the password of the login user. If local authentication server is configured on the device, the user name and password should be configured in advance on the device.
Remember Password	After this option is selected, you do not need to enter the user's password at the next-time connection.
Gateway Detection	Set whether to enable the gateway detection function, which applies in the ZTNA access scenario. If the ZTNA device has backup gateway configured, ZTNA users can enable gateway detection on ZTNA clients. When a user logs in, the ZTNA client will obtain the backup gateway list, detect the link quality of each gateway and establish a connection to the one with the best link quality. After the connection is established, the ZTNA client will detect and update the link quality of all gateways every 30 minutes. If a connection or login failure occurs, the ZTNA client will switch to connect the gateway with the best link quality. It is enabled by default.
Preferred Gateway	After gateway detection is enabled, the ZTNA client will obtain the backup gateway list during user login. At this time, users can manually select a preferred gateway. By default, the preferred gateway is not set. If it is set, the ZTNA client will preferentially connect it when the

Option	Description
	user logs in via this client again. If the connection fails, the ZTNA client will switch to connect the gateway with the best link quality.
SPA	Set whether to enable the SPA function, which applies in the ZTNA access scenario. If the ZTNA device has SPA enabled and is configured with hidden IP address and port number, ZTNA users also need to enable SPA on ZTNA clients. When a user logs in via the ZTNA client, the user needs to pass single packet authorization before establishing a connection to the ZTNA device. When SPA is disabled or is enabled but not configured with hidden IP address and port number on the ZTNA device, the ZTNA device will no perform single packet authorization on the clients no matter whether SPA is enabled on clients. • Enable: When SPA is enabled, the knock port should be manually specified. • Disable: When SPA is disabled, ZTNA clients will not knock when logging in. • Auto: No matter whether SPA is enabled on the ZTNA device, clients consider that the ZTNA device requires single packet authorization and knocks on the default knock port number. This is the default option.

Option	Description
Stability Optimization	Set whether to use TCP for data transmission. This function applies in the SSL VPN access scenario. It is disabled by default. To use it, make sure the device side has the TCP port configured. It is disabled by default.
Verify Server Cert	Click **Enable** button to verify the certificate of the server when establishing the connection. To add trusted certificates, please refer to General Configuration.

Tips: If the password control function and the change password function are enabled on the device, for example: the system will remind the user to change the password before and after the password expires, and verify the historical password to ensure that the new password is different from the previous password. For more information about password control function, refer to Configuring a Local AAA Server.

3. After the connection information configuration is completed, click **OK**. The system will save a login entry. If needed, you can repeat the previous step to add more login entries.
4. On the client main page, the configured connection information has been saved as a login entry. Click **Connect**. The client will attempt to establish a connection to the device.
5. If SMS authentication, email authentication or token authentication is enabled, enter the corresponding authentication code to complete the authentication.

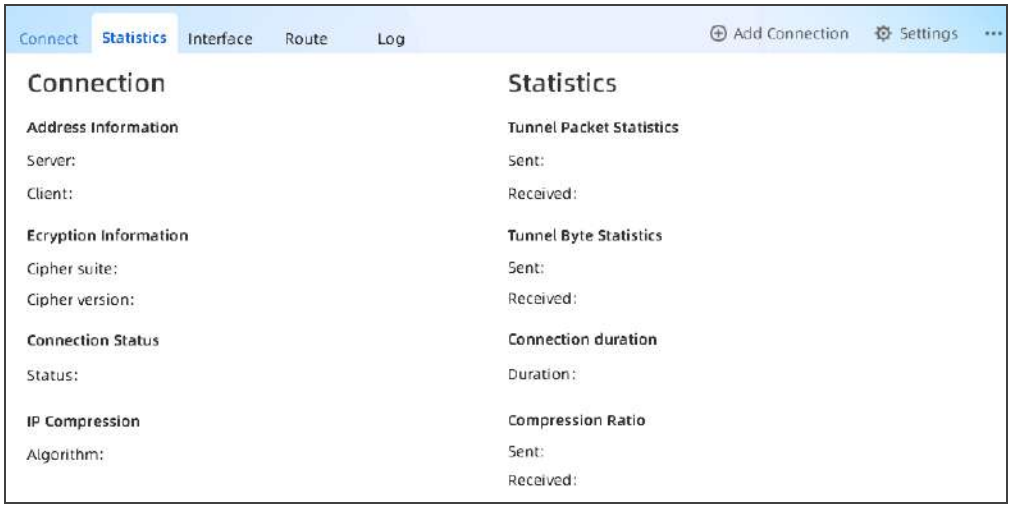
Finishing the above steps, the client will connect to the server automatically.

Editing and Deleting Login Entry

To edit or delete a login entry, place the cursor on the login entry. Click the icon to edit the entry; and the icon to delete the entry.

Viewing Connection and Statistics Information

On the client main page, click the **Statistics** tab to view connection and statistics information.

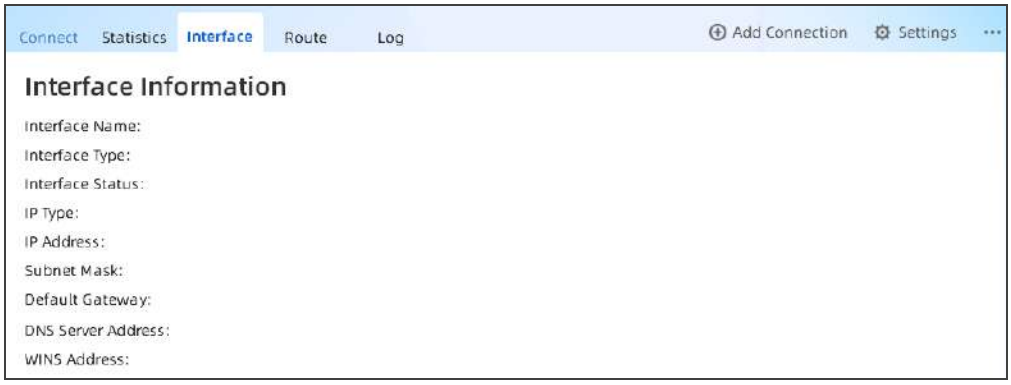


Address Information: Shows the IP addresses	
Server	The IP address of the connected SSL VPN/ZTNA server.
Client	The IP address of the client.
Encryption Information: Shows the encryption information.	
Cipher suite	The encryption algorithm and authentication algorithm used by SSL VPN/ZTNA.
Cipher version	The SSL version used by SSL VPN/ZTNA.
Connection Status	
Status	The current connecting state between the client and server.

Address Information: Shows the IP addresses	
IP Compress	
Algorithm	Shows the compression algorithm used by SSL VPN/ZTNA.
Tunnel Packets	
Send	The number of sent packets through the encryption tunnel.
Received	The number of received packets through the encryption tunnel.
Tunnel Bytes	
Send	Bytes sent through the tunnel.
Received	Bytes received through the tunnel.
Connection duration	
Duration	Time period during which the client is online.
Compression Ratio	
Send	Length ratio of sent data after compression.
Received	Length ratio of received data after compression.

Viewing Interface and Routing Information

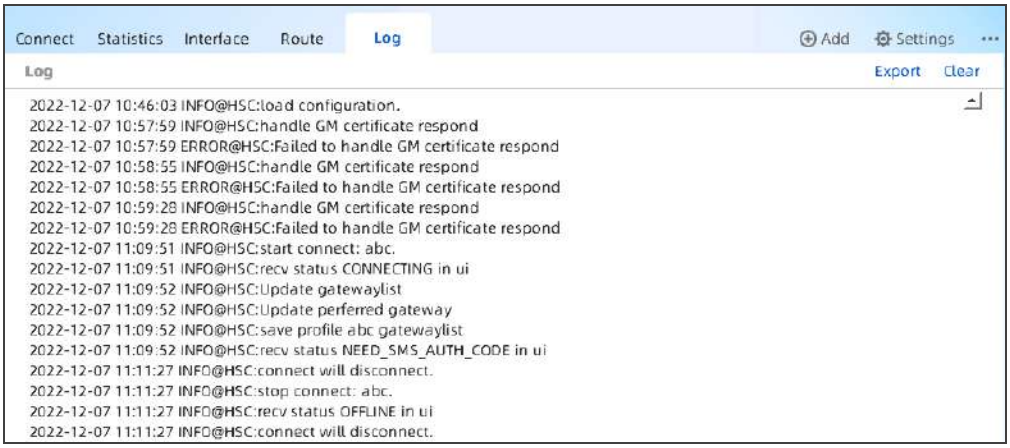
On the client main page, click the **Interface** tab to view interface information; click the **Route** tab to view routing information.



Option	Description
Interface Name	The name of the interface used to send encrypted data.
Interface Type	The type of the interface used to send encrypted data.
Interface Status	The status of the interface used to send encrypted data.
IP Type	The IP address type of the interface used to send encrypted data.
IP Address	The IP address (allocated by the device) of the interface used to send encrypted data.
Subnet Mask	The subnet mask of the interface used to send encrypted data.
Default Gateway	The default gateway address of the interface used to send encrypted data.
DNS Server Address	The address of the DNS server used by the client.
WINS Address	The address of the WINS server used by the client.

Viewing Log Information

On the client main page, click the **Log** tab to view log information.



Click ••• and select "Log Level" to set the level of logs to be displayed.

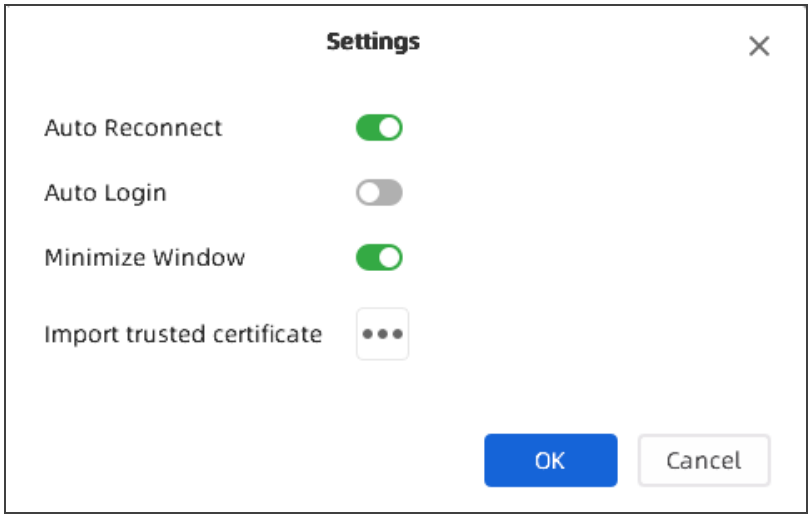
Client Menu

Right-click the green icon of the client, the client menu appears. Descriptions of the menu items:

- **Redirect URL**: When the device end has a redirect URL configured, users can click this menu to quickly jump to this URL address.
- **Resource List**: When accessing the SCVPN service, user can click this menu to open the browser page displaying internal resources.
- **Application Resource List**: When a user successfully connects to a ZTNA service using the Secure Connect client, this menu is displayed. After the user logs in, a ZTNA portal page will be displayed. The user can click this menu to display the latest ZTNA portal page to view the application resource access privilege after it is closed. The portal page displays the application resources that the user is granted access and is not granted access. For those that the user is not granted access, the user can attempt to acquire the access privilege by adjusting the access terminal configurations. The application resources that the user is denied from accessing will not be displayed on the portal page. If a user is denied from accessing any application resources, the portal page displays a message indicating that no Web resources are available to the user.
- **Show Window**: When Secure Connect client window is minimized, click this menu item to display the client main page.
- **Quit**: Click **Quit** to close the client.

General Configuration

Click **Settings** on the client main page.



- **Automatic reconnect**: Enable this option to automatically reconnect to the SSL VPN/ZTNA server when the connection is hung up.
- **Automatic login**: Enable this option to allow the specified user to login automatically when the client is starting. Select the auto login user from the drop-down list.
- **Minimize window**: Enable this option to allow the client window to be minimized.
- **Import trusted certificate**: After the Verify Server Cert function is enabled when establishing a connection, click ••• button, and click **Import** on the<Trusted certificate>page to import the authentication certificate for the server. Click **Delete** to delete the trusted certificate in the list

Uninstalling the Client

To uninstall the client, right-click the client icon and select Move to Trash from the drop-down-list.

Hillstone Secure Connect Client for Linux

The SSL VPN/ZTNA client for Linux is Hillstone Secure Connect. It can run in the following operation systems:

- CentOS 7.6/7.7/7.8/7.9/8.0/8.1/8.2/8.3/8.4/8.5
- Ubuntu 18.04/18.10/19.04/19.10/20.04/20.10/21.04
- Ubuntu Kylin 18.04/20.04

The encrypted data can be transmitted between the client and the SSL VPN/ZTNA server after a connection has been established successfully. The functions of the client are:

- Get interface and route information from the PC in which the client is running.
- Show the connection status, traffic statistics, and route information.
- Show log messages.
- Collect and report endpoint status information.

Take CentOS 7.6 as an example to introduce downloading and installing client, starting client and establishing connection, upgrading and uninstalling client, the client GUI and menu. The client configuration of other three Linux systems can refer to 64-bit Ubuntu Kylin16.04 desktop.

Downloading and Installing the Client

To download and install the Secure Connect Linux client, take the following steps:

1. Visit Hillstone Networks Official Website https://www.hillstonenet.com/more/services/product-downloads/, or https://IP-Address:Port-Number on the device side. In the URL, IP-Address and Port-Number refer to the IP address and HTTPS port number of the egress interface specified in the SSL VPN/ZTNA instance.

2. After downloading the installation file, right-click the client icon and select **Properties** to go to the properties page. In the properties page, click **Permissions** tab and check **Allow executing files as program**, then close it.

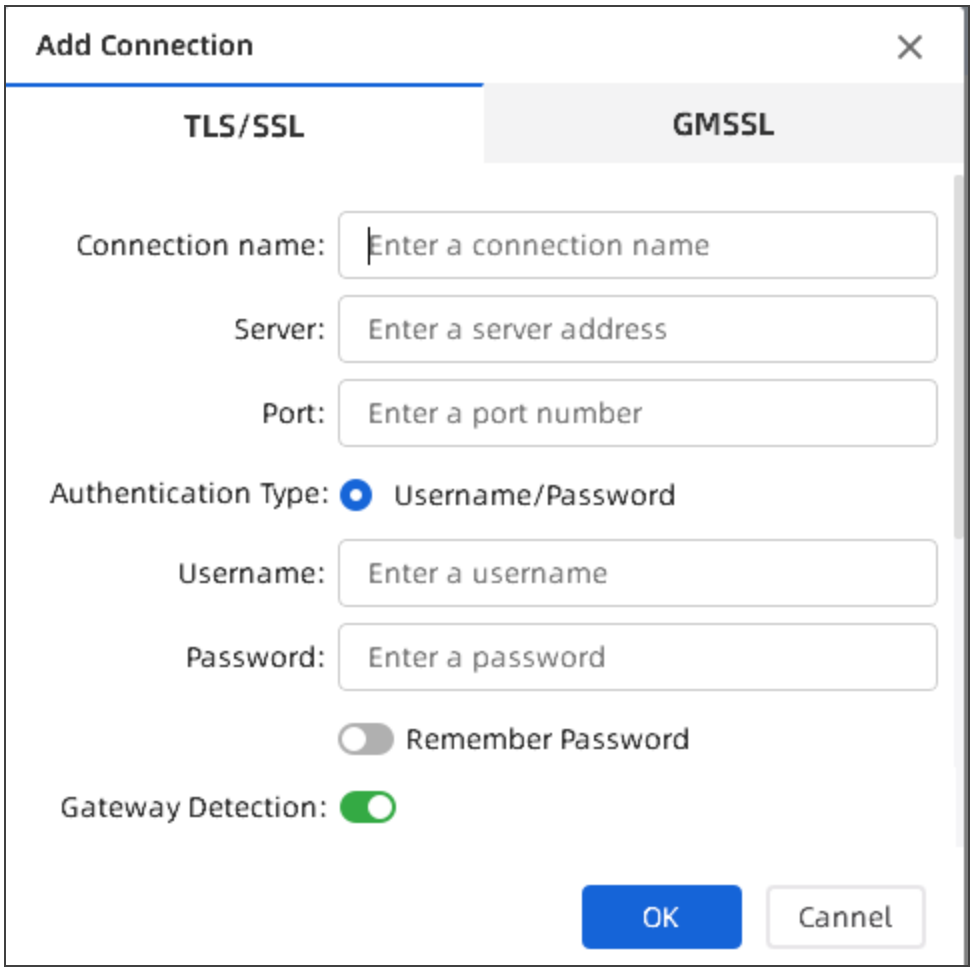
3. Double-click the client icon and follow the setup wizard to complete the installation.

Starting Up and Connecting

After the Secure Connect Linux client is installed successfully, take the following steps to start and log in the client:

1. Double-click the Hillstone Secure Connect icon on your desktop. The client main page is displayed.

2. Click **Add**. The following dialog box is displayed.



Enter the connection information.

Option	Description
TLS/SSL	Select this tab to use the TLS/SSL protocol.
GMSSL	Select this tab to use the GMSSL protocol.
Connection Name	Enter the connection name.
Server	Enter the IP address of SSL VPN or ZTNA server.
Port	Enter the HTTPS port number of SSL VPN or ZTNA

Option	Description
	server.
User name	Enter the name of the login user.
Password	Enter the password of the login user. If local authentication server is configured on the device, the user name and password should be configured in advance on the device.
Remember Password	After this option is enabled, you do not need to enter the user's password at the next-time connection.
Gateway Detection	Set whether to enable the gateway detection function, which applies in the ZTNA access scenario. If the ZTNA device has backup gateway configured, ZTNA users can enable gateway detection on ZTNA clients. When a user logs in, the ZTNA client will obtain the backup gateway list, detect the link quality of each gateway and establish a connection to the one with the best link quality. After the connection is established, the ZTNA client will detect and update the link quality of all gateways every 30 minutes. If a connection or login failure occurs, the ZTNA client will switch to connect the gateway with the best link quality. It is enabled by default.
Preferred Gateway	After gateway detection is enabled, the ZTNA client will obtain the backup gateway list during user login. At this time, users can manually select a preferred gateway. By default, the preferred gateway is not set. If it is set, the

Option	Description
	ZTNA client will preferentially connect it when the user logs in via this client again. If the connection fails, the ZTNA client will switch to connect the gateway with the best link quality.
SPA	Set whether to enable the SPA function, which applies in the ZTNA access scenario. If the ZTNA device has SPA enabled and is configured with hidden IP address and port number, ZTNA users also need to enable SPA on ZTNA clients. When a user logs in via the ZTNA client, the user needs to pass single packet authorization before establishing a connection to the ZTNA device. When SPA is disabled or is enabled but not configured with hidden IP address and port number on the ZTNA device, the ZTNA device will no perform single packet authorization on the clients no matter whether SPA is enabled on clients. • Enable: When SPA is enabled, the knock port should be manually specified. • Disable: When SPA is disabled, ZTNA clients will not knock when logging in. • Auto: No matter whether SPA is enabled on the ZTNA device, clients consider that the ZTNA device requires single packet authorization and knocks on the default knock port number. This is the default option.
Stability	Set whether to use TCP for data transmission. This func-

Option	Description
Optimization	tion applies in the SSL VPN access scenario. It is disabled by default. To use it, make sure the device side has the TCP port configured. It is disabled by default.
Verify Server Cert	Click **Enable** button to verify the certificate of the server when establishing the connection. To add trusted certificates, please refer to General Configuration.

Tips: If the password control function and the change password function are enabled on the device, for example: the system will remind the user to change the password before and after the password expires, and verify the historical password to ensure that the new password is different from the previous password. For more information about password control function, refer to Configuring a Local AAA Server.

3. After the connection information configuration is completed, click **OK**. The system will save a login entry. If needed, you can repeat the previous steps to add more login entries.
4. On the client main page, the configured connection information has been saved as a login entry. Click **Connect**. The client will attempt to establish a connection to the device.
5. If SMS authentication, email authentication or token authentication is enabled, enter the corresponding authentication code to complete the authentication.

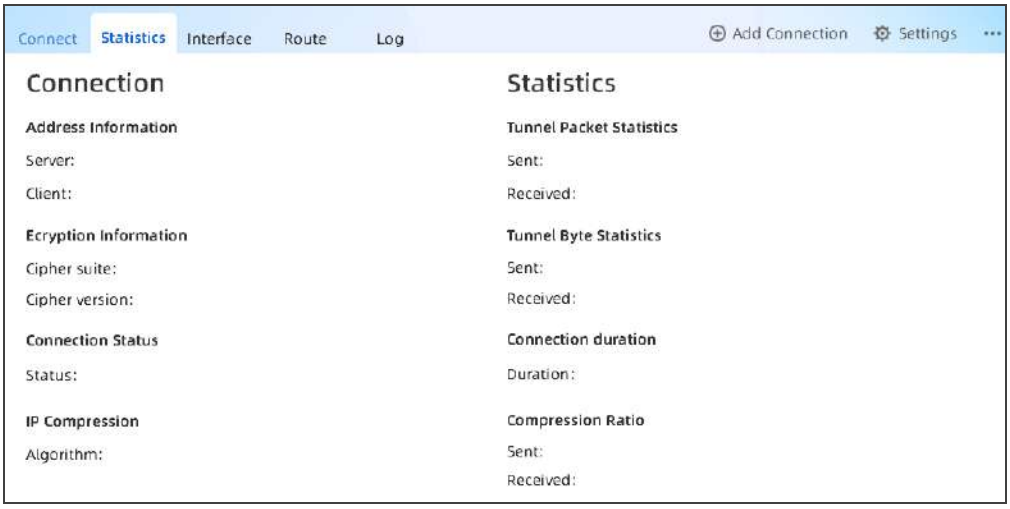
After the client connects to the SSL VPN/ZTNA server, the encrypted data can be transmitted between the client and the server now.

Editing and Deleting Login Entry

To edit or delete a login entry, place the cursor on the login entry. Click the icon to edit the entry; and the icon to delete the entry.

Viewing Connection and Statistics Information

On the client main page, click the **Statistics** tab to view connection and statistics information.

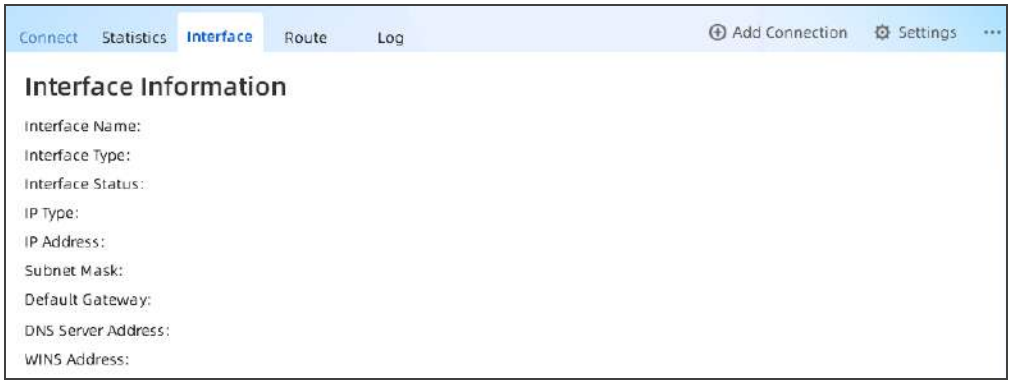


Address Information: Shows the IP addresses	
Server	The IP address of the connected SSL VPN/ZTNA server.
Client	The IP address of the client.
Encryption Information: Shows the encryption information.	
Cipher suite	The encryption algorithm and authentication algorithm used by SSL VPN/ZTNA.
Cipher version	The SSL version used by SSL VPN/ZTNA.
Connection Status	
Status	The current connecting state between the client and server.

Address Information: Shows the IP addresses	
IP Compression	
Algorithm	Shows the compression algorithm used by SSL VPN/ZTNA.
Tunnel Packet Statistics	
Send	The number of sent packets through the encryption tunnel.
Received	The number of received packets through the encryption tunnel.
Tunnel Byte Statistics	
Send	Bytes sent through the tunnel.
Received	Bytes received through the tunnel.
Connection duration	
Duration	Time period during which the client is online.
Compression Ratio	
Send	Length ratio of sent data after compression.
Receive	Length ratio of received data after compression.

Viewing Interface and Routing Information

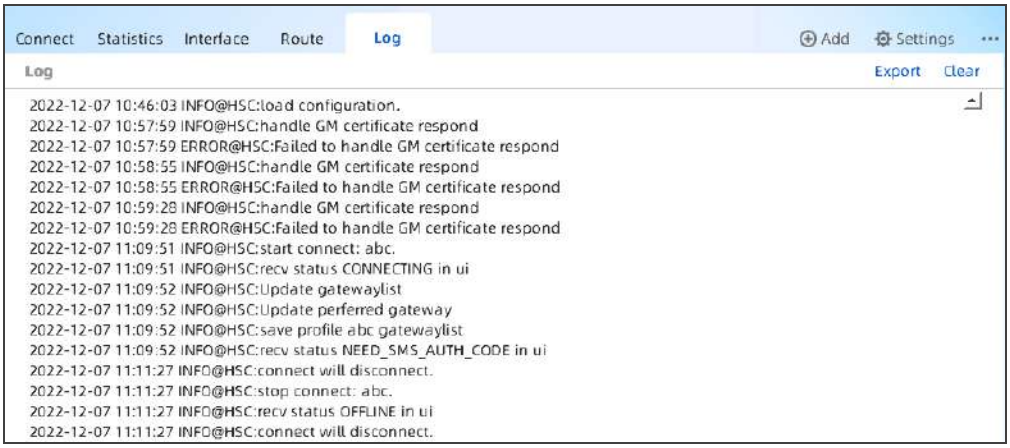
On the client main page, click the **Interface** tab to view interface information; click the **Route** tab to view routing information.



Option	Description
Interface Name	The name of the interface used to send encrypted data.
Interface Type	The type of the interface used to send encrypted data.
Interface Status	The status of the interface used to send encrypted data.
IP Type	The IP address type of the interface used to send encrypted data.
IP Address	The IP address (allocated by the device) of the interface used to send encrypted data.
Subnet Mask	The subnet mask of the interface used to send encrypted data.
Default Gateway	The default gateway address of the interface used to send encrypted data.
DNS Server Address	The address of the DNS server used by the client.
WINS Address	The address of the WINS server used by the client.

Viewing Log Information

On the client main page, click the **Log** tab to view log information.



Click ••• and select "Log Level" to set the level of logs to be displayed.

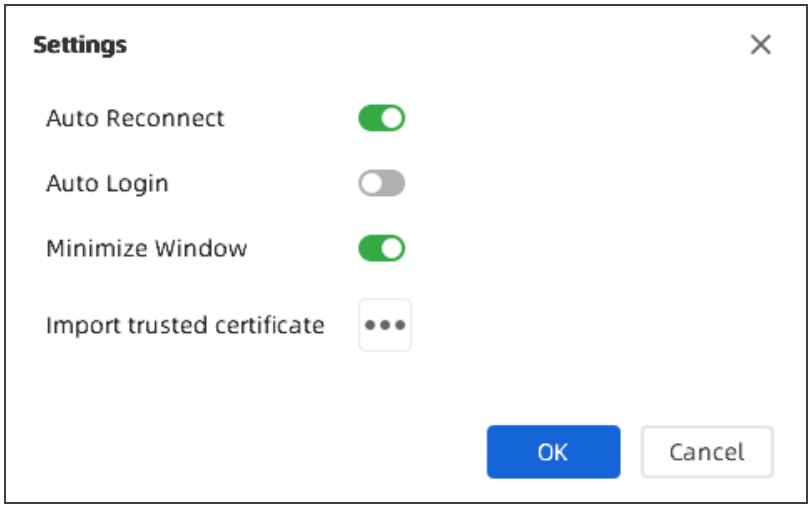
Client Menu

Right-click the green icon of the client, the client menu appears. Descriptions of the menu items:

- **Change Password**: Displays the dialog for changing password.
- **Redirect URL**: When the device end has a redirect URL configured, users can click this menu to quickly jump to this URL address.
- **Resource List**: When accessing the SCVPN service, user can click this menu to open the browser page displaying internal resources.
- **Application Resource List**: When a user successfully connects to a ZTNA service using the Secure Connect client, this menu is displayed. After the user logs in, a ZTNA portal page will be displayed. The user can click this menu to display the latest ZTNA portal page to view the application resource access privilege after it is closed. The portal page displays the application resources that the user is granted access and is not granted access. For those that the user is not granted access, the user can attempt to acquire the access privilege by adjusting the access terminal configurations. The application resources that the user is denied from accessing will not be displayed on the portal page. If a user is denied from accessing any application resources, the portal page displays a message indicating that no Web resources are available to the user.
- **Show Window**: When Secure Connect client window is minimized, click this menu item to display the client main page.
- **Quit**: Click **Quit** to close the client.

General Configuration

Click **Settings** on the client main page.



- **Automatic reconnect**: Enable this option to automatically reconnect to the SSL VPN/ZTNA server when the connection is hung up.
- **Automatic login**: Enable this option to allow the specified user to login automatically when the client is starting. Select the auto login user from the drop-down list.
- **Minimize window**: Enable this option to allow the client window to be minimized.
- **Import trusted certificate**: After the Verify Server Cert function is enabled when establishing a connection, click ••• button, and click **Import** on the<Trusted certificate>page to import the authentication certificate for the server. Click **Delete** to delete the trusted certificate in the list

L2TP VPN

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

L2TP (Layer Two Tunneling Protocol) is a VPDN technique that allows dial-up users to launch VPN connection from L2TP clients or L2TP access concentrators (LAC), and connect to a L2TP network server (LNS) via PPP. After the connection has been established successfully, LNS will assign IP addresses to legal users and permit them to access the private network.

The device acts as a LNS or a L2TP client in the L2TP tunnel network. When the device acts as a LNS, the device accepts connections from L2TP clients or LACs, implements authentication and authorization, and assigns IP addresses, DNS server addresses and WINS server addresses to legal users. When the device acts as a L2TP client, the device actively initiates PPP negotiation and authentication. After the tunnel is established, the traffic will be transmitted to the opposite end through the L2TP VPN tunnel.

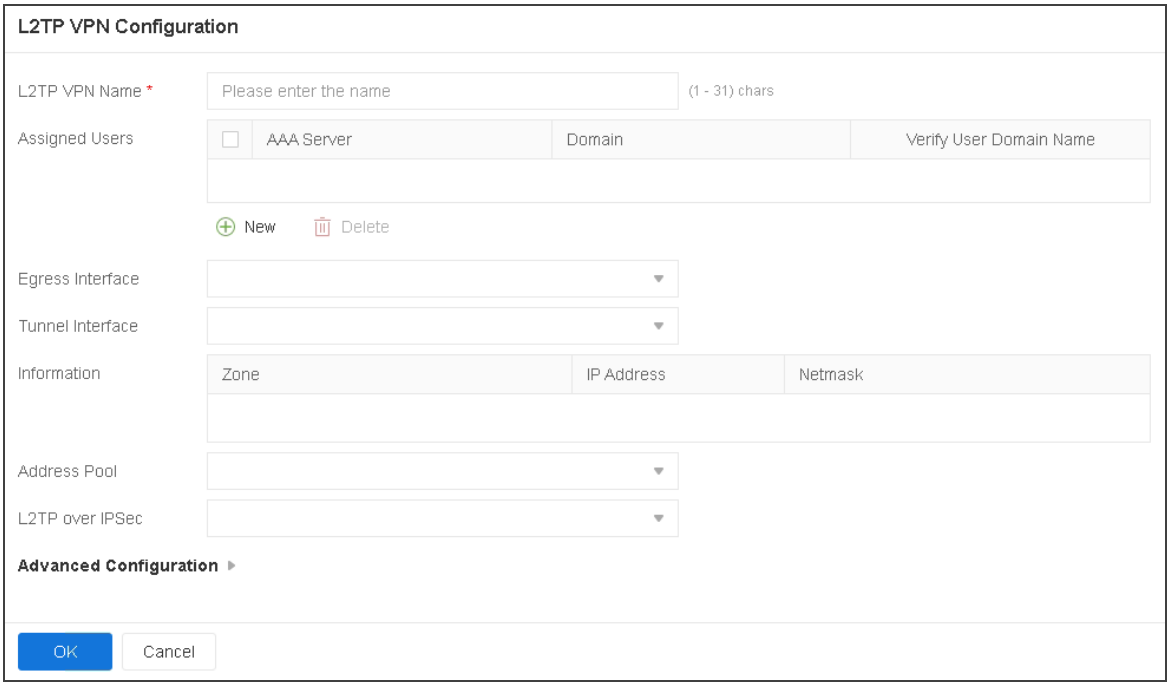
L2TP does not encrypt the data transmitted through the tunnel, so it cannot assure security during the transmission. You can use L2TP in combination with IPsec, and encrypt data by IPSec, thus assuring the security during the data transmitted through the L2TP tunnel.

Configuring a LNS

Configuring an L2TP VPN

To create an L2TP VPN instance, take the following steps:

1. Select **Network > VPN > L2TP VPN**.
2. In the L2TP VPN page, click **New**.



In the Name/Access User tab, configure the corresponding options.

Option	Description
L2TP VPN Name	Type the name of the L2TP VPN instance
Assigned Users	
AAA Server	Select an AAA server from the **AAA Server** drop-down list. You can click **View AAA Server** to view the detailed information of this AAA server.
Domain	Type the domain name into the **Domain** box. The domain name is used to distinguish the AAA server.
Verify User Domain Name	After this function is enable, system will verify the user-name and its domain name.
Add	Click **Add** to add the assigned users. You can repeat to add more items.

In the Interface/Address Pool/IPSec Tunnel tab, configure the corresponding options.

Access Interface	
Egress Interface	Select the interface from the drop-down list as the L2TP VPN server interface. This interface is used to listen to the request from L2TP clients.
Tunnel Interface	
Tunnel Interface	Specifies the tunnel interface used to bind to the L2TP VPN tunnel. Tunnel interface transmits traffic to/from L2TP VPN tunnel. • Select a tunnel interface from the drop-down list, and then click **Edit** to edit the selected tunnel interface. • Click **New** in the drop-down list to create a new interface.
Information	Shows the zone, IP address, and netmask of the selected tunnel interface.
Address Pool	
Address Pool	Specifies the L2TP VPN address pool. • Select an address pool from the drop-down list, and then click **Edit** to edit the selected address pool. • Click **New** in the drop-down list to create a new address pool. For more information about creating/editing address pools, see "Configuring an L2TP VPN Address Pool" on Page 687.

Information	Shows the start IP address, end IP address, and mask of the address pool.
L2TP over IPSec	
L2TP over IPSec	Select a referenced IPSec tunnel from the drop-down list. L2TP does not encrypt the data transmitted through the tunnel, so it cannot assure security during the transmission. You can use L2TP in combination with IPSec, and encrypt data by IPSec, thus assuring the security for the data transmitted through the L2TP tunnel.

3. If necessary, click **Advanced Configuration** to configure the advanced functions.

In the Parameters tab, configure the corresponding options.

Security	
Tunnel Authentication	Click **Enable** to enable tunnel authentication to assure the security of the connection. The tunnel authentication can be launched by either LNS or LAC. The tunnel cannot be established unless the both ends are authenticated, i.e., the secret strings of the two ends are consistent.
AVP Hidden	Click **Enable** to enable AVP hidden. L2TP uses AVP (attribute value pair) to transfer and negotiate several L2TP parameters and attributes. By default AVP is transferred in plain text. For data security consideration, you can encrypt the data by the secret string to hide the AVP during the transmission.
Secret	Specifies the secret string that is used for LNS tunnel authentication.
Peer	Specifies the host name of LAC. If multiple LACs are connected to LNS, you can specify different secret

	strings for different LACs by this parameter.
Add	Click **Add** to add the configured secret and peer name pair to the list.
Client Connection	
Accept Client IP	Click **Enable** to allow the accepting of IP address specified by the client. By default the client IP is selected from the address pool, and allocated by LNS automatically. If this function is enabled, you can specify an IP address. However, this IP address must belong to the specified address pool, and be consistent with the username and role. If the specified IP is already in use, system will not allow the user to log on.
Multiple Login	Click **Enable** to allow a user to log on and be authenticated on different hosts simultaneously.
Hello Interval	Specifies the interval at which Hello packets are sent. LNS sends Hello packets to the L2TP client or LAC regularly, and will drop the connection to the tunnel if no response is returned after the specified period.
LNS Name	Specifies the local name of LNS.
Tunnel Windows	Specifies the window size for the data transmitted through the tunnel.
Control Packet Transmit Retry	Specifies the retry times of control packets. If no response is received from the peer after the specified retry times, system will determine the tunnel connection is disconnected.
PPP Configuration	
LCP Interval Transmit	Specifies parameters for LCP Echo packets used for PPP negotiation. The options are:

Retries	• Interval: Specifies the interval at which LCP Echo packets are sent. • Transmit Retry: Specifies the retry times for sending LCP Echo packets. If LNS has not received any response after the specified retry times, it will determine the connection is disconnected.
PPP Authentication	Specifies a PPP authentication protocol. The options are: • PAP: Uses PAP for PPP authentication. • CHAP: Uses CHAP for PPP authentication. This is the default option. • Any: Uses CHAP for PPP authentication by default. If CHAP is not supported, then uses PAP.

4. Click **Done** to save the settings.

Configuring an L2TP VPN Address Pool

LNS assigns the IP addresses in the address pool to users. After the client has established a connection to LNS successfully, LNS will choose an IP address along with other related parameters (such as DNS server address, WINS server address, etc) from the address pool, and assign them to the client.

L2TP provides fixed IP addresses by creating and implementing IP binding rules.

- The static IP binding rule binds the client user to a fixed IP address in the address pool. Once the client has established a connection successfully, system will assign the binding IP to the client.
- The IP-role binding rule binds the role to a specific IP range in the address pool. Once the client has established a connection successfully, system will assign an IP address within the IP range to the client.

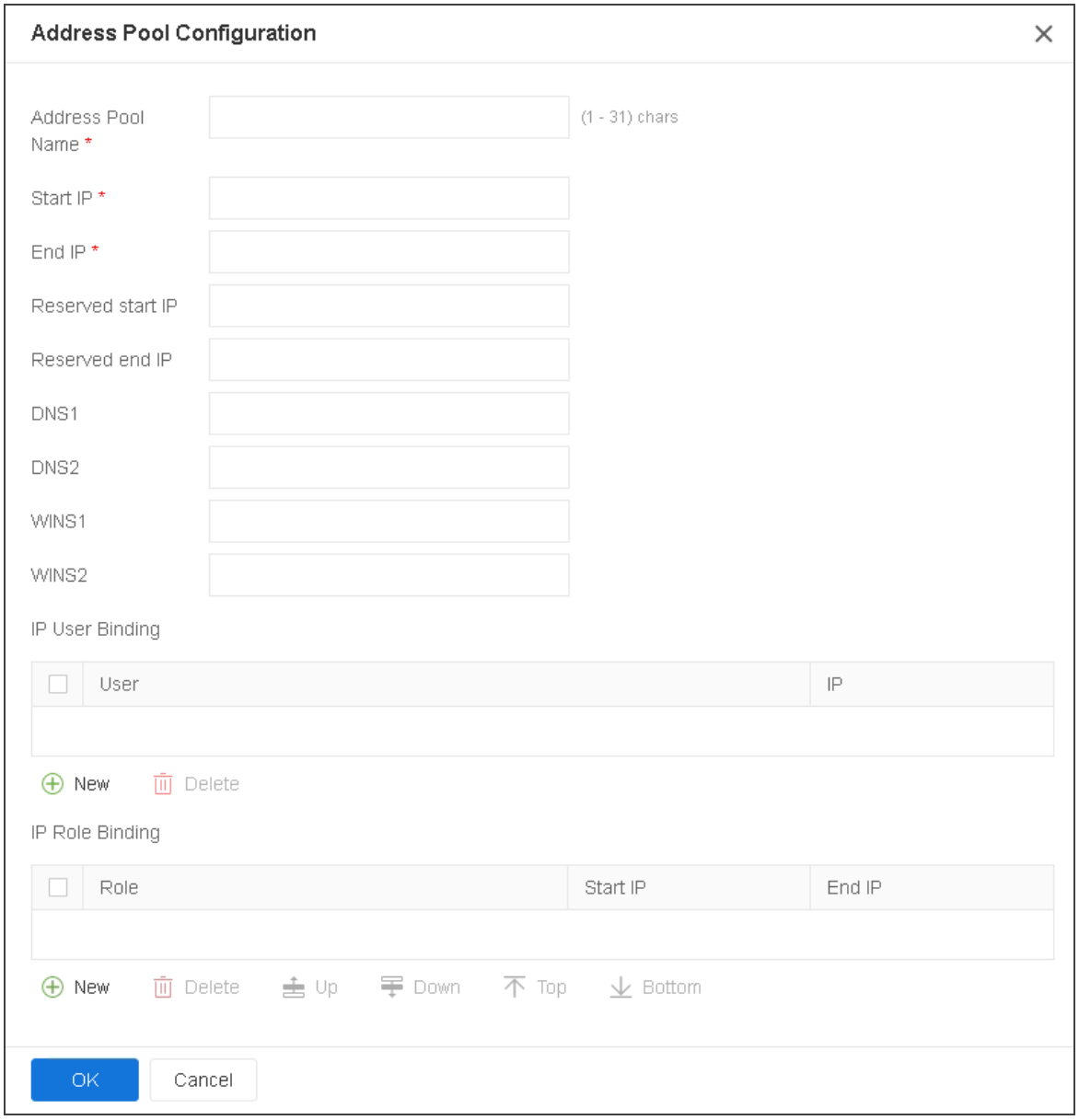
When LNS is allocating IP addresses in the address pool, system will check the IP binding rule and determine how to assign IP addresses for the client based on the specific checking order below:

Notes: The IP addresses defined in the static IP binding rule and IP-role binding rule should not be overlapped.

To create an address pool, take the following steps:

1. Select **Network > VPN > L2TP VPN**.
2. At the top-right corner, click **Address Pool**.

3. In the pop-up window, click **New**.



In the Basic Configuration tab, configure the corresponding options.

Option	Description
Address Pool	Specifies the name of the address pool.

Option	Description
Name	
Start IP	Specifies the start IP of the address pool.
End IP	Specifies the end IP of the address pool.
Reserved Start IP	Specifies the reserved start IP of the address pool.
Reserved End IP	Specifies the reserved end IP of the address pool.
DNS1/2	Specifies the DNS server IP address for the address pool. It is optional. Up to 2 DNS servers can be configured for one address pool.
WINS1/2	Specifies the WIN server IP addresses for the address pool. It is optional. Up to 2 WIN servers can be configured for one address pool.

In the IP User Binding tab, configure the corresponding options.

Option	Description
User	Type the user name into the **User** box.
IP	Type the IP address into the **IP** box.
Add	Click **Add** to add this IP user binding rule.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.

In the IP Role Binding tab, configure the corresponding options.

Option	Description
Role	Type the role name into the **Role** box.
Start IP	Type the start IP address into the **Start IP** box.
End IP	Type the end IP address into the **End IP** box.
Add	Click **Add**to add this IP role binding rule.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.
Up/Down/Top/Bottom	System will query for IP role binding rules by turn, and allocate the IP address according to the first matched rule. You can move the location up or down at your own choice to adjust the matching sequence accordingly.

4. Click **OK** to save the settings.

Viewing L2TP VPN Online Users

To view the L2TP VPN online users, take the following steps:

1. Select **Network > VPN > L2TP VPN**.
2. Select an L2TP VPN instance.
3. View the detailed information of the online users in the table.

Option	Description
Name	Displays the name of L2TP VPN.
Login Time	Displays the login time of the L2TP VPN online user.
Public IP	Displays the public IP of the L2TP VPN online user.

Option	Description
Private IP	Displays the private IP of the L2TP VPN online user.
Operation	Displays the executable operation of the L2TP VPN online user.

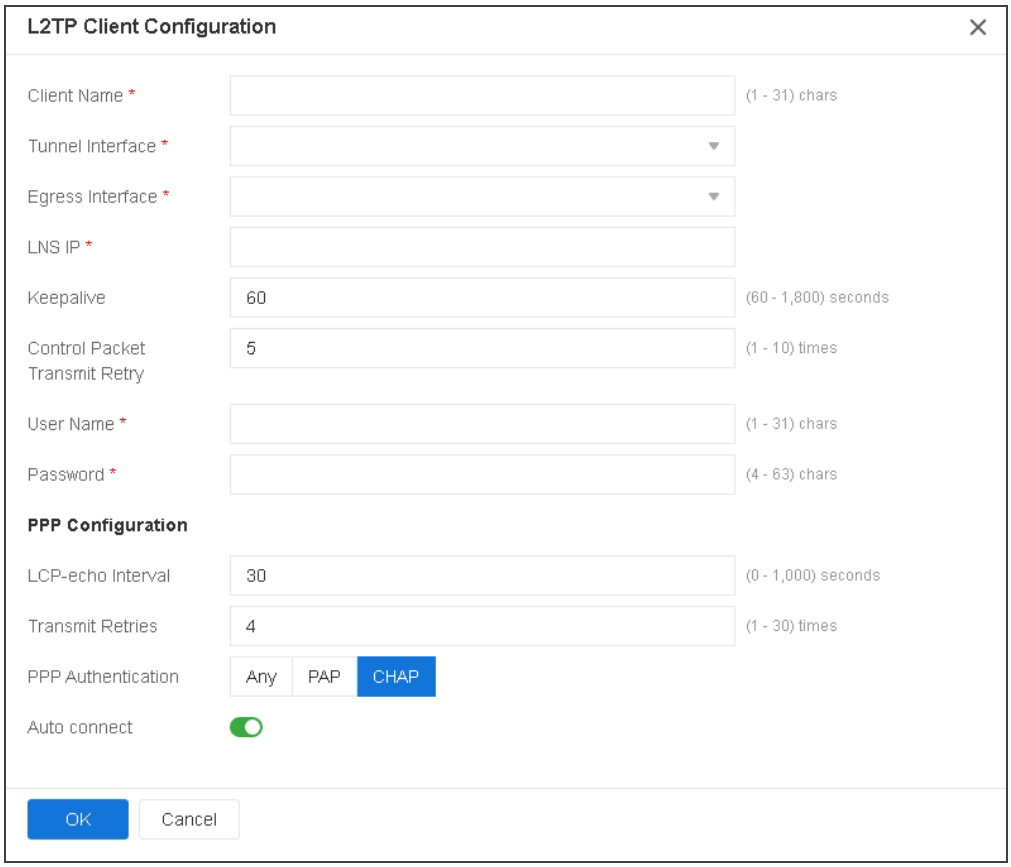
Configuring Device as L2TP Client

Configuring a L2TP Client

To create an L2TP client, take the following steps:

1. Select **Network > VPN > L2TP VPN**.
2. At the top-right corner, click **L2TP Client**.

3. In the L2TP Client page, click **New**.



Option	Description
Client Name	Type the name of the L2TP client.
Tunnel Interface	Specifies the tunnel interface used to bind to the L2TP client. Tunnel interface transmits traffic to/from L2TP client.
Egress Interface	Select the interface from the drop-down list as the L2TP client interface. This interface is used to listen to the request from LNS.
LNS IP	Specifies the IP address of the LNS server.

Option	Description
Keepalive	To ensure normal communication between the LNS and L2TP client, the L2TP client periodically sends Hello packets to check whether the LNS is properly connected. Keepalive indicates the interval at which the L2TP client sends two Hello packets. The smaller the value, the quicker the fault sensing; the larger the value, the lower the occupied bandwidths.
Control Packet Transmit Retry	Specifies the retry times of control packets. If no response is received from the peer after the specified retry times, system will determine the tunnel connection is disconnected.
User Name	Specifies the name of the L2TP client, the L2TP client uses the user name to initiate a request to the LNS for establishing an L2TP VPN tunnel.
Password	Specifies the password of the L2TP client.
PPP Configuration	
LCP-echo Interval	Specifies the interval at which LCP Echo packets are sent. The value range is 0 to 1000 seconds.
Transmit Retries	Specifies the retry times for sending LCP Echo packets. If L2TP client has not received any response after the specified retry times, it will determine the connection is disconnected.
PPP Authentic-	Specifies a PPP authentication protocol. The options

Option	Description
ation	are: • PAP: Uses PAP for PPP authentication. • CHAP: Uses CHAP for PPP authentication. This is the default option. • Any: Uses CHAP for PPP authentication by default. If CHAP is not supported, then uses PAP.
Auto connect	Enables the automatic L2TP client dialup function. After the function is enabled, the L2TP client and LNS can establish tunnels. Users can access the intranet connected to the LNS, without performing the PPP dialup.

4. Click **OK**.

VXLAN

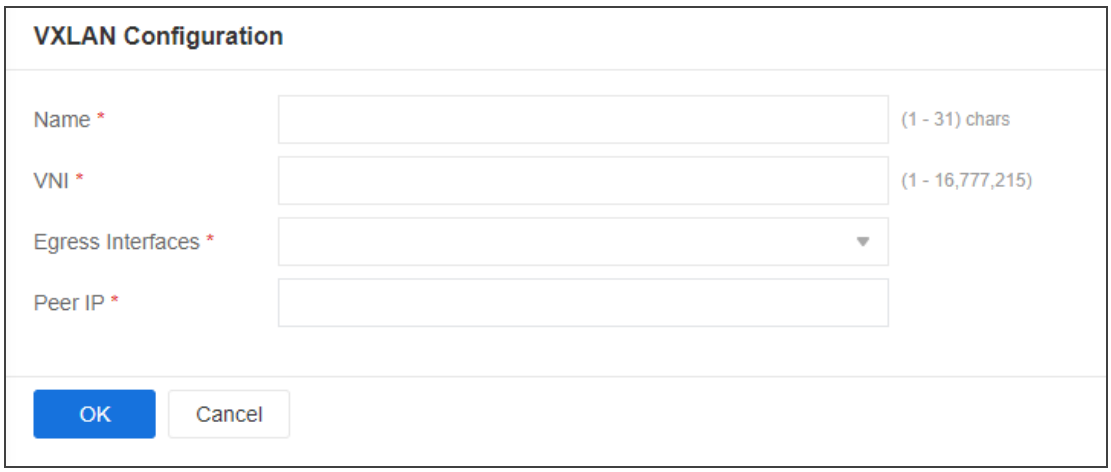
Virtual extensible local area network (VXLAN) is a tunnel encapsulation technology for large layer 2 network expansion overe NOV3 that uses MAC-in-UDP encapsulation. VXLAN uses a 24-bit network segment ID, called VXLAN network identifier (VNI), to identify users. This VNI is similar to a VLAN ID and supports a maximum of 16M [(2^24 - 1)/1024^2] VXLAN segments. VXLAN uses MAC-in-UDP encapsulation to extend Layer 2 networks to ensure uninterrupted services during VM migration, the IP address of the VM must remain unchanged.

VXLAN uses VTEP (VXLAN Tunnel Endpoint) equipment to encapsulate and decapsulate VXLAN packets, including ARP request packets and normal VXLAN data packets. VTEP encapsulates the original Ethernet frame through VXLAN and sends it to the peer VTEP device. The peer VTEP device decapsulates the VXLAN packet after receiving it, and then forwards it according to the original MAC. The VTEP can be a physical switch, a physical server, or other VXLAN-enabled Hardware equipment or software.

Creating VXLAN Static Tunnel

To creating VXLAN static tunnel, take the following steps:

1. Click **Network > VPN > VXLAN**.
2. Click **New**



Configure the following options.

Option	Description
Name	Specified the name of the VXLAN static tunnel.
VNI	Specified the ID as the global network identity of the VXLAN network. The value range is 1 to 16777215.
Egress Interfaces	Select the egress interface of the VXLAN network in the drop-down list.
Peer IP	Specified the destination VTEP IP address.

3. Click **OK**.

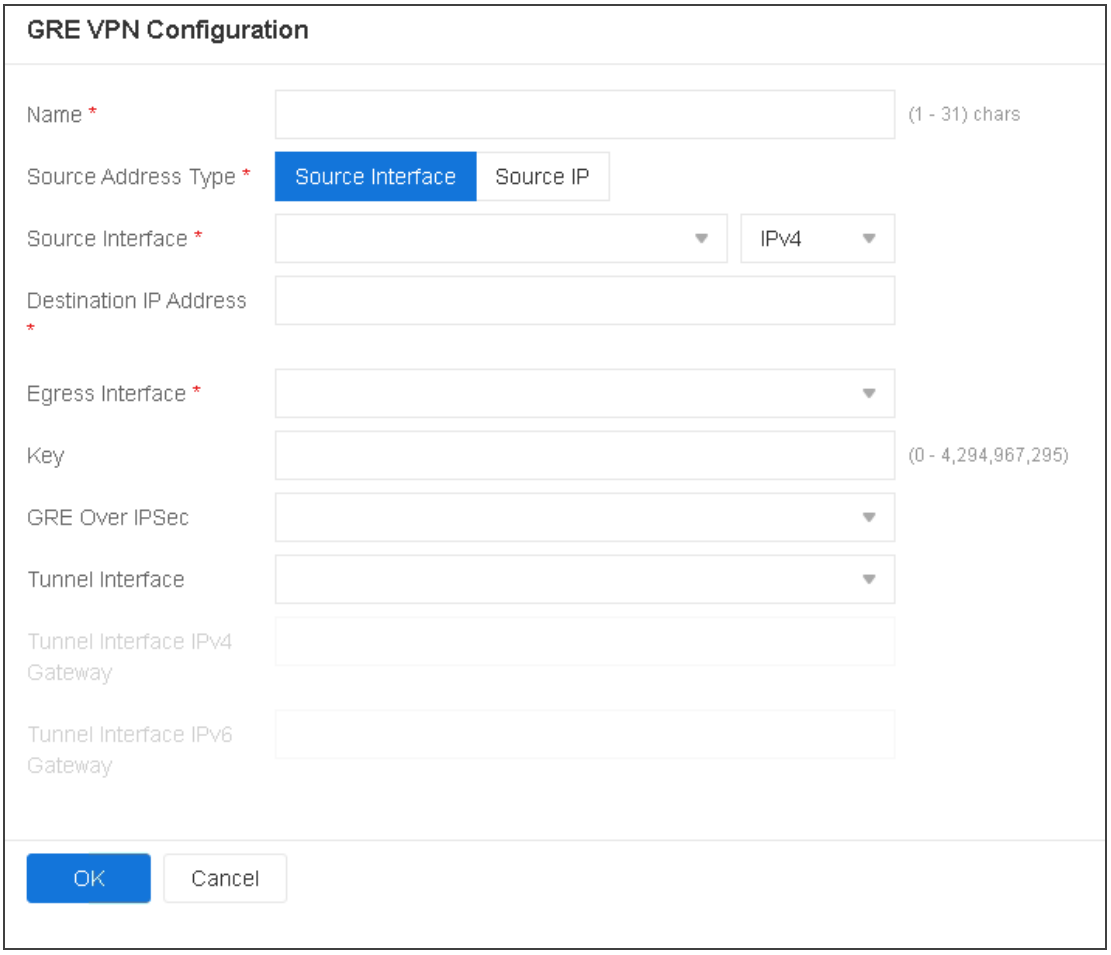
GRE VPN

Generic Routing Encapsulation (GRE) is a tunneling protocol that can encapsulate a wide variety of network layer protocols inside virtual point-to-point links over an Internet Protocol inter-network. StoneOS uses GRE over IPSEC feature to ensure the security of routing information passing between networks.

Configuring GRE VPN

To create an GRE VPN, take the following steps:

1. Select **Network > VPN > GRE VPN**.
2. In the GRE VPN page, click **New**.



Configure the corresponding options.

Option	Description
Name	Type the name of the GRE VPN.
Source Address Type	Specifies the type of source address for the GRE tunnel.
Source Interface/Source IP Address	Specifies a source interface or source IP Address for the GRE tunnel.
Destination IP	Specifies a destination address for the GRE tunnel

Option	Description
Address	
Engress Interface	Select the interface from the drop-down list as the GRE VPN interface.
Key	Specifies the verification key. When the key carried by the packets is the same as the key configured in the receiver, the packets will be decrypted. If the keys are not the same, the packets will be dropped.
GRE Over IPSec	Select a referenced IPSec tunnel from the drop-down list. GRE does not encrypt the data transmitted through the tunnel, so it cannot assure security during the transmission. You can use GRE in combination with IPSec, and encrypt data by IPSec, thus assuring the security for the data transmitted through the GRE tunnel.
Tunnel Interface	Specifies the tunnel interface used to bind to the GRE VPN tunnel. • Select a tunnel interface from the drop-down list, and then click  to edit the selected tunnel interface. • Click  in the drop-down list to create a new interface.
Tunnel Interface IPv4/IPv6 Gateway	Specifies the next hop (the peer tunnel interface) IP address of GRE tunnel when multiple tunnels bind to this interface. The next hop IP addresses can be spe-

Option	Description
	cified to IPv4 and/or IPv6 addresses.

3. Click **OK**.

Chapter 10 Object

This chapter describes the concept and configuration of objects that will be referenced by other modules in system, including:

- "Address" on Page 1034: Contains address information, and can be used by multiple modules, such as policy rules, NAT rules, QoS, session limit rules, etc.
- "Host Book" on Page 1040: A collection of one domain name or several domain names.
- "Service Book" on Page 1044: Contains service information, and can be used by multiple modules, such as policy rules, NAT rules, QoS, etc.
- "Application Book" on Page 1055: Contains application information, and it can be used by multiple modules, such as policy rules, NAT rules, QoS, etc.
- "SLB Server Pool " on Page 1105: Describes SLB server configurations.
- "Schedule" on Page 1110: Specifies a time range or period. The functions (such as policy rules, QoS rules, host blacklist, connections between the PPPoE interface and Internet) that use the schedule will take effect in the time range or period specified by the schedule.
- "AAA Server" on Page 1113: Describes how to configure an AAA server.
- "User" on Page 1148: Contains information about the functions and services provided by a Hillstone device, and users authenticated and managed by the device.
- "Role" on Page 1160: Contains role information that associates users to privileges. In function configurations, different roles are assigned with different services. Therefore, the mapped users can gain the corresponding services as well.
- "Track Object" on Page 1169: Tracks if the specified object (IP address or host) is reachable or if the specified interface is connected. This function is designed to track HA and interfaces.

- " URL Filtering" on Page 1176: URL filter controls the access to some certain websites and records log messages for the access actions.
- "NetFlow" on Page 1257 : Collect the user's incoming traffic information according to the NetFlow profile, and send it to the server with NetFlow data analysis tool.
- "End Point Protection" on Page 1262: Obtain the endpoint data monitored by the endpoint security control center by interacting with it, and then specify the corresponding processing action according to the security status of endpoint, so as to control the endpoint network behavior.
- "IoT Policy" on Page 1275: Identify the network video monitoring devices, like IPC (IP Camera) and NVR (Network Video Recorder) via the flowing traffic, then monitor the identified devices and block illegal behaviors according to the configurations.

Address

IP address is an important element for the configurations of multiple modules, such as policy rules, NAT rules and session limit rules. Therefore, system uses an address book to facilitate IP address reference and flexible configuration. You can specify a name for an IP range, and only the name is referenced during configuration. The address book is the database in system that is used to store the mappings between IP ranges and the corresponding names. The mapping entry between an IP address and its name in the address book is known as an address entry.

System provides a global address book. You need to specify an address entry for the global address book. When specifying the address entry, you can replace the IP range with a DNS name. Interfaces of the configured IPs will be used as address entries and added to the address book automatically. You can use them for NAT conveniently. Furthermore, an address entry also has the following features:

- All address books contain the following default address entries named **Any** and **private_network**. The IP address of **Any** is 0.0.0.0/0, which is any IP address. **Any** can neither be edited nor deleted. The IP addresses of **private_network** are 10.0.0.0/8, 172.16.0.0/12, 192.168.0.0/16, that all private network address. The **private_network** can be edited and deleted.
- One address entry can contain another address entry in the address book.
- If the IP range of an address entry changes, StoneOS will update other modules that reference the address entry automatically.

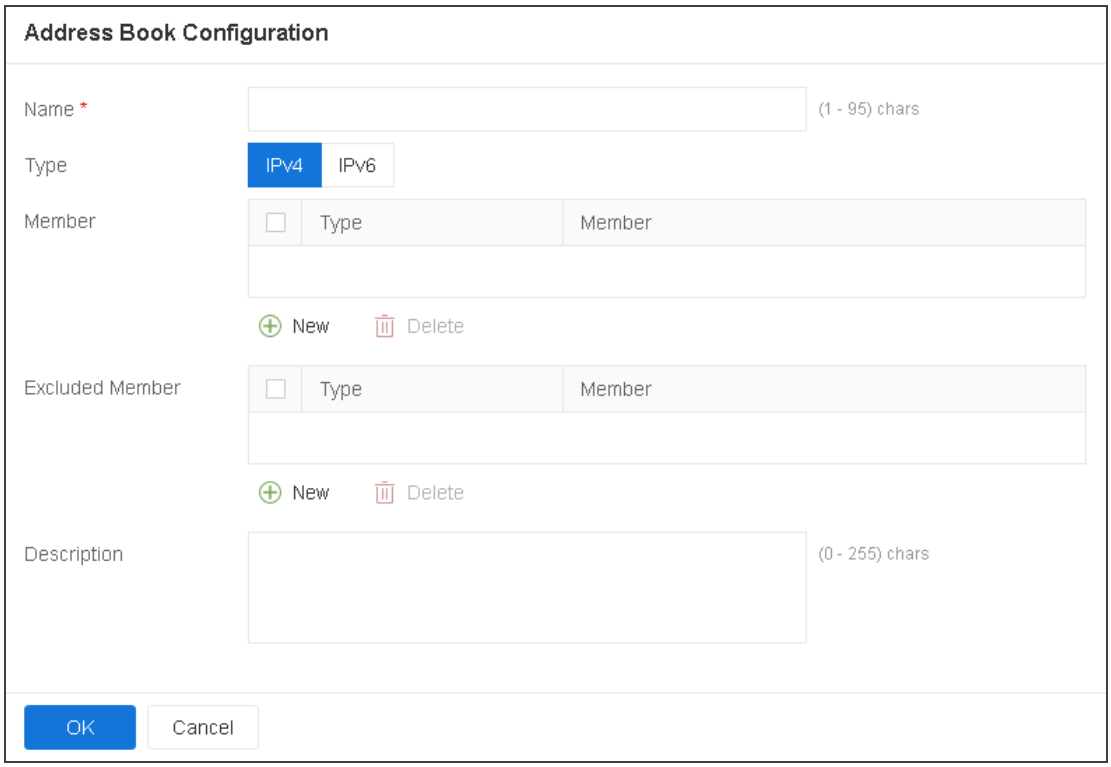
Address book supports IPv4 and IPv6 address. If IPv6 is enabled, you can configure IPv6 address entry.

Creating an Address Book

To create an address book, take the following steps:

1. Click **Object>Address Book**.

2. Click **New**.



In Address Book Configuration dialog box, enter the address entry configuration.

Basic	
Name	Type the address book name into the Name box.
Type	Select the IP type, including IPv4 or IPv6. Only the IPv6 firmware supports to configure IPv6 type.
Member	
Member	Click New to add a member . • When you select IPv4 type, configure IP/Netmask, IP Range, Hostname, Address Book, IP/Wildcard

Basic	
	or Country/Region as needed. • When you select IPv6 type, configure IPv6/prefix, IPv6 Range, Hostname, Address Book or IPv6/Wildcard as needed. Tips: • When you add the IP/Wildcard member, binary 1 indicates exact match and 0 indicates fuzzy match in wildcard netmask. The subnet mask format can not be configured. Meanwhile, the address book with the IP/Wildcard member cannot be referenced by QoS policy. • The address book with the Country/Region member can only be referenced by the security policy and the policy-based route rules. • The address book with the Country/Region member does not support the configuration of the **Excluded Member** settings. • When the type of the address entry member is IPv6/Wildcard, the 128bit wildcard mask must consist of consecutive 8 (or integer multiples of 8) zeros or consecutive 8 (or integer multiples of 8) 1s, such as FF00::FFFF. • A maximum of 8 address members of the IP/Wild-

Basic	
	card type or the IPv6/Wildcard type are allowed to be configured in each address book entry. • Only the security policy and the IPv6 address book support the address entry with the IPv6/Wildcard member added.
New	Click New to add the configured member to the list below. If it is needed, repeat the above steps to add more members.
Delete	Delete the selected member from the list.
Excluded Member	
Member	Specify the excluded member. Click New to add a member , and configure IP/netmask, IP/Prefix, or IP range as needed. **Note**: Excluded members' address range need to be in the address range of the members, otherwise the configuration cannot be completed.
New	Click New to add the configured excluded member to the list below. If needed, repeat the above steps to add more excluded members.
Delete	Delete the selected excluded member from the list.

3. Click OK.

Viewing Details

To view the details of an address entry, take the following steps, including the name, member, description and reference:

1. Click **Object>Address Book**.
2. In the Address Book dialog box, select "+" before an address entry from the member list, and view the details under the entry.

Searching Address Entries

Use the Filter to search for the address entries that match the filter conditions. The filter conditions include the address entry name, IP address of the members, the description, and whether the entry is referenced by other function modules.

1. Click **Object > Address Entry**.
2. At the top-right corner of the page, click **Filter**. Then a new row appears at the top.
3. Click **+Filter** to add a new filter condition. Then select a filter condition from the drop-down menu and enter a value.
4. Press **Enter** to search for the service entry that matches the filter conditions.
5. Repeat the above two steps to add more filter conditions. The relationship between each filter condition is **AND**.
6. To delete a filter condition, hover your mouse on that condition and then click the × icon.

   To close the filter, click the × icon on the right side of the row.

Save the filter conditions.

1. After adding the filter conditions, click the **+ Filter** after the next arrow, in the drop-down menu, click **Save Filters**.
2. Specifies the name of the filter condition to save, the maximum length of name is 32 characters, and the name supports only Chinese and English characters and underscores.
3. Click the **Save** button on the right side of the text box.
4. To use the saved filter condition, double click the name of the saved filter condition.
5. To delete the saved filter condition, click × on the right side of the filter condition.

Notes:

- You can add up to 20 filter conditions as needed.
- After the device has been upgraded, the saved filter condition will be cleared.

Host Book

You can specify a name to be a collection of one domain name or several domain names, and reference this host book when configuring. Host book is the database to store the relationships of domain integrations and the specified names in system.

The entry of the relationship of domain integrations and the specified name is called host entry.

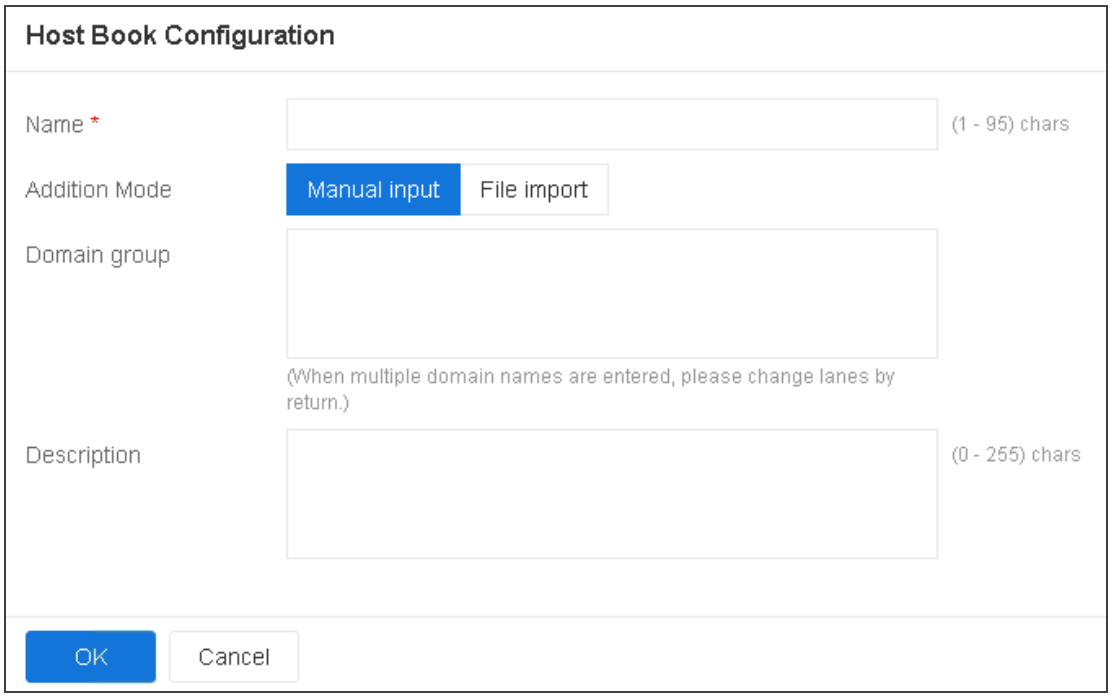
Notes:

- The maximum number of host entries is one fourth of the maximum number of address entries.

Creating a Host Book

To create a host book, take the following steps:

1. Select **Object > Host Book**.
2. Click **New**.



Configure the following options.

Option	Description
Name	Type a name for the host book.
Description	Type the description of host book entry.
Addition Mode	Specify the mode for adding domain members. • Manual input: Add the domain member to the host book via inputting IP address or domain manually. • File import: Add a batch of domain members to the host book via importing the file.
Domain Group	When the "Manual input" is selected, enter the IP address or domain names of the domain member. **Note**: Press **Enter** to separate several domain members.
File Name	When the "File import" is selected, click **Browser** to upload a domain name file in the local. **Note**: Only the UTF-8 encoding file (*.txt or *.csv) can be imported currently.

3. Click **OK**.

Editing a Host Book

To edit a host book, take the following steps:

1. Select **Object** > **Host Book**, and enter the **Host Book** page.
2. In the host book list, select a host book entry to edit and click **Edit**.
3. In the **Host Book Configuration** dialog, edit the selected host book entry as needed.

Notes: When you edit a host book entry, if you add more domain members via importing a file, the domain in the file will cover all the domain members in the selected entry.

Deleting a Host Book

To delete a host book, take the following steps:

1. Select **Object** > **Host Book**, and enter the **Host Book** page.
2. In the host book list, select a host book entry to delete and click **Delete**.

Viewing Details

To view details about a host book entry, take the following steps:

1. Select **Object** > **Host Book**.
2. In the host book list, select "+" before a host book entry, and view the details under the entry.

Service Book

Service is an information stream designed with protocol standards. Service has some specific distinguishing features, like corresponding protocol, port number, etc. For example, the FTP service uses TCP protocol, and its port number is 21. Service is an essential element for the configuration of multiple StoneOS modules including policy rules, NAT rules, QoS rules, etc.

System ships with multiple predefined services/service groups. Besides, you can also customize user-defined services/service groups as needed. All these service/service groups are stored in and managed by StoneOS service book.

Predefined Service/Service Group

System ships with multiple predefined services, and identifies the corresponding application types based on the service ports. The supported predefined services may vary from different Hillstone device models. Predefined service groups contain related predefined services to facilitate user configuration.

User-defined Service

Except for the above predefined services, you can also create your own user-defined services easily. The parameters that will be specified for the user-defined service entries include:

- Name
- Protocol type
- The source and destination port for TCP or UDP service, and the type and code value for ICMP service.

User-defined Service Group

You can organize some services together to form a service group, and apply the service group to StoneOS policies directly to facilitate management. The service group has the following features:

- Each service of the service book can be used by one or more service groups.
- A service group can contain both predefined services and user-defined services.
- A service group can contain another service group. The service group of StoneOS supports up to 8 layers of nests.

The service group also has the following limitations:

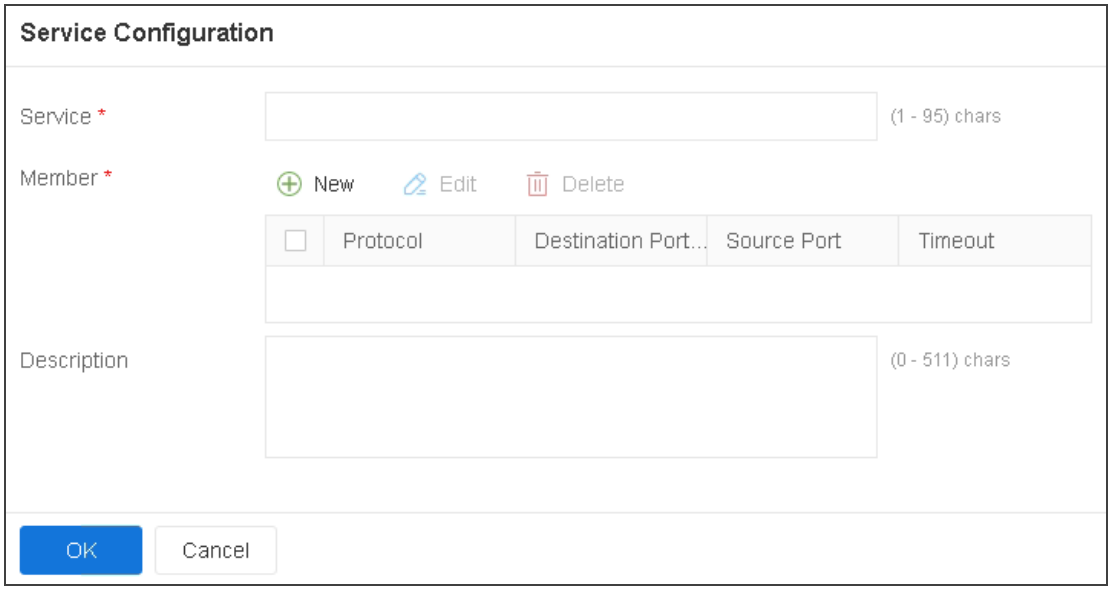
- The name of a service and service group should not be identical.
- A service group being used by any policy cannot be deleted. To delete such a service group, you must first end its relationship with the other modules.
- If a user-defined service is deleted from a service group, the service will also be deleted from all of the service groups using it.

Configuring a Service Book

This section describes how to configure a user-defined service and service group.

Configuring a User-defined Service

1. Select **Object > Service Book > Service**.
2. Click **New**.



Configure the following options.

Service Configuration	
Service	Type the name for the user-defined service into the text-box.
Member	Specify a protocol type for the user-defined service. The available options include TCP, UDP, ICMP, ICMPv6 and All. If needed, you can add multiple service items. Click **New** and the parameters for the protocol types are described as follows:
	TCP/UDP Destination port: • Min - Specifies the minimum port number of the specified service entry. • Max - Specifies the maximum port number of the specified service entry.

Service Configuration		
		The value range is 0 to 65535. Source port: • Min - Specifies the minimum port number of the specified service entry. • Max - Specifies the maximum port number of the specified service entry. The value range is 0 to 65535. **Notes:** • The minimum port number cannot exceed the maximum port number. • The "Min" of the destination port is required, and other options are optional. • If "Max " is not configured, system will use "Min" as the single code.
	ICMP	Type: Specifies an ICMP type for the service

entry. The value range is 0（Echp-Reply）, 3（Destination-Unreachable）, 4（Source Quench）, 5（Redirect）, 8（Echo）, 11（Time Exceeded）, 12（Parameter Problem）, 13（Timestamp）, 14（Timestamp Reply）, 15（Information Request）, 16（Information Reply）, 17（Address Mask Request）, 18（Address Mask Reply）, 30（Traceroute）, 31（Datagram Conversion Error）, 32（Mobile Host Redirect）, 33（IPv6 Where-Are-You）, 34（IPv6 I-Am-Here）, 35（Mobile Registration Request）, 36（Mobile Registration Reply）. Code: Specifies a minimum value and maximum value for ICMP code. The value range is 0 to 15, the default value is : min code - 0, max code - 15.

Notes:

- The minimum code cannot exceed the maximum code.
- If "Max " is not configured, system will

Service Configuration		
		 use "Min" as the single code.
	ICMPv6	Type: Specifies an ICMPv6 type for the service entry. The value range is 1（Dest-Unreachable）, 2（Packet Too Big）, 3（Time Exceeded）, 4（Parameter Problem）, 5-99 (Unallocated Error message), 100（Private experimentation）, 101（Private experimentation）, 102-126 (Unallocated Error message), 127（Reserved for expansion of ICMPv6 error message）, 128（Echo Request）, 129（Echo Reply）, 130（Multicast Listener Query）, 131（Multicast Listener Report）, 132（Multicast Listener Done）, 133（Router Solicitation）, 134（Router Advertisement）, 135（Neighbor Solicitation）, 136（Neighbor Advertisement）, 137（Redirect Message）, 138（Router Renumbering）, 139（ICMP Node Information Query）, 140（ICMP Node Information Response）, 141（Inverse Neighbor Discovery Solicitation Message）, 142（Inverse Neighbor Dis-

Service Configuration		
		covery Advertisement Message）, 143（Version 2 Multicast Listener Report）, 144（Home Agent Address Discovery Request Massage）, 145（Home Agent Address Discovery Reply Massage）, 146（Mobile Prefix Solicitation）, 147（Mobile Prefix Advertisement ）, 148（Certification Path Solicitation Message）, 149（Certification Path Advertisement Message）, 150（ICMP message utilized by experimental mobility protocols such as Seamoby）, 151（Multicast Router Advertisement）, 152（Multicast Router Solicitation ）, 153（Multicast Router Termination）, 154（FMIPv6 Messages）, 200（Private experimentation）, 201（Private experimentation）and 255（Reserved for expansion of ICMPv6 informational）. Code: Specifies a minimum value and maximum value for ICMP code. The value range is 0 to 255, the default value is : min code - 0, max code - 255.
	All	Protocol: Specifies a protocol number for the service entry. The value range is 1 to 255.
Description	If it's needed, type the description for the service into the	

Service Configuration	
	text box.

3. Click **OK**.

Configuring a User-defined Service Group

1. Select **Object > Service Book > Service Group**.

2. Click **New**.

Configure the following options.

Service Group Configuration	
Name	Type the name for the user-defined service group into the text box.
Description	If needed, type the description for the service into the text box.
Member Type	Add services or service groups to the service group. System supports at most 8-layer nested service group.

Service Group Configuration	
	Expand Pre-defined Service or User-defined Service from the left pane, select services or service groups, and then click **Add** to add them to the right pane. To remove a selected service, select it from the right pane, and then click **Remove**.

3. Click **OK**.

Viewing Details

To view the details of a service entry, take the following steps, including the name, protocol, destination port and reference:

1. Click **Object>Service Book > Service**.
2. In the service dialog box, select an address entry from the member list, and view the details under the list.

Searching Service Entries

Use the Filter to search for the service entries that match the filter conditions. The filter conditions include service type, name, protocol, destination port and source port, and whether the service entry is referenced by other function modules.

1. Click **Object > Service Book > Service**.
2. At the top-left corner of the **Service** page, click **Filter**.
3. Click **+ Filter** to add a new filter condition. Then select a filter condition from the drop-down menu and enter a value.
4. Press **Enter** to search for the service entry that matches the filter conditions.

5. Repeat the above two steps to add more filter conditions. The relationship between each filter condition is **AND**.

6. To delete a filter condition, hover your mouse on that condition and then click the × icon.

   To close the filter, click the × icon on the right side of the row.

Save the filter conditions.

1. After adding the filter conditions, click the **+ Filter** after the next arrow, in the drop-down menu, click **Save Filters**.

2. Specifies the name of the filter condition to save, the maximum length of name is 32 characters, and the name supports only Chinese and English characters and underscores.

3. Click the **Save** button on the right side of the text box.

4. To use the saved filter condition, double click the name of the saved filter condition.

5. To delete the saved filter condition, click × on the right side of the filter condition.

Notes:

- You can add up to 20 filter conditions as needed.
- After the device has been upgraded, the saved filter condition will be cleared.

Searching Service Groups

Use the Filter to search for the service groups that match the filter conditions. The filter conditions include service group name, and whether the service group is referenced by other function modules.

1. Click **Object > Service Book > Service Group**.
2. At the top-left corner of the page, click **Filter**. Then a new row appears at the top.
3. Click **Filter** to add a new filter condition. Then select a filter condition from the drop-down menu and enter a value.
4. Press **Enter** to search for the service group that matches the filter conditions.
5. Repeat the above two steps to add more filter conditions. The relationship between each filter condition is **AND**.
6. To delete a filter condition, hover your mouse on that condition and then click the × icon.

   To close the filter, click the × icon on the right side of the row.

Save the filter conditions.

1. After adding the filter conditions, click the **Filter** after the next arrow, in the drop-down menu, click **Save Filters**.
2. Specifies the name of the filter condition to save, the maximum length of name is 32 characters, and the name supports only Chinese and English characters and underscores.
3. Click the **Save** button on the right side of the text box.
4. To use the saved filter condition, double click the name of the saved filter condition.
5. To delete the saved filter condition, click × on the right side of the filter condition.

Notes:

- You can add up to 20 filter conditions as needed.
- After the device has been upgraded, the saved filter condition will be cleared.

Application Book

Application has some specific features, like corresponding protocol, port number, application type, etc. Application is an essential element for the configuration of multiple device modules including policy rules, NAT rules, application QoS management, etc.

System ships with multiple predefined applications and predefined application groups. Besides, you can also customize user-defined application and application groups as needed. All of these applications and applications groups are stored in and managed by StoneOS application book.

If IPv6 is enabled, IPv6 applications will be recognized by StoneOS.

Editing a Predefined Application

You can view and use all the supported predefined applications and edit configurations such as TCP timeout, but cannot delete any of them. To edit a predefined application, take the following steps:

1. Select **Object > Application Book > Application**.
2. Select the application you want to edit from the application list, and click **Edit**.
3. In the Application Configuration dialog box, edit configurations such as TCP timeout and signatures for the application.

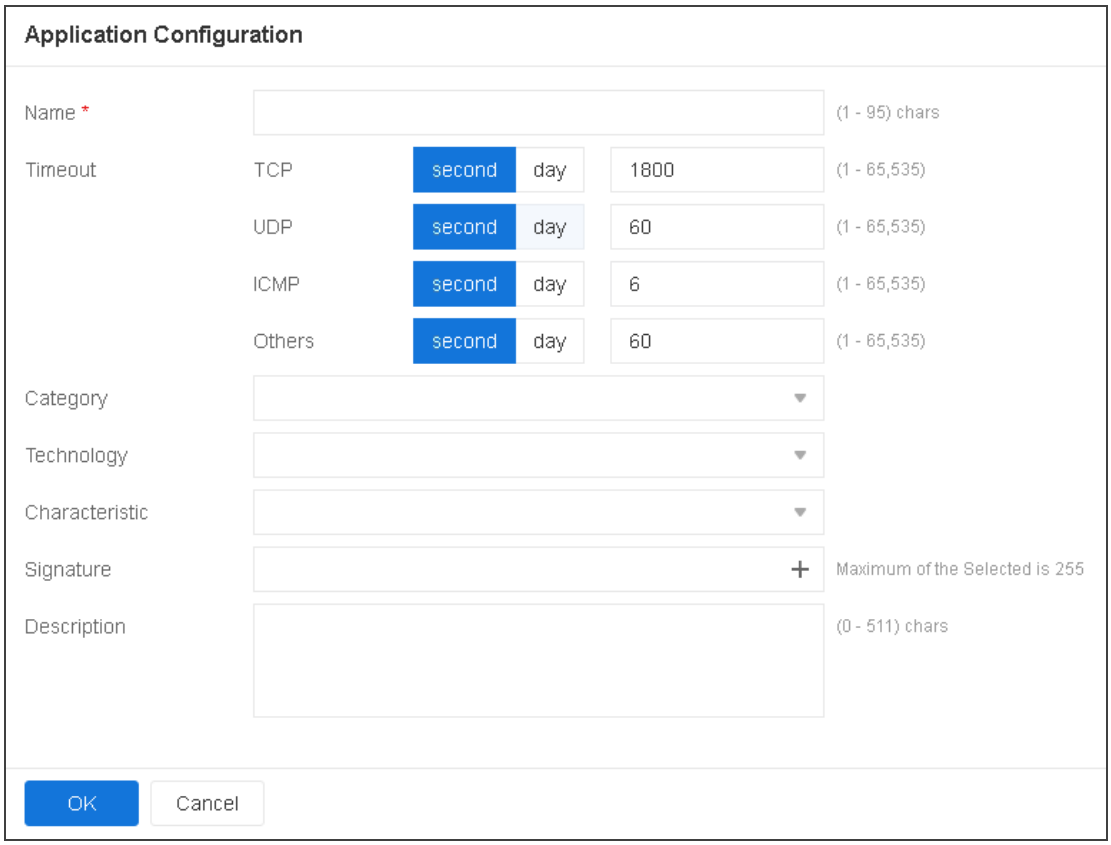
Creating a User-defined Application

You can create your own user-defined applications. By configuring the customized application signature rules, system can identify and manage the traffic that crosses into the device, thus identifying the type of the traffic.

To create a user-defined application, take the following steps:

1. Select **Object > Application Book > Application**.

2. Click **New**.



Configure the following options.

Option	Description
Name	Specifies the name of the user-defined application.
Timeout	Configures the application timeout value. If not, system will use the default value of the protocol.
Category	Specifies the category of the user-defined application. The categories and subcategories are maintained by the application signature database. The category corresponds

Option	Description
	to the application group of level 1 in the signature database and the subcategory corresponds to the application group of level 2 under level 1. You can configure a category for each user-defined application. By default, user-defined applications are not configured with a category.
Subcategory	Specifies the subcategory of the user-defined application. You can configure only one subcategory for the application. By default, user-defined applications are not configured with a subcategory.
Technology	Specifies the technology used by the user-defined application. The technologies used by applications are maintained by the application signature database. You can configure only one technology for the application. By default, user-defined applications are not configured with a technology.
Characteristic	Specifies the characteristic of the user-defined application. The characteristics are maintained by the application signature database. You can configure one or more characteristics. By default, user-defined applications are not configured with a characteristic.
Signature	Select the signature of the application and then click **Add**. To create a new signature, see "Creating a Signature Rule" on Page 729.
Description	Specify the description of the user-defined application.

3. Click **OK**.

Creating a User-defined Application Group

To create a user-defined application group, take the following steps:

1. Select **Object > Application Book > Application Groups**
2. Click **New**.

Configure the following options.

Option	Description
Name	Specifies a name for the new application group.
Member	Select an application, application group, or application filter that you want to add to the application group. To search for an application, you can enter the name of the application. To delete an added application, click **X**.
Description	Specifies the description for the application group.

3. Click **OK**.

Creating an Application Filter Group

Application Filter Group allows you to create a group to filter applications according to application category, sub-category, technology, risk, and attributes.

To create an application filter group, take the following steps:

1. Select **Object > Application Book > Application Filters**.
2. Click **New**.
3. Type an application filter group name in the Name text box.
4. Specifies the filter condition. Choose the category, subcategory, technology, risk or characteristic from the drop-down list and then select a condition under the corresponding filter. You can add multiple filters based on your needs.
5. Click **OK**.

Creating a Signature Rule

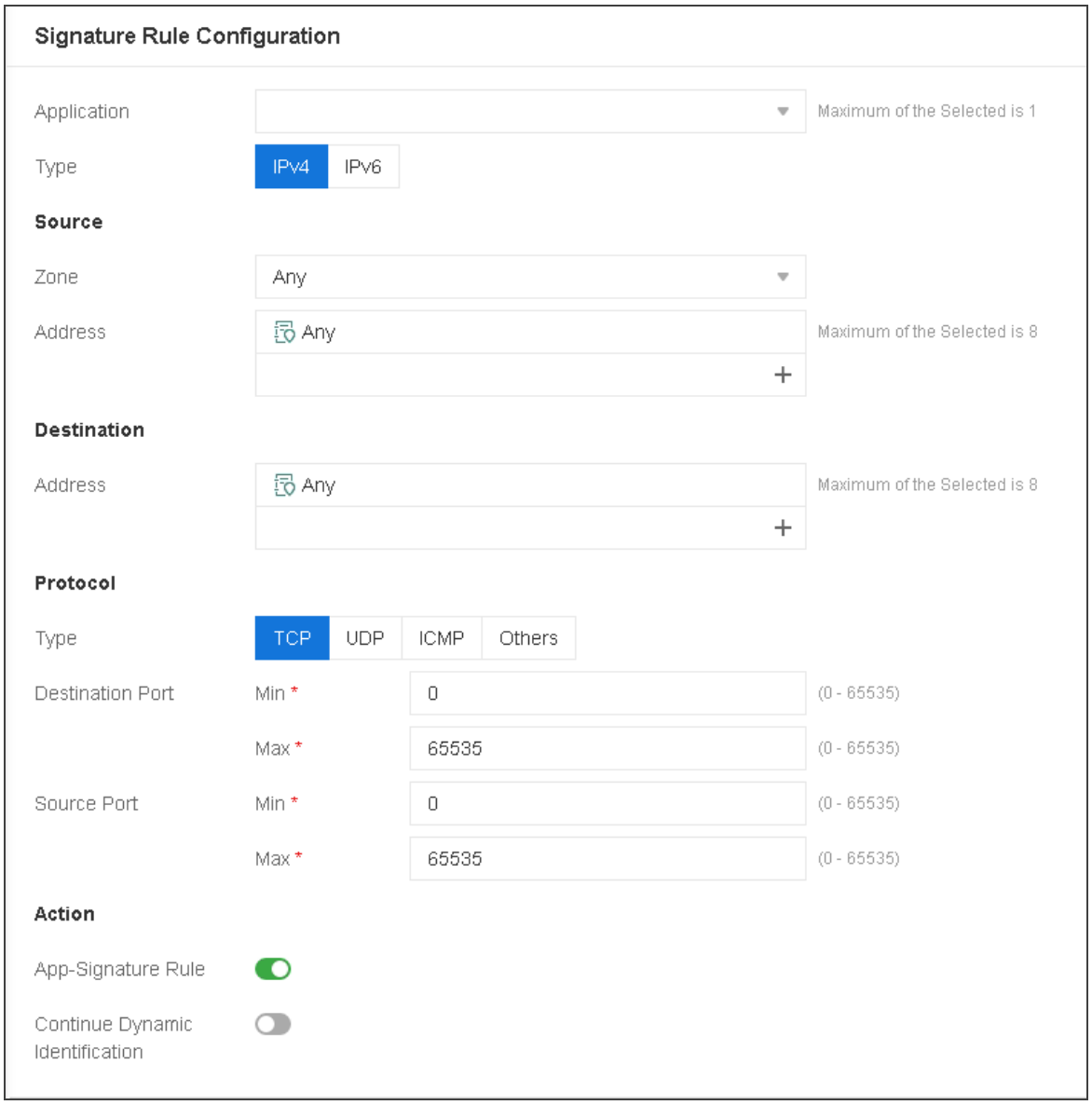
By configuring the customized application signature rules, system can identify and manage the traffic that crosses into the device. When the traffic matches all of the conditions defined in the signature rule, it hits this signature rule. Then system identifies the application type.

If IPv6 is enabled, traffic of IPv6 address will be recognized by StoneOS.

To create a new signature rule, take the following steps:

1. Select **Object > Application Book > Static Signature Rule**.

2. Click **New**.



Configure the following options.

Option	Description
Type	Specify the IP address type, including IPv4 and IPv6

Option	Description
	address. If IPv6 is enabled, traffic of IPv6 address will be recognized by StoneOS.
Source	
Zone	Specify the source security zone of the signature rule.
Address	Specify the source address. You can use the Address Book type or the IP/Netmask type. You can also perform the following operation: • You can click in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member

Option	Description
	1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched.
Destination	
Address	Specify the source address. You can use the Address Book type or the IP/Netmask type. You can also perform the following operation: • You can click in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be

Option	Description
	matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched.
Protocol	
Enable	Select the **Enable** button to configure the protocol of the signature rule.
Type	When selecting **TCP** or **UDP**, • Destination Port: Specify the destination port number of the user-defined application signature. If the destination port number is within a range, system will identify the value of min-port as the minimum port number and identify the value of max-port as the maximum port number. The range of destination port number is 0 to 66535. The port number cannot be 0. For example, the destination port number is in the range of 0 to 20, but it cannot be 0. • Source Port: Specify the source port number of the user-defined application signature. If the source port number is within a range, system will identify

Option	Description
	the value of min-port as the minimum port number and identify the value of max-port as the maximum port number. The range of source port number is 0 to 66535. When selecting **ICMP** or **ICMPv6**: • When IPv4 is selected, select **ICMP**: • Type: Specify the value of the ICMP type of the application signature. The options are as follows: is 0（Echp-Reply）, 3（Destination-Unreachable）, 4（Source Quench）, 5（Redirect）, 8（Echo）, 11（Time Exceeded）, 12（Parameter Problem）, 13（Timestamp）, 14（Timestamp Reply）, 15（Information Request）, 16（Information Reply）, 17（Address Mask Request）, 18（Address Mask Reply）, 30（Traceroute）, 31（Datagram Conversion Error）, 32（Mobile Host Redirect）, 33（IPv6 Where-Are-You）, 34（IPv6 I-Am-Here）, 35（Mobile Registration Request）, 36（Mobile Registration Reply）. • Min Code: Specify the value of the ICMP

Option	Description
	code of the application signature. The ICMP code is in the range of 0 to 15. The default value is 0. • When IPv6 is selected, select **ICMPv6**: • Type: Specify the value of the ICMPv6 type of the application signature. The options are as follows: 1（Dest-Unreachable）, 2（Packet Too Big）, 3（Time Exceeded）, 4（Parameter Problem）, 5-99 (Unallocated Error message), 100（Private experimentation）, 101（Private experimentation）, 102-126 (Unallocated Error message), 127（Reserved for expansion of ICMPv6 error message）, 128（Echo Request）, 129（Echo Reply）, 130（Multicast Listener Query）, 131（Multicast Listener Report）, 132（Multicast Listener Done）, 133（Router Solicitation）, 134（Router Advertisement）, 135（Neighbor Solicitation）, 136（Neighbor Advertisement）, 137（Redirect Message）, 138（Router Renumbering）, 139（ICMP Node Information Query）, 140（ICMP Node Information Response）,

Option	Description
	141（Inverse Neighbor Discovery Solicitation Message）, 142（Inverse Neighbor Discovery Advertisement Message）, 143（Version 2 Multicast Listener Report）, 144（Home Agent Address Discovery Request Massage）, 145（Home Agent Address Discovery Reply Massage）, 146（Mobile Prefix Solicitation）, 147（Mobile Prefix Advertisement ）, 148（Certification Path Solicitation Message）, 149（Certification Path Advertisement Message）, 150（ICMP message utilized by experimental mobility protocols such as Seamoby）, 151（Multicast Router Advertisement）, 152（Multicast Router Solicitation ）, 153（Multicast Router Termination）, 154（FMIPv6 Messages）, 200（Private experimentation）, 201（Private experimentation）and 255（Reserved for expansion of ICMPv6 informational）. • Min Code: Specify the value of the ICMPv6 code of the application signature. The ICMPv6 code is in the range of 0 to 255. The default value is 0.

Option	Description
	When selecting **Others**: • Protocol: Specifies the protocol number of the application signature. The protocol number is in the range of 1 to 255.
Action	
App-Signature Rule	Select **Enable** to make this signature rule take effect after the configurations. Otherwise, it will not take effect.
Continue Dynamic Identification	After enabling this function, if the traffic satisfies the user-defined signature rule and system has identified the application type, system will continue identifying the application. To be more accurate, you can enable this function to set the system to continue dynamically identification.

3. Click **OK**.

Viewing Details

To view the details of an application entry, including the name, category, subcategory, risk, technology, and reference, take the following steps:

1. Click **Object > Application Book > Application**.
2. In the application dialog box, select "+" before an address entry from the member list, and view the details under the entry.

Configuring Application Resource/Application Resource Group

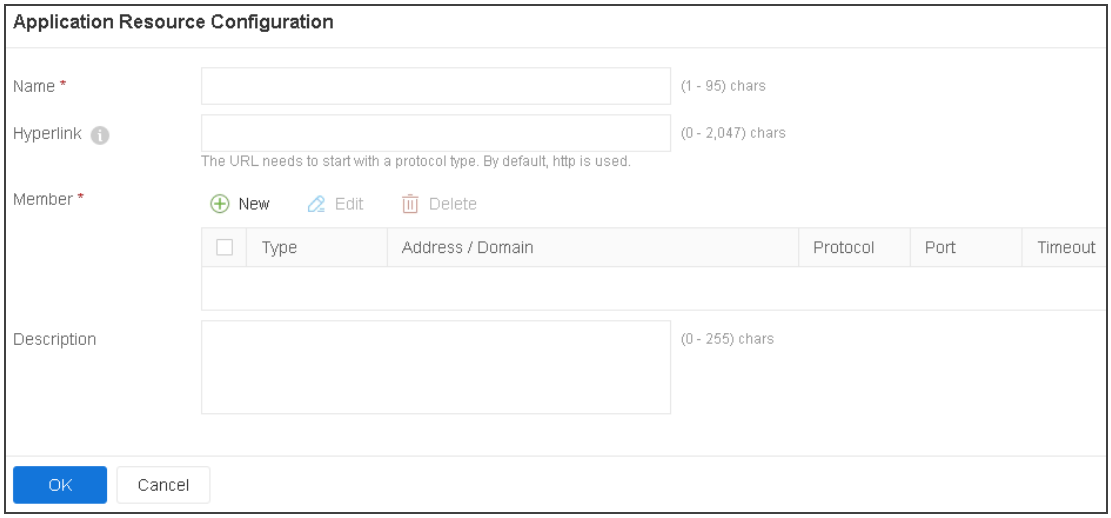
Application resource refers to the applications, contents, services, etc. that users want to access. You need to configure the address, protocol, port number and others to define an application resource entry. Each application resource can contain up to 16 application resource entries. Application resource group is a group of up to 16 application resources. The system supports a maximum of 256 application resources and 64 application resource groups.

The system supports the following ways to define an application resource entry:

- Based on IP address, protocol and port number
- Based on IP range, protocol and port number
- Based on domain name, protocol and port number

To configure an application resource, take the following steps:

1. Select **Object** > **Application Resource Book** > **Application Resource**. Or select **ZTNA** > **Application Resource Book** > **Application Resource**.
2. Click **New**.



In the Application Resource Configuration tab, configure the corresponding options.

Option	Description
Name	Type the name of the application resource. The length is 1 to 95 characters.
Hyperlink	Type the hyperlink of the application resource. The length is 0 to 2047 characters. On the ZTNA portal displayed after a user logs in, the user can copy the hyperlink to access an application resource in a browser if the application resource is configured with an hyperlink; or, the user can directly click the application resource icon to access it (make sure the link work). An application resource without a hyperlink configured will not be displayed on the ZTNA portal. If the specified hyperlink does not contain the protocol type, the default HTTP protocol will be used.
Member	Click **New** to add a resource entry and configure the options. Each application resource can contain up to 16 entries. • Type: Specify the address type of the resource entry, including IPv4/Netmask, IPv6/Prefix, IPv4 Range and IPv6 Range and Domain. • Address: Specify the IP address or IP range of the resource entry. • Protocol: Specify the protocol type of the resource entry. TCP and UDP are supported for application resources defined based on IP address. HTTP and HTTPS are supported for application resources

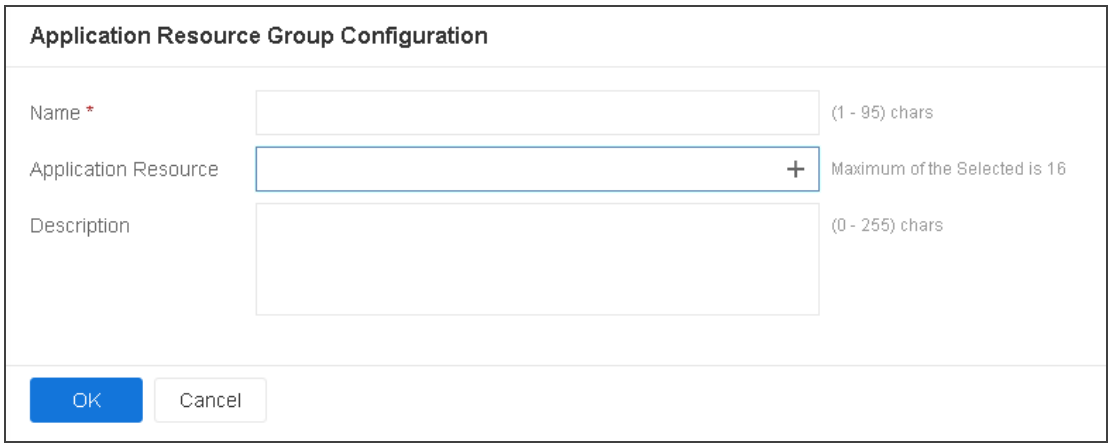
Option	Description
	defined based on domain name. • Port: Specify the port number of the resource entry. The value ranges from 1 to 65535. • Timeout: Specify the timeout value in seconds or days. The value range is 1 to 65535 when it is expressed in seconds and 1 to 1000 when in days. The default value is 1800s when the protocol is TCP, HTTP or HTTPS, and 60s when UDP.
Description	Specify description for the application resource. The length is 0 to 255 characters.

3. Click **OK** to save the configuration.
4. On the Application Resource page, by clicking the "+" button in the list to unfold an application resource, you can view more details about it, including the group it belongs to and the ZTNA policy ID that is bound to it.

To configure an application resource group, take the following steps:

1. Select **Object** > **Application Resource Book** > **Application Resource Group**. Or select **ZTNA** > **Application Resource Book** > **Application Resource Group**.

2. Click **New**.



In the Application Resource Group Configuration tab, configure the corresponding options.

Option	Description
Name	Type the name of the application resource group. The length is 1 to 95 characters.
Application Resource	Select existing application resources. Or, click **New** to create an application resource. You can add up to 16 application resources.
Description	Type description for the application resource group. The length is 0 to 255 characters.

3. Click **OK** to save the configuration.

4. On the Application Resource Group page, by clicking the "+" button to unfold an application resource group, you can view more details about it, including the ZTNA policy ID that is bound to it.

Configuring an Address Pool

The servers allocate the IPs in the address pools to the clients. After the client connects to the server successfully, the server will fetch an IP address along with other related parameters (e.g.,

DNS server address, and WIN server address) from the address pool and then allocate the IP and parameters to the client.

You can create an IP binding rule to meet the fixed IP requirement. The IP binding rule includes the IP-user binding rule and the IP-role binding rule. The IP-user binding rule binds the client to a fixed IP in the configured address pool. When the client connects to the server successfully, the server will allocate the binding IP to the client. The IP-role binding rule binds the role to an IP range in the configured address pool. When the client connects to the server successfully, the server will select an IP from the IP range and allocate the IP to the client.

After the client successfully connects to the server, the server will check the binding rules in a certain order to determine which IP to allocate. The order is shown as below:

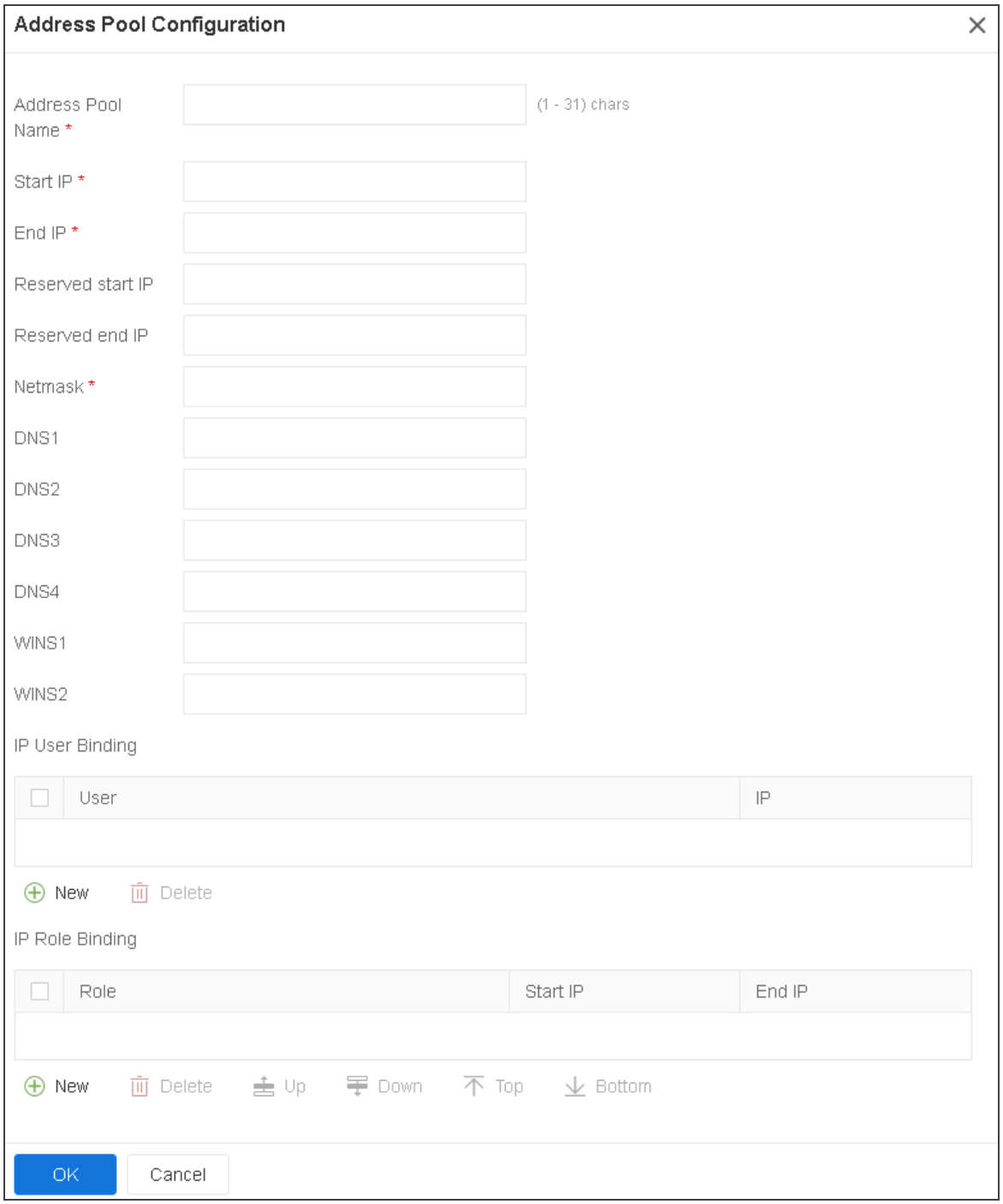
- Check whether the IP-user binding rule is configured for the client. If yes, allocate the bound IP to the client; if no, the server will select an IP which is not bound or used from the address pool, then allocate it to the client.
- Check whether the IP-role binding rule is configured for the client. If yes, get an IP from the IP range and allocate to the client; if no, the server will select an IP which is not bound or used from the address pool, then allocate it to the client.

Notes: IP addresses in the IP-user binding rule and the IP address in the IP-role binding rules should not overlap.

To configure an address pool, take the following steps:

1. Select **Object > Access Address Pool**.
2. Select the **IPv4** or **IPv6** tab, this option can only be configured in the IPv6 version.

3. Click **New**.



In the Access Address Pool Configuration tab, configure the following options.

Option	Description
Access Address Pool Name	Specifies the name of the address pool.
Start IP	Specifies the start IP of the address pool.
End IP	Specifies the end IP of the address pool.
Reserved start IP	Specifies the reserved start IP of the address pool.
Reserved end IP	Specifies the reserved end IP of the address pool.
Netmask	Specifies the netmask in the dotted decimal format.
Prefix Length	Specifies the prefix for this IPv6 address range. The range is 111 to 128.
DNS1/2/3/4	Specifies the DNS server IP address for the address pool. It is optional. 4 DNS servers can be configured for one address pool at most.
WINS1/2	Specifies the WIN server IP addresses for the address pool. It is optional. Up to 2 WIN servers can be configured for one address pool. This option can only be configured when the created IPv4 address pool.

In the IP User Binding tab, configure the corresponding options.

Option	Description
User	Type the user name into the **User** box.

IP	Type the IP address into the **IP** box.
New	Click **New** to add an IP user binding rule.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.

In the IP Role Binding tab, configure the corresponding options.

Option	Description
Role	Type the role name into the **Role** box.
Start IP	Type the start IP address into the **Start IP** box.
End IP	Type the end IP address into the **End IP** box.
New	Click **New**to add an IP role binding rule.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.
Up/Down/Top/Bottom	System will query IP role binding rules by turn, and allocate the IP address according to the first matched rule. You can move the location up or down at your own choice to adjust the matching sequence accordingly.

4. Click **OK** to save the settings.

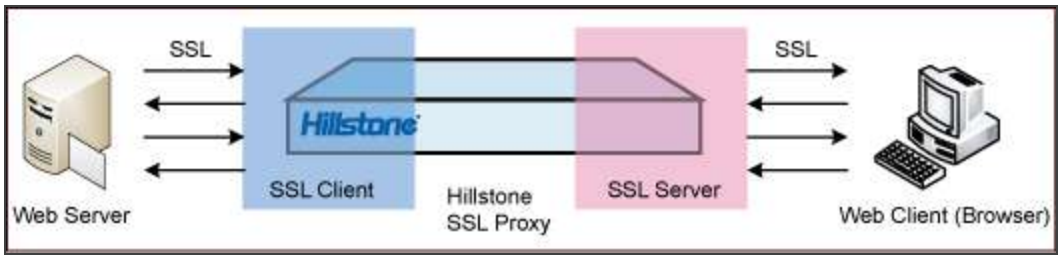
When a user name is binding with multiple roles corresponding to IP role binding rules, the system will query IP role binding rules by turn, and allocate the IP address according to the first matched rule. To adjust the sequence of IP role binding rules, in the Access Address Pool page, select an address pool and click **Move IP-Role Binding**. In the **Move IP-Role Binding** dialog box, select the role to be adjusted and then click **Up/Down/Top/Bottom**.

SSL Proxy

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

To assure the security of sensitive data when being transmitting over networks, more and more websites adopt SSL encryption to protect their information. The device provides the SSL proxy function to decrypt HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. The SSL proxy function works in the following two scenarios:

The first scenario, the device works as the gateway of Web clients. The SSL proxy function replaces the certificates of encrypted websites with the SSL proxy certificate to get the encrypted information and send the SSL proxy certificates to the client's Web browser. During the process, the device acts as an SSL client and SSL server to establish connections to the Web server and Web browser respectively. The SSL proxy certificate is generated by using the device's local certificate and re-signing the website certificate. The process is described as below:



The second scenario, the device works as the gateway of Web servers. The device with SSL proxy enabled can work as the SSL server, use the certificate of the Web server to establish the SSL connection with Web clients (Web browsers), and send the decrypted traffic to the internal Web server.

Work Mode

There are two work modes. For the first scenario, the SSL proxy function can work in the "Client Inspection - Proxy" mode ; for the second scenario, the SSL proxy function can work in the "Server Inspection - Offload" mode and "Server Inspection - Proxy" mode.

When the SSL proxy function works in the "Client Inspection - Proxy" mode, it can perform the SSL proxy on specified websites.

For the websites that do not need SSL proxy, it dynamically adds the IP address and port of the websites to a bypass list, and the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic will be bypassed.

For the websites proxied by the SSL proxy function, the device will check the parameters of the SSL negotiation. When a parameter matches an item in the checklist, the corresponding HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic can be blocked or bypassed according to the action you specified.

- If the action is Block, the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic will be blocked by the device.
- If the action is Bypass, the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic will not be decrypted. Meanwhile, the device will dynamically add the IP address and port number of the Website to the bypass list, and the HTTPS/POP3S/SMTPS/IMAPS traffic/RDPS/FTPS will be bypassed.

The device will decrypte the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic that are not blocked or bypassed.

When the SSL proxy function works in the "Server Inspection - Offload" mode, it will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, and send the HTTPS traffic as plaintext to the Web server.

When the SSL proxy function works in the "Server Inspection - Proxy" mode, it will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, and re-encrypt the traffic and send it to the Web server.

You can integrate SSL proxy function with the following:

- Integrate with the application identification function. Devices can decrypt the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic encrypted using SSL by the applications and identify the application. After the application identification, you can configure the policy rule, QoS, session limit, policy-based route.

- Support unilateral SSL proxy in WebAuth. SSL client can use SSL connection during authentication stage. When authentication is completed, SSL proxy will no longer take effect, and the client and server communicate directly without SSL encryption.
- Integrate with AV, IPS, Antispam, Sandbox , Content Filter , File Filter and URL. Devices can perform the AV protection, IPS protection, Sandbox protection, Content filter , File filter, File content cilter and URL filter on the decrypted HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, can perform the File content filter, Web content, Web posting, HTTP/FTP control on the decrypted HTTPS traffic, and can perform the Email filter on the decrypted POP3S/SMTPS/IMAPS/RDPS/FTPS traffic.

Working as the Gateway of Web Clients

To implement the SSL proxy, you need to bind an SSL proxy profile to the policy rule. After binding the SSL proxy profile to a policy rule, system will use the SSL proxy profile to deal with the traffic that matches the policy rule. To implement the SSL proxy, take the following steps:

1. Configure the corresponding parameters of SSL negotiation, including the following items: specify the PKI trust domain of the device certificates, obtain the CN value of the subject field from the website certificate, and import a device certificate to the Web browser.
2. Configure an SSL proxy profile, including the following items: choose the work mode, configure the actions to the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when its SSL negotiation matches the item in the checklist, enable the audit warning page, and so on.
3. Bind an SSL proxy profile to a proper policy rule. The device will decrypt the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic that matches the policy rule and is not blocked or bypassed by the device.

Configuring SSL Proxy Parameters

Configuring SSL proxy parameters includes the following items:

- Specify the PKI trust domain of the device certificate
- Obtain the CN value of the website certificate
- Import a device certificate to a Web browser

Specifying the PKI Trust Domain of Device Certificate

By default, the certificate of the default trust domain trust_domain_ssl_proxy_2048 will be used to generate the SSL proxy certificate with the Web server certificate together, and then system will issue the generated SSL proxy certificate to the client. You can specify another PKI trust domain in system as the trust domain of the device certificate. The specified trust domain must have a CA certificate, local certificate, and the private key of the local certificate. To specify a trust domain, take the following steps:

1. Click **Policy > SSL Proxy**.
2. At the top-right corner of the page, click **Trust Domain Configuration**.
3. Select a trust domain from the Trust domain drop-down list.
    - The trust domain of trust_domain_ssl_proxy uses RSA and the modulus size is 1024 bits.
    - The trust domain of trust_domain_ssl_proxy_2048 uses RSA and the modulus size is 2048 bits.
4. Click **OK** to save the settings.

Obtaining the CN Value

To get the CN value in the Subject field of the website certificate, take the following steps (take www.gmail.com as the example):

1. Open the IE Web browser, and visit https://www.gmail.com.
2. Click the **Security Report** button () next to the URL.
3. In the pop-up dialog box, click **View certificates**.
4. In the Details tab, click **Subject**. You can view the CN value in the text box.

Importing Device Certificate to Client Browser

In the proxy process, the SSL proxy certificate will be used to replace the website certificate. However, there is no SSL proxy certificate's root certificate in the client browser, and the client cannot visit the proxy website properly. To address this problem, you have to import the root certificate (certificate of the device) to the browser.

To export the device certificate to local PC firstly, take the following steps:

1. Export the device certificate to local PC. Select **System > PKI**.
2. In the Management tab in the PKI Management dialog box, configure the options as below:
   - Trust domain: trust_domain_ssl_proxy or trust_domain_ssl_proxy_2048
   - Content: CA certificate
   - Action: Export
3. Click **OK** and select the path to save the certificate. The certificate will be saved to the specified location.

Then, import the device certificate to the client browser. Take Internet Explorer as an example:

1. Open IE.
2. From the toolbar, select **Tools > Internet** Options.
3. In the **Content** tab, click **Certificates**.

4. In the Certificates dialog box, click the **Trusted Root Certification Authorities** tab.

5. Click **Import**. Import the certificate following the Certificate Import Wizard.

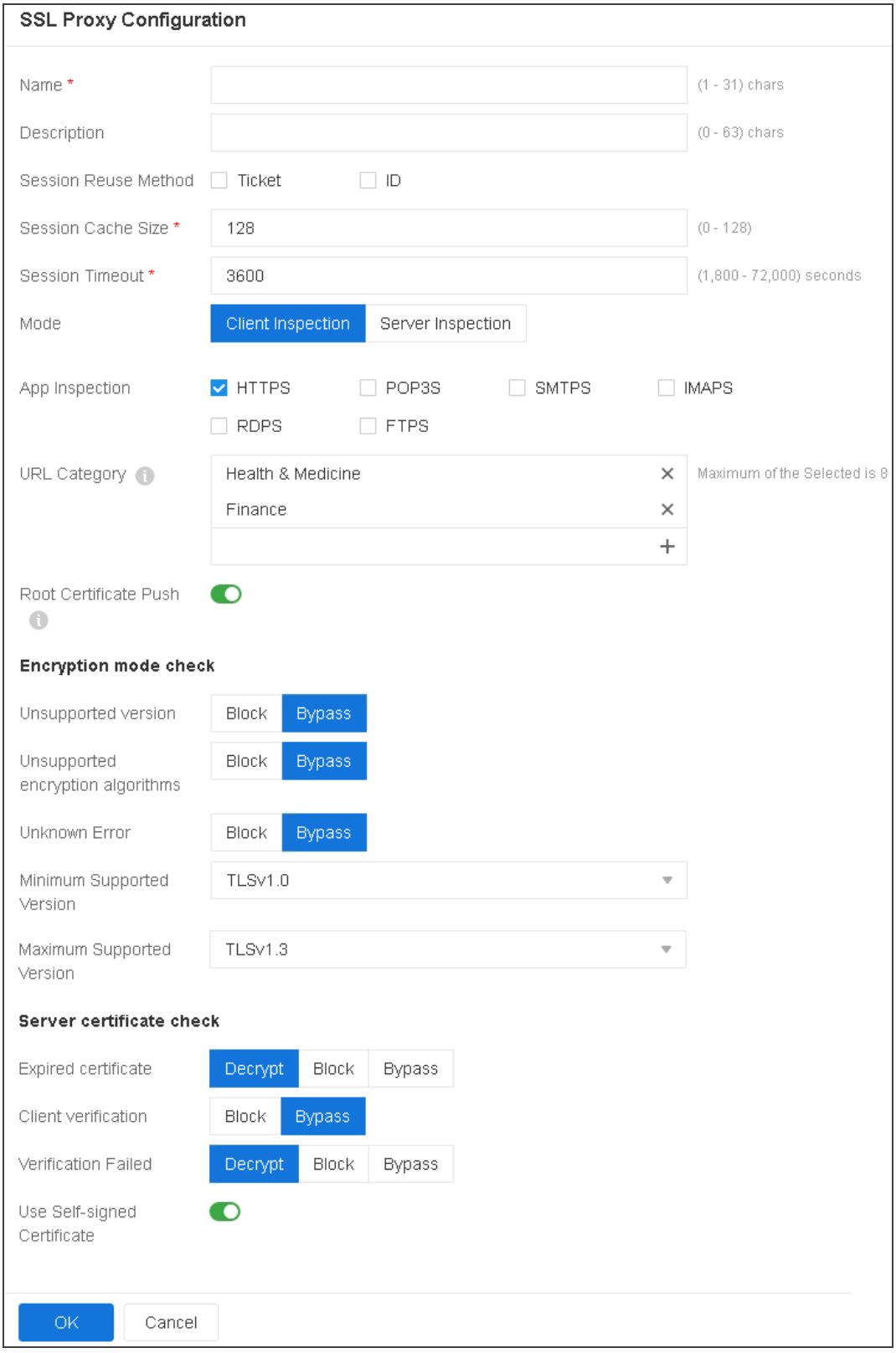
Configuring an SSL Proxy Profile

On the SSL Proxy Configuration page, you can configure the session reuse function, choose the work mode, configure the actions to the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when its SSL negotiation matches the item in the checklist, enable the audit warning page, and so forth. System supports up to 32 SSL proxy profiles.

To configure an SSL proxy profile, take the following steps:

1. Select **Object> SSL Proxy> SSL Proxy**.

2. Click **New**in the upper right corner to create a new SSL proxy profile.


SSL Proxy Configuration
Name *
(1 - 31) chars
Description
(0 - 63) chars
Session Reuse Method
Ticket
ID
Session Cache Size *
128
(0 - 128)
Session Timeout *
3600
(1,800 - 72,000) seconds
Mode
Client Inspection
Server Inspection
App Inspection
HTTPS
POP3S
SMTPS
IMAPS
RDPS
FTPS
URL Category
Health & Medicine
Finance
Maximum of the Selected is 8
Root Certificate Push
Encryption mode check
Unsupported version
Block
Bypass
Unsupported encryption algorithms
Block
Bypass
Unknown Error
Block
Bypass
Minimum Supported Version
TLSv1.0
Maximum Supported Version
TLSv1.3
Server certificate check
Expired certificate
Decrypt
Block
Bypass
Client verification
Block
Bypass
Verification Failed
Decrypt
Block
Bypass
Use Self-signed Certificate
OK
Cancel

In the Basic tab, configure the settings.

Option	Description
Name	Specify the name of the SSL proxy profile.
Description	Add the description of the SSL proxy file.
Session Reuse Method	After the Session Reuse function is enabled, when the client initiates an SSL connection request to the server, the server checks whether the request connection has been created, and if so, the previous SSL connection is resumed without the need for a complete TLS handshake, thereby reducing the time consumption during the handshake process. The system supports the following two session reuse methods: • Ticket: Select the check box to enable the session reuse based on session ticket. In this method, when an SSL connection is established between a client and a server for the first time, the server encapsulates the symmetric key and other status information generated in the TLS handshake into a session ticket which is encrypted, and then forwards the session ticket to the client, which is stored in the cache of the client. When the client initiates the SSL connection again (or initiates the connection request again after disconnection), the session ticket will first be sent to the server for decryption. If the server successfully decrypts and verifies the ticket, the first SSL connection will be resumed.

Option	Description
	• ID: Select the check box to enable the session reuse based on session ID. In this method, when an SSL connection is established between a client and a server for the first time, the session ID, symmetric key and other status information generated during the TLS handshake will be stored both in the cache of the client and the server. When the client initiates the SSL connection request again (or initiates the connection request again after disconnection), the server compares the session ID in the new request with the cached one and, if consistent, the first SSL connection will be resumed.  Notes: • When the device works as the gateway of Web clients, the Web servers need to support the session reuse function. • If session reuse based on session ticket and based on session ID are both configured, session reuse based on session ticket will be prioritized.
Session	Specifies the size of the session caches stored in the sys-

<table>
<tr><th>Option</th><th>Description</th></tr>
<tr><td>Cache Size</td><td>tem during session reuse based on session ticket or during session reuse based on session ID.

See the range and default values:<table><tr><th>Model</th><th>Range (Unit: piece)</th><th>Default value (Unit: piece)</th></tr><tr><td>SG-6000-E1600and below platforms of E series;</td><td>0 - 32. 0 means session cache information is not saved.</td><td>32</td></tr><tr><td>SG-6000-E1606 to SG-6000-E3968 of E series;</td><td>0 - 128. 0 means session cache information is not saved.</td><td>128</td></tr><tr><td>SG-6000-E3965 and above platforms of E series;</td><td>0-256. 0 means session cache information is not saved.</td><td>256</td></tr></table></td></tr>
<tr><td>Session Timeout</td><td>Specify the timeout value of the session caches stored in the system during session reuse based on session ticket or</td></tr>
</table>

Option	Description
	during session reuse based on session ID. If this timeout expires, the session caches will be deleted, and when the client establishes a SSL connection with the server, it needs a complete TLS handshake. The value range is 1800 to 72000 seconds. The default value is 3600 seconds.
Mode	When the device works as the gateway of Web clients, the SSL proxy function can work in the client-inspection proxy mode. When the device works as the gateway of Web servers, the SSL proxy function can work in the server-inspection proxy/offload mode. • In the client-inspection proxy mode, the device will proxy the SSL connection from the client, decrypt and inspect its data.. • In the server-inspection proxy mode, the device will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, re-encrypt the data and send the HTTPS traffic as plaintext to the Web server. • In the server-inspection offload mode, the device will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, and send the HTTPS traffic as plaintext to the Web server.

Option	Description
App Inspection	Select an application to be proxied by the SSL proxy function. Currently, system supports to perform SSL proxy on the HTTPS, POP3S, SMTPS, IMAPS, RDPS and FTPS traffic passing through the default port. By default, only the HTTPS traffic will be proxied, but you can select multiple applications as needed. To make sure the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic passing through user-defined ports will be proxied by the function, you can configure the user-defined ports in **Object > APP Book >** Static Signature Rule. **Note:** Only the predefined applications created in **Object > APP Book >** Application can be proxied by the SSL proxy function.
Root Certificate Push	Click the **Enable** button again to enable the Root Certificate Push. When the HTTPS traffic is decrypted by the SSL proxy function, the Install Root Certificate page will display in your Web browser. On the Install Root Certificate page, you can select **Download** or **Downloaded, Ignored** as needed. • Download: Click the button to download the root certificate to your local PC. For details on importing a root certificate to your Web browser, refer to Importing Device Certificate to Client Browser. • Downloaded, Ignored: If you click the button, sys-

Option	Description
	tem will no longer push the Install Root Certificate page, and will redirect you to the page you want to visit. **Notes:** • When the Install Root Certificate page appears, if you close the browser without selecting either **Download** or **Download, Ignored**, system will still push the page for your next HTTPS request. • You must install the root certificate. If you do not install the root certificate, system will prompt the access is not secure, therefore the access page may not be loaded completely. Click the **Enable** button to disable the Root Certificate Push. With the function disabled, when the client initiates an HTTPS request: • If the root certificate has been installed in your Web browser, you will be redirected to the page you want to visit. • If the root certificate has not been installed in your Web browser, you will see the prompted that you're visiting is not secure.

In the Decryption Configuration tab, configure the following options. After the system completes inspection of the SSL negotiation, the

HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic that is not blocked or bypassed will be decrypted. If the parameters match multiple items in the checklist and you have configured different actions for different items, the Block action will take effect, and the corresponding traffic will be blocked.

Encryption mode check	
Unsupported version	Check the SSL protocol version used by the server. • When the SSL protocol used by the SSL server is not supported in system, you can select **Block** to block its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Bypass** to bypass its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. The default action is to bypass the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. • When the SSL protocol used by the SSL server is supported, it will continue to check other items.
Unsupported encryption algorithms	Check the encryption algorithm used by the server. • When the encryption algorithm used by the SSL server is not supported in system, you can select **Block** to block its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Bypass** to bypass its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. The default action is to bypass the

	HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. • When the encryption algorithm used by the SSL server is supported, it will continue to check other items.
Unknown Error	Check the unknown error. • When SSL negotiation fails and the cause of failure can't be confirmed, you can select **Block** to block its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Bypass** to bypass its HTTPS/POP3S/SMTPS/IMAPS traffic. The default action is to bypass the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. • When system do not need check unknown failure, it will continue to check other items.
Minimum Supported Version	Specify the minimum SSL protocol version supported by the system. When the SSL protocol version used by the SSL server meets the requirements, the system can proxy its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic.
Maximum Supported Version	Specify the minimum SSL protocol version supported by the system. When the SSL protocol version used by the SSL server meets the requirements, the system can proxy

	its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic.
Server certificate check	
Expired certificate	Check the certificate used by the server. When the certificate is overdue, you can select **Block** to block its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Bypass** to bypass its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Decrypt** to decrypt the HTTPS/POP3S/SMTPS/IMAPS traffic. The default action is to decrypt the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic.
Client verification	Check whether the SSL server verifies the client certificate. • When the SSL server verifies the client certificate, you can select **Block** to block its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Bypass** to bypass its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. The default action is to bypass the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. • When the SSL server does not verify the client certificate, it will continue to check other items.
Verification	Verify the server certificate. You can configure an action

Failed	for the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when the certificate is failed to be verified. The default action is to decrypt the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. • Decrypt: Decrypt the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when the certificate is failed to be verified, and select whether to use the self-signed certificate. • Use the self-signed certificate: Click the **Enable** button to use the self-signed certificate to complete the SSL negotiation with the Web browser. In this case, your browser will prompt a warning message. • Do not use the self-signed certificate: Click the **Enable** button again to disable the self-signed certificate. Then, the system will use the trusted certificate "SG6000" to complete the SSL negotiation with the Web browser. If the certificate "SG6000" has been installed, your browser will not prompt a warning message. • Block: Block the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when the certificate is failed to be verified.

	• Bypass: Bypass the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when the certificate is failed to be verified.

3. Click **OK** to save the settings.

Working as the Gateway of Web Servers

To implement an SSL proxy, you need to bind an SSL proxy profile to the policy rule. After binding the SSL proxy profile to a policy rule, the system will use the SSL proxy profile to deal with the traffic that matches the policy rule. To implement SSL proxy, take the following steps:

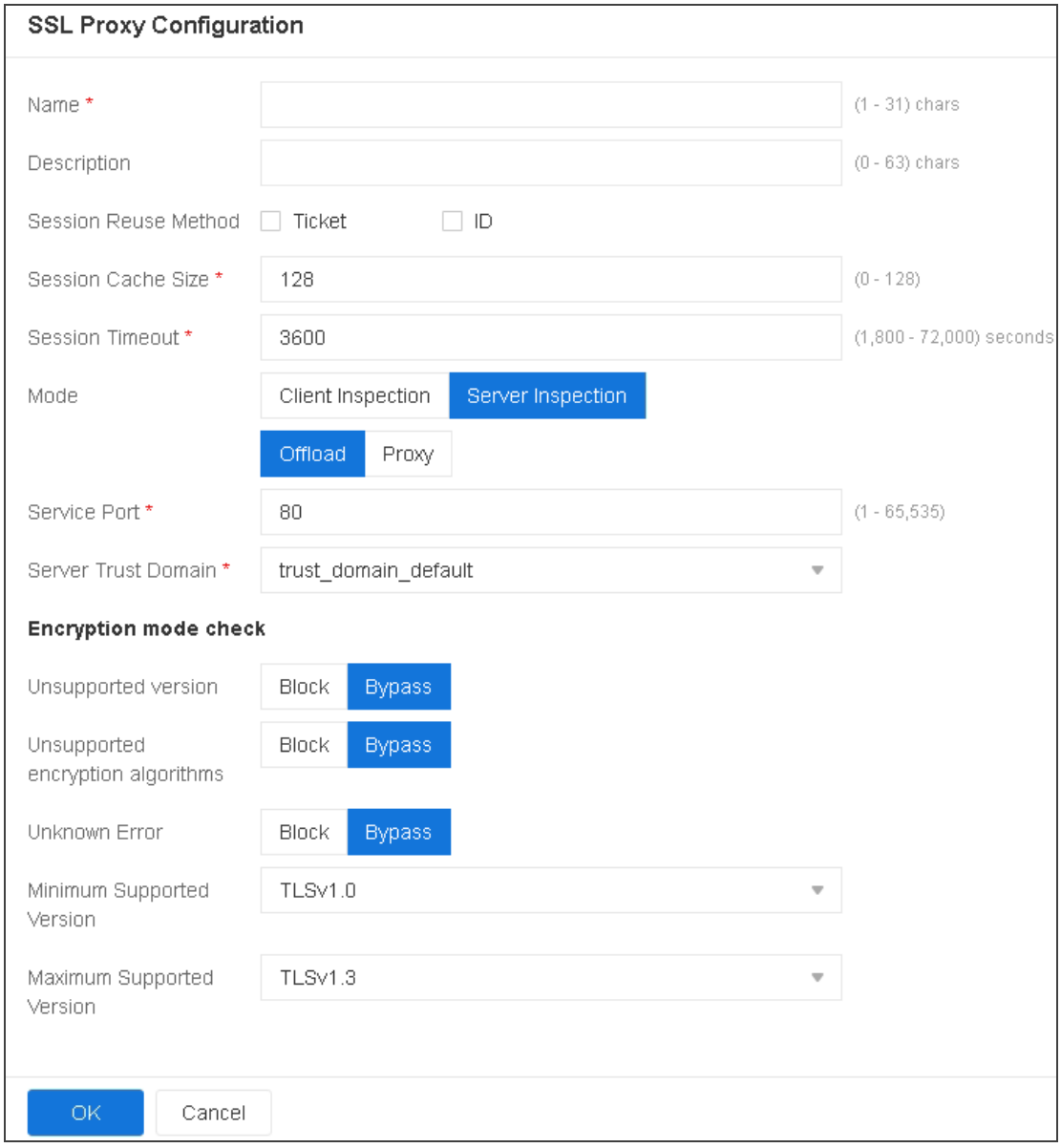
1. Configure an SSL proxy profile. You can choose the work mode, specify the trust domain of the Web server certificate and the HTTP port number of the Web server.
2. Bind an SSL proxy profile to a proper policy rule. The device will decrypt the HTTPS traffic that matches the policy rule.

Configuring an SSL Proxy Profile

On the SSL Proxy Configuration page, you can configure options such as the session reuse, the work mode, the trust domain of the Web server certificate, and the HTTP port number of the Web server.

To configure an SSL proxy profile, take the following steps:

1. Select **Policy > SSL Proxy > SSL Proxy**.
2. Click **New** in the upper right corner to create a new SSL proxy profile.



In the Basic tab, configure the following options.

Option	Description
Name	Specify the name of the SSL proxy profile.
Description	Add the description of the SSL proxy Profile.
Session	After the Session Reuse function is enabled, when the cli-

Option	Description
Reuse Method	ent initiates an SSL connection request to the server, the server checks whether the request connection has been created, and if so, the previous SSL connection is resumed without the need for a complete TLS handshake, thereby reducing the time consumption during the handshake process. The system supports the following two session reuse methods: • Ticket: Select the check box to enable the session reuse based on session ticket. In this method, when an SSL connection is established between a client and a server for the first time, the server encapsulates the symmetric key and other status information generated in the TLS handshake into a session ticket which is encrypted, and then forwards the session ticket to the client, which is stored in the cache of the client. When the client initiates the SSL connection again (or initiates the connection request again after disconnection), the session ticket will first be sent to the server for decryption. If the server successfully decrypts and verifies the ticket, the first SSL connection will be resumed. • ID: Select the check box to enable the session reuse based on session ID. In this method, when an SSL connection is established between a client and

Option	Description
	a server for the first time, the session ID, symmetric key and other status information generated during the TLS handshake will be stored both in the cache of the client and the server. When the client initiates the SSL connection request again (or initiates the connection request again after disconnection), the server compares the session ID in the new request with the cached one and, if consistent, the first SSL connection will be resumed.  Notes: • When the device works as the gateway of Web servers, the Web clients need to support the session reuse function. • If session reuse based on session ticket and based on session ID are both configured, session reuse based on session ticket will be prioritized.
Session Cache Size	Specifies the size of the session caches stored in the system during session reuse based on session ticket or during session reuse based on session ID.

<table>
<tr><th>Option</th><th>Description</th></tr>
<tr><td></td><td>See the range and default values:<table><tr><th>Model</th><th>Range (Unit: piece)</th><th>Default value (Unit: piece)</th></tr><tr><td>SG-6000-E1600and below platforms of E series;</td><td>0 - 32. 0 means session cache inform-ation is not saved.</td><td>32</td></tr><tr><td>SG-6000-E1606 to SG-6000-E3968 of E series;</td><td>0 - 128. 0 means session cache inform-ation is not saved.</td><td>128</td></tr><tr><td>SG-6000-E3965 and above platforms of E series;</td><td>0-256. 0 means session cache inform-ation is not saved.</td><td>256</td></tr></table></td></tr>
<tr><td>Session Timeout</td><td>Specify the timeout value of the session caches stored in the system during session reuse based on session ticket or during session reuse based on session ID. If this timeout expires, the session caches will be deleted, and when the</td></tr>
</table>

Option	Description
	client establishes a SSL connection with the server, it needs a complete TLS handshake. The value range is 1800 to 72000 seconds. The default value is 3600 seconds.
Mode	Select the server-inspection proxy/offload mode. When the device works as the gateway of Web servers, the SSL proxy function can work in this mode. • In the server-inspection proxy mode, the device will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, re-encrypt the data and send the HTTPS traffic as plaintext to the Web server. • In the server-inspection offload mode, the device will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, and send the HTTPS traffic as plaintext to the Web server.
Service Port	Specify the HTTP port number of the Web server when the device works in the server-inspection proxy/offload mode.
Server Trust Domain	Since the device will work as the SSL server and use the certificate of the Web server to establish the SSL connection with Web clients (Web browsers), you need to import the certificate and the key pair into a trust domain in the device. For more information about importing the

Option	Description
	certificate and the key pair, see "PKI" on Page 520. After you complete the importing, select the trust domain used by this SSL Profile.
Warning	Select **Enable** to enable the warning page. When the HTTPS traffic is decrypted by the SSL proxy function, the request to a HTTPS website will be redirected to a warning page of SSL proxy. In this page, system notifies the users that their access to HTTPS websites are being monitored and asks the users to protect their privacy.

3. Click **OK** to save the settings.

Binding an SSL Proxy Profile to a Policy Rule

After binding the SSL proxy profile to a policy rule, system will process the traffic that is matched to the rule according to the profile configuration. To bind the SSL proxy profile to a policy rule, see "Security Policy" on Page 1286.

Configuring Domain White List

Websites that do not need or support SSL proxy can be added to the domain white list. The system provides the predefined domain white list to save the sites that do not support SSL proxy. For example, sites that require client certificate authentication or sites with fixed website certificates. You can also add sites to the domain white list as needed. The sites on the predefined domain white list cannot be edited or deleted.

Creating a User-defined Domain White List

If you choose not to decrypt a site out of service concerns, privacy concerns, or other voluntary reasons, you can add it to the domain white list. The device will not perform the SSL proxy function for the sites on the white list. To create a user-defined domain white list, take the following steps:

1. Select **Object > SSL Proxy > Domain White List**.
2. Click **New** to create a new domain white list.

On the Whitelist Configuration page, configure the following options.

Option	Description
Domain	Enter the domain of the domain white list. You can enter 1 to 63 characters and the domain is case sensitive. You can use the wildcard "*" in the domain. The wildcard "*" can only be used once and should be placed at the beginning of the domain, such as "*.hillstonenet.com".
Description	Enter the description of the user-defined domain white list. You can enter 1 to 63 characters.
Free Proxy	Click **Enable** or **Disable** button to enable or disable the domain white list.

3. Click **OK**.

Editing a User-defined Domain White List

To edit a user-defined domain white list, take the following steps:

1. Select **Object > SSL Proxy > Domain White List**.
2. On the domain white list, select the site that needs to be edited on the domain white list entry to edit and click **Edit**.
3. On the **Whitelist Configuration** page, edit the description information and the Free Proxy status of the selected site.
4. Click **OK**.

Deleting a User-defined Domain White List

To delete a user-defined domain white list, take the following steps:

1. Select **Object > SSL Proxy > Domain White List**.
2. 2. On the domain white list, select the site that needs to be deleted on the domain white

list entry to delete and click **Delete**.

3. Click **Delete** in the pop-up dialog box to delete this site from the domain white list.

Exporting the Domain White List

The system exports the domain white list file in .csv format, of which the content is the real-time information of the domain white list in the system.

To export the domain white list from the system to local, take the following steps:

1. Select **Object > SSL Proxy > Domain White List**.
2. Click **Export**.

Configuring the IP Whitelist

The device will not perform the SSL proxy function for the traffic from the IPs listed on the IP whitelist. You can add the IP, the traffic from which does not need or support SSL proxy, to the IP whitelist. The IP whitelist contains dynamic IP whitelist and static IP whitelist.

Configuring Dynamic IP Whitelist

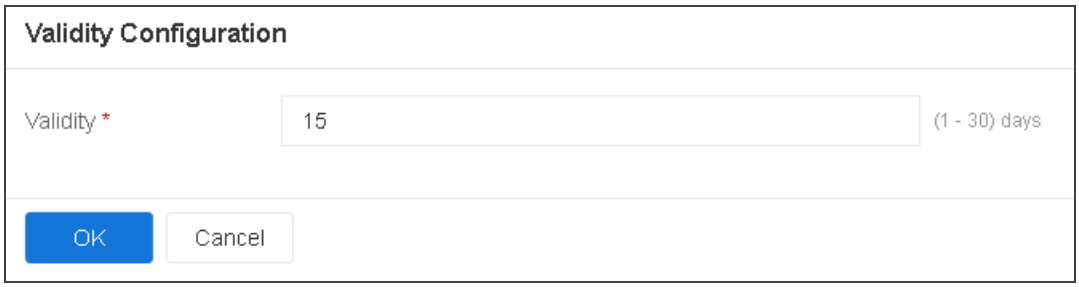
When the device works as the gateway of Web clients, the system automatically adds the IP address to the dynamic IP whitelist in the following conditions: The traffic from this IP cannot be SSL proxied by the system and the action for this traffic is to bypass. In this scenario, the system will not perform the SSL proxy function for the traffic from the IPs listed on the IP whitelist in the future. For more information on the configuration of the SSL proxy profile, see Configuring an SSL Proxy Profile. The traffic from the IP, which is added to the dynamic IP whitelist because its traffic cannot be proxied by the device, will be re-proxied again after the validity time is due. You can configure the validity time of IPs on the dynamic IP whitelist. The system automatically deletes the existing dynamic IPs on the whitelist after their validity time is due. The system checks the dynamic IPs on the whitelist every hour to delete the IPs that expire.

Configuring the Validity Time of the Dynamic IP Whitelist

To configure the validity time of the dynamic IPs on the whitelist, take the following steps:

1. Select **Object > SSL Proxy > IP WhiteList**.

2. Click the **Validity Configuration**.



On the Validity Configuration page, configure the following options.

Option	Description
Validity	Specify the validity time of the dynamic IPs on the whitelist. The unit is by day. The range of the validity time is from 1 to 30 days. The default validity time is 15 days.

3. Click **OK**.

Notes: After you modify the SSL Profile policy or change the validity time of the dynamic IPs on the whitelist, the system deletes all current dynamic IPs on the whitelist.

Configuring the Dynamic IPs on the Whitelist to be Permanently Valid

To prevent the specified dynamic IPs on the whitelist from being automatically deleted by the system, you can configure the dynamic IP on the whitelist to be permanently valid. To configure a dynamic IP on the whitelist to be permanently valid, take the following steps:

1. Select **Object > SSL Proxy > IP WhiteList**.

2. On the IP whitelist, select the IP that needs to be set permanently valid and click **Set IP Persistent**.
3. Click **OK**.

Configuring Static IP Whitelist

The device will not perform the SSL proxy function for the traffic from the IPs on the IP whitelist. You can create a static IP on the whitelists as needed and the static IPs on the whitelist never expire. To create a static IP on the whitelist, take the following steps:

1. Select **Object > SSL Proxy > IP WhiteList**.
2. Click **New**.

On the IP Whitelist Configuration page, configure the following options.

Option	Description
Type	Specify the IP type of the static IP on the whitelist as IPv4 or IPv6.
IP	Specify the IP address of the static IP on the whitelist.
TCP Port	Specify the TCP port of the static IP on the whitelist.

3. Click **OK**.

Deleting IP Whitelist

To delete the IP on the whitelist, take the following steps:

1. Select **Object > SSL Proxy > IP WhiteList**.
2. On the IP whitelist page, select the IP that needs to be deleted and click **Delete**.
3. Click **Delete** in the pop-up dialog box to delete this IP from the IP whitelists.

Notes: The total number of IPs that can be listed on the whitelist varies on different platforms. When the number of IP addresses that can be listed on the whitelist exceeds its upper limit, the system generates event logs to remind you of clearing IPs on the whitelist.

SLB Server Pool

The SLB function uses the load balancing algorithm to distribute the traffic and this utilizes the resources of the intranet servers. You can use the following methods to balance the server load:

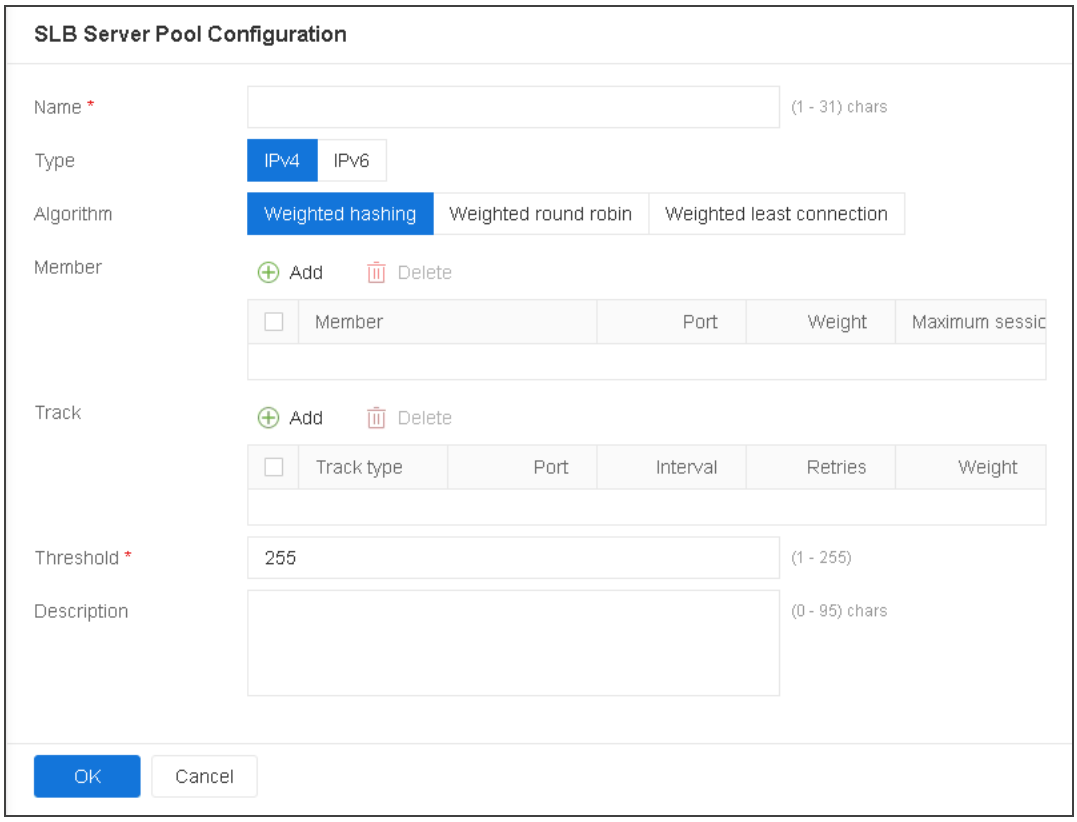
- Distribute the traffic to the specified port of each intranet server. This is applicable to the scenario that different intranet servers provide the same service via specified port at the same time.
- Distribute the traffic to different ports of an intranet server. This is applicable to the scenario that an intranet server provides the same service by running the same process at different ports.
- Combine the above two methods.

Configuring SLB Server Pool and Track Rule

To configure an SLB server pool and track rule, take the following steps:

1. Select **Object > SLB Server Pool**.

2. Click **New**. The SLB Server Pool Configuration dialog box appears.



In the SLB Server Pool Configuration dialog box, configure the following options.

Option	Description
Name	Specifies the name of the SLB server pool.
Type	Specifies the type of the SLB server pool, include IPv4 or IPv6.
Algorithm	Select an algorithm for load balancing.
Member	
Member	Specifies the member of the pool. You can type the IP range or the IP address and the netmask.
Port	Specifies the port number of the server.

Option	Description
Maximum Sessions	Specifies the allowed maximum sessions of the server. The value ranges from 0 to 1,000,000,000. The default value is 0, which represents no limitation.
Weight	Specifies the traffic forwarding weight during the load balancing. The value ranges from 1 to 255.
Add	Add the SLB address pool member to the SLB server pool. You can add up to 256 members.
Track	
Track Type	Selects a track type.
Port	Specifies the port number that will be tracked. The value ranges from 0 to 65535. • When the members in the SLB server pool have the same IP address and different ports, you don't need to specify the port when configuring the track rule. System will track each IP address and its port in the SLB server pool. • When there is a member whose port is not configured exists in the SLB sever pool, you must specify the port when configuring the track rule. System will track the specified port of the IP addresses in the SLB server pool. • When the members in the SLB server pool are all configured with IP addresses and ports and these

Option	Description
	configured IP addresses are different from each other, you can select whether to specify the port when configuring the track rule. If specified, system will track the specified port of these IP addresses. If not, system will track the configured ports of the IP addresses of the members.
Interface	Specify the source interface of the track rule. The system will use the IP address of the specified interface as the source IP address to send Ping/TCP/UDP messages.
Interval	Specifies the interval between each Ping/TCP/UDP packet. The unit is second. The value ranges from 3 to 255.
Retries	Specifies a retry threshold. If no response packet is received after the specified times of retries, System will determine this track entry fails, i.e., the track entry is unreachable. The value range is 1 to 255.
Weight	Specifies a weight for the overall failure of the whole track rule if this track entry fails. The value range is 1 to 255.
Add	Click **Add** to add the configured track rule to the list.
Threshold	Types the threshold for the track rule into the **Threshold** box. The value range is 1 to 255. If the sum of weights for failed entries in the track rule exceeds the threshold, system will conclude that the track rule fails.

Option	Description
Description	Types the description for this track rule.

3. Click **OK** to save the settings.

Viewing Details of SLB Pool Entries

To view the details of the servers in the SLB pool, take the following steps:

1. Click **Object > SLB Server Pool**.
2. Select "+" before an SLB pool entry.
3. In the Server List tab under the entry, view the information of the servers that are in this SLB pool.
4. In the Monitoring tab, view the information of the track rules.
5. In the Referenced tab, view the DNAT rules that use the SLB pool.

Schedule

System supports a schedule. This function allows a policy rule or NAT rule to take effect in a specified time and controls the duration of the connection between a PPPoE interface and the Internet. The schedule consists of a periodic schedule and an absolute schedule. The periodic schedule specifies a time point or time range for periodic schedule entries, while the absolute schedule decides a time range in which the periodic schedule will take effect.

Periodic Schedule

Periodic schedule is the collection of periods specified by all of the schedule entries within the schedule. You can add up to 16 schedule entries to a periodic schedule. These entries can be divided into 3 types:

- Daily: The specified time of every day, such as Everyday 09:00:30 to 18:00:20.
- Days: The specified time of a specified day during a week, such as Monday Tuesday Saturday 09:00:15 to 13:30:45.
- Period: A continuous period during a week, such as from Monday 09:30:30 to Wednesday 15:00:05.

Absolute Schedule

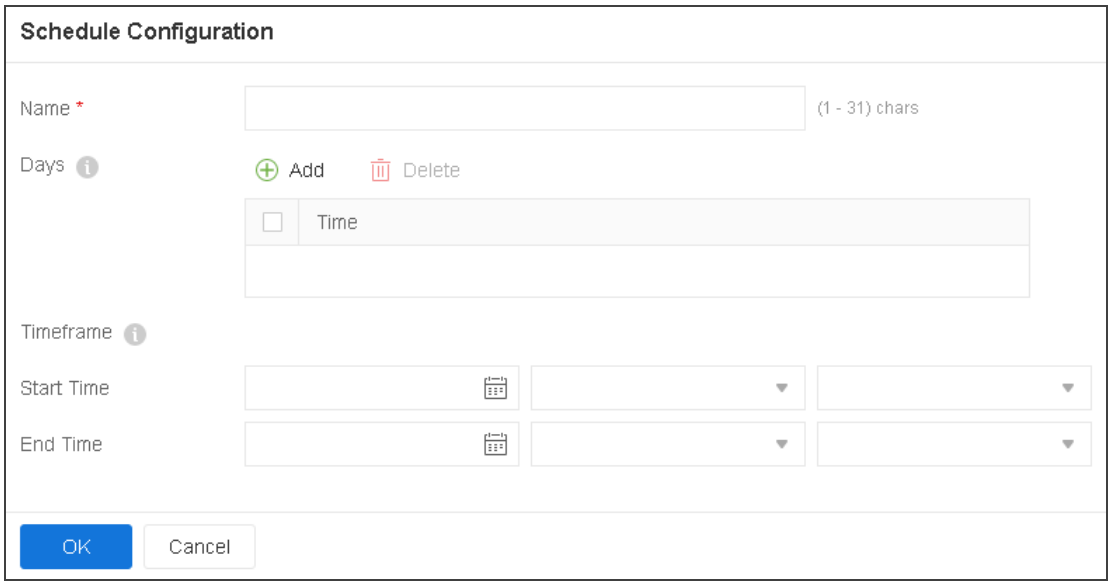
An absolute schedule is a time range in which a periodic schedule will take effect. If no absolute schedule is specified, the periodic schedule will take effect as soon as it is used by some module.

Creating a Schedule

To create a schedule, take the following steps:

1. Select **Object > Schedule**.

2. Click **New**.



Configure the following options.

Schedule Configuration Dialog Box		
Name	Specifies a name for the new schedule.	
Add	Specifies a type for the periodic schedule in Add Periodic Schedules section.	
	Type	• Daily - The specified time of every day. Click this radio button, and then, in the Time section, select a start time and end time from the Start time and End time drop-down list respectively. • Days - The specified time of a specified day during a week. Click this

Schedule Configuration Dialog Box	
	radio button, and then select a day/days in the Days and Time section, and finally select a start time and end time from the Start time and End time drop-down list respectively. • Duration - A continuous period during a week. Click this radio button, and then in the Duration section select a start day/time and end day/time from the Start time and End time drop-down list respectively. Preview — Preview the detail of the configured periodic schedule in the Preview section.
Delete	Select the entry you want to delete from the period schedule list below, and click **Delete**.
Absolute Schedule	The absolute schedule decides a time range in which the periodic schedule will take effect. Without configuring an absolute schedule, the periodic schedule will take effect as soon as it is used by some module.

3. Click **OK**.

Notes: In both absolute schedule and periodic schedule, the interval between the Start time and the End time should not be less than 1 minute.

AAA Server

An AAA server is a server program that handles user requests to access computer resources, and for an enterprise, this server provides authentication, authorization, and accounting (AAA) services. The AAA server typically interacts with network access and gateway servers and with databases and directories containing user information.

Here in StoneOS system, authentication supports the following five types of AAA server:

- Local server: a local server is the firewall itself. The firewall stores user identity information and handles requests. A local server authentication is fast and cheap, but its storage space is limited by the firewall hardware size.
- External servers:
    - Radius Server
    - LDAP Server
    - Active-Directory Server
    - TACACS+ Server

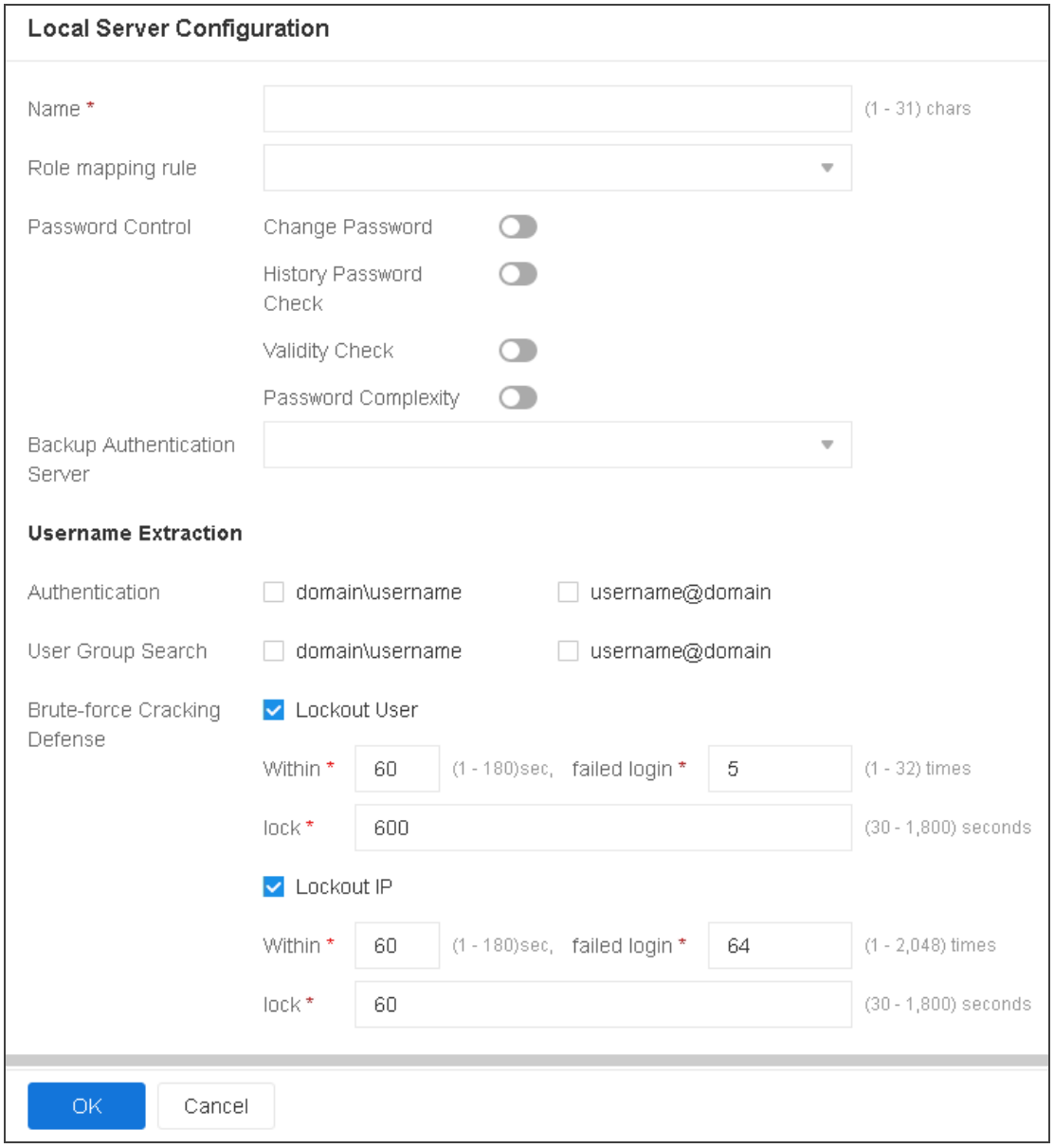
According to the type of authentication, you need to choose different AAA servers:

- "802.1x" on Page 513 : Only local and Radius servers support these two types of authentication.
- "Configuring IPSec-XAUTH Address Pool" on Page 583: Local, Radius, Ldap, AD and Tacacs+ servers are supported.
- Other authentication methods mentioned in this guide: all four servers can support the other authentication methods.

Configuring a Local AAA Server

1. Select **Object > AAA Server**, and click **New > Local Server**.

2. The **Local Server Configuration** page opens.



Configure the following.

Option	Description
Name	Type the name for the new server into the text box.
Role mapping rule	Specifies a role mapping rule for the server. With this option selected, system will allocate a role for the users who have been authenticated to the server according to the specified role mapping rule.
Password Control	To prevent account security problem, you can configure the password control function. • Change Password: Click the button to enable the Change Password function. With this function enabled, the system allows users to change their own passwords after the successful WebAuth or SCVPN authentication. • Change Password after First Login: Click the button to enable **Change Password after First Login**. Before enabling this function, you need to enable the **Change password** function first. With this function enabled, when you log in for web authentication for the first time, the prompt "Change the password for the first login" appears, forcing you to change the password according to the configured password complexity. When you log in to the SSL VPN for the first time, two modes are available for you:

Option	Description
	• Compatible Mode: ① If this function does not apply to the SSL VPN client, you can log in to the SSL VPN client for the first time without changing the password. ② If this function applies to the SSL VPN client, you need to change the login password immediately after logging in to the SSL VPN client for the first time. • Enforce Mode: Users need to change the login password immediately after logging in to the SSL VPN client for the first time.  Notes: • In case the Enforce Mode is configured, the SSL VPN client cannot be used if this function is not supported by the SSL VPN client. You are advised to upgrade the SSL VPN client or switch to the compatible mode. • The SSL VPN client versions that allow you to change the password upon the first login are as follows: SSL VPN Windows cli-

Option	Description
	 ent 1.4.9.1274 or later version, Linux 1.4.0 or later version, Android 4.5 or later version, and iOS 2.0.6 or later version. • Change Password after First Login function is not supported by SSL VPN Windows client (non-administrator) version 1.5.x. • History Password Check: Click the button to enable **History Password Check**. With the function enabled, when you change the password, the system verifies that whether the new password is the same as historical passwords. Specify the number of historical passwords to be verified. The value rage is from 1 to 5. The default value is 3, indicating that the new password cannot be the same as the last three historical passwords. • Validity Check: Click the button to enable **Validity Check**. With this function enabled, the system checks the validity of the password. Configure the valid period of password in the textbox.

Option	Description

	• Password Expiry Warning: Click the button to enable **Password Expiry Warning** and configure the warning period before password expiry. The value range is from 1 to 30 days. For example, if the value is set to 10, it indicates that you will get a warning about the approaching account expiry 10 days before the expiration date. The default value is 7.
	• Password Complexity: The lower the complexity of the password, the more likely it is to be cracked. Examples of low complexity are passwords containing username or short passwords. For security reasons, you can enable the password complexity configuration and configure the password complexity requirements to ensure that the user's password has high complexity. Click the button to enable **Password Complexity** configuration.
	  • Minimum Password Length: Specifies the minimum password length. The value range is 1 to 16. The default value is 1.
	  • Minimum Capital Letter Length: Specifies the minimum length of uppercase letters contained in the password. The value range

Option	Description
	is 0-16. The default value is 0. • Minimum Lowercase Letter Length: Specifies the minimum length of lowercase letters contained in the password. The value range is 0-16. The default value is 0. • Minimum Number Length: Specifies the minimum length of the number contained in the password. The value range is 0-16. The default value is 0. • Minimum Special Character Length: Specifies the minimum length of special characters (that is, non-numeric characters) contained in the password. The value range is 0-16. The default value is 0. • Password cannot contain username: Click the button to enable**Password cannot contain username**. Passwords are not allowed to contain the username.
Backup Authentication Server	To configure a backup authentication server, select a server from the drop-down list. After configuring a backup authentication server for the local server, the backup authentication server will take over the authentication task when the primary server malfunctions or

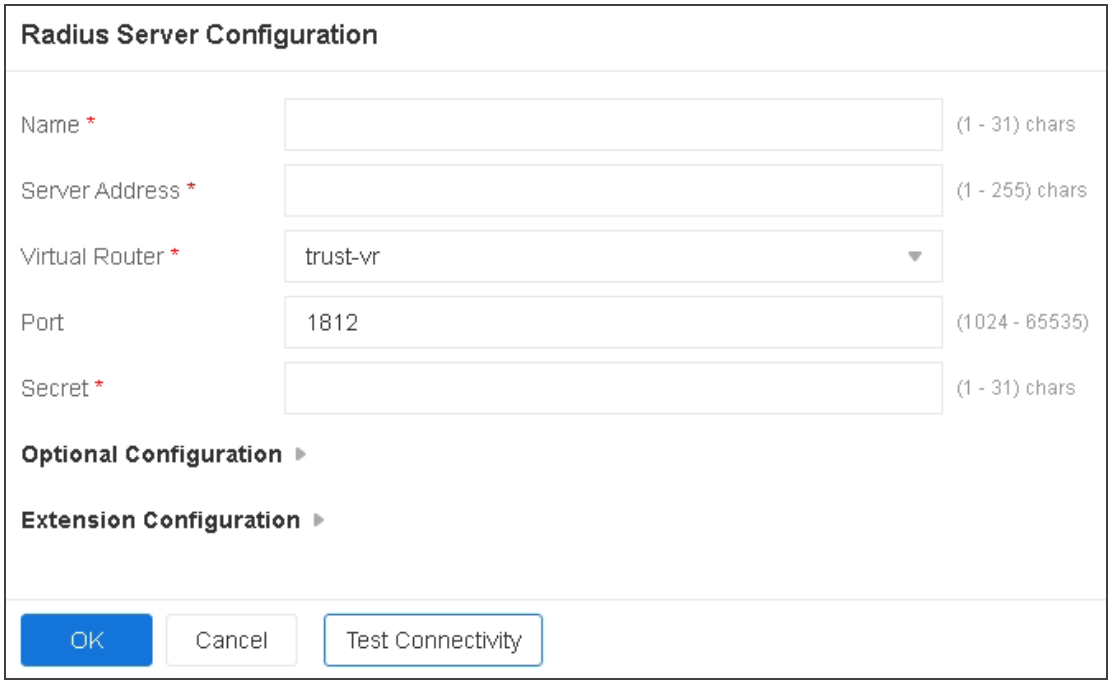
Option	Description
	authentication fails on the primary server. The backup authentication server can be any existing local, Active-Directory, RADIUS or LDAP server defined in system.
Username Extraction	
Authentication	Specifies the authentication user name format. During authentication, the system will extract the user name for authentication based on the configured authentication user name format. If the specified format is not available, the system will use the original user name. The supported format includes "domain\username" and "username@domain".
Search Group	Specifies the user name format when the system searches from the local storage. When implementing policy control based on user name or user groups, the system will search for the group of a user name in the organization units that are locally saved. The supported format includes "domain\username" and "username@domain".
Brute-force Cracking Defense	To prevent illegal users from obtaining user name and password via brute-forth cracking, you can configure the brute-force cracking defense by locking out user or IP. • Select the **Lockout User** check box to enable the user-based brute-force cracking defense. If the failed attempts reached the specified times (1-32

Option	Description
	times) within the specified period (1-180 seconds), the login user will be locked out for the specified time (30-1800 seconds). By default, within 60 seconds, if the failed attempts reached 5 times, the login user will be locked out for 600 seconds. • Select the **Lockout IP** check box to enable the IP-based brute-force cracking defense. If the failed attempts reached the specified times (1-2048 times) within the specified period (1-180 seconds), the IP will be locked out for the specified time (30-1800 seconds). By default, within 60 seconds, if the failed attempts reached 64 times, the IP will be locked out for 60 seconds.

3. Click **OK**.

Configuring Radius Server

1. Select **Object > AAA Server**, and click **New > Radius Server**.
2. The **Radius Sever Configuration** page opens.



Configure the following.

Basic Configuration	
Name	Specifies a name for the Radius server.
Server Address	Specifies an IP address (IPv4 or IPv6) or domain name for the Radius server.
Virtual Router	Specifies a VR for the Radius server.
Port	Specifies a port number for the Radius server. The value range is 1024 to 65535. The default value is 1812.
Secret	Specifies a secret for the Radius server. You can specify at most 31 characters.
Optional Configuration	
Authorization	When a user is authenticated by the Radius server, when

Basic Configuration	
Policy	the user is authenticated successfully, the Radius server will create a security policy for the authenticated user that includes the destination network segment, destination port, protocol, and behavior. This policy is called an authorization policy. System supports two authorization policies: "Authorization Policy During Authentication" and "Dynamic Authorization Policy". You can enable the authorization policy function to enable to obtain the authorization policy from the Radius server and add it to the system's policy list to make it effective. When the authenticated user is disconnected, the authorization policy will be deleted automatically. • By default, the authorization policy is disabled. Select the checkbox after **Authorization Policy** to enable the authorization policy. After the authorization policy of the Radius server is enabled, you add the obtained authorization policy to the aggregation policy that has been created, and arrange it as the member of aggregation policy at the end of aggregation policy, which is more convenient for the user to manage the authorization policy uniformly. If it is not added to the aggregation policy, the authorization policy will be added to the end of the system policy list

Basic Configuration	
	by default. • Select the aggregate policy name from the drop-down list.
Username Extraction	
Authentication	Specifies the authentication user name format. During authentication, the system will extract the user name for authentication based on the configured authentication user name format. If the specified format is not available, the system will use the original user name. The supported format includes "domain\username" and "username@domain".
Search Group	Specifies the user name format when the system searches from the local storage. When implementing policy control based on user name or user groups, the system will search for the group of a user name in the organization units that are locally saved. The supported format includes "domain\username" and "username@domain".
Role mapping rule	Specifies a role mapping rule for the server. With this option selected, system will allocate a role for the users who have been authenticated to the server according to the specified role mapping rule.
Backup server 1/ Backup	Specifies an IP address or domain name for backup server 1 or backup server 2.

Basic Configuration	
server 2	
Virtual Router1 / Virtual Router2	Specifies a VR for the backup server.
Retries	Specifies a retry time for the authentication packets sent to the AAA server. The value range is 1 to 10. The default value is 3.
Timeout	Specifies a timeout for the server response. The value range is 1 to 30 seconds. The default value is 3.
Backup Authentication Server	Specifies a backup authentication server. After configuring a backup authentication server for the Radius server, the backup authentication server will take over the authentication task when the primary server malfunctions or authentication fails on the primary server. The backup authentication server can be any existing local, Active-Directory, RADIUS or LDAP server defined in system.
LOCAL NAS IP	Specifies the LOCAL NAS IP address. This way, the source IP address of Radius authentication packets and accounting packets, as well as the *nas-ip-address* of the authentication packets are all changed to this specified IP address, ensuring that packets returned by the Radius server are received by the current device in the complex network environment. The LOCAL NAS IP should be the same as the interface

<table>
<tr><th colspan="3">Basic Configuration</th></tr>
<tr><td></td><td colspan="2">IP of the device. Otherwise, Radius authentication packets or accounting packets may not be properly sent.

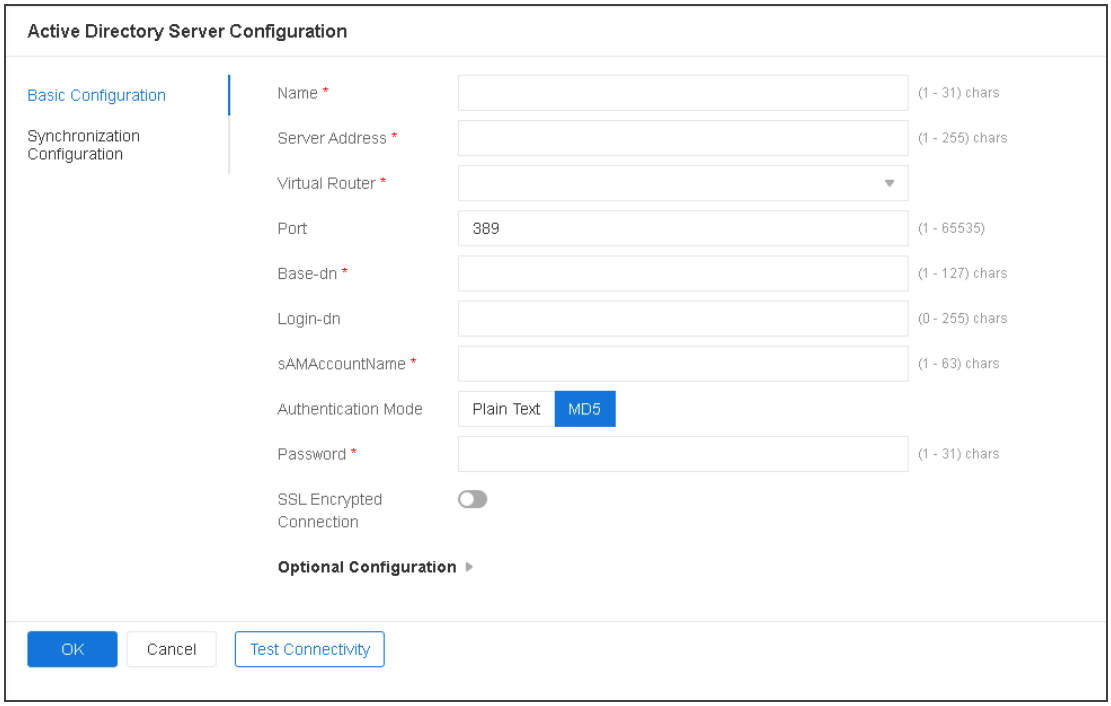
  Notes:
• In the HA environment, the configuration of the LOCAL NAS IP address is not synchronized to the backup device. Therefore, you need to configure it in both primary and backup devices.
• It should be ensured that there are reachable routes between the current device and the Radius server.</td></tr>
<tr><td>Enable Accounting</td><td colspan="2">Select the Enable checkbox to enable accounting for the Radius server, and then configure options in the sliding out area.</td></tr>
<tr><td></td><td>Server Address</td><td>Specifies an IP address or domain name for the accounting server.</td></tr>
<tr><td></td><td>Virtual Router</td><td>Specifies a VR for the accounting server.</td></tr>
<tr><td></td><td>Port</td><td>Specifies a port number for the accounting server. The value range is</td></tr>
</table>

Basic Configuration		
		1024 to 65535. The default value is 1813.
	Password	Specifies a password for the accounting server.
	Backup server 1/Backup server 2	Specifies an IP address or domain name for backup server 1 or backup server 2.
	Virtual Router-1/Virtual Router2	Specifies a VR for the backup server.
Extension Configuration		
Extended Password Encryption Algorithm	Specifies the SM4 extended password encryption algorithm for the Radius server. After configuration, the Radius server will use SM4 for the encrypted storage and encrypted transmission of passwords.	

3. Click **OK**.

Configuring Active Directory Server

1. Select **Object > AAA Server**, and click **New > Active Directory Server**.
2. The **Active Directory Server Configuration** page opens.



Configure the following.

Basic Configuration	
Name	Specifies a name for the Active Directory server.
Server Address	Specifies an IP address (IPv4 or IPv6) or domain name for the Active Directory server.
Virtual Router	Specifies a VR for the Active Directory server.
Port	Specifies a port number for the Active Directory server. The value range is 1 to 65535. The default value is 389.
Base-dn	Specifies a Base-dn for the AD server. The Base-dn is the starting point at which your search will begin when the AD server receives an authentication request. For the example of abc.xyz.com as

Basic Configuration	
	described above, the format for the Base-dn is "dc=a-abc,dc=xyz,dc=com".
Login-dn	Specifies authentication characteristics for the Login-dn (typically a user account with query privilege pre-defined by the AD server). When the authentication mode is plain, the Login-dn should be configured. DN (Distinguished name) is a username of the AD server who has a privilege to read user information. The format of the DN is"cn=xxx, DC=xxx,...". For example, the server domain is abc.xyz.com, and the AD server admin name is administrator who locates in Users directory. Then the login-dn should be "cn=a-administrator,cn=users,dc=abc,dc=xyz,dc=com".
sAMAccountName	When the authentication mode is MD5, the sAMAccountName should be configured. sAMAccountName is a username of the AD server who has a privilege to read user information. The format of sAMAccountName is "xxx". For example, the AD server admin name is administrator , and then the sAMAccountName should be "administrator".
Authentication Mode	Specifies an authentication or synchronization method (either plain text or MD5). The default method is MD5. If the sAMAccountName is not

Basic Configuration	
	configured after you specify the MD5 method, the plain method will be used in the process of synchronizing user from the server, and the MD5 method will be used in the process of authenticating the user.
Password	Specifies a password for the AD server.
SSL Encrypted Connection	Click the **Enable** button to enable the SSL encrypted connection function. With this function enabled, the system connects to the Active Directory authentication server through SSL.
Optional Configuration	
Authorization Policy	When a user is authenticated by the Radius server, when the user is authenticated successfully, the Radius server will create a security policy for the authenticated user that includes the destination network segment, destination port, protocol, and behavior. This policy is called an authorization policy. System supports two authorization policies: "Authorization Policy During Authentication" and "Dynamic Authorization Policy". You can enable the authorization policy function to enable to obtain the authorization policy from the Radius server and add it to the system's policy list to make it effective. When the authenticated user is disconnected, the author-

Basic Configuration	
	ization policy will be deleted automatically. • By default, the authorization policy is disabled. Select the checkbox after **Authorization Policy** to enable the authorization policy. After the authorization policy of the Radius server is enabled, you add the obtained authorization policy to the aggregation policy that has been created, and arrange it as the member of aggregation policy at the end of aggregation policy, which is more convenient for the user to manage the authorization policy uniformly. If it is not added to the aggregation policy, the authorization policy will be added to the end of the system policy list by default. • Select the aggregate policy name from the drop-down list.
Username Extraction	
Authentication	Specifies the authentication user name format. During authentication, the system will extract the user name for authentication based on the configured authentication user name format. If the specified format is not available, the system will use the original user name. The supported format includes "domain\username" and "username@domain".

Basic Configuration	
Search Group	Specifies the user name format when the system searches from the local storage. When implementing policy control based on user name or user groups, the system will search for the group of a user name in the organization units that are locally saved. The supported format includes "domain\username" and "username@domain".
Role Mapping Rule	Specifies a role mapping rule for the server. With this option selected, system will allocate a role for users who have been authenticated to the server according to the specified role mapping rule.
Backup server 1/Backup server 2	Specifies an IP address or domain name for backup server 1 or backup server 2.
Virtual Router-1/Virtual Router2	Specifies a VR for the backup server.
Authentication Base-DN	Specifies an authentication Base-dn for the AD server. All users in the Base-DN (including those directly under the user group) will be allowed to pass the authentication. The format of the DN is"OU-U=xxx, DC=xxx,...".
Synchronization Base-DN	Specifies a Synchronization Base-dn for the AD server. All users and user groups in the Base-DN will be synchronized to the local. The format of the

Basic Configuration		
	DN is"OU=xxx, DC=xxx,...".	
Synchronization	Check the checkbox to enable the synchronization function; clear the checkbox to disable the synchronization function, and the system will stop synchronizing and clear the existing user information. By default, system will synchronize the user information on the configured Active-Directory server with the local server every 30 minutes.	
Automatic Synchronization	Click the radio button to specify the automatic synchronization.	
	Interval Synchronization	Specifies the time interval for automatic synchronization. The value range is 15 to 1440 minutes. The default value is 30.
	Daily Synchronization	Specifies the time when the user information is synchronized everyday. The format is HH:MM, HH and MM indicates hour and minute respectively.
	Once Synchronization	If this parameter is specified, system will synchronize automatically when the configuration of Active-Directory server is modified. After executing this command , sys-

Basic Configuration	
	tem will synchronize the user information immediately.
Synchronous Operation Mode	Specifies user synchronization mode, including Group Synchronization and OU Synchronization. By default, the user information will be synchronized with the local server based on the group.
Synchronization Object	Filter the synchronization information obtained and retain the information of the specified object. You can select the syn object as users or groups. By default, users and groups are both selected.
OU maximum depth	Specifies the maximum depth of OU to be synchronized. The value range is 1 to 12, and the default value is 12. OU structure that exceeds the maximum depth will not be synchronized, but users that exceed the maximum depth will be synchronized to the specified deepest OU where they belong to. If the total characters of the OU name for each level(including the “OU=” string and punctuation) is more than 128, OU information that exceeds the length will not be synchronized with the local server.
User Filter	Specifies the user-filter conditions. System can only synchronize and authenticate users that are in accordance with the filtering condition on the authen-

Basic Configuration	
	tication server. The length is 0 to 120 characters. For example, if the condition is configured to “memberOf=CN=Admin,DC=test,DC=com”, system only can synchronize or authenticate user whose DN is “memberOf=CN=Admin,DC=test,DC=com”. The commonly used operators are: =(equals a value)、&(and)、|(or)、!(not)、*(Wildcard: when matching zero or more characters)、～=(fuzzy query.)、>=Be greater than or equal to a specified value in lexicographical order.)、<=(Be less than or equal to a specified value in lexicographical order.).
Backup Authentication Server	Specifies a backup authentication server. After configuring a backup authentication server for the Radius server, the backup authentication server will take over the authentication task when the primary server malfunctions or authentication fails on the primary server. The backup authentication server can be any existing local, Active-Directory, RADIUS or LDAP server defined in system.
Synchronization Base-dn	Synchronization Base-DN is the starting point at which the system synchronizes users and user groups from the Active Directory server. Click this field. In the **Server Directory** panel, select the path

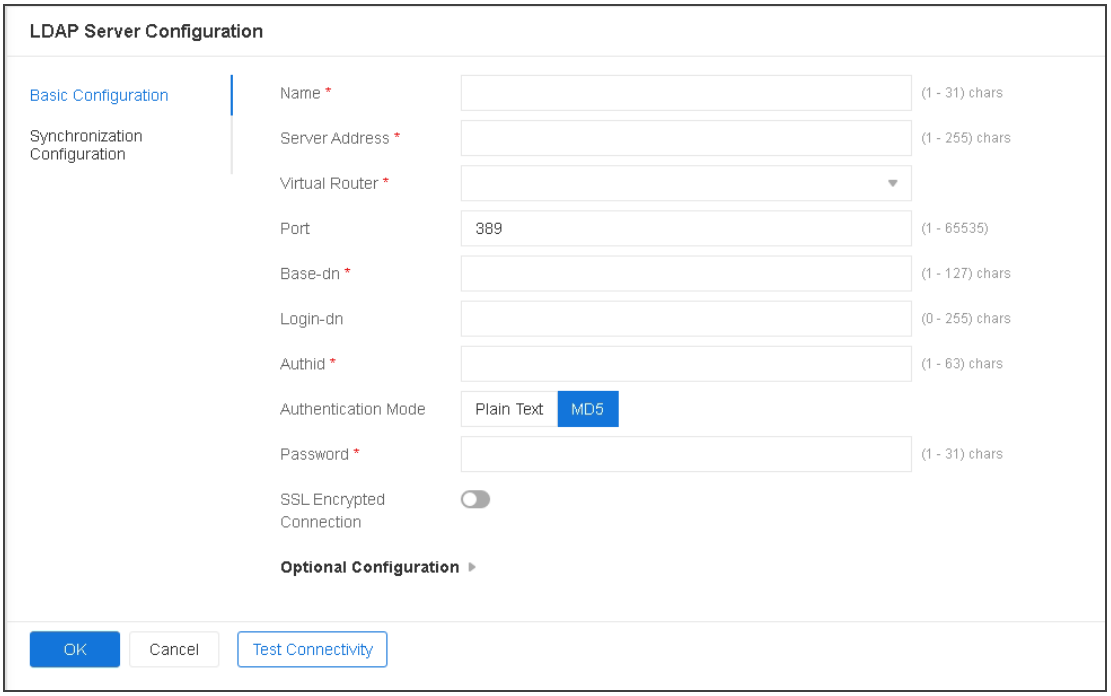
Basic Configuration	
	that you want to synchronize. This way, all users and user groups in the path are synchronized to the local. At most 32 paths can be selected.

3. Click **OK**.

Configuring LDAP Server

1. Select **Object > AAA Server**, and click **New > LDAP Server**.

2. The **LDAP Server Configuration** page opens.



Configure the following

Basic Configuration	
Server Name	Specifies a name for the LDAP server.

Basic Configuration	
Server Address	Specifies an IP address (IPv4 or IPv6) or domain name for the LDAP server.
Virtual Router	Specifies a VR for the LDAP server.
Port	Specifies a port number for the LDAP server. The value range is 1 to 65535. The default value is 389.
Base-dn	Specifies the details for the Base-dn. The Base-dn is the starting point at which your search will begin when the LDAP server receives an authentication request.
Login-dn	Specifies authentication characteristics for the Login-dn (typically a user account with query privileges pre-defined by the LDAP server).
Authid	Specifies the Authid, which is a string of 1 to 63 characters and is case sensitive.
Authentication Mode	Specifies an authentication or synchronization method (either plain text or MD5). The default method is MD5. If the Authid is not configured after you specify the MD5 method, the plain method will be used in the process of synchronizing user from the server, and the MD5 method will be used in the process of authenticating user.
Password	Specifies a password for the LDAP server. This should correspond to the password for Admin DN.
SSL Encrypted	Click the **Enable** button to enable the SSL encrypted

Basic Configuration	
Connection	connection function. With this function enabled, the system connects to the LDAP authentication server through SSL.
Optional Configuration	
Username Extraction	
Authentication	Specifies the authentication user name format. During authentication, the system will extract the user name for authentication based on the configured authentication user name format. If the specified format is not available, the system will use the original user name. The supported format includes "domain\username" and "username@domain".
Search Group	Specifies the user name format when the system searches from the local storage. When implementing policy control based on user name or user groups, the system will search for the group of a user name in the organization units that are locally saved. The supported format includes "domain\username" and "username@domain".
Role Mapping Rule	Specifies a role mapping rule for the server. With this option selected, system will allocate a role for the users who have been authenticated to the server according to the specified role mapping rule.

Basic Configuration	
Backup server 1/Backup server 2	Specifies an IP address or domain name for backup server 1 or backup server 2.
Virtual Router-1/Virtual Router2	Specifies a VR for the backup server.
Authentication Base-DN	Specifies an authentication Base-dn for the AD server. All users in the Base-DN (including those directly under the user group) will be allowed to pass the authentication. The format of the DN is"OU=xxx, DC=xxx,...".
Synchronization Base-DN	Specifies a Synchronization Base-dn for the AD server. All users and user groups in the Base-DN will be synchronized to the local. The format of the DN is"OU-U=xxx, DC=xxx,...".
Synchronization	Check the checkbox to enable the synchronization function; clear the checkbox to disable the synchronization function, and system will stop synchronizing and clear the existing user information. By default, system will synchronize the user information on the configured LDAP server with the local every 30 minutes.
Automatic Synchronization	Click the radio button to specify the automatic syn-

Basic Configuration		
	chronization.	
	Interval Synchronization	Specifies the time interval for automatic synchronization. The value range is 15 to 1440 minutes. The default value is 30.
	Daily Synchronization	Specifies the time when the user information is synchronized everyday. The format is HH:MM, HH and MM indicates hour and minute respectively.
	Once Synchronization	If this parameter is specified, system will synchronize automatically when the configuration of LDAP server is modified. After executing this command , system will synchronize user information immediately.
Synchronous Operation Mode	Specifies the user synchronization mode, including Group Synchronization and OU Synchronization. By default, the user information will be synchronized with the local server based on the group.	
Synchronization Object	Filter the synchronization information obtained and retain the information of the specified object. You can select the syn object as users or groups. By default, users and groups are both selected.	

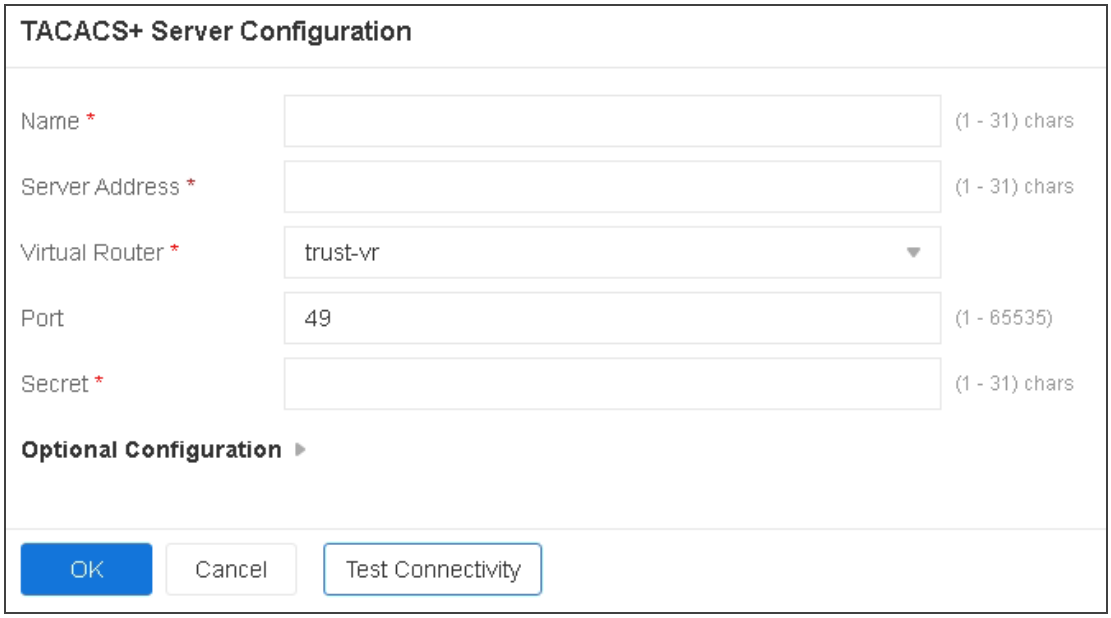
Basic Configuration	
OU maximum depth	Specifies the maximum depth of OU to be synchronized. The value range is 1 to 12, and the default value is 12. OU structure that exceeds the maximum depth will not be synchronized, but users that exceed the maximum depth will be synchronized to the specified deepest OU where they belong to. If the total characters of the OU name for each level(including the "OU=" string and punctuation) is more than 128, OU information that exceeds the length will not be synchronized with the local server.
User Filter	Specifies the user filters. System can only synchronize and authenticate users that match the filters on the authentication server. The length is 0 to 120 characters. For example, if the condition is configured to "(|(objectclass=inetOrgperson)(objectclass=person))", system only can synchronize or authenticate users which are defined as inetOrgperson or person. The commonly used operators are as follows: =(equals a value)、&(and) 、|(or)、!(not)、*(Wildcard: when matching zero or more characters)、~=(fuzzy query.)、>=(Be greater than or equal to a specified value in lexicographical order.)、<=(Be less than or equal to a specified value in lexicographical order.).

Basic Configuration	
Naming Attribute	Specifies a naming attribute for the LDAP server. The default naming attribute is uid.
Group Naming Attribute	Specifies a naming attribute of group for the LDAP server. The default naming attribute is uid.
Member Attribute	Specifies a member attribute for the LDAP server. The default member attribute is uniqueMember.
Group Class	Specifies a group class for the LDAP server. The default class is groupofuniquenames.
Backup Authentication Server	Specifies a backup authentication server. After configuring a backup authentication server for the LDAP server, the backup authentication server will take over the authentication task when the primary server malfunctions or authentication fails on the primary server. The backup authentication server can be any existing local, Active-Directory, RADIUS or LDAP server defined in system.
Synchronization Base-dn	Synchronization Base-DN is the starting point at which the system synchronizes users and user groups from the LDAP server. Click this field. In the **Server Directory** panel, select the path that you want to synchronize. This way, all users and user groups in the path are synchronized to the local. At most 32 paths can be selected.

3. Click **OK**.

Configuring TACACS+ Server

1. Select **Object > AAA Server**.
2. Click **New > TACACS+ Server**, and the **TACACS+ Server Configuration** page opens.



Configure the following.

Basic Configuration	
Server Name	Enter a name for the TACACS+ server.
Server Address	Specify the IP address or host name for the TACACS+ server.
Virtual Router	Specify the VRouter of TACACS+ server.
Port	Enter port number for the TACACS+ server. The default value is 49. The value range is 1 to 65535.
Secret	Enter the shared secret to connect the TACACS+ server.

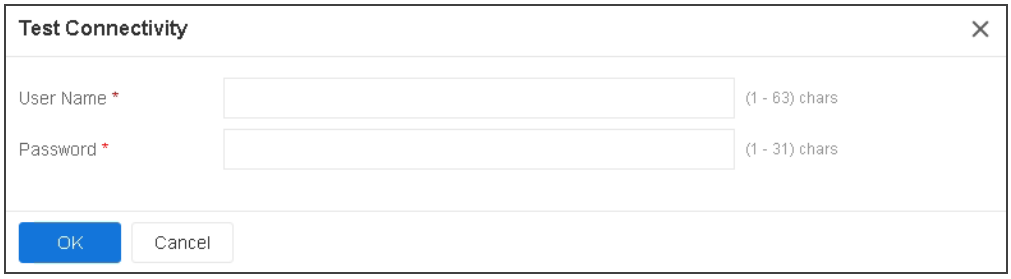
Basic Configuration	
Optional	
Username Extraction	
Authentication	Specifies the authentication user name format. During authentication, the system will extract the user name for authentication based on the configured authentication user name format. If the specified format is not available, the system will use the original user name. The supported format includes "domain\username" and "username@domain".
Search Group	Specifies the user name format when the system searches from the local storage. When implementing policy control based on user name or user groups, the system will search for the group of a user name in the organization units that are locally saved. The supported format includes "domain\username" and "username@domain".
Role mapping rule	Select a role mapping rule for the server. With this option selected, system will allocate a role for the users who have been authenticated to the server according to the specified role mapping rule.
Backup Server 1 (2)	Enter the domain name or IP address for the backup TACACS+ server.
Virtual Router 1 (2)	Select the VRouter for the backup server.

Connectivity Test

When AAA server parameters are configured, you can test if they are correct by testing server connectivity.

To test server connectivity, take the following steps:

1. Select **Object > AAA Server**, and click **New**.
2. Select your AAA server type, which can be Radius, AD, LDAP or TACACS+. The local server does not need the connectivity test.
3. After filling out the fields, click **Test Connectivity**.
4. For Radius or TACACS+ server, enter a username and password in the popped <Test Connectivity> dialog box. If the server is AD or LDAP, the login-dn and secret is used to test connectivity.



5. Click **Test Connectivity**. If "Test connectivity success" message appears, the AAA server settings are correct.

If there is an error message, here are the causes:

- Connect AAA server timeout: Wrong server address, port or virtual router.
- AAA server configuration error: Secret is wrong.
- Wrong name or password: Username or password for testing is wrong.

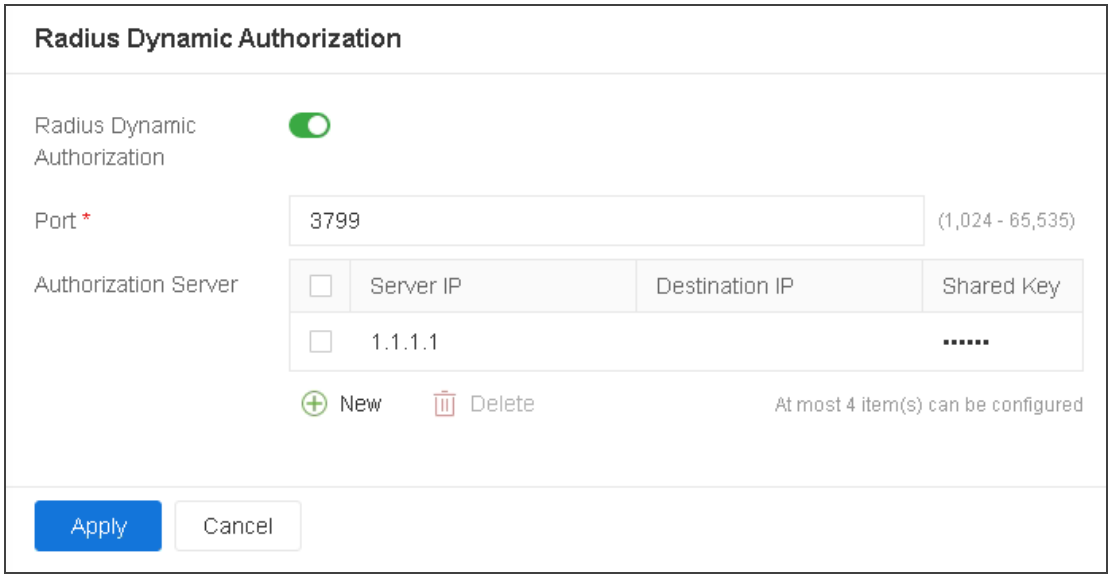
Radius Dynamic Authorization

The Radius dynamic authorization function, includes:

- When the user is authenticated successfully, the Radius server can send a Radius CoA (Change of Authorization) request message to the authority of the authenticated user to the device. The device automatically generates the security policy rule for the user. When the user goes offline, the device delete this user's security policy rule automatically
- When the SCVPN user is authenticated successfully, the Radius server can send a Radius DM (Disconnect Messages) request message to send the accounting user information (including the user name, user IP address, user accounting ID, etc.) to the device, and the device can disconnect the specified scvpn authentication user and end the accounting.

To configure the Radius dynamic authorization function, take the following steps:

1. Select **Object** > **Radius Dynamic Authorization**.



2. Click the **Enable** button after **Radius Dynamic Authorization** to enable the Radius dynamic authorization function.

3. Type the port number of the Radius dynamic authorization server into the **Port** textbox. The value range is 1024 to 65535. The default value is 3799.

4. In the Authorization Server section, click **New**, and then specify the IP address, destination IP and shared key of the Radius dynamic authorization server.

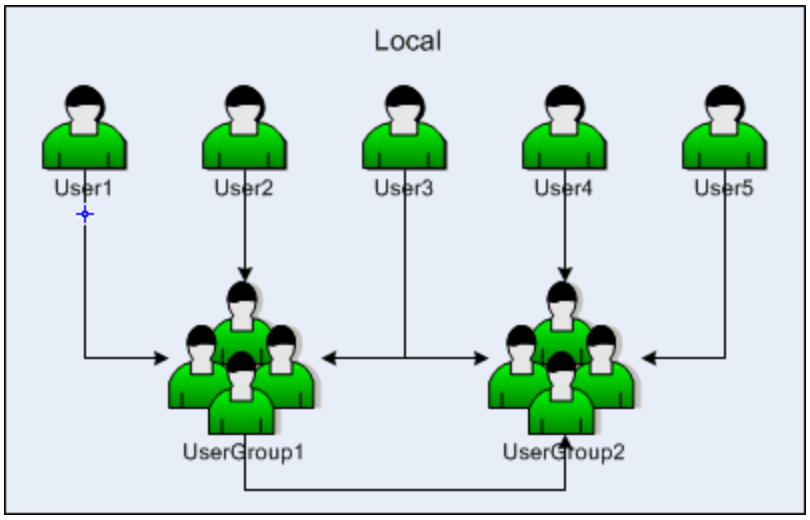
5. To delete the Radius dynamic authorization server, select the checkbox in the list, and then click **Delete**.

6. Click **Apply**.

Notes: If you need to use the Radius dynamic authorization function, first enable and configure the Radius accounting server. For the configuration, refer to Enable Accounting.

User

User refers to the user who uses the functions and services provided by the Hillstone device, or who is authenticated or managed by the device. The authenticated users consist of local user and external user. The local users are created by administrators. They belong to different local authentication servers, and are stored in system's configuration files. The external users are stored in external servers, such as AD server or LDAP server. System supports User Group to facilitate user management. Users belonging to one local authentication server can be allocated to different user groups, while one single user can belong to different user groups simultaneously; similarly, user groups belonging to one local authentication server can be allocated to different user groups, while one single user group can belong to different user groups simultaneously. The following diagram uses the default AAA server, Local, as an example and shows the relationship between users and user groups:



As shown above, User1, User2 and User3 belong to UserGroup1, while User3 also belongs to UserGroup2, and UserGroup2 also contains User4, User5 and UserGroup1.

Configuring a Local User

This section describes how to configure a local user and user group.

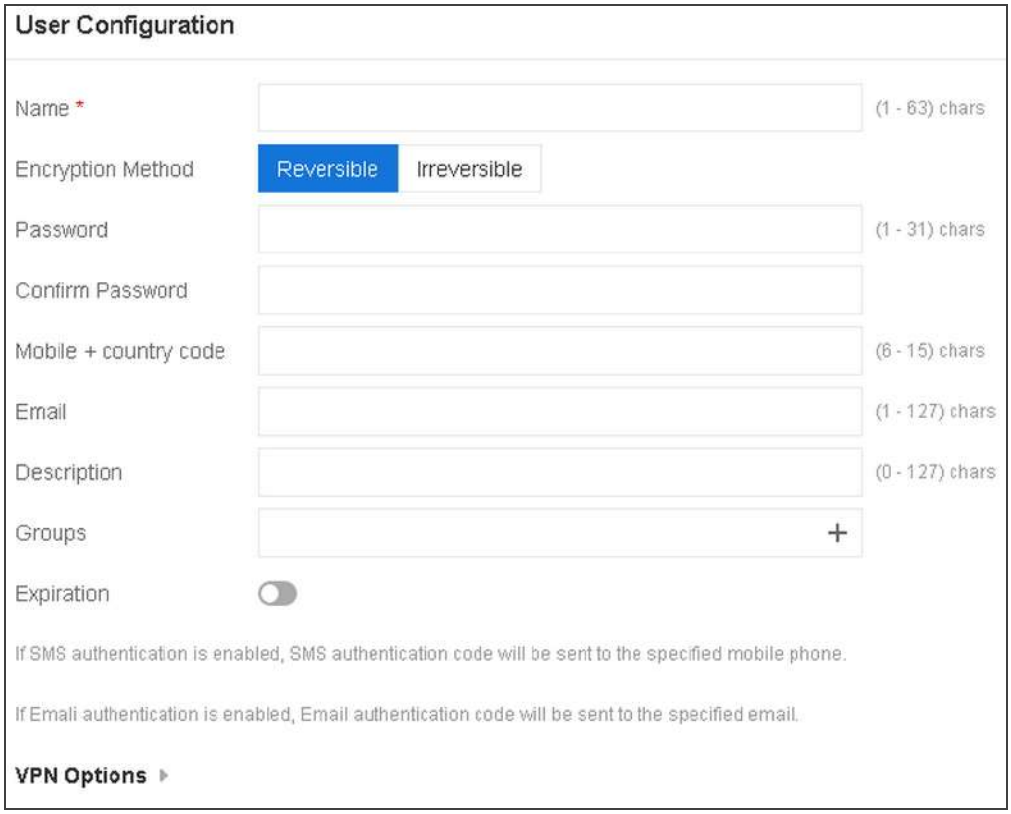
Click **Object > User > Local User** or **ZTNA > User > Local User**, some information and operations are provided as below:

- Click the "Local server" drop-down box in the upper left corner of the page to switch the local user's server.
- Red Expired, orange Will expire within a week and yellow Will expire within a month colors are used to mark the expired users , expired within a week, expired within a month in the list.
- Check the information of the local user in the list, including user, user group, expiration, mobile and description.

Creating a Local User

To create a local user, take the following steps:

1. Select **Object > User > Local User** or **ZTNA > User > Local User**.
2. Click **New > User**.



Configure the following.

Option	Description
Name	Specifies a name for the user.
Encryption Method	Specifies method to encrypt the user's password, that is, the encrypted algorithm of password is reversible or irreversible . • Reversible: System will use the reversible encryption algorithm AES to encrypt the user password. In some authentication scenarios, system can decrypt the password for authentication. • Irreversible: System will use the SHA irre-

Option	Description
	versible encryption algorithm to encrypt user passwords. The passwords cannot be decrypted. In this case, the user can not authenticate through CHAP (Challenge Handshake Authentication Protocol, which is used in L2TP VPN and 802.1X).
Password	Specifies a password for the user.
Confirm password	Type the password again to confirm.
Mobile+country code	Specifies the user's mobile number. When users log into the SCVPN client, system will send the verification code to the mobile number.
Email	Specifies the user's Email address. The value range is 1 to 127 characters. If the Email authentication function is enabled, users will receive the verification code via this Email. For more information about Email authentication, see Configuring an SSL VPN.
Description	If needed, type the description of the user.
Group	Add the user to a selected user group. Click + and the **User Group** list appears. Then, click the user group you want to add to. Note: When a user is added to more than 256 groups, only the first 256 group associations will take effect based on the association sequence. This principle also applies when the group associations are configured on an external authentication server.
Expiration	Click the button to enable **Expiration** for the user.

Option	Description
	Specify the expiration date and time. If the user expires, the user cannot be authenticated therefore is cannot be used in system. By default expiration is disabled.

Expand VPN Options, configure network parameters for the PnPVPN client.

Option	Description
IKE ID	Specifies a IKE ID type for dial-up VPN users. If FQDN or ASN1 is selected, type the ID's content in the text box below.
DHCP Start IP	Specifies a start IP for the DHCP address pool.
DHCP End IP	Specifies an end IP for the DHCP address pool.
DHCP Netmask	Specifies a netmask for the DHCP address pool.
DHCP Gateway	Specifies a gateway for the DHCP address pool. The IP address of the gateway corresponds to the IP address of PnPVPN client's Intranet interface and PC's gateway address. The PC's IP address is determined by the segment and netmask configured in the above DHCP address pool. Therefore, the gateway's address and DHCP address pool should be in the same segment.
DNS1	Specifies an IP address for the DNS server. You can specify one primary DNS server (DNS1) and up to three alternative DNS servers.
DNS2	
DNS3	
DNS4	
WINS1	Specifies an IP address for the WINS server. You can specify one primary WINS server (WINS1)and one alternative WINS server.
WINS2	

Option	Description
Tunnel IP 1	Specifies an IP address for the master PnPVPN client's tunnel interface. Select the **Enable SNAT** check box to enable SNAT.
Tunnel IP 2	Specifies an IP address for the backup PnPVPN client's tunnel interface.

3. Click **OK**.

Creating a User Group

To create a user group, take the following steps:

1. Select **Object > User > Local User** or **ZTNA > User > Local User**.
2. Click **New > User Group**.
3. Type the name of the user group into the Name box.
4. Specify members for the user group. Expand User or User Group in the Available list, select a user or user group and click **Add** to add it to the Selected list on the right. To delete a selected user or user group, select it in the Selected list and then click **Remove**. One user group can contain multiple users or user groups, but system only supports up to 5 layers of nested user groups and does not support the loopback nest. Therefore, a user group should not nest the upper-layer user group it belongs to.
5. Click **OK**.

Export User List

The system exports the user-list file in .csv format, of which the content is the real-time information of the user list in the system.

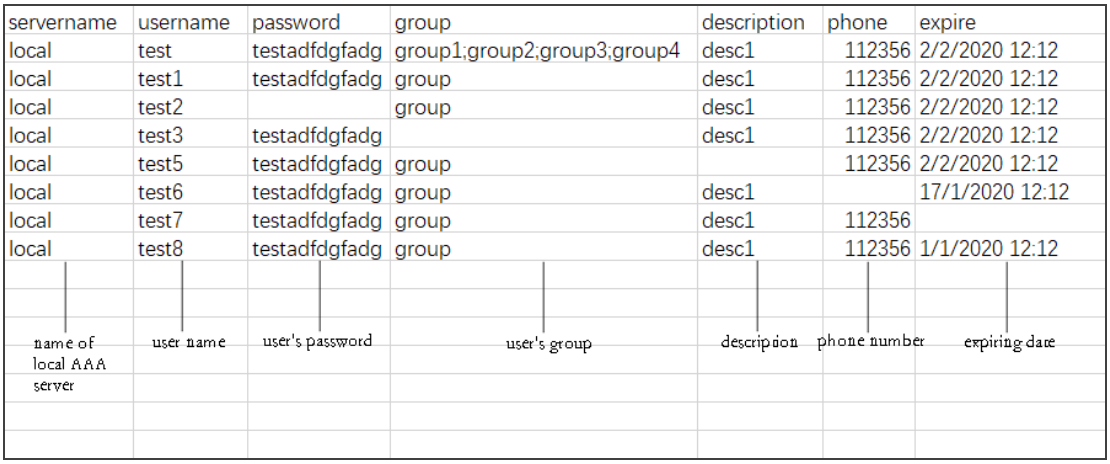
Export user binding list from system to local, take the following steps:

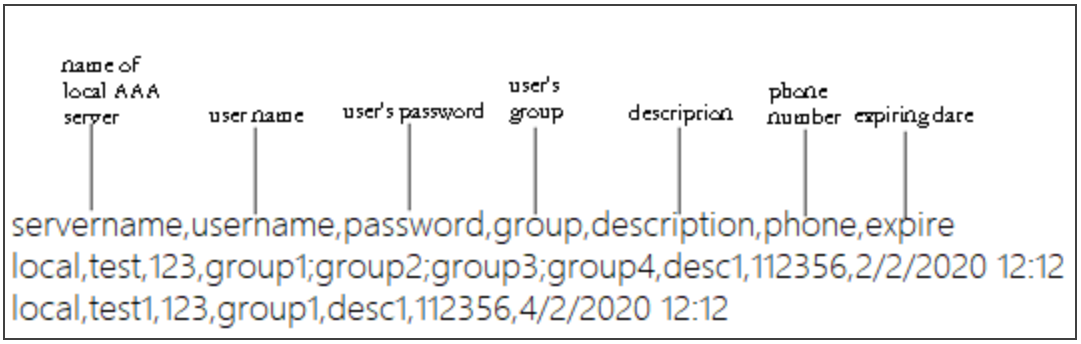
1. Select **Object > User > Local User** or **ZTNA > User > Local User**.
2. Click **Export User List** to open the **Export User List** page, and select the saved position in local.
3. Click **OK** to finish export.

Import User List

The system supports the import of user-list files in UTF-8 or GBK ecoding with .csv format.csv format. When the user-list file is imported, the system will carry out validity test and complexity check of the user password. If the results turn out to be successful, the importing is successful; if the results turn out to be unsuccessful, the importing is unsuccessful.

The user-list in .csv file is illustrated in the figure below.





Notes: Before importing the user-list file, please read carefully the annotations in the above figures and fill in the user information according to the format.

Import user binding list to system, take the following steps:

1. Select **Object>User> Local User** or **ZTNA > User > Local User**.
2. Click **Import User List** to open the **Import User List** page.
3. Click **Browse** to select the file name needed to be imported.
4. Click **OK** to finish import.

Notes:

- The user password in the import/export file is not encrypted, unless the password strings match the AES encryption format.
- Please try to keep the import file format consistent with the export file.
- When imported, if the same user name exists under the same server, the original user information will be overwritten.
- When imported, if a user is new to the system, it and its user information will be added to the system automatically.
- In the imported user-list file, the "username" field should not contain slash/-comma/double quotation marks/question mark/@; the "group" field should not contain comma/double quotation marks/question mark.
- In the imported user-list file, the date in the "expire" field should be typed in the format of DD/MM/YYYY HH:SS.

Configuring a LDAP User

This section describes how to configure a LDAP user.

Synchronizing Users

To synchronize users in a LDAP server, firstly, you need to configure a LDAP server, refer to "Configuring LDAP Server" on Page 1136. To synchronize users:

1. Select **Object > User > LDAP User** or **ZTNA > User > LDAP User**.
2. Select a server from the LDAP Server drop-down list, and click **Sync Users**.

Notes: By default, after creating a LDAP server, system will synchronize the users of the LDAP server automatically, and then continue to synchronize every 30 minutes.

Configuring an Active Directory User

This section describes how to configure an active directory (AD) user.

Synchronizing Users

To synchronize users in an AD server to the device, first you need to configure an AD server ,refer to "Configuring Active Directory Server" on Page 1127. To synchronize users, take the following steps:

1. Select **Object > User >AD User** or **ZTNA > User > AD User**.
2. Select an AD server from the Active Directory Server drop-down list, and click **Sync Users**.

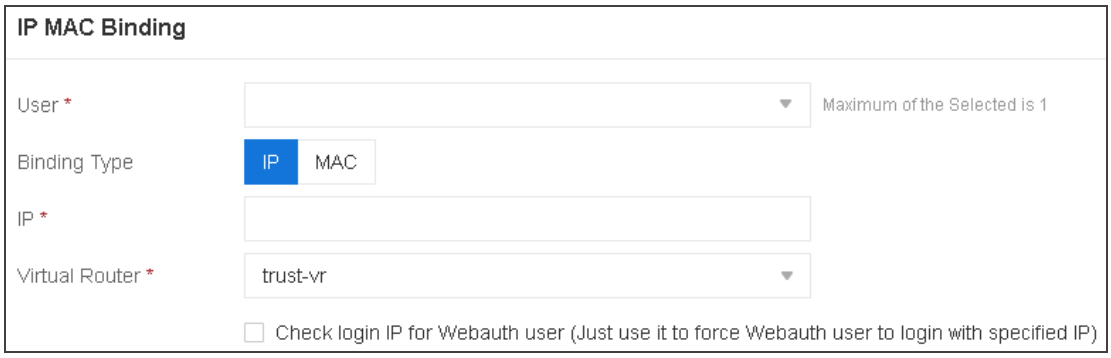
Notes: By default, after creating an AD server, system will synchronize the users of the AD server automatically, and then continue to synchronize every 30 minutes.

Configuring a IP-User Binding

Adding User Binding

To bind an IP or MAC address to a user, take the following steps:

1. Select **Object > User > IP-User Binding** or **ZTNA > User > IP-User Binding**.
2. Click **Add User Binding**.



Configure the following options.

User	
AAA Server	Select an AAA server from the drop-down list.
User	Select a user for the binding from the drop-down list.
Binding Type	
Binding Type	By specifying the binding type, you can bind the user to a IP address or MAC address. • IP - If IP is selected, type the IP address into the IP text box. Both the IPv4 address and IPv6 address are supported. And select a VR from the Virtual Router drop-down list. Select the **Check**

User	
	WebAuth IP-User Mapping Relationship check box to apply the IP-User mapping only to the check for IP-user mapping during Web authentication if needed. • MAC - If MAC is selected, type the MAC address into the MAC text box. And select a VR from the Virtual Router drop-down list.

3. Click **OK**.

Import Binding

Import user binding list to system, take the following steps:

1. Select **Object>User> IP-User Binding** or **ZTNA > User > IP-User Binding**..
2. Click **Import** , and the **Import User Binding List** dialog box pops up.
3. Click **Browse** to select the file name needed to be imported.
4. Click **OK** to finish import.

Export Binding

Export user binding list from system to local, take the following steps:

1. Select **Object>User> IP-User Binding** or **ZTNA > User > IP-User Binding**..
2. Select the exported user category(include local, LDAP, AD and all users) in the **Export** drop-down list to pop up the export dialog box, and select the saved position in local.
3. Click **OK** to finish export.

Role

Roles are designed with certain privileges. For example, a specific role can gain access to some specified network resources, or make exclusive use of some bandwidth. In StoneOS, users and privileges are not directly associated. Instead, they are associated by roles.

The mappings between roles and users are defined by role mapping rules. In function configurations, different roles are assigned with different services. Therefore, the mapped users can gain the corresponding services as well.

System supports role combination, i.e., the AND, NOT or OR operation on roles. If a role is used by different modules, the user will be mapped to the result role generated by the specified operation.

System supports the following role-based functions:

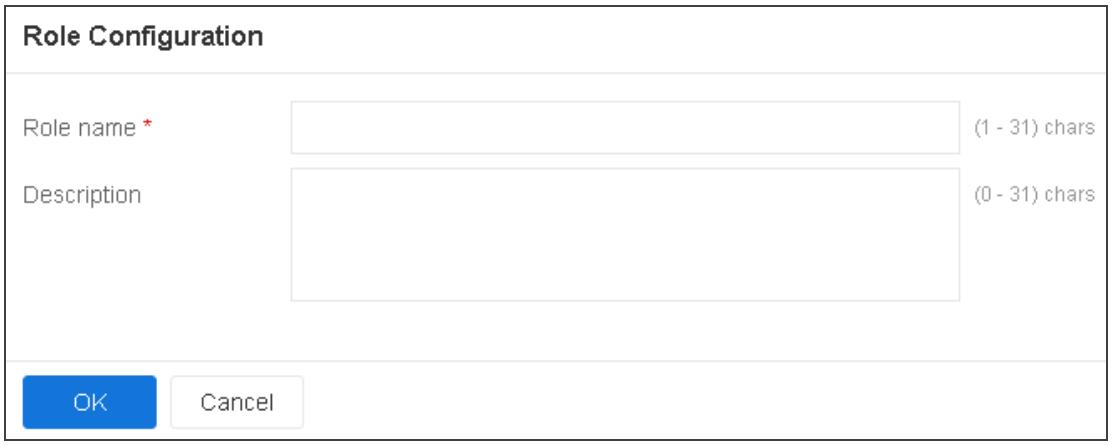
- Role-based policy rules: Implements access control for users of different types.
- Role-based QoS: Implements QoS for users of different types.
- Role-based statistics: Collects statistics on bandwidth, sessions and new sessions for users of different types.
- Role-based session limits: Implements session limits for specific users.
- SCVPN role-based host security detection: Implements control over accesses to specific resources for users of different types.
- Role-based PBR: Implements routing for users of different types.

Configuring a Role

Creating a Role

To create a role, take the following steps:

1. Select **Object > Role > Role**.
2. Click **New**.



Configure the following options.

Option	Description
Role Name	Type the role name into the Role Name box.
Description	Type the description for the role into the Description box.

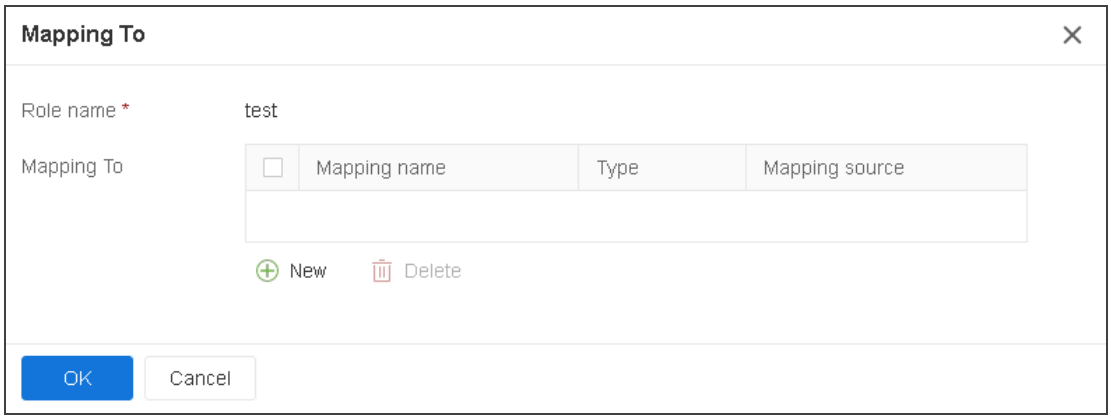
3. Click **OK**.

Mapping to a Role Mapping Rule

You can map the role to user, user group, CN, OU or the user attribute through this function or Creating a Role Mapping Rule. After Creating a Role Mapping Rule, you can click Mapping To to map the selected role again.

To map the selected role again, take the following steps:

1. Select **Object > Role > Role**.
2. Select the role need to be mapped, and click **Mapping To**.

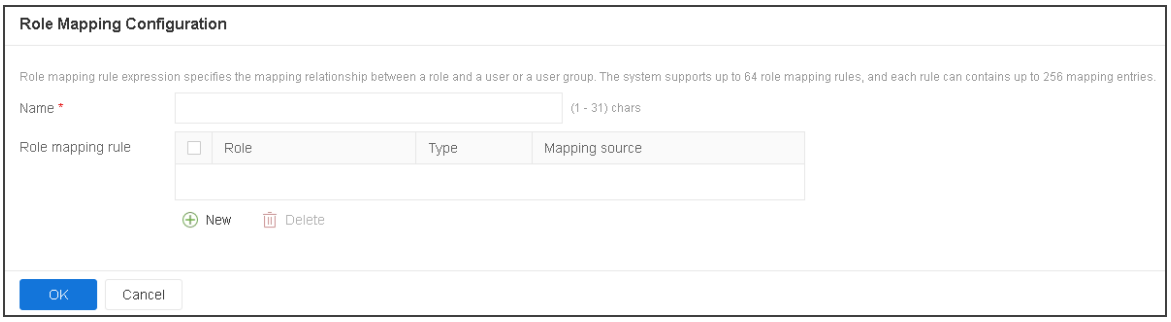


3. In the Mapping name section, select a created mapping rule name from the first drop-down list (For detailed information of creating a role mapping role, see Creating a Role Mapping Rule.), and then select a user, user group, certificate name (the CN field of USB Key certificate), organization unit (the OU field of USB Key certificate) , User Attributes, distinguished name (the DN Field of the USB Key Certificate) or any from the second drop-down list. If User, User group, CN, OU, User Attributes or DN is selected, also select or enter the corresponding user name, user group name, CN, OU, User Attributes or DN into the box behind.
4. Click **Add** to add to the role mapping list.
5. If needed, repeat Step 3 and Step 4 to add more mappings. To delete a role mapping, select the role mapping you want to delete from the mapping list, and click **Delete**.
6. Click **OK**.

Creating a Role Mapping Rule

To create a role mapping rule, take the following steps:

1. Select **Object > Role > Role Mapping** .
2. Click **New**.



3. Type the name for the rule mapping rule into the Name box.
4. In the Member section, select a role name from the first drop-down list, and then select a user, user group, certificate name (the CN field of USB Key certificate) or organization unit (the OU field of USB Key certificate) , User Attributes, , distinguished name (the DN Field of the USB Key Certificate) from the second drop-down list. If User, User group, CN, OU, User Attributes or DN is selected, also select or enter the corresponding user name, user group name, CN, OU, User Attributes or DN into the box behind.
5. Click **Add** to add to the role mapping list.
6. If needed, repeat Step 4 and Step 5 to add more mappings. To delete a role mapping, select the role mapping you want to delete from the mapping list, and click **Delete**.
7. Click **OK**.

Configuring a User Attribute Instance

To configure a user attribute instance, take the following steps:

1. Select **Object > Role > Role Mapping** .
2. Click **Configuration** in the upper-right corner, and select **User Attributes** to go to the User Attributes page.
3. Click **New** to go to the User Attributes Configuration page.

On the User Attributes Configuration page, configure the following options:

Option	Description
Name	Specifies the name of the user attribute instance.
Type	Specifies the protocol type, which can be RADIUS or AD/LDAP.
Rule Matching Policy	Specifies the rule matching policy of the user attribute instance, including: • The current rule is matched if any filter condition is met: The user

Option	Description
	is matched to the role mapped to the user attribute instance when the user hits any filter configured in the user attribute instance; • The current rule is matched if all filter conditions are met: The user is matched to the role mapped to the user attribute instance only when the user hits all filters configured in the user attribute instance.
Current Filter Conditions	Specifies the current filter conditions for this user attribute instance. Click **New** and enter the name of the user attribute in the Attributes textbox, or select a common user attribute from the dropdown list. Select the mapping operation from the **Operation** dropdown list. Enter the mapping value of the user attribute in the Value textbox.  Notes: • Each user attribute instance supports up to 8 filers. • When protocol type is specified as RADIUS, the mapping operation associated with string-typed user attributes can only be contain, start-with, end-with, or same-as. The mapping operation associated with number-typed user attributes can only be equal-to, greater-than, or less-than. • When the mapping operation is contain, start-with, end-with, or same-as, the mapping value can be strings or numbers. When the mapping oper-

Option	Description
	 ation is equal-to, greater-than, or less-than, the mapping value can only be numbers.

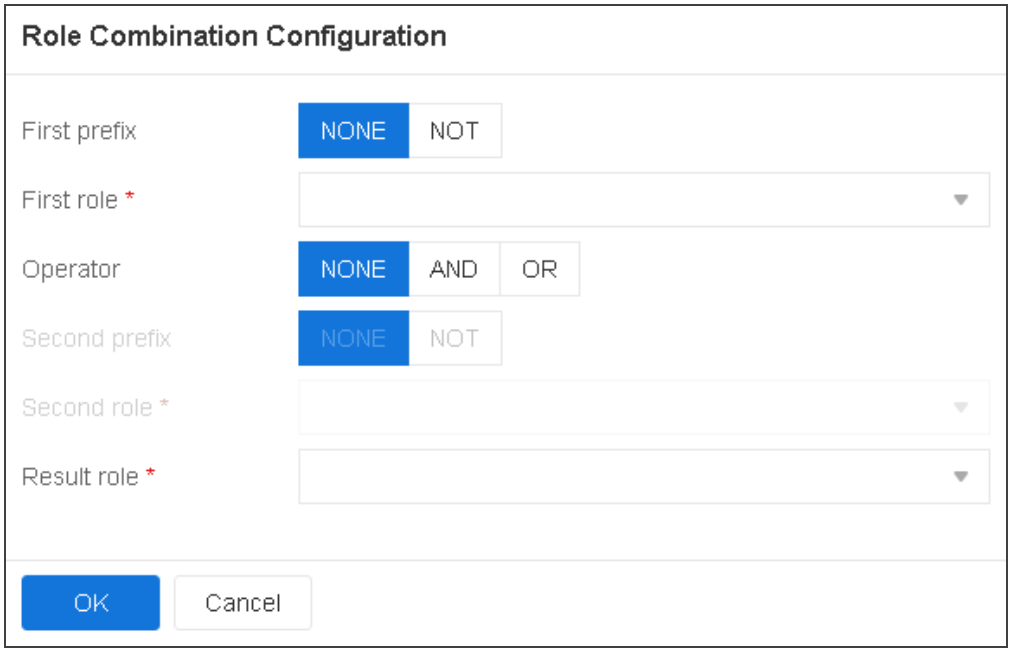
4. Click **OK** to complete the configuration. Newly created user attribute instance will be displayed on the **User Attributes** list
5. If needed, you can add more user attribute instances.
6. If you need to delete a user attribute instance, select the user attribute instance from the list, and click **Delete**.

 **Notes:** The system supports up to 64 user attributes instances.

Creating a Role Combination

To create a role combination, take the following steps:

1. Select **Object > Role > Role Combination**.
2. Click **New**.



Configure the following options.

Option	Description
First Prefix	Specifies a prefix for the first role in the role regular expression.
First Role	Select a role name from the First Role drop-down list to specify a name for the first role in the role regular expression.
Operator	Specifies an operator for the role regular expression.
Second Prefix	Specifies a prefix for the second role in the role regular expression.
Second Role	Select a role name from the Second Role drop-down list to specify a name for the second role in the role regular expression.

Option	Description
Result Role	Select a role name from the Result Role drop-down list to specify a name for the result role in the role regular expression.

3. Click **OK**.

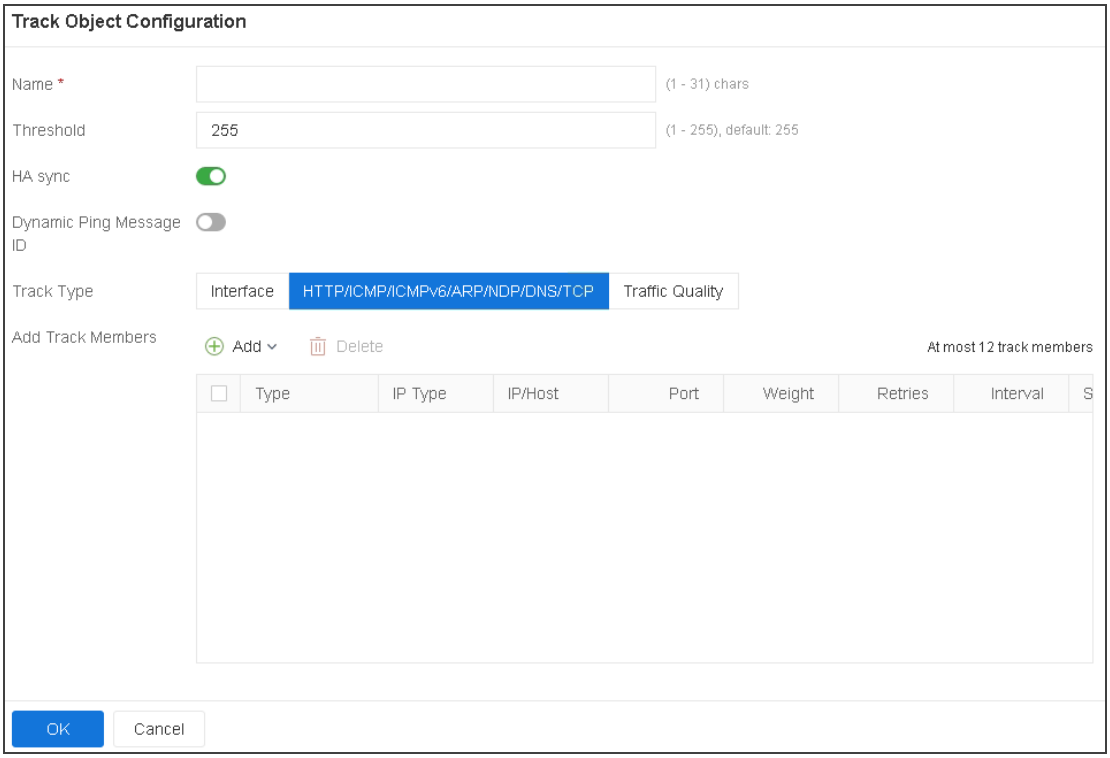
Track Object

The devices provide the track object to track if the specified object (IP address or host) is reachable or if the specified interface is connected. This function is designed to track HA and interfaces.

Creating a Track Object

To create a track object, take the following steps:

1. Select **Object > Track Object**.
2. Click **New**.



Configure the following options.

Option	Description
Name	Specifies a name for the new track object.
Threshold	Type the threshold for the track object into the text box. If the sum of weights for failed entries in the track object exceeds the threshold, system will conclude that the whole track object fails.

Track Type	Select a track object type. One track object can only be configured with one type. Select **Interface** radio button:
	• Click **Add** in Add Track Members section and then configure the following options in the Add Interfaces dialog box:
	  • Interface - Select a track interface from the drop-down list.
	  • Weight - Specifies a weight for the interface, i.e. the weight for overall failure of the whole track object if this track entry fails.
	Select **HTTP/ICMP/ICMPv6/ARP/NDP/DNS/TCP** radio button:
	• Click **Add**, select a packet type from the drop-down list, and then configure the following options in the Add HTTP/ICMP/ICMPv6/ARP/NDP/DNS/TCP Member dialog box:
	  • IP Type - Specifies the IP type for the track

Option	Description
	object when the track is implemented by HTTP/DNS/TCP packets. • IP/Host - Specifies an IP address or host name for the track object when the track is implemented by HTTP/ICMP/ICMPv6/TCP packets. IP - Specifies an IP address for the track object when the track is implemented by ARP/NDP packets. DNS - Specifies an IP address for the track object when the track is implemented by DNS packets. • Weight - Specifies a weight for overall failure of the whole track object if this track entry fails. • Retries: Specifies a retry threshold. If no response packet is received after the specified times of retries, system will determine this track entry fails, i.e., the track entry is unreachable. The value range is 1 to 255. The default value is 3. • Interval - Specifies an interval for sending packets. The value range is 1 to 255 seconds. The default value is 3.

Option	Description
	• Egress Interface - Specifies an egress interface from which HTTP/ICMP/ICMPv6/ARP/NDP/DNS/TC-P packets are sent. • Source Interface- Specifies a source interface for HTTP/ICMP/ICMPv6/ARP/DNS/TCP packets.
	Select **Traffic Quality** radio button: • Click **Add** in Add Track Members section and then configure the following options in the Add Traffic Quality Member dialog box: • IP Type - Specifies the address type of the traffic quality member, including IPv4 and IPv6. When "IPv4" is specified, only the IPv4 traffic of the tracked interface; when "IPv6" is specified, only the IPv6 traffic of the tracked interface. • Interface - Specifies the name of the tracked interface. • Interval - Specifies the duration of per track period. The unit is second. The value range is 1 to 255. The default value is 3. After a track

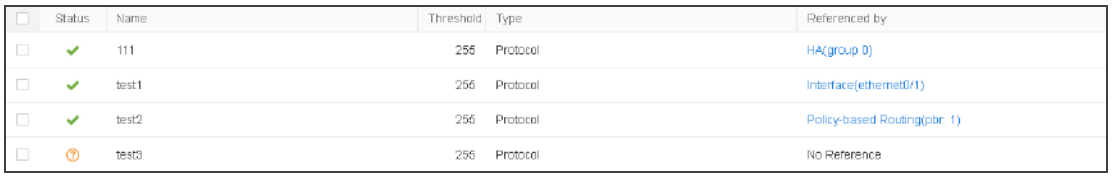
Option	Description
	period is finished, system will reset the tracked value of new session. • Retries - Specifies the threshold value which concludes the track entry is failed. The value range is 1 to 255. The default value is 3. • Weight - Specifies how important this track failure is to the judgment of track object failure. The value range is 1 to 255. The default value is 255. • Low Watermark - Specifies the failure threshold value of new session success rate. The value range is 0 to 100. The default value is 30. During a track period, when the new session success rate is below the specified low watermark, system will conclude the track is failed. • High Watermark- Specifies the failure threshold value of new session success rate. The value range is 0 to 100. The default value is 50. During a track period, when the new session success rate exceeds the specified low watermark, system will conclude the track is successful.

Option	Description
	Note: During a track period, when the new session success rate is equal to or exceeds the low water-mark, and is equal to or below the low watermark, system will keep the previous track state.
HA sync	Select this check box to enable HA sync function. The primary device will synchronize its information with the backup device.
Dynamic Ping Mes-sage ID	Select this check box to enable the Dynamic Ping Message ID function. With this function enabled, the header ID of ICMP messages sent by the same track object is a dynamic value. This function is disabled by default. With this func-tion disabled, the header ID of ICMP messages sent by the same track object is a fixed value.

3. Click **OK.** The created track object will be displayed in the track object list.

Track Object List

The track object list displays information about configured track objects in the system, including **Status**, **Name**, **Threshold**, **Type**, and **Referenced by**. The **Referenced by** column displays the func-tional module bound to the track object, which can be an interface, HA, policy-based route, or vsys-track-status (non-root VSYS). Click the functional module to view details about the module. When the module is unbound or unbound to the track object, the **Referenced by** column displays **No Reference**.



Notes:

- A track object can be bound to only one module.
- In the non-root VSYS, you need to create a track object before binding it. After binding, **vsys-track-status** is displayed in the **Referenced by** column of the track object list. You cannot view details about vsys-track-status.
- In the non-root VSYS, track objects can be bound by interfaces and policy-based routes, but cannot be bound by HA. After binding, you can view details about related items in the track object list.

For information on how interfaces, HA, policy-based routes, and non-root VSYS bind track objects, see:

- Interface: An Interface binds a track object.
- HA: A HA binds a track object.
- Policy-based Route: A policy-based route binds a track object.
- Non-root VSYS: A non-root VSYS binding a track object only support command line configuration. For details, refer to the chapter **Configuring VSYS** in the **StoneOS CLI User Guide**.

URL Filtering

URL filtering controls the access to some certain websites and records log messages for the access actions. URL filtering helps you control the network behaviors in the following aspects:

- Access control to certain category of websites, such as gambling and pornographic websites.
- Access control to certain category of websites during the specified period. For example, forbid to access IM websites during the office hours.
- Access control to the website whose URL contains the specified keywords. For example, forbid to access the URL that contains the keyword of game.

If IPv6 is enabled, you can configure URL and keyword for both IPv4 and IPv6 address. How to enable IPv6, see StoneOS_CLI_User_Guide_IPv6.

Configuring URL Filtering

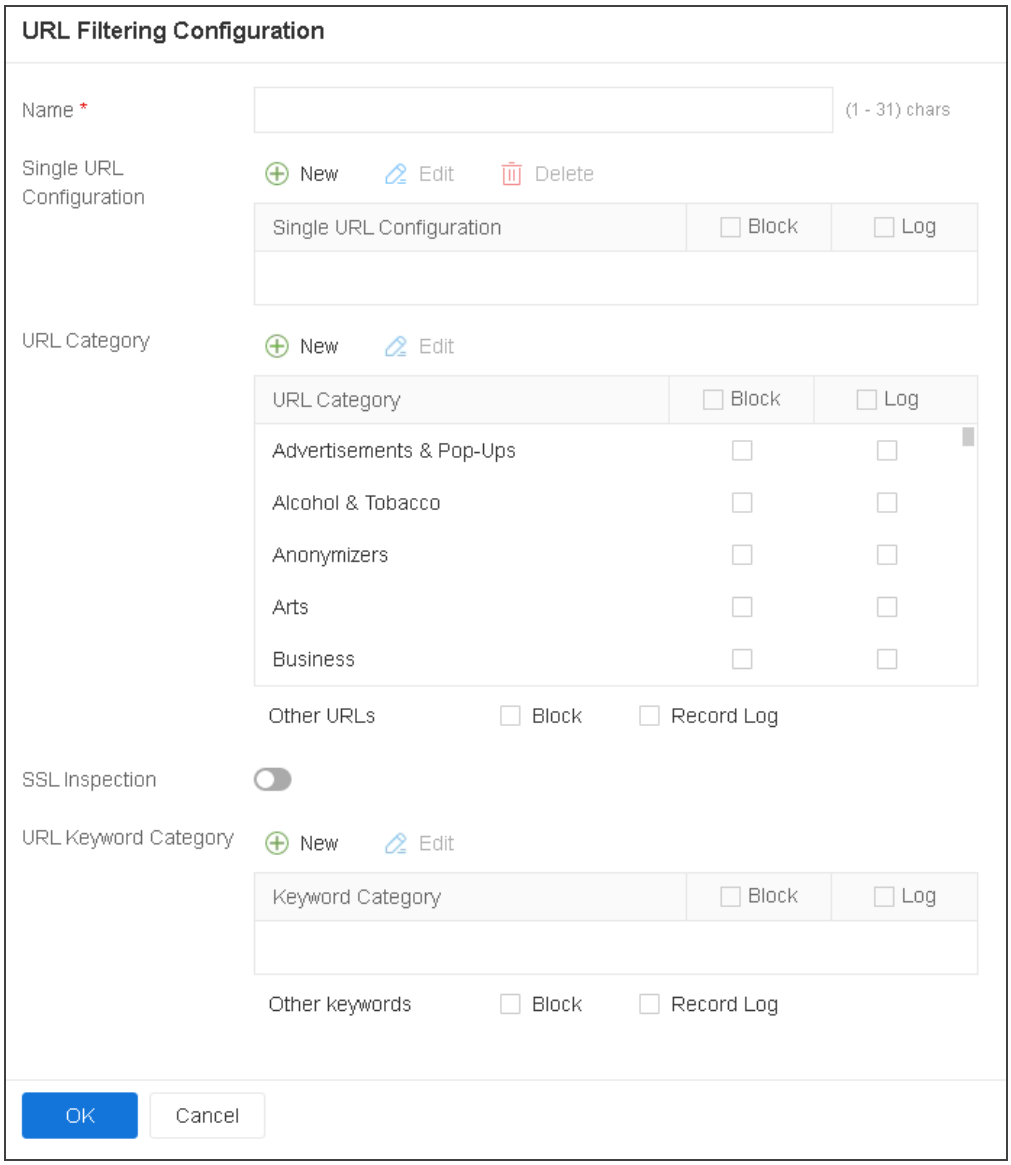
Configuring URL filtering contains two parts:

- Create a URL filtering rule
- Bind a URL filtering rule to a security zone or policy rule

Part 1: Creating a URL filtering rule

1. Select **Object > URL Filtering>Profile**.

2. Click **New**.



Configure the following options.

Option	Description
Name	Specifies the name of the rule. You can configure the same URL filtering rule name in different VSYSs.

Option	Description
Safe Search	Many search engines, such as Google, Bing, Yahoo!, Yandex, and YouTube, all have a "SafeSearch" setting, which can filter adult content, and then return search results at different levels based on the setting. The system supports the safe search function in the URL filtering Profile to detect the "SafeSearch" setting of search engine and perform corresponding control actions. Select the **Enable** check box to enable the safe search function to detect the settings of the search engine's "SafeSearch" and perform corresponding control actions.  Notes: • The safe search function only can be used in the following search engines currently: Google, Bing, Yahoo!, Yandex, and YouTube. • The safe search function only can be used in combination with the SSL proxy function because the search engine uses the HTTPS protocol. Therefore, when the "SafeSearch" is enabled, enable the SSL proxy function for the policy rule which is bound with

Option	Description
	 URL filter profile. • To ensure the valid "SafeSearch" function of Google, you need to configure policy rules to block the UDP 80 and UDP 443 port.
Control Action	Specifies the safe search action. o Block: Selects the check box to specify the action as block, When the " SafeSearch" setting of search engine is not set, users will be prevented from accessing the search page and a warning page will pop up which provides users with the link for "SafeSearch" setting. o Enforce: Selects the check box to specify the action as execute. When the "SafeSearch" setting of search engine is not set, system will force to set it at the “strict” level.

3. In the **URL Category** part to configure the URL category control type for URL filtering rules to control the access to some certain category of website.

In the URL Category part, configure the following options.

Option	Description
New	Creates a new URL category. For more information about URL categories, see "User-defined URL DB" on Page 859.
Edit	Selects a URL category from the list, and click **Edit** to

Option	Description
	edit the selected URL category. **URL Keyword Category** controls the access to the website whose URL contains the specific keywords. Click the **URL Keyword Category**option to configure. The options are: • New: Creates new keyword categories. For more information about keyword category, see "Keyword Category" on Page 863. • Edit: Select a URL keyword category from the list, and click **Edit** to edit the selected URL keyword categories. • Keyword category: Shows the name of the configured keyword categories. • Block: Selects the check box to block access to the website whose URL contains the specified keywords. • Log: Selects the check box to log the access to the website whose URL contains the specified keywords. • Other URLS: Specifies the actions to the URLs that do not contain the keywords in the list, including **Block Access** and **Record Log**.
URL category	Shows the name of pre-defined and user-defined URL categories in the VSYS.

Option	Description
Block	Selects the check box to block access to the corresponding URL category.
Log	Selects the check box to log access to the corresponding URL category.
Other URLs	Specifies the actions to the URLs that are not in the list, including **Block Access** and **Record Log**.
SSL inspection	Select the **Enable** button to enable SSL negotiation packets inspection. For HTTPS traffic, system can acquire the domain name of the site which you want to access from the SSL negotiation packets after this feature is configured. Then, system will perform URL filtering in accordance with the domain name. If SSL proxy is configured at the same time, SSL negotiation packets inspection method will be preferred for URL filtering.

4. In the **URL Keyword Category** part to configure the URL keyword category control type for URL filtering rules to control the access to the website whose URL contains the specific keywords.

In the URL Keyword Category part, configure the following options.

Option	Description
New	Creates new keyword categories. The system supports predefined keyword categories and custom keyword categories. For more information about keyword category, see "Keyword Category" on Page 863.

Option	Description
Edit	Select a URL keyword category from the list, and click **Edit** to edit the selected URL keyword categories.
Keyword category	Shows the name of the configured keyword categories.
Block	Selects the check box to block access to the website whose URL contains the specified keywords.
Log	Selects the check box to log the access to the website whose URL contains the specified keywords.
Other URLs	Specifies the actions to the URLs that do not contain the keywords in the list, including **Block Access** and **Record Log**.

5. Click **OK** to save the settings.

Notes: The control type of a URL filtering rule can configure both the URL category and the URL keyword category.

Part 2: Binding a URL filtering rule to a security zone or security policy rule

The URL filtering configurations are based on security zones or policies.

- If a security zone is configured with the URL filtering function, system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the URL filtering function, system will perform detection on the traffic that is destined to the policy rule you specified, and then respond.

- The threat protection configurations in a policy rule are superior to that in a zone rule if they are specified at the same time, and the URL filtering configurations in a destination zone are superior to that in a source zone if they are specified at the same time.
- To perform the URL filtering function on the HTTPS traffic, see the policy-based URL filtering.

To create the zone-based URL filtering, take the following steps:

1. Create a zone. For more information about how to create this, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog box, select the Threat Protection tab.
3. Enable the threat protection that you need, and select the URL filtering rules from the profile drop-down list below; you can click **Add Profile** from the profile drop-down list below to create a URL filtering rule. For more information, see "Part 1: Creating a URL filtering rule" on Page 846.
4. Click **OK** to save the settings.

To create the policy-based URL filtering, take the following steps:

1. Configure a security policy rule. For more information, see "Configuring a Security Policy Rule" on Page 1287.
2. In the Protection tab, select the **Enable** check box of URL Filtering.
3. From the **Profile** drop-down list, select a URL filtering rule. You can also click **Add Profile** to create a new URL filtering rule.
4. To perform the URL filtering function on the HTTPS traffic, you need to enable the SSL proxy function for this security policy rule. System will decrypt the HTTPS traffic according to the SSL proxy profile and then perform the URL filtering function on the decrypted

traffic.

According to the various configurations of the security policy rule, system will perform the following actions:

Policy Rule Configurations	Actions
SSL proxy enabled URL filtering disabled	System decrypts the HTTPS traffic according to the SSL proxy profile but it does not perform the URL filtering function on the decrypted traffic.
SSL proxy enabled URL filtering enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the URL filtering function on the decrypted traffic.
SSL proxy disabled URL filtering enabled	System performs the URL filtering function on the HTTP traffic according to the URL filtering profile. The HTTPS traffic will not be decrypted and system will transfer it.

If the SSL proxy and URL filtering functions are enabled on a security policy rule but the control type of the selected URL filtering rule is the Web surfing record, the system will not record the GET and POST methods and the posted contents via HTTPS.

If the zone which the security policy rule binds with is also configured with a URL filtering, system will perform the following actions:

Policy Rule Configurations	Zone Configurations	Actions
SSL proxy enabled URL fil-	URL filtering enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the URL filtering function on the decrypted traffic according to the

Policy Rule Configurations	Zone Configurations	Actions
tering disabled		URL filter rule of the zone.
SSL proxy enabled URL filtering enabled	URL filtering enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the URL filtering function on the decrypted traffic according to the URL filtering rule of the policy rule.
SSL proxy disabled URL filtering enabled	URL filtering enabled	System performs the URL filtering function on the HTTP traffic according to the URL filtering rule of the policy rule. The HTTPS traffic will not be decrypted and system will transfer it.

5. Click **OK** to save the settings.

If necessary, you can go on to configure the functions of "Predefined URL DB" on Page 858, "URL Lookup" on Page 861, and "Warning Page" on Page 865.

Object	Description
Predefined URL DB	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL categories.
URL Lookup	Use the URL lookup function to inquire URL information from the URL database, including the URL category and the category type.
Warning Page	• Block warning: When your network access is blocked, a warning page will prompt in the Web browser.

Object	Description
	• Audit warning: When your network access is audited, a warning page will prompt in the Web browser.

Notes:

- Only after canceling the binding can you delete the URL filtering rule.
- To get the latest URL categories, you are recommended to update the URL database first. For more information about URL database, see "Predefined URL DB" on Page 858.
- You can export the log messages to specified destinations. For more information about log messages, see "Log Configuration" on Page 1713.

Cloning a URL filtering Rule

System supports the rapid clone of a URL filtering rule. You can clone and generate a new URL filtering rule by modifying some parameters of the one current URL filtering rule.

To clone a URL filtering rule, take the following steps:

1. Select **Object > URL Filtering**.
2. Select a URL filtering rule in the list.
3. Click the **Clone** button above the list, and the **Name** configuration box will appear below the button. Then enter the name of the new URL filtering rule.
4. The cloned URL filtering rule will be generated in the list.

Viewing URL Hit Statistics

The URL access statistics includes the following parts:

- Summary: The statistical information of the top 10 user/IPs, the top 10 URLs, and the top 10 URL categories during the specified period of time are displayed.
- User/IP: The user/IP and detailed hit count are displayed.
- URL: The URL and detailed hit count are displayed.
- URL Category: The URL category and detailed hit count and traffic are displayed.

To view the URL hit statistics, see "URL Hit" on Page 1629 in Monitor.

- To view the URL hit statistics, enable **URL Hit** in "Monitor Configuration" on Page 1670.
- To view the traffic of the URL category, enable **URL Hit** and **URL Category Bandwidth** in "Monitor Configuration" on Page 1670.

Viewing Web Surfing Records

To view the Web surfing records, view "URL Log" on Page 1704. Before you view the Web surfing records, see "Log Configuration" on Page 1713 to enable URL Log function.

Configuring URL Filtering Objects

When using URL filtering function, you need to configure the following objects:

Object	Description
Predefined URL DB	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL categories.
User-defined URL DB	The user-defined URL database is defined by you and you can use it to specify the URL category.
URL Lookup	Use the URL lookup function to inquire URL information from the URL database.

Object	Description
Keyword Category	Use the keyword category function to view the predefined keyword categories and customize the keyword categories. For more information about keyword category, see Keyword Category in URL Filtering.
Warning Page	Enable or disable the warning page. • Block warning: When your network access is blocked, a warning page will prompt in the Web browser. • Audit warning: When your network access is audited, a warning page will prompt in the Web browser.

Predefined URL DB

System contains a predefined URL database.

Notes: The predefined URL database is controlled by a license . Only after a URL license is installed, the predefined URL database can be used.

The predefined URL database provides URL categories for the configurations of a URL filtering. It includes dozens of categories and tens of millions of URLs .

When identifying the URL category, the user-defined URL database has a higher priority than the predefined URL database.

Configuring Predefined URL Database Update Parameters

By default, system updates predefined URL database everyday. You can change the update parameters according to your own requirements. Currently, two default update servers are provided: https://update1.hillstonenet.com and https://update2.hillstonenet.com. Besides, you can update the predefined URL database from your local disk. For more information about how to change the update parameters, see Updating Signature Database.

Upgrading Predefined URL Database Online

To upgrade the URL database online, take the following steps:

1. Select **System > Upgrade Management > Signature Database Update**.
2. In the URL category database update section, click **Update** to update the predefined URL database.

Upgrading Predefined URL Database from Local

To upgrade the predefined URL database from local, take the following steps:

1. **System > Upgrade Management > Signature Database Update**
2. In the URL category database update section, click **Browse** to select the URL database file from your local disk.
3. Click **Upload** to update the predefined URL database.

Notes: You can not upgrade the predefined URL database from local in non-root VSYS.

User-defined URL DB

Besides categories in predefined URL database, you can also create user-defined URL categories, which provides URL categories for the configurations of URL filtering. When identifying the URL category, the user-defined URL database has a higher priority than the predefined URL database.

System provides three predefined URL categories: custom1, custom2, custom3. You can import your own URL lists into one of the predefined URL categories.

Notes: You can not import your own URL lists into one of the predefined URL category in non-root VSYS.

Configuring User-defined URL DB

To configure a user-defined URL category, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog box will appear.
3. Click **New**. The URL Category dialog box will appear.

4. Type the category name in the **Category** box. URL category name cannot only be a hyphen (-). And you can create at most 16 user-defined categories.
5. Type a URL into the **URL http(s)://** box.
6. Click **Add** to add the URL and its category to the table.
7. To edit an existing one, select it and then click **Edit**. After editing it, click **Add** to save the changes.
8. Click **OK** to save the settings.

Importing User-defined URL

System supports to batch imported user-defined URL lists into the predefined URL category named custom1/2/3. To import user-defined URL, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog box will appear.
3. Select one of the predefined URL category(custom1/2/3), and then click **Import**.
4. In the Batch Import URL dialog box, click **Browse** button to select your local URL file. The file should be less than 1 M, and have at most 1000 URLs. Wildcard is supported to use once in the URL file, which should be located at the start of the address.
5. Click **OK** to finish importing.

Clearing User-defined URL

In the predefined URL category named custom1/2/3, clear a user-defined URL, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog box will appear.
3. Select one of the predefined URL categories(custom1/2/3), and then click **Clear**. The URL in the custom 1/2/3 will be cleared from the system.

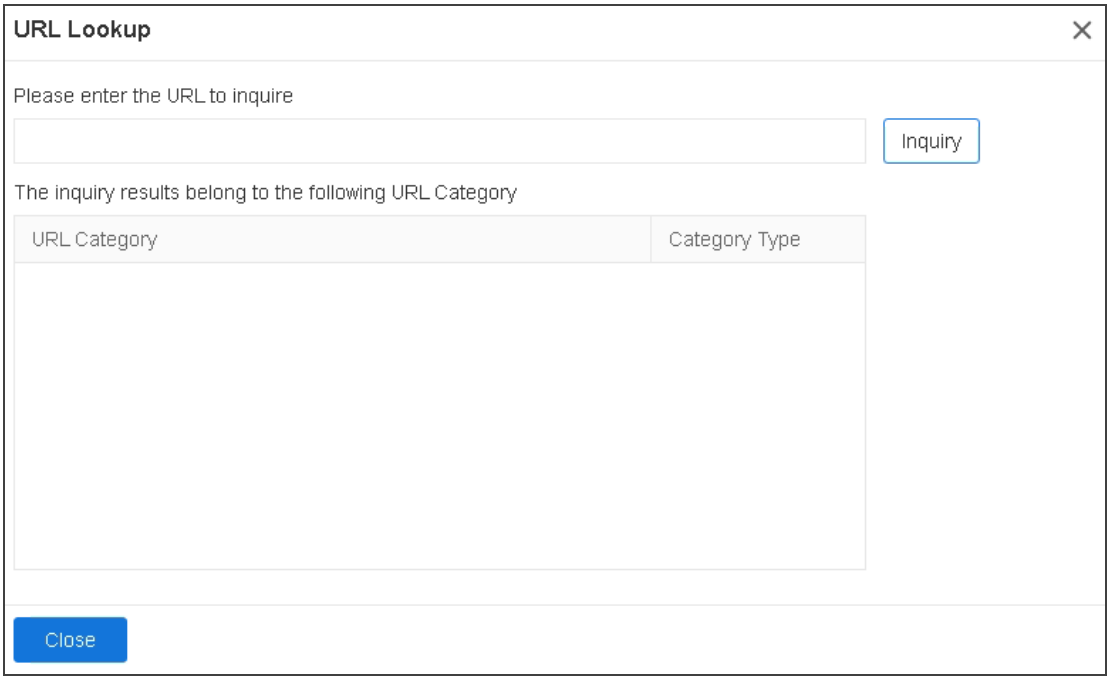
URL Lookup

You can inquire a URL to view the details by URL lookup, including the URL category and the category type.

Inquiring URL Information

To inquiry URL information, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, click **Configuration > URL Lookup**. The URL Lookup dialog box will appear.



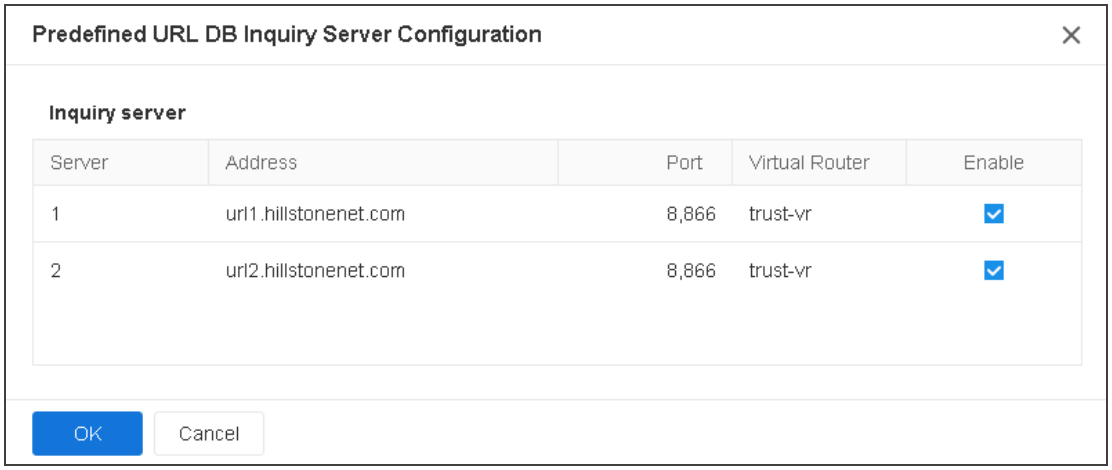
3. Type the URL into the **Please enter the URL to inquire** box.
4. Click **Inquire**, and the results will be displayed at the bottom of the dialog box.

Configuring URL Lookup Servers

URL lookup server can classify an uncategorized URL (URL is neither in predefined URL database nor in user-defined URL database) you have accessed, and then add it to the URL database during database updating. Two default URL lookup servers are provided: url1.hillstonenet.com and url2.hillstonenet.com. By default, the URL lookup servers are enabled.

To configure a URL lookup server, take the following steps:

1. Select **Object > URL Filtering>Profile**.
2. At the top-right corner, Select **Configuration > Predefined URL DB**. The Predefined URL DB dialog box will appear.
3. Click **Inquiry Server Configuration**. The Predefined URL DB Inquiry Server Configuration dialog box will appear.



4. In the Inquiry server section, double-click the cell in the IP/Port/Virtual Router column of Server1/2 and type a new value.
5. Select the check box in the **Enable** column to enable this URL lookup server.
6. Click **OK** to save the settings.

Keyword Category

Keyword categories include predefined keyword categories and custom keyword categories, which are used in the URL filtering function. You can use predefined keyword categories or customize the keyword category as needed. System provide four predefined keyword categories, which are **predef_bank_card** (keyword for bank card number), **predef_email_address** (keyword for email address), **predef_cellphone_number** (keyword for mobile phone number), and **predef_mainland_id_card** (keyword for ID number), which cannot be edited or deleted.

After configuring a URL filtering rule, system will scan traffic according to the configured keywords and calculate the trust value for the hit keywords. The calculating method is: adding up

the results of *times * trust value* of each keyword that belongs to the category. Then system compares the sum with the threshold 100 and performs the following actions according to the comparison result:

- If the sum is larger than or equal to category threshold (100), the configured category action will be triggered;
- If more than one category action can be triggered and there is block action configured, the final action will be Block;
- If more than one category action can be triggered and all the configured actions are Permit, the final action will be Permit.

For example, a URL filtering rule contains two keyword categories C1 with action block and C2 with action permit. Both of C1 and C2 contain the same keywords K1 and K2. Trust values of K1 and K2 in C1 are 20 and 40. Trust values of K1 and K2 in C2 are 30 and 80.

If system detects 1 occurrence of K1 and K2 each on a URL, then C1 trust value is 20*1＋40*1-1=60<100, and C2 trust value is 30*1+80*1=110>100. As a result, the C2 action is triggered and the URL access is permitted.

If system detects 3 occurrences of K1 and 1 occurrence of K2 on a URL, then C1 trust value is 20*3+40*1=100, and C2 trust value C2 is 30*3+80*1=170>100. Conditions for both C1 and C2 are satisfied, but the block action for C1 is triggered, so the web page access is denied.

Configuring a Keyword Category

To configure a keyword category, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, select **Configuration > Keyword Category**. The Keyword Category page will appear.
3. Display predefined keyword categories and created custom keyword categories in the Keyword Category page.

4. Click **New**. The **Keyword Category Configuration** page will appear.

5. Type the category name.
6. Click **New** and specify the keyword, character matching method (simple/regular expression), and trust value (100 by default).
7. Repeat the above steps to add more keywords.
8. To delete a keyword, select the keyword you want to delete from the list and click **Delete**.
9. Click **OK** to save your settings.

Warning Page

The warning page shows the user block information and user audit information. You can enable or disable the warning page as needed.

The warning page include predefined warning page and user-defined warning page.

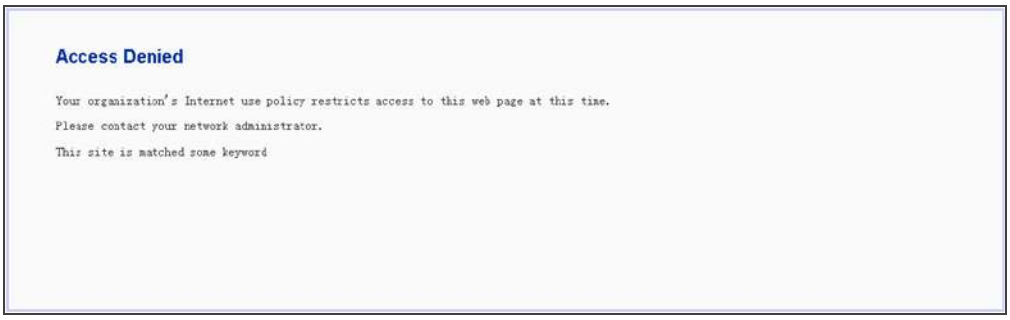
- Predefined warning page: Displays the predefined warning information content, including prompt information and warning reasons.
- User-defined warning page: You can customize the warning page by custom warning information and pictures. For details, please refer to "Warning Page Management" on Page 1837..

Enabling/ Disabling the Block Warning

The block warning is disabled by default. If the internet behavior is blocked by the URL filtering function, the Internet access will be denied. The information of Access Denied will be shown in your browser, and some web surfing rules will be shown to you on the warning page at the same time. According to the different network behaviors, the predefined warning page includes the following two situations:

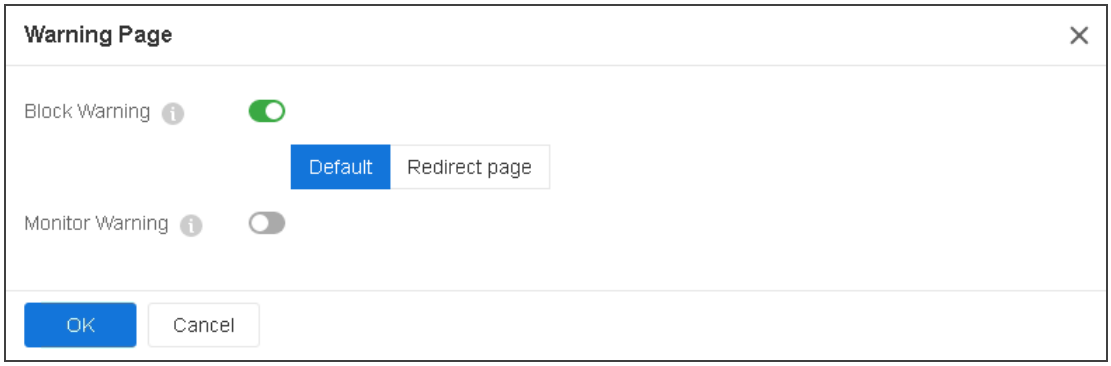
- Visiting a certain type of URL.

- Visiting the URL that contains a certain type of keyword category.



To enable or disable the block warning , take the following steps:

1. Click **Object > URL Filtering > Profile**.
2. At the top-right corner, select **Configuration > Warning Page**. The Warning Page dialog box will appear.



3. In the Block Warning section, select **Enable**. To disable this function, unselect the **Enable** check box.

4. Configure the display information in the blocking warning page.

Option	Description
Default	Use the default blocking warning page as shown above. After selecting the **Default** radio button: • If the user-defined warning page is not configured, the predefined warning page will be used. • If the user-defined warning page is configured and enabled, the user-defined warning page will be used.
Redirect page	Redirect to the specified URL. Type the URL in the **URL http://** box. You can click Detection to verify whether the URL is valid.

5. Click **OK** to save the settings.

Enabling/ Disabling the Audit Warning

The audit warning function is disabled by default. After enabling the audit warning function, when your network behavior matches the configured URL filtering rule, your HTTP request will be redirected to a warning page where the audit and privacy protection information is displayed. See the picture below:

To enable or disable the audit warning function, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, select **Configuration > Warning Page**. The Warning Page dialog box will appear.
3. In the Audit Warning section, select **Enable**.To disable this function, unselect the **Enable** check box.
    - If the user-defined warning page is not configured, the predefined warning page will be used.
    - If the user-defined warning page is configured and enabled, the user-defined warning page will be used.

    For details, please refer to "Warning Page Management" on Page 1837..
4. Click **OK** to save the settings.

First Access of Uncategorized URL

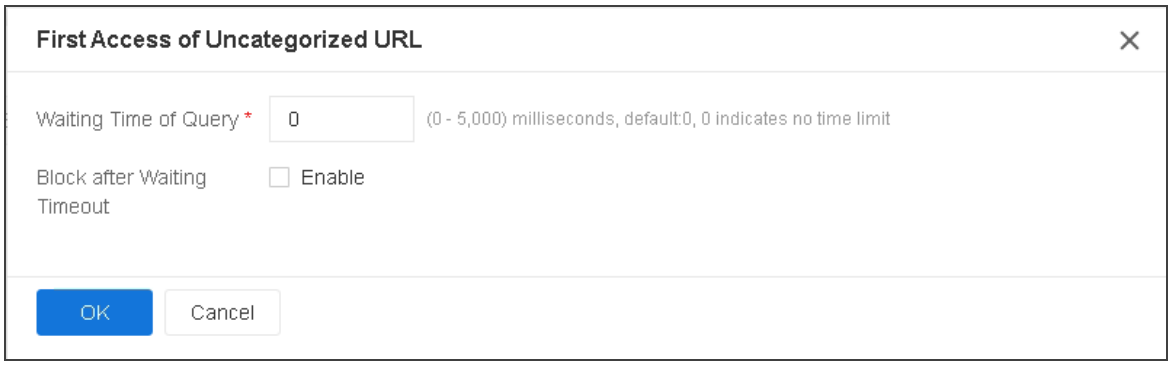
For the uncategorized URL that you visit for the first time, that is, the URL which is neither in the system's predefined URL database nor in the user-defined URL database, system will continue to query the category of the URL in the cloud. Because the query may takes a litter while, system cannot process the uncategorized URL immediately until the query result is returned.

To solve the above problem, you can specify the waiting time of query and enable the block action when waiting times out. After the waiting time of query is exceeded, system will block the access to the uncategorized URL.

To configure related content of the first access of an uncategorized URL, take the following steps:

Select **Object** > **URL Filtering** > **Profile**.

At the top-right corner, select **Configuration** > **First Access of Uncategorized URL**. The First Access of Uncategorized URL dialog box will appear.



Type the waiting time value of query into the Waiting Time of Query text box. The range is 0 to 5000ms. The default value is 0, which means there is no wait time limit.

Select the Enable check box after Block after Waiting Timeout to enable the block action, after the waiting time of query is exceeded, system will block the access of uncategorized URL. After clearing the Enable check box, after the waiting time of query is exceeded, system will continue to perform URL filtering according to the configuration of URL filtering profile.

Click **OK** to save the settings.

Configuring the URL Blacklist/Whitelist

You can further control the access to some websites by configuring URL blacklists and whitelists.

- After the URL blacklist is configured, when you send an access request to the specified URL in the blacklist, the system will block the request.
- After the URL whitelist is configured, when you send an access request to the specified URL in the whitelist, system will not perform URL filtering for the access request and let the request pass
- The URL blacklist, the URL whitelist and the URL filtering rule all configured with URL categories, the matching priority for URL category filtering is: the URL blacklist > the URL whitelist > the URL filtering rule.

Notes:

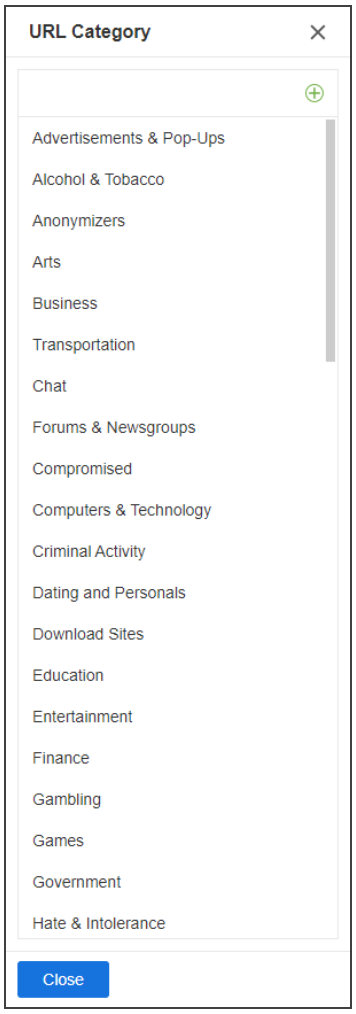
- An URL category can only be referenced by an object (URL blacklist, URL whitelist or URL filtering profile). For example, when the URL category "Advertisement" has been added to the URL blacklist, this URL category cannot be added to the URL whitelist, and it will not be referenced in the URL filtering profile.
- Non-root VSYS does not support the URL blacklist\whitelist function, and the URL blacklist/whitelist configuration under root VSYS does not take effect and has no effect on non-root VSYS.

Configuring the URL Blacklist

To configure the URL blacklist, take the following steps:

1. Select **Object > URL Filtering > URL Blacklist/Whitelist**.
2. Select **URL Blacklist** tab to open the URL blacklist page, which displays all URL categories that have been added to the URL blacklist and the corresponding URL type and description.

3. Click "+" , and select the add the URL category needed to add to the URL black list.



4. The "URL category" on the left contains all URL categories that can be referenced (pre-defined URL DB and user-defined URL DB). You can also click ⊕ to create a new URL category. For specific steps, see Configuring User-defined URL DB.

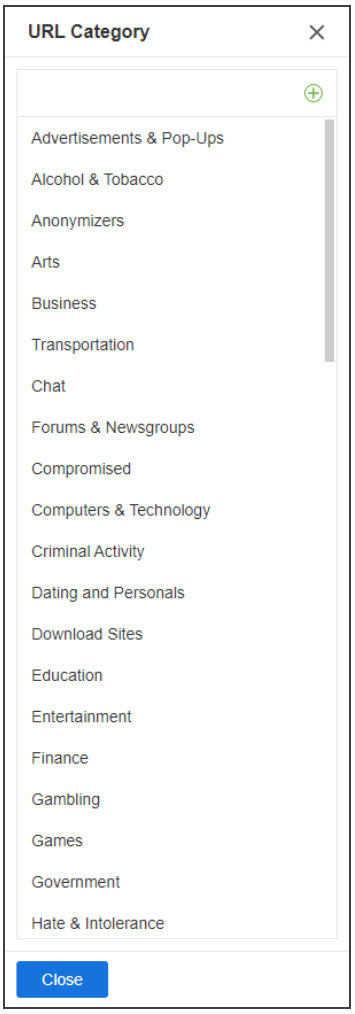
5. If you need to delete the URL category entry in the URL blacklist, in the "URL blacklist" list on the right, select the URL category entry you want to delete and click ✕ .

6. Click **OK**.

Configuring the URL Whitelist

To configure the URL whitelist, take the following steps:

1. Select **Object > URL Filtering > URL Blacklist/Whitelist**.
2. Select **URL Whitelist** tab to open the URL whitelist page, which displays all URL categories that have been added to the URL whitelist and the corresponding URL type and description.
3. Click "+" , and select the add the URL category needed to add to the URL white list.



4. The "URL category" on the left contains all URL categories that can be referenced (pre-defined URL DB and user-defined URL DB). You can also click ⊕ to create a new URL category. For specific steps, see Configuring User-defined URL DB.
5. If you need to delete the URL category entry in the URL whitelist, in the "URL whitelist" list on the right, select the URL category entry you want to delete and click ✕ .
6. Click **OK**.

Data Security

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

The data security function allows you to flexibly configure control rules to comprehensively control and audit (by behavior logs and content logs) on user network behavior.

Data security can audit and filter in the following network behaviors:

Function	Description
File filter	Checks the files transported through HTTP(S), FTP, SMTP (S), IMAP(S), POP3(S), SMB protocols and control them according to the file filter rules.

Content filter	• File content filter: Detect sensitive keywords carried in the file content of the specified protocol type and file type, and can log or block them.
	• Web content :Controls the network behavior of visiting the webpages that contain certain keywords, and log the actions.
	• Web posting: Controls the network behavior of posting on websites and posting specific keywords, and logs the posting action and posted content.
	• Email filter: Controls and audit SMTP(S)/POP3 (S)/IMAP(S)mails :
	  • Control and audit all the behaviors of sending emails;
	  • Control and audit the behaviors of sending emails

Function	Description
	that contain specific sender, recipient, keyword or attachment. • Application behavior control: Controls and audits the actions of HTTP(S), FTP and TELNET applications: • FTP contents and methods, including Login, Get, and Put; • HTTP(S) methods, including Connect, Get, Put, Head, Options, Post, and Trace; • Request content initiated by the TELNET client.
Network Behavior Record	Audits the IM applications behaviors and record log messages for the access actions.

Configuring Objects

Objects mean the items referenced during Content Filter rules. When using the data security function, you need to configure the following objects:

Object	Description
Predefined URL DB	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
User-defined URL DB	The user-defined URL database is defined by yourself and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
URL Lookup	Use the URL lookup function to inquire URL information from the URL database.
Keyword Category	Use the keyword category function to view the predefined keyword categories and customize the keyword categories. You can use it to specify the keyword for the File Content Filter/Web Content/Web Posting/Email filter/HTTP(S)/FTP Control functions. For more information about keyword category, see Keyword Category in Data Security.
Warning Page	Enable or disable the warning page. • Block warning: When your network access is blocked, a warning page will prompt in the Web browser. • Audit warning: When your network access is audited, a warning page will prompt in the Web browser.

Object	Description
Bypass Domain	Domains that are not controlled by the internet behavior control rules.
Exempt User	Users that are not controlled by the internet behavior control rules.

Predefined URL DB

The system contains a predefined URL database.

Notes: The predefined URL database is controlled by a license controlled. Only after a URL license is installed, the predefined URL database can be used.

The predefined URL database provides URL categories for the configurations of Web content/Web posting. It includes dozens of categories and tens of millions of URLs .

When identifying the URL category of a URL, the user-defined URL database has a higher priority than the predefined URL database.

Configuring Predefined URL Database Update Parameters

By default, the system updates predefined URL database everyday. You can change the update parameters according to your own requirements. Currently, two default update servers are provides: https://update1.hillstonenet.com and https://update2.hillstonenet.com. Besides, you can update the predefined URL database from your local disk. For more information about how to change the update parameters, see Updating Signature Database.

Upgrading Predefined URL Database Online

To upgrade the URL database online:

1. Select **System > Upgrade Management > Signature Database Update**.

2. In the URL category database update section, click **Update** to update the predefined URL database.

Upgrading Predefined URL Database from Local

To upgrade the predefined URL database from local:

1. **System > Upgrade Management > Signature Database Update**
2. In the URL category database update section, click **Browse** to select the URL database file from your local disk.
3. Click **Upload** to update the predefined URL database.

User-defined URL DB

Besides categories in predefined URL database, you can also create user-defined URL categories, which provides URL categories for the configurations of Web content/Web posting. When identifying the URL category, the user-defined URL database has a higher priority than the predefined URL database.

System provides three predefined URL categories: custom1, custom2, custom3. You can import your own URL lists into one of the predefined URL category.

Configuring User-defined URL DB

To configure a user-defined URL category:

1. Select **Object > URL Filtering> Profile**.
2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog appears.

3. Click **New**. The URL Category dialog appears.

4. Type the category name in the **Category** box. URL category name cannot only be a hyphen (-). And you can create at most 16 user-defined categories.
5. Type a URL into the **URL http(s)://** box.
6. Click **Add** to add the URL and its category to the table.
7. To edit an existing one, select it and then click **Edit**. After editing it, click **Add** to save the changes.
8. Click **OK** to save the settings.

Importing User-defined URL

System supports to batch import user-defined URL lists into the predefined URL category named custom1/2/3. To import user-defined URL:

1. Select **Object > URL Filter**.
2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog appears.
3. Select one of the predefined URL category(custom1/2/3), and then click **Import**.

4. In the Batch Import URL dialog, click **Browse** button to select your local URL file. The file should be less than 1 M, and has at most 1000 URLs. Wildcard is supported to use once in the URL file, which should be located at the start of the address.

5. Click **OK** to finish importing.

Clearing User-defined URL

In the predefined URL category named custom1/2/3, clear user-defined URL:

1. Select **Object > URL Filter**.

2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog appears.

3. Select one of the predefined URL category(custom1/2/3), and then click **Clear**, the URL in the custom 1/2/3 will be cleared from the system.

URL Lookup

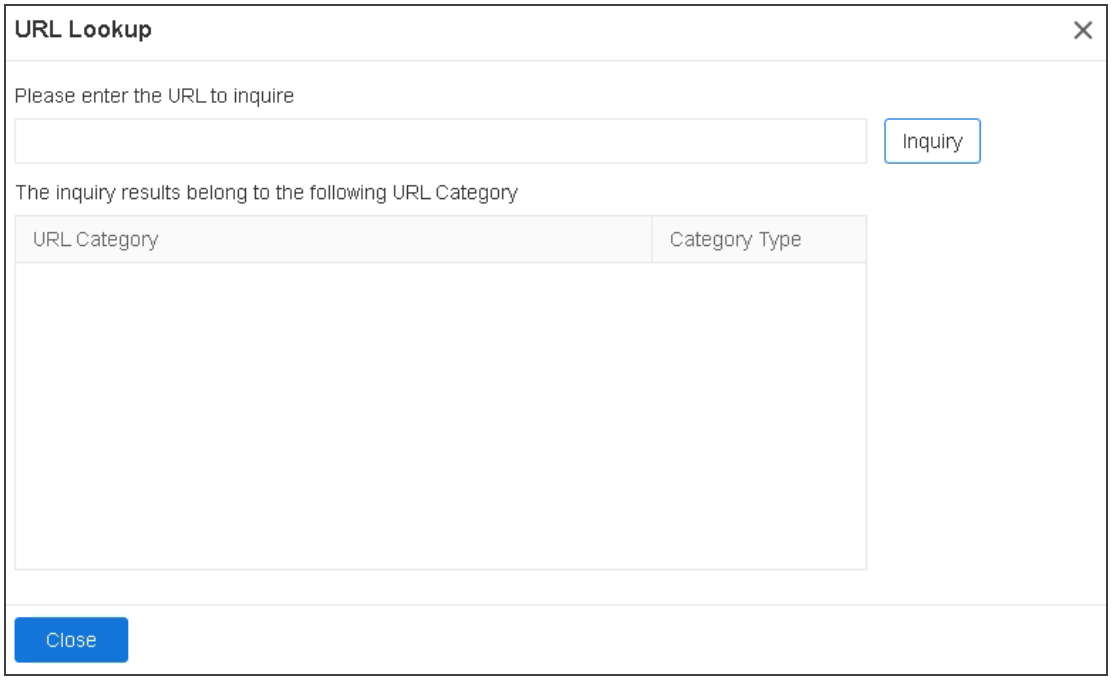
You can inquire a URL to view the details by URL lookup, including the URL category and the category type.

Inquiring URL Information

To inquiry URL information:

1. Select **Object > URL Filtering> Profile**.

2. At the top-right corner, click **Configuration > URL Lookup**. The URL Lookup dialog appears.



3. Type the URL into the **Please enter the URL to inquire** box.

4. Click **Inquire**, and the results will be displayed at the bottom of the dialog.

Configuring URL Lookup Servers

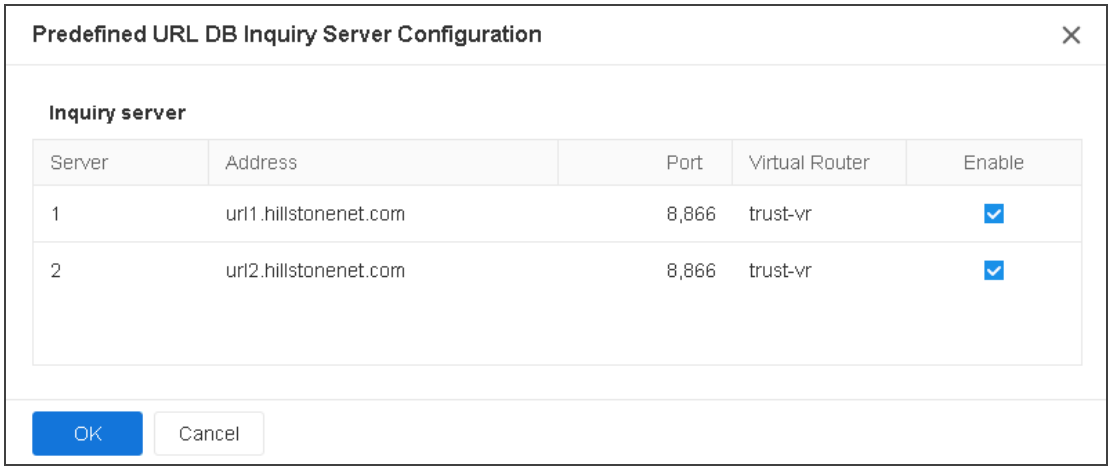
URL lookup server can classify an uncategorized URL (URL is neither in predefined URL database nor in user-defined URL database) you have accessed, and then add it to the URL database during database updating. Two default URL lookup servers are provided: url1.hillstonenet.com and url2.hillstonenet.com. By default, the URL lookup servers are enabled.

To configure a URL lookup server:

1. Select **Object > URL Filtering> Profile**.

2. At the top-right corner, Select **Configuration > Predefined URL DB**. The Predefined URL DB dialog appears.

3. Click **Inquiry Server Configuration**. The Predefined URL DB Inquiry Server Configuration dialog appears.



4. In the Inquiry server section, double-click the cell in the IP/Port/Virtual Router column of Server1/2 and type a new value.
5. Select the check box in the **Enable** column to enable this URL lookup server.
6. Click **OK** to save the settings.

Keyword Category

Keyword categories include predefined keyword categories and custom keyword categories, which are used in the URL filtering function. You can use predefined keyword categories or customize the keyword category as needed. System provide four predefined keyword categories, which are **predef_bank_card** (keyword for bank card number), **predef_email_address** (keyword for email address), **predef_cellphone_number** (keyword for mobile phone number), and **predef_mainland_id_card** (keyword for ID number), which cannot be edited or deleted.

After configuring a internet behavior control rule, the system will scan traffic according to the configured keywords and calculate the trust value for the hit keywords. The calculating method is: adding up the results of *times * trust value* of each keyword that belongs to the category. Then the system compares the sum with the threshold 100 and performs the following actions according to the comparison result:

- If the sum is larger than or equal to category threshold (100), the configured category action will be triggered;
- If more than one category action can be triggered and there is block action configured, the final action will be Block;
- If more than one category action can be triggered and all the configured actions are Permit, the final action will be Permit.

For example, a web content rule contains two keyword categories C1 with action block and C2 with action permit. Both of C1 and C2 contain the same keywords K1 and K2. Trust values of K1 and K2 in C1 are 20 and 40. Trust values of K1 and K2 in C2 are 30 and 80.

If the system detects 1 occurrence of K1 and K2 each on a web page, then C1 trust value is 20*1＋40*1=60<100, and C2 trust value is 30*1+80*1=110>100. As a result, the C2 action is triggered and the web page access is permitted.

If the system detects 3 occurrences of K1 and 1 occurrence of K2 on a web page, then C1 trust value is 20*3+40*1=100, and C2 trust value C2 is 30*3+80*1=170>100. Conditions for both C1 and C2 are satisfied, but the block action for C1 is triggered, so the web page access is denied.

Configuring a Keyword Category

To configure a keyword category:

1. Select **Object > URL Filtering> Profile**.
2. At the top-right corner, Select **Configuration > Keyword Category**. The Keyword Category page appears.
3. Display predefined keyword categories and created custom keyword categories in the Keyword Category page.

4. Click **New**. The **Keyword Category Configuration** page appears.

5. Type the category name.
6. Click **New** and specify the keyword, character matching method (simple/regular expression), and trust value (100 by default).
7. Repeat the above steps to add more keywords.
8. To delete a keyword, select the keyword you want to delete from the list and click **Delete**.
9. Click **OK** to save your settings.

Warning Page

The warning page shows the user block information and user audit information. You can enable or disable the warning page as needed.

The warning page includes predefined warning page and user-defined warning page.

- Predefined warning page: Displays the predefined warning information content, including prompt information and warning reasons.
- User-defined warning page: You can customize the warning page by custom warning information and pictures. For details, please refer to "Warning Page Management" on Page 1837..

Enabling/ Disabling the Block Warning

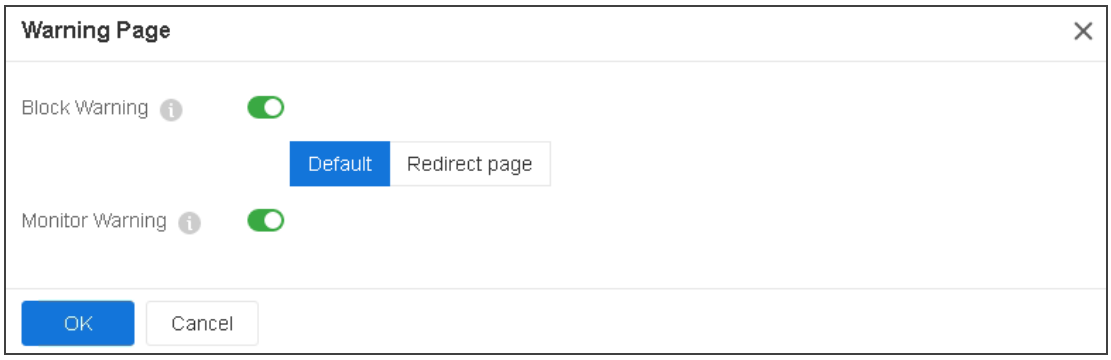
The block warning is disabled by default. If the internet behavior is blocked by the internet behavior control function, the Internet access will be denied. The information of Access Denied will be shown in your browser, and some web surfing rules will be shown to you on the warning page at the same time. The predefined warning page below:

After enabling the block warning function, block warning information will be shown in the browser when one of the following actions is blocked:

- Visiting the web page that contains a certain type of keyword category
- Posting information to a certain type of website or posting a certain type of keywords
- HTTP actions of Connect, Get, Put, Head, Options, Post, and Trace.

To enable or disable the block warning:

1. Click **Object > URL Filtering> Profile**.
2. At the top-right corner, Select **Configuration > Warning Page**. The Warning Page dialog appears.



3. In the Block Warning section, select **Enable**.To disable this function, unselect the **Enable** check box.

    - If the user-defined warning page is not configured, the predefined warning page will be used.
    - If the user-defined warning page is configured and enabled, the user-defined warning page will be used.

    For details, please refer to "Warning Page Management" on Page 1837..

4. Click **OK** to save the settings.

Enabling/ Disabling the Audit Warning

The audit warning function is disabled by default. After enabling the audit warning function, when your internet behavior matches the configured internet behavior rules, your HTTP request will be redirected to a warning page, on which the audit and privacy protection information is displayed. See the picture below:

To enable or disable the audit warning function:

1. Select **Object > Data Security>Content Filter> Web Content/Web Posting/Email Filter/HTTP/FTP Control**.
2. At the top-right corner, Select **Configuration > Warning Page**. The Warning Page dialog appears.

3. In the Audit Warning section, select **Enable**.To disable this function, unselect the **Enable** check box.

   - If the user-defined warning page is not configured, the predefined warning page will be used.
   - If the user-defined warning page is configured and enabled, the user-defined warning page will be used.

   For details, please refer to "Warning Page Management" on Page 1837..

4. Click **OK** to save the settings.

Bypass Domain

Regardless of internet behavior control rules, requests to the specified bypass domains will be allowed unconditionally.

To configure a bypass domain:

1. Select **Object > Data Security>Content Filter> Web Content/Web Posting/Email Filter/HTTP/FTP Control**.
2. At the top-right corner, Select **Configuration > Bypass Domain**. The Bypass Domain dialog appears.

3. Click **New**.In the text box, type the domain name. The domain name will be added to the system and displayed in the bypass domain list.

4. Click **OK** to save the settings.

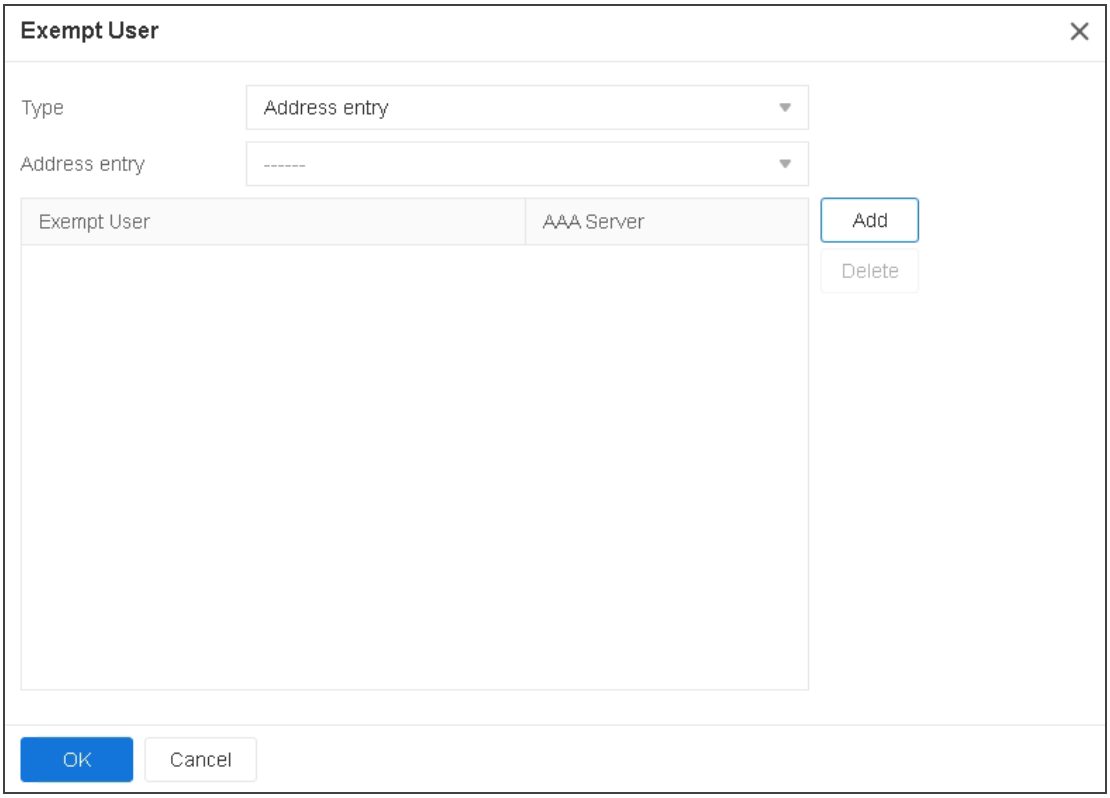
Exempt User

The Exempt User function is used to specify the users who will not be controlled by the internet behavior control rules. The system supports the following types of exempt user: IP, IP range, role, user, user group, and address entry.

To configure the user exception:

1. Select **Object > Data Security>Content Filter> Web Content/Web Posting/Email Filter/HTTP/FTP Control**.

2. At the top-right corner, Select **Configuration > Exempt User**. The Exempt User dialog appears.



3. Select the type of the user from the **Type** drop-down list.

4. Configure the corresponding options.

5. Click **Add**. The user will be added to the system and displayed in the exempt user list.

6. Click **OK** to save the settings.

File Filter

The file filter function checks the files transported through HTTP(S), FTP, SMTP(S), IMAP(S), POP3(S), SMB protocols and control them according to the file filter rules.

- Be able to check and control the files transported through GET and POST methods of HTTP (S), FTP, SMTP(S), IMAP(S), SMB, and POP3(S). If SMB protocol type is used, the system supports the detection and controlling of files in break-point resumption scenarios.
- Support file type filter conditions.
- Support block, log, and permit actions.

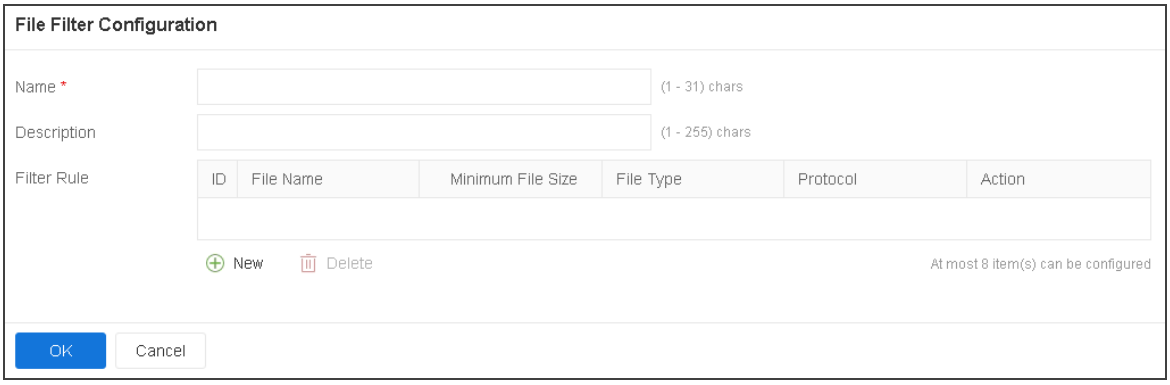
After you bind the file filter profile to a policy rule, the system will process the traffic that matches the rule according to the profile. The system also supports binding the file filter profile to a ZTNA policy to perform file detection and processing on the traffic matching the ZTNA policy. For configuration information, refer to Configuring ZTNA Policy.

Creating File Filter Rule

Use the file filter rule to specify the protocol that you want to check, the filter conditions, and the actions.

To create a file filter rule:

1. Select **Object > Data Security > File Filter**.
2. Click **New**.



3. In the dialog box, enter values.

Option	Description
Name	Specifies the name of the file filter rule.
Description	Specifies the description of the file filter rule.
Filter Rule	
ID	The ID of file filter rule item. There can be up to 8 items in each file filtering rule. Click the + button to add a file filter rule item. If one filter rule item is configured with the block action and the file happens to match this rule, then the system will block the uploading/downloading of this file.
Minimum File Size	When the size of the transported file reaches the specified file size, the system will trigger the actions. The range is from 1 to 512,000. The unit is KB.
File Type	Specify the file type. Click on the column's cells and select from the drop-down menu. You can specify more than one file types. To control the file type that not supported, you can use the UNKNOWN type. When the

Option	Description
	transmitted file is a particular type, the system will trigger the actions. The file filter function can identify the following file types: 7Z, AI, APK, ASF, AVI, BAT, BMP, CAB, CATPART, CDR, CIN, CLASS, CMD, CPL, DLL, DOC, DOCX, DPX, DSN, DWF, DWG, DXF, EDIT, EMF, EPS, EPUB, EXE, EXR, FLA, FLV, GDS, GIF, GZ, HLP, HTA, HTML, IFF, ISO, JAR, JPG, KEY, LNK, LZH, MA, MB, MDB, MDI, MIF, MKV, MOV, MP3, MP4, MPEG, MPKG, MSI, NUMBERS, OCX, PAGES, PBM, PCL, PDF, PGP, PIF, PL, PNG, PPT, PPTX, PSD, RAR, REG, RLA, RMVB, RPF, RTF, SGI, SH, SHK, STP, SVG, SWF, TAR, TDB, TIF, TORRENT, TXT, VBE, WAV, WEBM, WMA, WMF, WMV, WRI, WSF, XLS, XLSX, XML, XPM, ZIP, BZ2, UNKNOWN
Protocol	Specifies the protocols. http-get represents to check the files transported through the GET method of HTTP. http-post represents to check the files transported through the POST method of HTTP. ftp represents to check the files transported through FTP. smtp represents to check the files transported through SMTP. imap represents to check the files transported through IMAP. pop3 represents to check the files transported through POP3. You can specify more than one protocol types.

Option	Description
	This option is required.
Action	Specify the action to control the files that matches the filter conditions. You can specify block or log. This option is required.

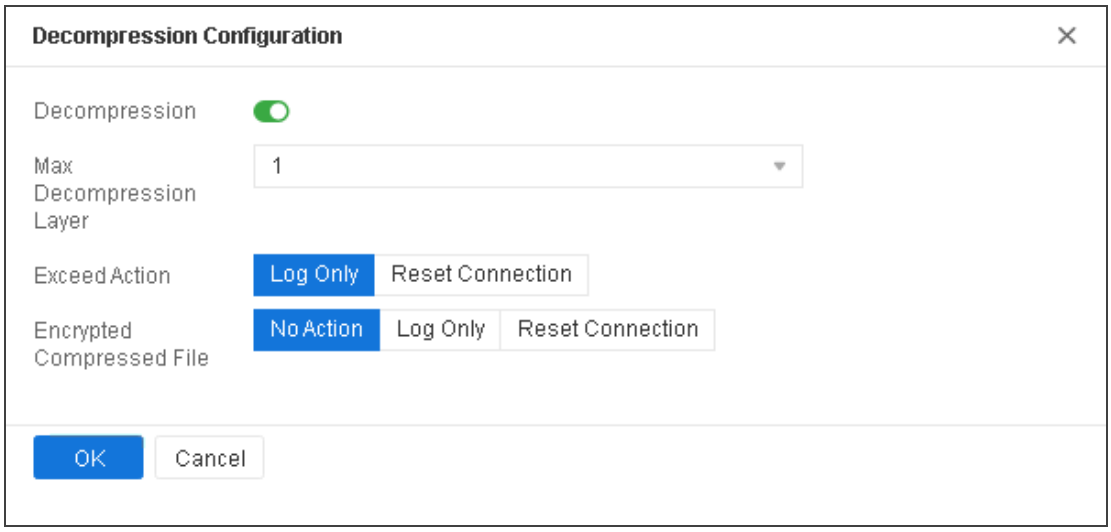
4. Click **OK**.

Configuring Decompression Control Function

After configuring the decompression control function, StoneOS can decompress the transmitted compressed files, and can handle the files that exceed the max decompression layer as well as the encrypted compressed files in accordance with the specified actions. This function supports to decompress the files in type of RAR, ZIP, TAR, GZIP, and BZIP2.

To configure the decompression control function, take the following steps:

1. Select **Object > Data Security > File Filter**.
2. At the top-right corner, click **Compression Configuration**.



In the Compression Configuration dialog box, configure the following options.

Option	Description
Decompression	Select / clear the **Enable** check box to enable / disable the decompression function.
Max Decompression Layer	By default, StoneOS can check the files of up to 5 decompression layers. To specify a decompression layer, select a value from the drop-down list. The value range is 1 to 5.
Exceed Action	Specifies an action for the compressed files that exceed the max decompression layer. Select an action from the drop-down list: • Log Only - Only generates logs but will not check and control the files. This action is enabled by default. • Reset Connection - Resets connections for the files.
Encrypted Compressed File	Specifies an action for encrypted compressed files: • ------ - Will not take any actions against the files, but might further check and control the files according to the file filter rule. • Log Only - Only generates logs but will not check and control the files. • Reset Connection - Resets connections for the files.

3. Click **OK**.

Notes: For compressed files containing docx, pptx, xlsx, jar, and apk formats, when **Exceed Action** is specified as **Reset Connection**, the maximum compression layers should be added one more layer to prevent download failure.

Viewing File Filter Logs

To view the file filter logs, refer to "File Filter Log" on Page 1707.

Content Filter

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

Includes:

- "File Content Filter" on Page 897: Detect and control the behavior of sensitive keywords carried in the file content of the specified transmission protocol type and file type.
- "Web Content" on Page 1227: Controls the network behavior of visiting the webpages that contain certain keywords, and log the actions.
- "Web Posting" on Page 1233: Controls the network behavior of posting on websites and posting specific keywords, and logs the posting action and posted content.
- "Email Filter" on Page 1239: Controls and audit SMTP(S)/POP3(S)/IMAP(S) mails :
  - Control and audit all the behaviors of sending emails.
  - Control and audit the behaviors of sending emails that contain specific sender, recipient, keyword or attachment.
- "APP Behavior Control" on Page 1245:Controls and audits the actions of HTTP(S) and FTP applications:
  - FTP methods, including Login, Get, and Put.
  - HTTP(S) methods, including Connect, Get, Put, Head, Options, Post, Delete and Trace.
  - Request content initiated by the TELNET client.

File Content Filter

The file content filtering function can detect sensitive keywords carried in the file content of the specified protocol type and file type, and can log or block them. For example, the content of doc-type files downloaded through the HTTP protocol is detected, and the log information is recorded for the files containing the keyword content of the mobile phone number.

Configuring File Content Filter

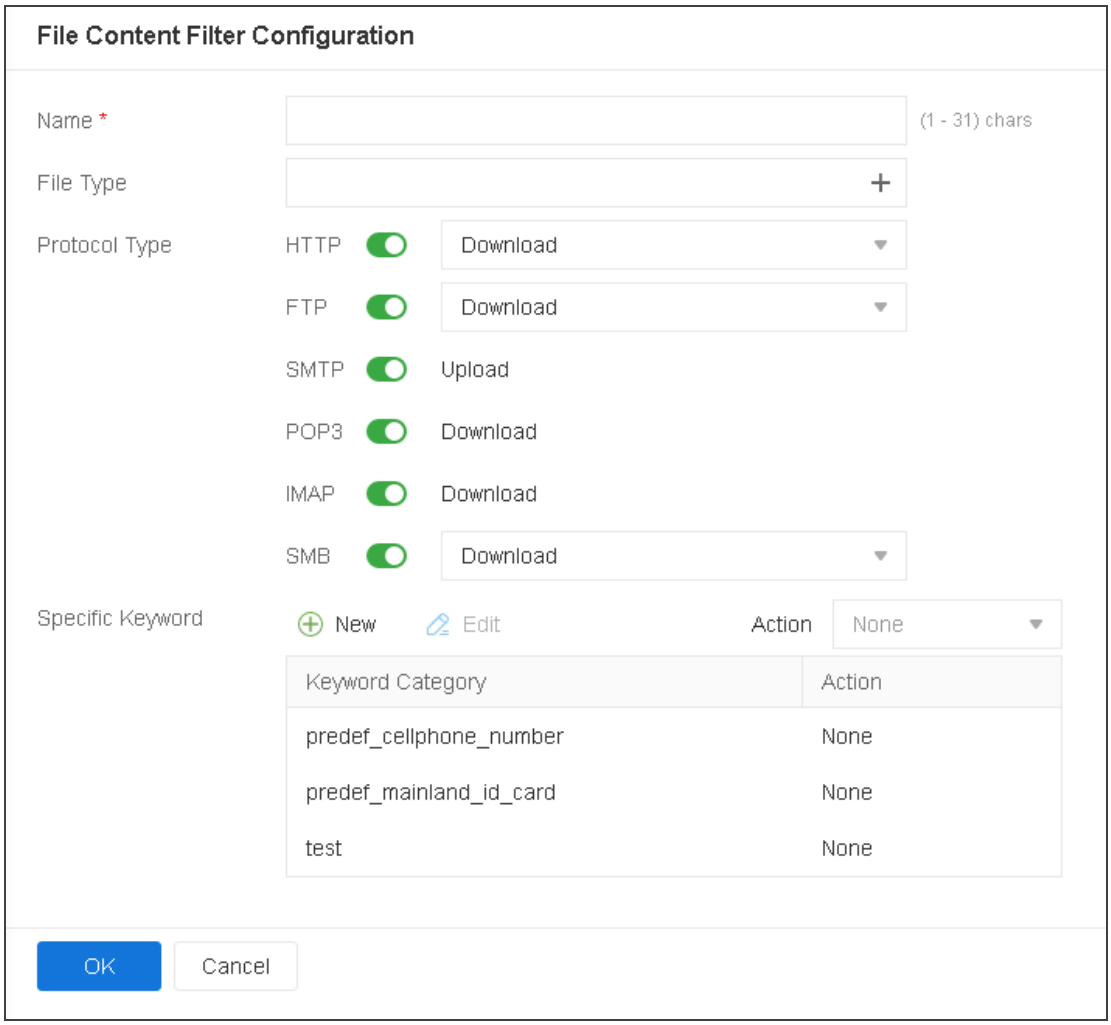
Configuring file content filter contains two parts:

- Create a file content filter rule
- Bind a file content filter rule to a security zone or policy rule. The system also supports binding the file content filter profile to a ZTNA policy to perform file content detection and processing on the traffic matching the ZTNA policy. For configuration information, refer to Configuring ZTNA Policy.

Part 1: Creating a file content filter rule

1. Select **Object > Data Security > Content Filter > File Content Filter**

2. Click **New**.



In the File Content Filter Configuration dialog box, enter values.

Option	Description
Name	Specifies the rule name.
File Type	Specifies the file type. Click the + button and select the file type in the **File Type** page, you can specify one or more file types. Currently supported file types are: txt, doc, docx, ppt,

Option	Description
	pptx, xls, xlsx.
Protocol Type	Specifies the detected file transfer protocol and direction. Click the **Enable** button after the specified protocol type, and select the detection direction from the drop-down list. HTTP, FTP, and SMB protocols support Download, Upload, and Bidirectional; SMTP protocol only supports select Upload; POP3 and IMAP protocols only support Download.
Specific Keyword	Specifies the keyword category for filtering and the action. 1. All predefined keyword categories and custom keyword categories displayed in this partial list. 2. Select the control action in the **Action** drop-down list, including None, Log Only, and Block (block and record log). 3. Click the **New** to configure the keywords that need to be controlled in the **Keyword Category Configuration** page. For more information about keyword category, see "Configuring Objects" on Page 1206.

3. Click **OK**.

Part 2: Binding a file content filter rule to a security zone or security policy rule

The file content filter configurations are based on security zones or policies.

- If a security zone is configured with the file content filter function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the file content filter function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the file content filter configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based file content filter:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, click **Data Security** .
3. Enable the File Content Filter, and select a file content filter rule from the profile drop-down list below; or you can click ⊕ from the profile drop-down list below, to create a file content filter rule, see Configuring File Content Filter.
4. Click **OK** to save the settings.

To realize the policy-based file content filter:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. Click **Data Security** to expand the option, click the **Enable** button of File Content Filter.
3. From the **Profile** drop-down list, select a file content filter rule. You can also click ⊕ to create a new file content filter rule.
4. Click **OK** to save the settings.

Viewing Monitored Results of Keyword Blocking in File Content

If you have configured file content filter with keyword blocking, you can view the monitored results of blocking those words.

Select **Monitor > Keyword Block > File Content**, you will see the monitored results. For more about monitoring, refer to File Content.

Viewing Logs of Keyword Blocking in File Content

To see the system logs of keyword blocking in file content, please refer to the "Content Filter Log" on Page 1708.

Web Content

The web content function is designed to control the network behavior of visiting the websites that contain certain keywords. For example, you can configure to block the access to website that contains the keyword "gamble", and record the access action and website information in the log.

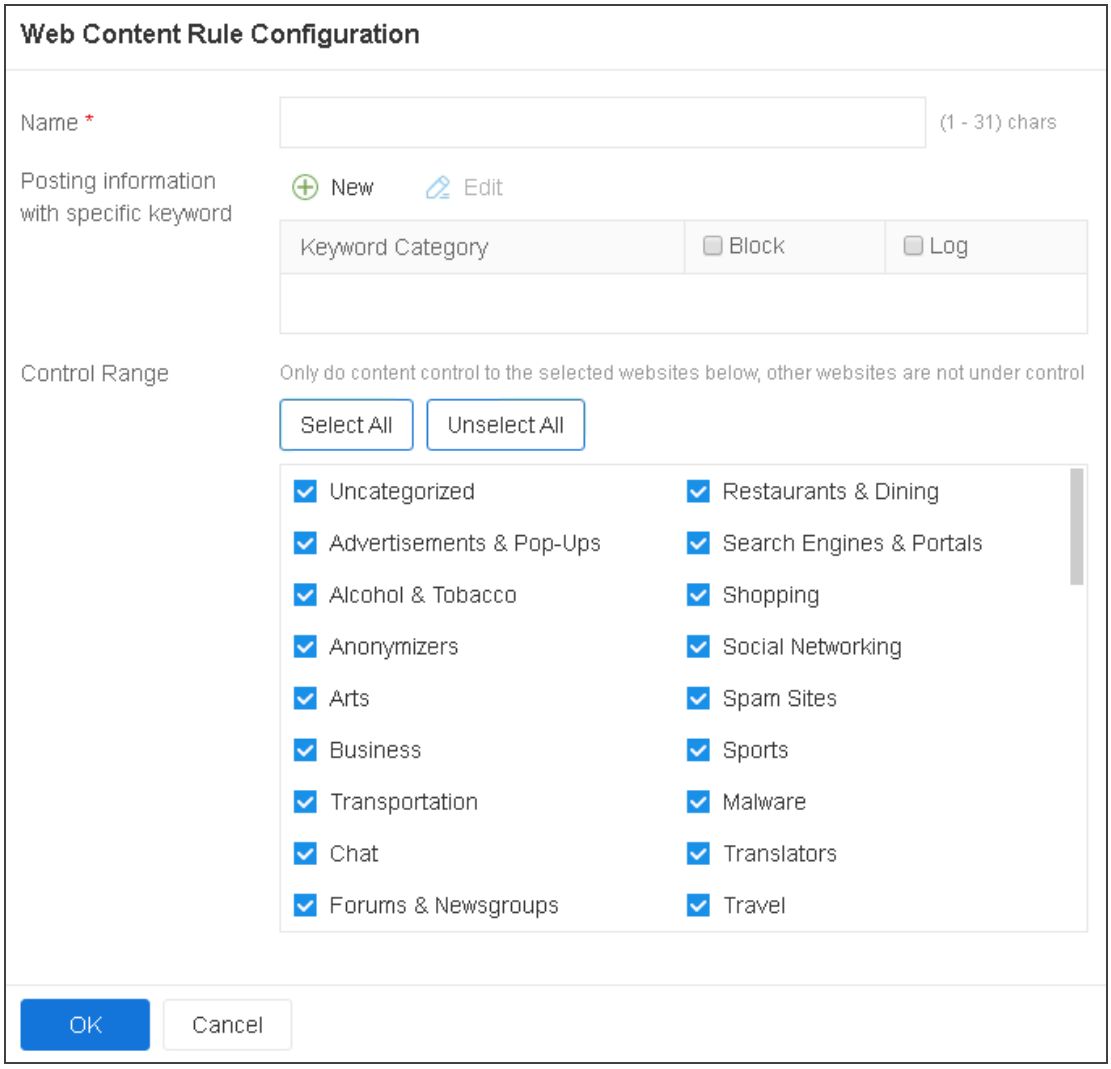
Configuring Web Content

Configuring Web Content contains two parts:

- Create a Web Content rule
- Bind a Web Content rule to a security zone or policy rule

Part 1: Creating a web content rule

1. Select **Object > Data Security > Content Filter > Web Content**.
2. Click **New**.



In the Web Content Rule Configuration dialog box, enter values.

Option	Description
Name	Specifies the rule name.
Posting information with specific keyword	Defines the action when a keyword is matched. • New: Creates new keyword categories. For more information about keyword category, see "Configuring Objects" on Page 1206.

Option	Description
	• Edit: Edits selected keyword category. • Keyword category: Shows the name of configured keyword categories. • Block: Select the check box to block the web pages containing the corresponding keywords. • Log: Select the check box to record log messages when visiting the web pages containing the corresponding keywords. • Record contents: Select the check box to record the keyword context. This option is available only when the device has a storage media (SD card, U disk, or storage module provided by Hillstone) with the NBC license installed.
Control Range	Specify the coverage of this rule. By default, the rule applies to all website. 1. Click **Control Range**. 2. Select or unselect the websites you want to monitor and control. 3. Click **OK**.

3. Click **OK**.

Part 2: Binding a Web Content rule to a security zone or security policy rule

The Web content configurations are based on security zones or policies.

- If a security zone is configured with the Web content function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the Web content function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the Web content configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based Web Content:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, click Data Security to expand the option.
3. Enable the Web content, and select a Web content rules from the profile drop-down list below; or you can click ⊕ from the profile drop-down list below, to create a Web content rule, see Creating a Web content rule.
4. Click **OK** to save the settings.

To realize the policy-based Web content:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. Click **Data Security** to expand the option, click the **Enable** button ofWeb Content.
3. From the **Profile** drop-down list, select a Web Content rule. You can also click ⊕to create a new Web Content rule.
4. Click **OK** to save the settings.

If necessary, you can configure some additional features by going to the right top corner and click **Configuration**.

Option	Description
Predefined URL DB	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
User-defined URL DB	The user-defined URL database is defined by yourself and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
URL Lookup	Use the URL lookup function to inquire URL information from the URL database.
Warning Page	• Block warning: When your network access is blocked, you will be prompted with a warning page in the Web browser. • Audit warning: When your network access is audited, you will be prompted with a warning page in the Web browser.
Bypass Domain	Domains that are not controlled by the internet behavior control rules.
User Exception	Users that are not controlled by the internet behavior control rules.

Notes:

- To enusre you have the latest URL database, it is better to update your database first. Refer to "Configuring Objects" on Page 1206.
- You can export logs to a designated destination. Refer to "Log Configuration" on Page 1713.
- By default, a rule will immediately take effect after you click **OK** to complete configuration.

Viewing Monitored Results of Keyword Blocking in Web Content

If you have configured email filter with keyword blocking, you can view the monitored results of blocking those words.

Select **Monitor > Keyword Block > Web Content**, you will see the monitored results. For more about monitoring, refer to "Web Content" on Page 1648.

Viewing Logs of Keyword Blocking in Web Content

To see the system logs of keyword blocking in web content, please refer to the "Content Filter Log" on Page 1708.

Web Posting

The web posting function can control the network behavior of posting on websites and posting specific keywords, and can log the posting action and posting content. For example, forbid the users to post information containing the keyword X, and record the action log.

Configuring Web Posting

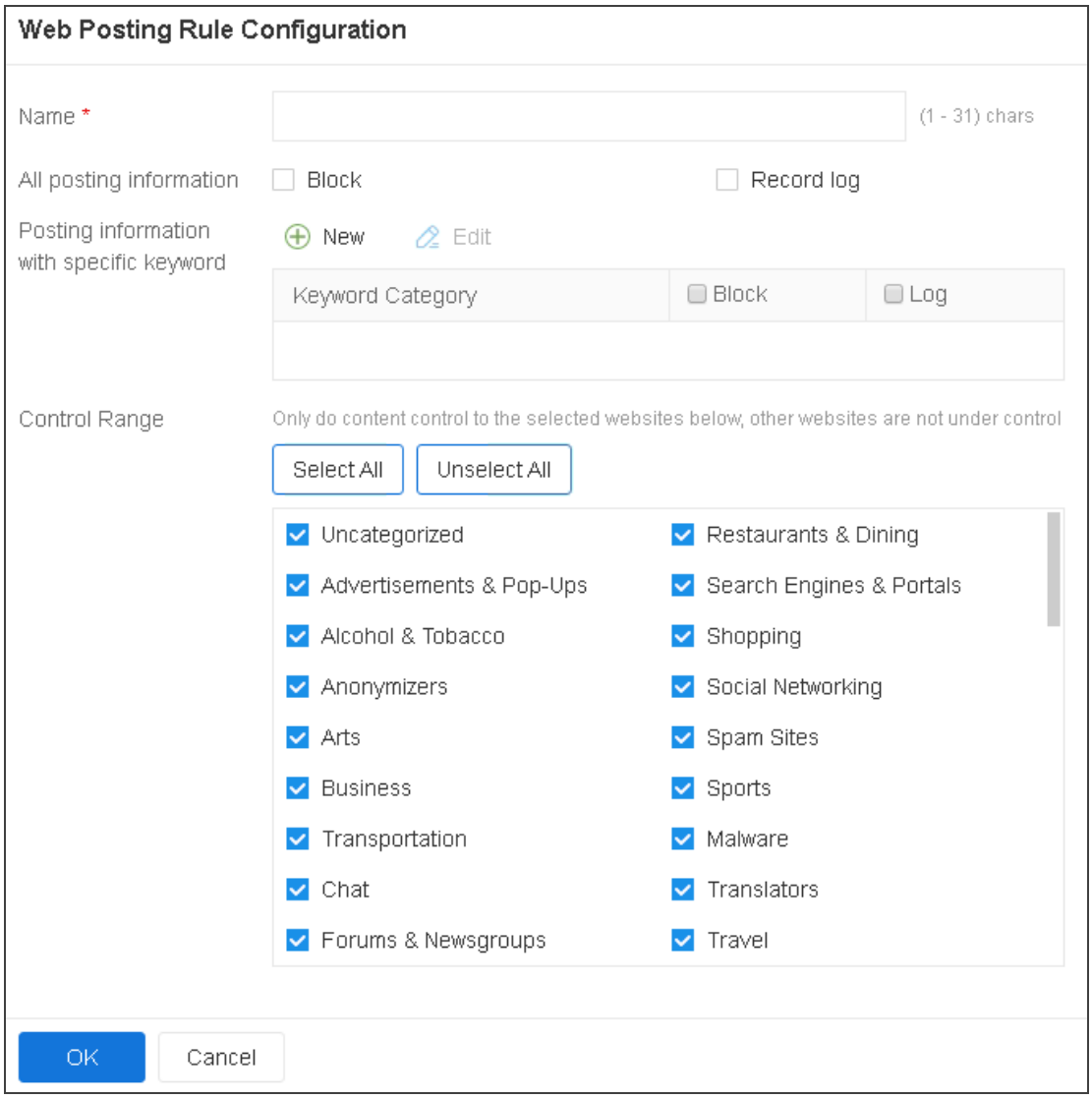
Configuring Web Posting contains two parts:

- Create a web posting rule
- Bind a web posting rule to a security zone or policy rule

Part 1: Creating a web posting rule

1. Select **Object > Data Security > Content Filter > Web Posting**.

2. Click **New**.



In the Web Posting Rule Configuration dialog, enter values.

Option	Description
Name	Specifies the rule name.
All posting information	The action applies to all web posting content. • Block: Select to block all web posting behaviors.

Option	Description
	• Record Log: Select to record all logs about web posting.
Posting information with specific keyword	Controls the action of posting specific keywords. The options are: • New: Creates new keyword categories. For more information about keyword category, see "Keyword Category" on Page 1212. • Edit: Edits selected keyword category. • Keyword category: Shows the name of configured keyword categories. • Block: Blocks the posting action of the corresponding keywords. • Log: Records log messages when posting the corresponding keywords.
Control Range	Specify the coverage of this rule. By default, the rule applies to all website. 1. Click **Control Range**. 2. Select or unselect the websites you want to monitor and control. 3. Click **OK**.

3. Click **OK**.

Part 2: Binding a Web Posting rule to a security zone or security policy rule

The web posting configurations are based on security zones or policies.

- If a security zone is configured with the web posting function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the web posting function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the web posting configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based web posting:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, select Data Security tab.
3. Enable the threat protection you need, and select a Web content rules from the profile drop-down list below; or you can click **Add Profile** from the profile drop-down list below, to create a Web content rule, see Creating a web posting rule.
4. Click **OK** to save the settings.

To realize the policy-based web posting:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. In the Data Security tab, select the **Enable** check box of web posting.
3. From the **Profile** drop-down list, select a web posting rule. You can also click **Add Profile** to create a new web posting rule.
4. Click **OK** to save the settings.

If necessary, you can configure some additional features by going to the right top corner and click **Configuration**.

Option	Description
Predefined URL DB	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
User-defined URL DB	The user-defined URL database is defined by yourself and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
URL Lookup	Use the URL lookup function to inquire URL information from the URL database.
Warning Page	• Block warning: When your network access is blocked, you will be prompted with a warning page in the Web browser. • Audit warning: When your network access is audited, you will be prompted with a warning page in the Web browser.
Bypass Domain	Domains that are not controlled by the internet behavior control rules.
User Exception	Users that are not controlled by the internet behavior control rules.

Notes:

- To enusre you have the latest URL database, it is better to update your database first. Refer to "Configuring Objects" on Page 1206.
- If there is an action conflict between setting for "all websites" and "specific keywords", when a traffic matches both rules, the "deny" action shall prevail.
- You can export logs to a designated destination. Refer to "Log Configuration" on Page 1713.
- By default, a rule will immediately take effect after you click **OK** to complete configuration.

Viewing Monitored Results of Keyword Blocking in Web Posts

If you have configured web posting rule with keyword blocking, you can view the monitored results of blocking those words.

Select **Monitor > Keyword Block > Web Posting**, you will see the monitored results. For more about monitoring, refer to "Keyword Block" on Page 1647.

Viewing Logs of Keyword Blocking in Web Posts

To see the system logs of keyword blocking in web posts, please refer to the "Content Filter Log" on Page 1708.

Email Filter

The email filter function is designed to control the email sending actions according to the sender, receiver, email content and attachment, and record the sending log messages. Both the SMTP (S)/POP(S)/IMAP(S) emails and the web mails can be controlled.

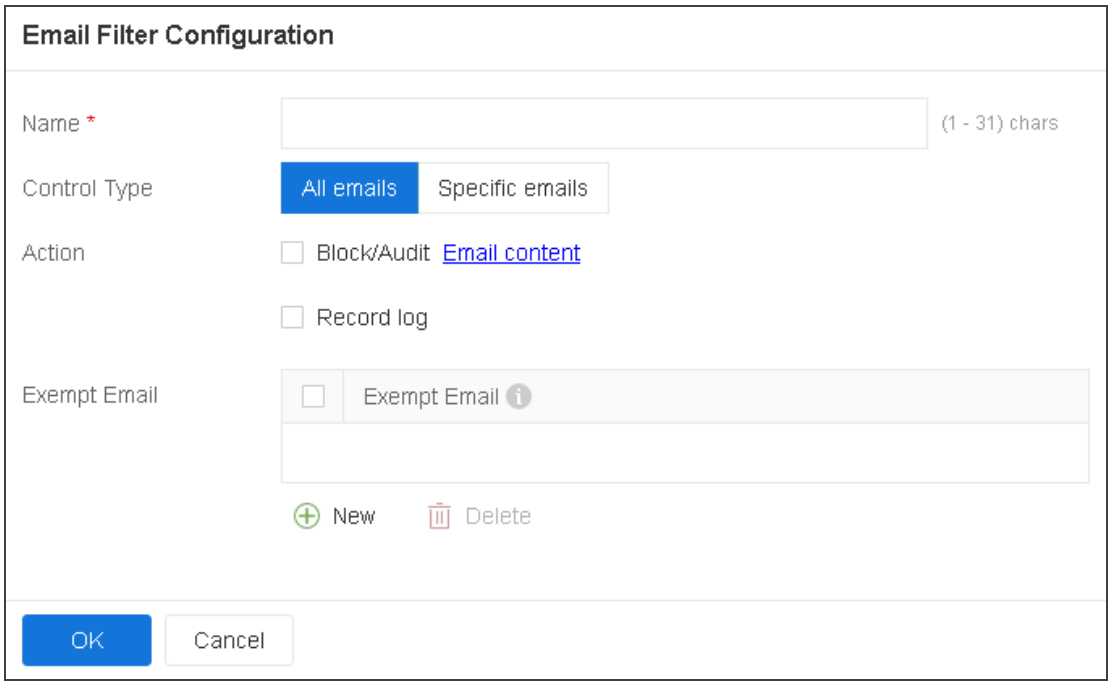
Configuring Email Filter

Configuring email filter contains two parts:

- Create an email filter rule
- Bind an email filter rule to a security zone or policy rule

Part 1: Creating an email filter rule

1. Select **Object > Data Security > Content Filter > Email Filtering Log**.
2. Click **New**.



In the dialog box, enter values.

Option	Description
Name	Specifies the rule name.
Control Type	All emails - This option applies to all the sending emails. • Record Log - Select this check box if you want all emails to be logged.
	Specific mail items - This option applies to specific mail items. To configure the email sender: 1. Click **Sender**. 2. In the prompt, enter sender's email address. 3. Click **Add**. 4. You may select to block the sender or keep a record. 5. Click **OK**. To configure the email receiver: 1. Click **Recipient**. 2. In the prompt, enter email receiver's email address. 3. Click **Add**. 4. You may select to block the receiver or keep a record. 5. Click **OK**. To configure the email content keywords:

Option	Description
	Other emails Select an action for emails other than which are added above.
Exempt Email	
Exempt Email	To configure mail addresses that do not follow the regulations of email filter: 1. Click **Exempt Email**. 2. In the prompt, enter emails that do not obey email filter. 3. Click **Add**, and you can add more. 4. Click **OK**.

Part 2: Binding an Email filter rule to a security zone or security policy rule

The email filter configurations are based on security zones or policies.

- If a security zone is configured with the email filter function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the email filter function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the email filter configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based email filter:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, select Threat Protection tab.
3. Enable the threat protection you need, and select an email filter rules from the profile drop-down list below; or you can click **Add Profile** from the profile drop-down list below, to create an email filter rule, see Creating an email filter rule.
4. Click **OK** to save the settings.

To realize the policy-based email filter:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. In the Protection tab, select the **Enable** check box of email filter.
3. From the **Profile** drop-down list, select an email filter rule. You can also click **Add Profile** to create a new email filter rule.
4. Click **OK** to save the settings.

If needed, you can also configure SSL proxy, keyword category, warning page, bypass domain and user exempt user.

To configure those features, click **Configuration** on the right top corner of the Email Filtering Log list page.

Option	Description
Keyword Category	Use the keyword category function to customize the keyword categories. You can use it to specify the keyword for the URL category/Web posting/email filter functions.
Warning Page	• Block warning: When your network access is blocked, you will be prompted with a warning page in the Web browser.

Option	Description
	• Audit warning: When your network access is audited, you will be prompted with a warning page in the Web browser.
Bypass Domain	Domains that are not controlled by the internet behavior control rules.
Exempt User	Users that are not controlled by the internet behavior control rules.

Notes:

- If an email filter rule has added all three of Audit/Block Sender, Receiver and email content, the rule will take effect when one of them is hit.
- You can export logs to a designated destination. Refer to "Log Configuration" on Page 1713.
- By default, a rule will immediately take effect after you click **OK** to complete configuration.

Viewing Monitored Results of Email Keyword Blocking

If you have configured email filter with keyword blocking, you can view the monitored results of blocking those words.

Select **Monitor > Keyword Block > Email Content**, you will see the monitored results. For more about monitoring, refer to "Email Content" on Page 1649.

Viewing Logs of Emails Keyword Blocking

To see the system logs of email's keywords, please refer to the "Content Filter Log" on Page 1708.

APP Behavior Control

The APP behavior control function is designed to control and audit (record log messages) the actions of FTP, HTTP(S) and TELNET applications, including:

- Controlling and auditing the FTP content and Login, Get, and Put actions;
- Controlling and auditing the Connect, Get, Put, Head, Options, Post, Trace, Delete actions of HTTP(S);
- Controlling and auditing the request content initiated by TELNET client.

Configuring APP Behavior Control

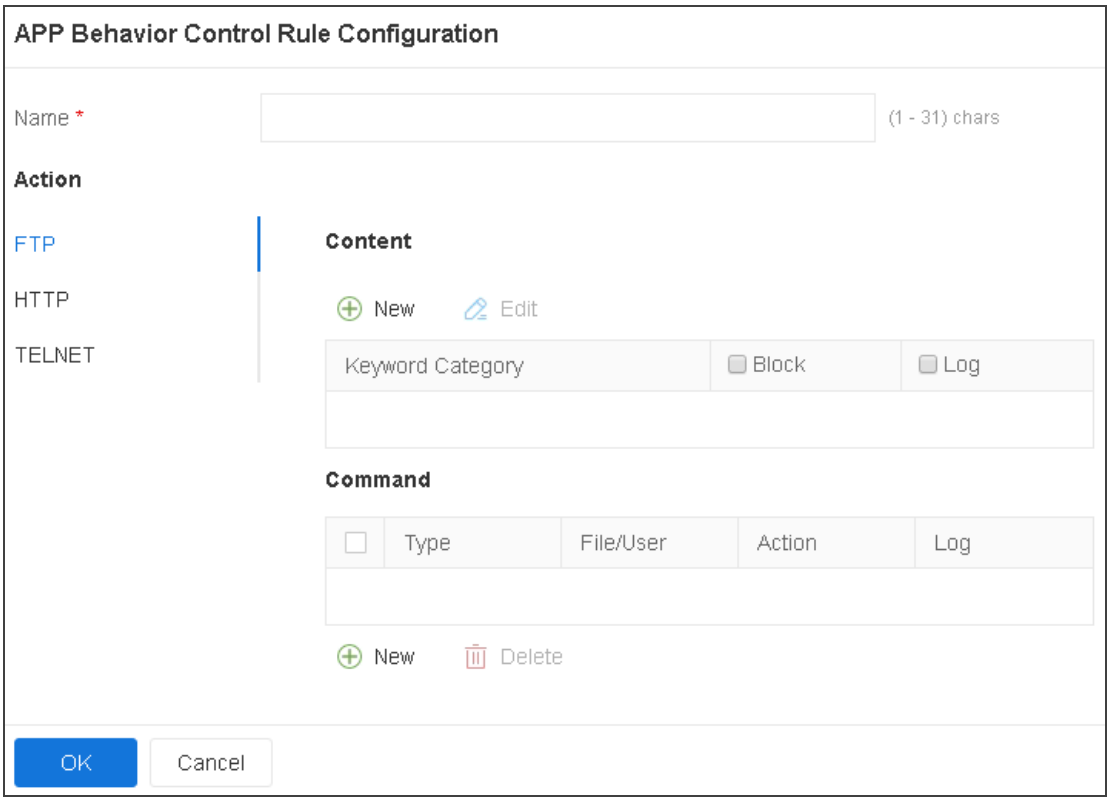
Configuring behavior control contains two parts:

- Creating an application behavior control rule
- Binding an application behavior control rule to a security zone or policy rule

Part 1: Creating an APP behavior control rule

1. Select **Object > Data Security > Content Filter > APP Behavior Control**.

2. Click **New**.



In the APP Control Rule Configuration dialog box, enter values.

Option	Description
Name	Specifies the rule name.
Action	
FTP	Content: Controls the FTP content. If the content matches the specified keyword categories, system will execute the specified action, including **Block** or **Log**. Expand the **Content**, and configure the control options. • **New**: Click the button to create a keyword category. For how to create the category, refer to the Keyword Category of Configuring Objects.

Option	Description
	• **Edit**: Select one keyword from the list and edit the category. • **Keyword Category**: Displays the keyword categories in system. • **Block**: Select the check box to block the FTP content matching the keyword category. • **Log**: Select the check box to record logs when the FTP content matches the keyword category. Command: Controls the FTP methods, including Login, Get, and Put. Expand the **Command**, and configure the control options. • From the first drop-down list, select the method to be controlled, it can be GET, PUT, or Login. • Type the file name (for the method of GET or PUT) or user name (for the method of Login) into the next box. • From the second drop-down list, select the action. It can be Block or Permit. • From the third drop-down list, specify whether to record the log messages. • Click **Add**. • Repeat Step 1 to 5 to add more control entries.

Option	Description
	To edit/delete a control entry, select the entry from the list, and then click **Edit** or **Delete**.
HTTP	Comment: Controls the HTTP(S) methods, including Connect, GET, PUT, Head, Options, Post, Trace, and Delete. Expand HTTP(S), and configure the HTTP(S) control options. • From the first drop-down list, select the method to be controlled, it can be Connect, GET, PUT, Head, Options, Post, Trace, or Delete. • Type the domain name into the next box. • From the second drop-down list, select the action. It can be Block or Permit. • From the third drop-down list, specify whether to record the log messages. • Click **Add**. • Repeat Step 1 to 5 to add more control entries. To edit/delete a control entry, select the entry from the list, and then click **Edit** or **Delete**.
TELNET	Content: Controls the request content initiated by the TELNET client. If the content matches the specified keyword categories, system will execute the specified action, including **Block** or **Log**. Expand the **Content**, and configure the control options.

Option	Description
	• **New**: Click the button to create a keyword category. For how to create the category, refer to the Keyword Category of Configuring Objects. • **Edit**: Select one keyword from the list and edit the category. • **Keyword Category**: Displays the keyword categories in system. • **Block**: Select the check box to block the request content matching the keyword category. • **Log**: Select the check box to record logs when the request content matches the keyword category.

3. Click **OK**.

Part 2: Binding an APP behavior control rule to a security zone or security policy rule

The APP behavior control configurations are based on security zones or policies.

- If a security zone is configured with the APP behavior control function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the APP behavior control function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the APP behavior control configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based APP behavior control:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, select Data Security tab.
3. Enable the threat protection you need, and select an email filter rules from the profile drop-down list below; or you can click **Add Profile** from the profile drop-down list below, to create an APP behavior control rule, see Creating an APP behavior control rule.
4. Click **OK** to save the settings.

To realize the policy-based APP behavior control:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. In the Data Security tab, select the **Enable** check box of APP behavior control.
3. From the **Profile** drop-down list, select a APP behavior control rule. You can also click **Add Profile** to create a new APP behavior control rule.
4. Click **OK** to save the settings.

If necessary, you can configure some additional features by going to the right top corner and click **Configuration**.

Option	Description
Predefined URL database	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
User-defined URL database	The user-defined URL database is defined by yourself and you can use it to specify the URL category and URL range for the URL category/Web posting functions.

Option	Description
URL lookup	Use the URL lookup function to inquire URL information from the URL database.
Keyword category	Customizes keyword categories as needed.
Warning Page	• Block warning: When your network access is blocked, you will be prompted with a warning page in the Web browser. • Audit warning: When your network access is audited, you will be prompted with a warning page in the Web browser.
Bypass Domain	Domains that are not controlled by the internet behavior control rules.
Exempt User	Users that are not controlled by the internet behavior control rules.

Notes:

- You can export logs to a designated destination. Refer to "Log Configuration" on Page 1713.
- By default, a rule will immediately take effect after you click **OK** to complete configuration.

Viewing Logs of APP Behavior Control

To see the system logs of APP behavior control, please refer to the "Content Filter Log" on Page 1708.

Network Behavior Record

Network behavior record function audits the IM applications behaviors and record log messages for the access actions, includes:

- Audits the QQ, WeChat and sinaweibo user behaviors.
- Log the access behaviors.

Configuring Network Behavior Recording

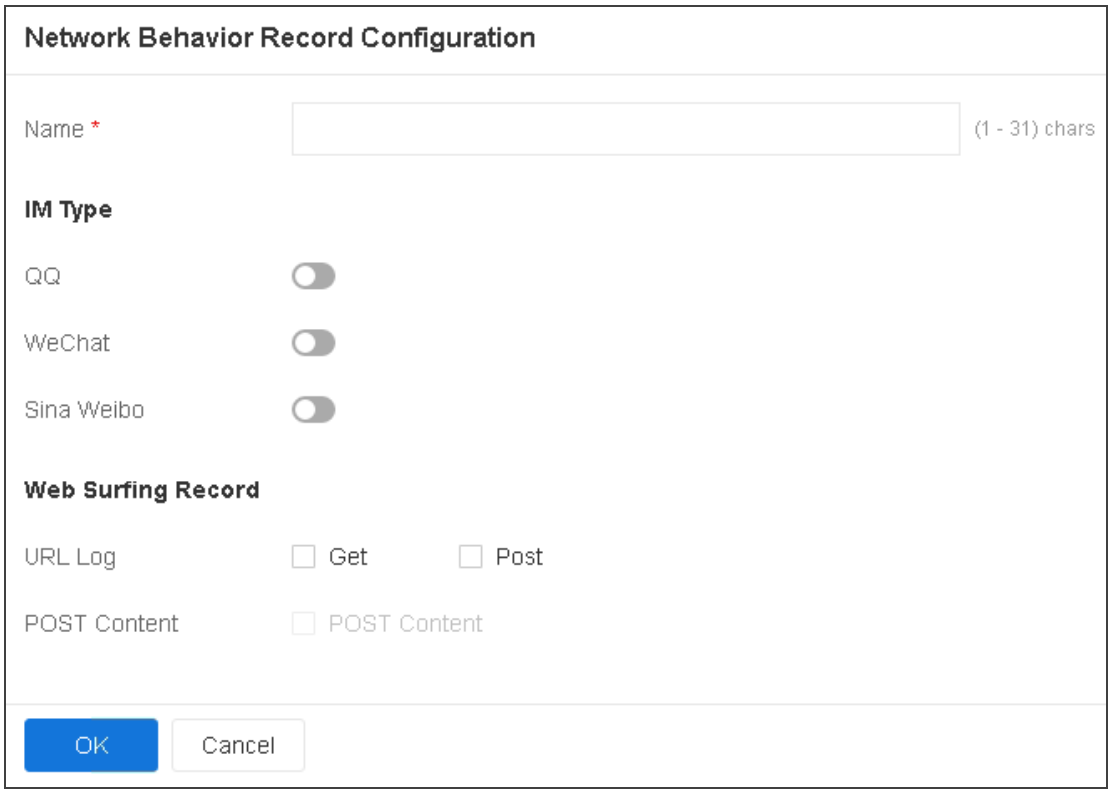
Configuring network behavior record contains two parts:

- Create a network behavior record rule
- Bind a network behavior record rule to a security zone or policy rule

Part 1: Creating a NBR rule

1. Select **Object > Data Security > Network Behavior Record**.

2. Click **New**.



In the Network Behavior Record Configuration dialog box, enter values.

Option	Description
Name	Specifies the rule name.
IM	
QQ	To audits the QQ behavior. 1. Select the **QQ** checkbox. 2. Timeout: Specifies the timeout value. The unit is minute. The default value is 10. During the timeout period, the IM user traffic of the same UID will not trigger the new logs and after the

Option	Description
	timeout reaches, it will trigger new logs.
WeChat	To audits the WeChat behavior. 1. Select the **Wechat** checkbox. 2. Timeout: Specifies the timeout value. The unit is minute. The default value is 20. During the timeout period, the IM user traffic of the same UID will not trigger the new logs and after the timeout reaches, it will trigger new logs.
Sina Weibo	To audits the sina weibo behavior. 1. Select the **Sina Weibo** checkbox 2. Timeout: Specifies the timeout value. The unit is minute. The default value is 20. During the timeout period, the IM user traffic of the same UID will not trigger the new logs and after the timeout reaches, it will trigger new logs.
Web Surfing Record	
URL Log	logs the GET and POST methods of HTTP. • Get: Records the logs when having GET methods. • Post: Records the logs when having POST methods.
POST Content	Post Content: Records the posted content.

3. Click **OK**.

Part 2: Binding a network behavior record rule to a security zone or security policy rule

The network behavior record configurations are based on security zones or policies.

- If a security zone is configured with the network behavior record function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the network behavior record function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the network behavior record configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based network behavior record:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, select Data Security tab.
3. Enable the threat protection you need, and select a network behavior record rules from the profile drop-down list below; or you can click **Add Profile** from the profile drop-down list below, to create a network behavior record rule, see Creating a network behavior record rule.
4. Click **OK** to save the settings.

To realize the policy-based network behavior record:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. In the Data Security tab, select the **Enable** check box of network behavior record.

3. From the **Profile** drop-down list, select a network behavior record rule. You can also click **Add Profile** to create a new network behavior record rule.

4. Click **OK** to save the settings.

Notes:

- You can export logs to a designated destination. Refer to "Log Configuration" on Page 1713
- By default, a rule will immediately take effect after you click **OK** to complete configuration

Viewing Logs of Network Behavior Recording

To see the logs of network behavior recording, please refer to the "Network Behavior Record Log" on Page 1709.

NetFlow

NetFlow is a data exchange method, which records the source /destination address and port numbers of data packets in the network. It is an important method for network traffic statistics and analysis.

Hillstone NetFlow supports the NetFlow Version 9. With this function configured, the device can collect user's ingress traffic according to the NetFlow profile, and send it to the server with NetFlow data analysis tool, so as to detect, monitor and charge traffic.

Related Topics:

- "Configuring NetFlow" on Page 1258

Configuring NetFlow

The NetFlow configurations are based on interfaces.

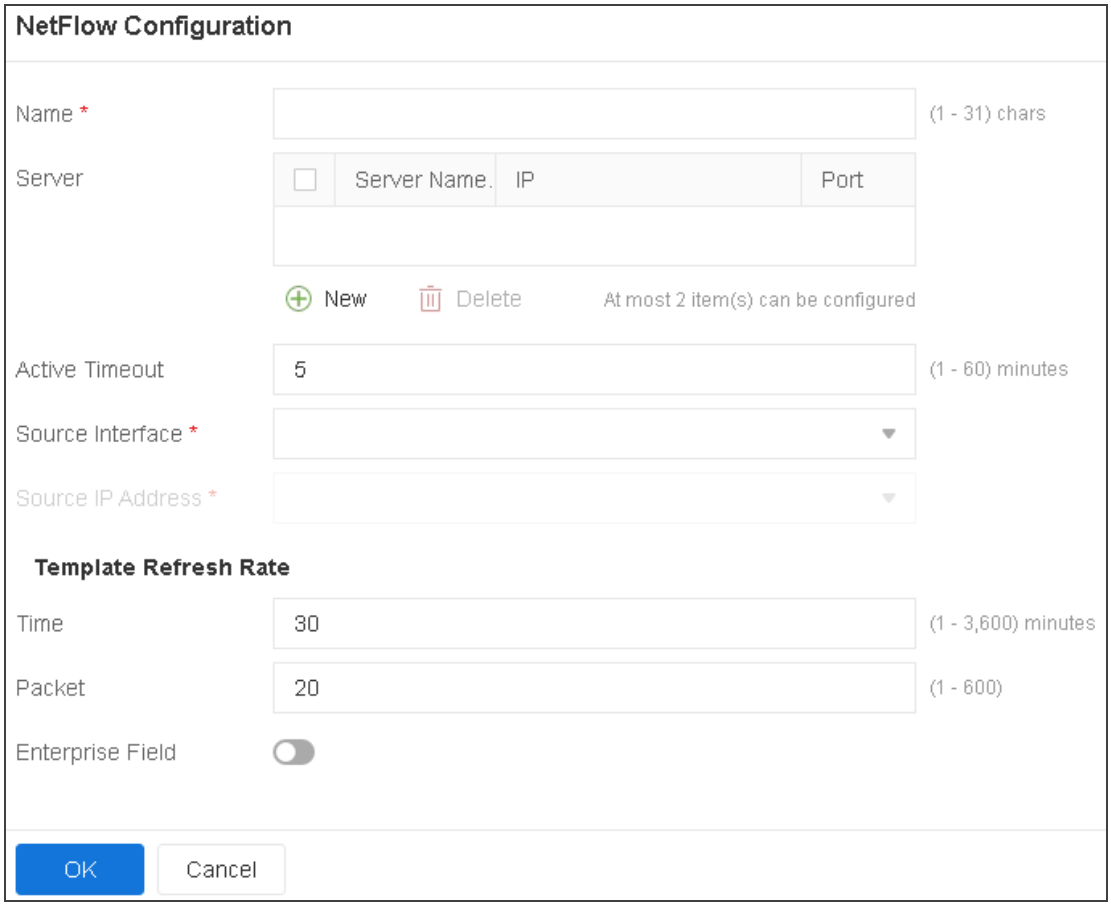
To configure the interface-based NetFlow, take the following steps:

1. Click **Object > NetFlow > Configuration**. Select **Enable** check box to enable the NetFlow function.
2. Click **Object > NetFlow > Profile** to create a NetFlow rule .
3. Bind the NetFlow rule to an interface. Click **Network > Interface**. Select the interface you want to bind or click **New** to create a new interface. In the Interface Configuration dialog box, select the **Basic** tab and then select a NetFlow rule from the **NetFlow configuration** drop-down list.

Configuring a NetFlow Rule

To configure the NetFlow rule, take the following steps:

1. Click **Object > NetFlow > Profile**.
2. Click **New** to create a new NetFlow rule. To edit an existing one, select the check box of this rule and then click **Edit**.



In the NetFlow Configuration dialog box, configure the following options

Option	Description
Name	Enter the name of the NetFlow rule.
Server	To configure the NetFlow server, take the following steps: 1. Type the server name, IP address and port number into the **Server Name**, **IP** and **Port** box respectively. 2. Click **New** to add a NetFlow server which will be

Option	Description
	displayed in the list below. 3. Repeat the above steps to add more servers. You can add up to 2 servers. To delete a server, select the server check box you want to delete from the list and click **Delete**.
Active Timeout	The active timeout value is the time after which the device will send the collected NetFlow traffic information to the specified server once. Type the active timeout value into the **Active Timeout** box. The range is 1 to 60 minutes. The default value is 5 minutes.
Source Interface	Select the source interface for sending NetFlow traffic information in the **Source Interface** drop-down list.
Source IP Address	After specifying the source interface, the system will automatically acquire and display the management IP address or the secondary IP address of the source interface in the drop-down list.
Template Refresh Rate	You can configure the NetFlow template refresh rate by time or number of packets, after which system will refreshes the NetFlow rule. • Time: Specifies the time after which system refreshes the NetFlow rule. The range is 1 to 3600 minutes. The default value is 30 minutes. • Packets: Specifies the number of packets. When

Option	Description
	the number of NetFlow packets exceeds the specified value, system will refreshes the NetFlow rule. The range is 1 to 600. The default value is 20.
Enterprise Field	Select the **Enterprise Field** check box, and the collected NetFlow traffic information will contain enterprise field information.

3. Click **OK** to save the settings.

NetFlow Global Configurations

To configure the NetFlow global configurations, take the following steps:

1. Select **Object > NetFlow > Configuration**.
2. Select the **Open NetFlow** check box of NetFlow to enable the NetFlow function. Clear the check box to disable the NetFlow function. The NetFlow function will take effect after rebooting.

End Point Protection

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

The endpoint security control center is used to monitor the security status of each access endpoint and the system information of the endpoint.

When the end point protection function is enabled, the device can obtain the endpoint data monitored by the endpoint security control center by interacting with it, and then specify the corresponding processing action according to the security status of endpoint, so as to control the endpoint network behavior.

Notes:

- At present, end point protection function only supports linkage with "JIANGMIN" endpoint security control center.
- End point protection is controlled by license. To use end point protection, apply and install the EPP license.

Related Topics:

- "Configuring End Point Protection" on Page 1263
- "Configuring End Point Security Control Center Parameters" on Page 1269
- "End Point Monitor" on Page 1618
- "EPP Log" on Page 1705

Configuring End Point Protection

This chapter includes the following sections:

- Preparation for configuring end point protection function.
- Configuring end point protection function.

Preparing

Before enabling end point protection, make the following preparations:

1. Make sure your system version supports end point protection.
2. Import an EPP license and reboot.

Configuring End Point Protection Function

The end point protection configurations are based on security zones or policies.

To realize the zone-based end point protection, take the following steps:

1. Create a zone. For more information, refer to "Security Zone" on Page 169.
2. In the **Zone Configuration**page, select **End Point Protection** tab.
3. Enable the end point protection you need and select an end point protection rule from the profile drop-down list below; or you can click **Add Profile** from the profile drop-down list. To create an endpoint protection rule, see Configuring End Point Protection Rule.
4. Click **OK** to save the settings.

To realize the policy-based endpoint protection, take the following steps:

1. Create a security policy rule. For more information, refer to "Security Policy" on Page 1286.
2. In the Policy Configuration page, expand Protection.

3. Select the **Enable** check box of **End Point Protection**. Then select an endpoint protection rule from the Profile drop-down list, or you can click **Add Profile** from the Profile drop-down list to create an end point protection rule. For more information, see Configuring End Point Protection Rule.

4. Click **OK** to save the settings.

Notes: When the zone and policy bind the same end point protection rule, the priority is policy > zone.

Configuring End Point Protection Rule

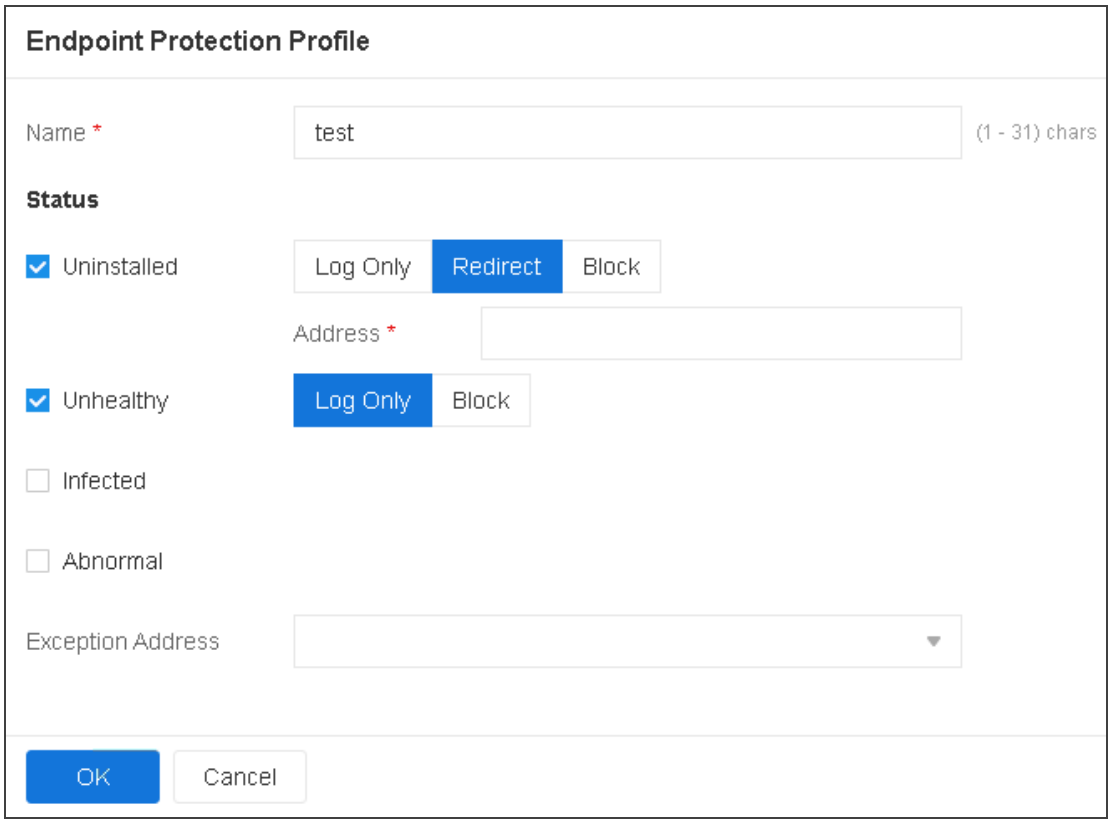
System has two default end point protection rules: **predef_epp** and **no_epp**.

- **predef_epp**: Execute the **Logonly** action for the endpoint whose status is "Uninstall" and "Unhealthy". Execute the **Block** action for the endpoint whose status is "Infected" and "Abnormal", and the block time is 60s.
- **no_epp**:No protective action is executed on all endpoints by default.

To configure an end point protection rule, take the following steps:

1. Click **Object> End Point Protection > Profile**.

2. Click **New**.



In End Point Protection Rule page, enter the end point protection rule configurations.

Option	Description
Name	Specifies the rule name.
Status	Specifies the protection action corresponding to the end-point status. • Uninstalled: Specifies the protection action for the endpoint which doesn't install an anti-virus client. Select the **Uninstalled** check box, and select the protection action in the drop-down list.

Option	Description
	• Redirect - Redirects the endpoint to the specified URL. Enter the URL in the **Address** text box. • Logonly - System will pass traffic and record logs only. • Block - Block the endpoint connection, and specifies the block time in the **Block time** text box. The unit is second. The value ranges from 60 to 65535. • Unhealthy: Specifies the protection action for the unhealthy endpoint. Select the **Unhealthy** check box, and select the protection action in the drop-down list. • Logonly - System will pass traffic and record logs only. • Block - Block the endpoint connection, and specifies the block time in the **Block time** text box. The unit is second. The value ranges from 60 to 65535. • Infected: Specifies the protection action for the infected endpoint. Select the **Infected** check box, and select the protection action in the drop-down

Option	Description
	list. • Logonly - System will pass traffic and record logs only. • Block - Block the endpoint connection, and specifies the block time in the **Block time** text box. The unit is second. The value ranges from 60 to 65535. • Abnormal: Specifies the protection action for the abnormal endpoint. Select the **Abnormal** check box, and select the protection action in the drop-down list. • Logonly - System will pass traffic and record logs only. • Block - Block the endpoint connection, and specifies the block time in the **Block time** text box. The unit is second. The value ranges from 60 to 65535.
Exception Address	The exception address is not controlled by the end point protection rule. Select the address book name in the drop down list. **Notes:** Before selecting the exception address, you need to add the exception

Option	Description
	endpoint address to the address book. For configuration, see "Address" on Page 1034.

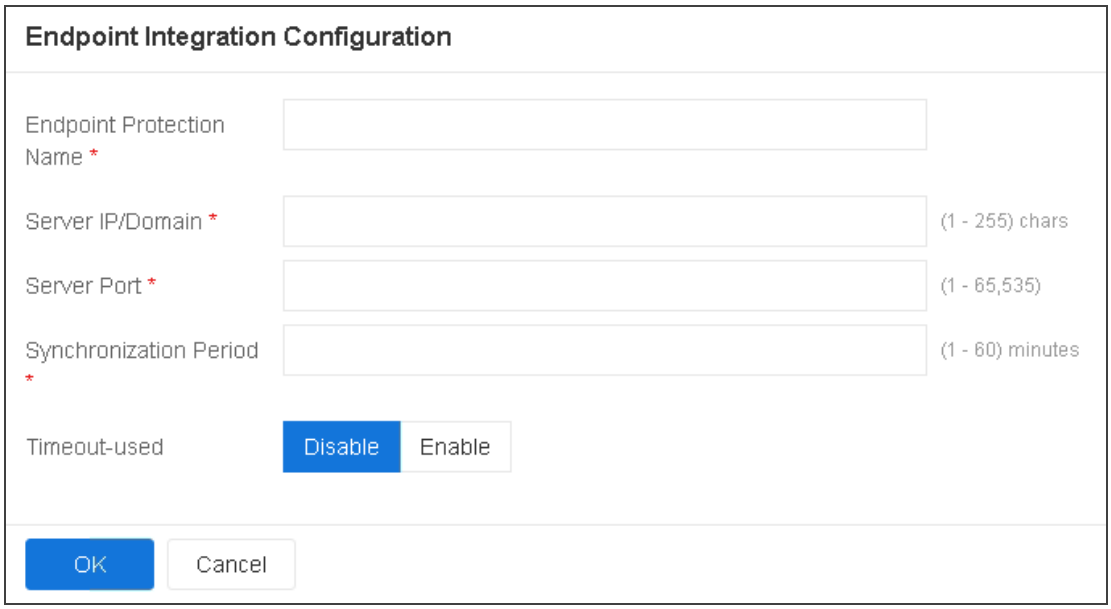
3. Click **OK** to save the settings.

Configuring End Point Security Control Center Parameters

To configure the endpoint security control center parameters, take the following steps:

1. Go to **System > Third Party Linkage**.

2. Click **New**.



In the End Point Linkage Configuration page, enter values.

Option	Description
Endpoint Prevention Name	Display the end point protection type as Jiangmin. Only one endpoint security control center server with the same type can be configured.
Server IP/Domain	Specifies the address or domain name of the endpoint security control center server. The range is 1 to 255 characters.
Server Port	Specifies the port of the endpoint security control center server. The range is 1 to 65535.
Synchronization Period	Specifies the synchronization period of endpoint data information. The range is 1 to 60 minutes. The default value is 10 minutes.
Timeout-used	• Disable: When the endpoint security control center is disconnected with the device and doesn't restore to connection in two synchronization periods, the synchronized endpoint data information will be cleared. By default, the timeout entry is disabled. • Enable: When the endpoint security control center is disconnected with the device and doesn't restore to connection in two synchronization periods, the endpoint data information that the system has been synchronized the last time continues to be used.

3. Click **OK**.

ACL

System supports ACL (Access Control List) based on MAC addresses and DSCP. You can create access control profile based on MAC addresses and bind the profile to security policies to achieve access control of the specific MAC addresses and DSCP. With the combination of security policy and ACL rules, system can achieve accurate access controlling.

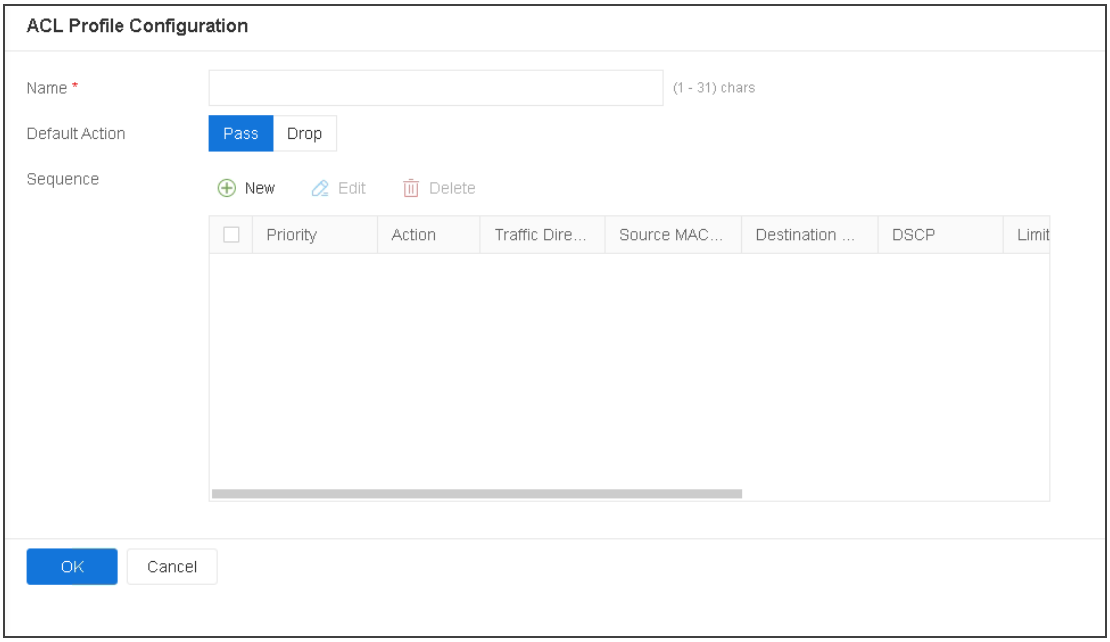
ACL Profile

The ACL profile consists of one or more access control rules. In the access rule, you can set the source MAC address and destination MAC address and DSCP to filter the packets flowing through the device, and set access control action for the matched packets, pass or discard. The configured access control profiles will take effect only when they are bound to security policies.

To configure an ACL profile, take the following steps:

1. Select **Object** > **ACL** > **Profile**.

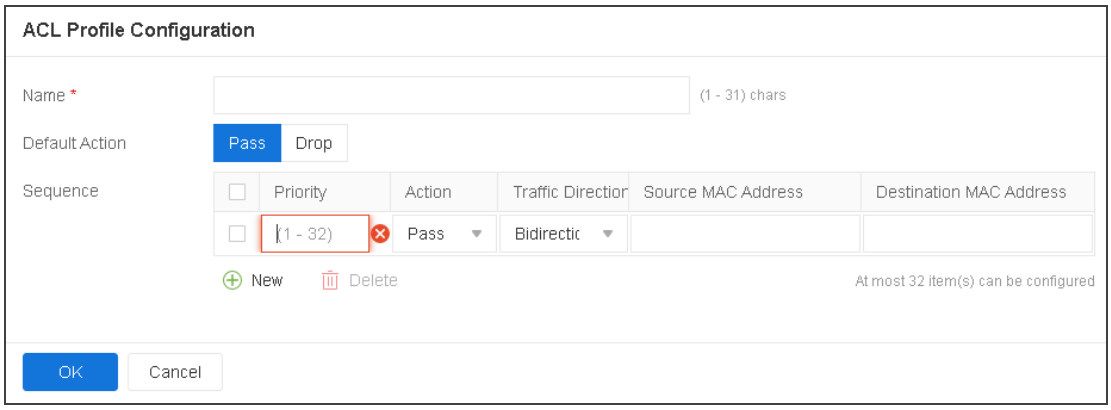
2. Click **New** and the ACL Profile Configuration dialog box will appear.



In the ACL Profile Configuration dialog, configure the corresponding options.

Option	Description
Name	Specify the name of the ACL profile.
Default Action	Specify the default action of access control. For the packets which match the access control rule in the list below, it will be processed according to the action set in the access control rule; for the packets which fail to match the access control rule, it will be processed according to the default action set here. Default control actions include: • Pass: By default, packets will be allowed to pass the detection of access control, but still need to be detected via IPS, Anti-virus and so on. • Block: By default, packets will be blocked directly and will not pass through the device.

3. Click New on the ACL Profile Configuration, and the ACL Rule Configuration dialog pops up.



In the <ACL Rule Configuration> dialog, configure the corresponding options.

Option	Description
Priority	Specify the priority of ACL rules to be matched, ranging from 1 to 32. The bigger the value, the higher the priority.
Action	Specify the action to be executed after the ACL rules have been matched, including: • Pass: Packets will be allowed to pass the detection of access control, but still need to be detected via IPS, Anti-virus and so on. • Block: Packets will be blocked directly and will not pass through the device.
Traffic Direction	Specify the traffic direction of the ACL rule. **Forward** indicates the traffic direction where the session is initiated. **Backward** indicates traffic direction where the session is responded. **Bidirectional** indicates the direction of both Forward and Backward. By default, system matches the bidirectional traffic.
Source MAC Address	Specify the source MAC address of packets to be matched.
Destination MAC Address	Specify the destination MAC address of packets to be matched.
DSCP	Specify the DSCP value to be matched. The range is 0-63.
Limit Type	Specify the limit type that the access control rules match for the extension headers of IPv6 messages, including Total

Option	Description
	Header Number, Single Header Number and Header Order.
	• Total Header Number: Select this option and then specify the Total Header Number and Comparison Mode. The system will count and limit the total number of extension headers in IPv6 message. If the restriction requirements are met, the system will process according to the action of this rule. • Single Header Number: Select this option, and then specify the Header and Comparison Mode. The system will count and limit the specify header in IPv6 message. If the restriction requirements are met, the system will process according to the action of this rule. • Header Order:Select this option, and then specify the Header Order:Positive Sequence and out of order-.Positive Sequence means that the extension headers should be arranged in order. " Out of order" means that the extension headers are arranged in non order, that is, out of order. If the restriction requirements are met, the system will process according to the action of the rule.
Log	System will log when the messages matching the access control rules.

4. Click **OK**.

IoT Policy

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

IoT, the abbreviation of Internet of Things, is the extension of Internet connectivity into physical devices and everyday objects.

The IoT policy in system can identify the network video monitoring devices, like IPC (IP Camera) and NVR (Network Video Recorder) via the flowing traffic, then monitor the identified devices and block illegal behaviors according to the configurations.

Notes:

- Only the IPC and NVR devices of Hikvision, Dahua and Uniview are supported currently.
- The IoT Policy function is available only when the IoT license is installed on the system.
- The network video monitoring devices in the NAT scenario cannot be identified with the IoT policy.

Links:

- Configuring IoT Policy
- Configuring Admittance List
- IoT Monitor
- IoT Log

Configuring IoT Policy

The chapter introduces the following topics:

- Preparations for IoT Policy Configuration
- Configuring IoT Policy

Preparations for IoT Policy Configuration

Before configuring the IoT policy, ensure the following conditions have been met.

1. The IoT Policy function is supported for the system version.
2. The IoT license has been installed and you log in to the device again.

Configuring IoT Policy

System supports the configuration of IoT policy based on the zone.

To configure the IoT policy based on the zone, take the following steps:

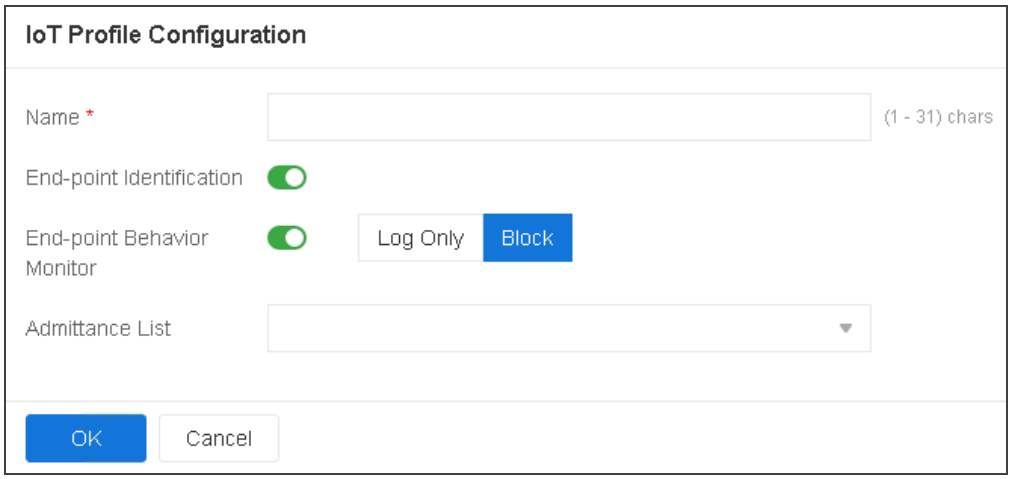
1. For how to create or edit the zone, refer to Zone.
2. In the **Zone Configuration** dialog, click the **IoT Monitor** tab.
3. Select the **Enable** check box. You can select a configured IoT profile from the **Profile** drop-down list, or click **Add Profile** in the drop-down list to create an IoT profile. For how to configure the IoT policy profile, refer to Configuring IoT Profile.
4. Click **OK** to save the configurations.

Configuring IoT Profile

To create an IoT profile, take the following steps:

1. Click **Object** > **IoT Policy** > **Profile**.

2. Click **New** and the **IoT Profile Configuration** dialog pops up.



In the dialog, configure the options as follows:

Option	Description
Name	Specify the name of the IoT profile.
End-point Identification	Select the **Open** check box to enable the end-point identification. When the function is enabled, system will probe the end-point IP in the IoT monitoring list actively, and identify the information of manufacturer and model of the network video monitoring devices according to the returned packets. Then the information will be displayed in the IoT monitoring list. The end-point identification will be triggered • when a new end-point IP adds into the IoT monitoring list. • when the network video monitoring device logs in

Option	Description
	again. • when the network video monitoring device has been online, and the function will be triggered every 5 minutes.
End-point Behavior Monitor	Select the **Open** check box to enable the end-point behavior monitoring. When the function is enabled, system can check whether the devices behaviors are illegal. If illegal behaviors are detected, you can execute the following operation: • Log Only: System will let the traffic flowing through the end-point device pass and record logs. • Block: System will block the traffic flowing through the end-point device.
Admittance List	You can select a configured admittance list profile from the drop-down list, or click **Add Profile** in the drop-down list to Configure Admittance List.

3. Click **OK** to save the configurations.

Notes: To ensure the normal performance of IoT policy, the network video monitoring devices should:

- enable ONVIF service and multi-cast detection function.
- communicate with the Hillstone devices.

Configuring Admittance List

For the traffic flowing through the zone bound with the IoT policy profile, systems supports to control it by configuring the admittance list of the IP, MAC and IP/MAC types, that is, only the traffic matches the type in the admittance list is allowed to pass. By default, all the traffic flowing through the zone bound with the IoT policy profile is allowed to pass.

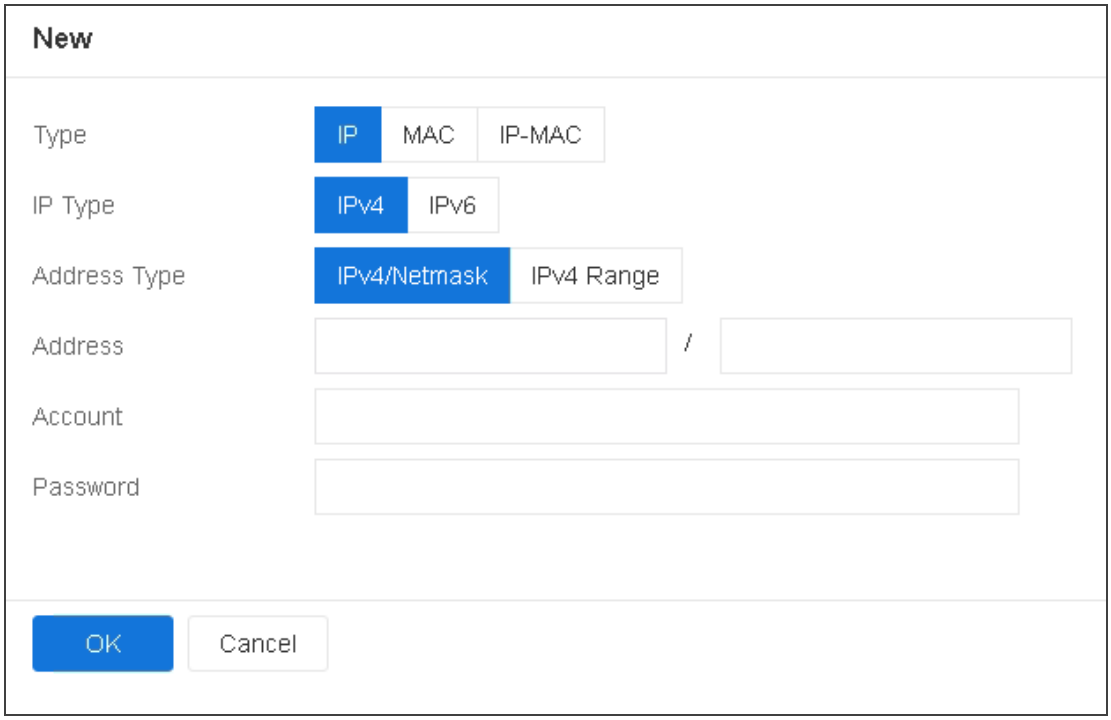
When the admittance lists of the IP/MAC, IP and MAC types are all configured, traffic matches the admittance lists in the sequence of IP/MAC > IP > MAC. Traffic can pass in the following conditions.

- Traffic first matches the admittance list of IP/MAC type, and both the IP and MAC types are matched.
- Traffic first matches the admittance list of IP/MAC type, while only the IP type is matched. Then traffic tries to match the admittance list of IP and MAC type in order, and both the IP and MAC types are matched.

You can configure the admittance list with the following methods:

Creating Admittance List Profile

1. Click **Object** > **IoT Policy** > **Admittance List**.
2. Click **New**, and the **Admittance List Configuration** dialog pops up. Enter the name of the admittance list into the **Name** text box. Click **Add** and the **Add** dialog pops up.



Configure the options as follows:

Option	Description
Mode	Specify the type of the admittance list, including IP, MAC and IP-MAC. Note: When the network video monitoring devices and the Hillstone devices are not in the same broadcast domain, the obtained MAC address in the packets may not be true. Then the network video monitoring devices cannot match the admittance list. Therefore, you're suggested to configure the admittance list of IP type.
IP	Specify the type of admittance list as IP and configure the following items:

Option	Description

	• IP Type: Select the IP address type of the network video monitoring device, including IPv4 and IPv6.
	  • IPv4/Netmask: Enter the IPv4 address and netmask.
	  • IPv4 Range: Enter the start IPv4 address and end IPv4 address.
	  • IPv6/Prefix: Enter the IPv6 address and prefix.
	  • IPv6 Range: Enter the start IPv6 address and end IPv6 address.
	• Account (Optional): Enter the admin name of the network video monitoring device.
	• Password (Optional): Enter the password of the account.

MAC	Specify the type of admittance list as MAC and configure the MAC address of the network video monitoring device.
IP-MAC	Specify the type of admittance list as IP/MAC and configure the following items: • IP Type: Select the IP address type of the network video monitoring device, including IPv4 and IPv6. • IPv4: Enter the IPv4 address into the text box.

Option	Description
	• IPv6: Enter the IPv6 address into the text box. • MAC: Enter the MAC address into the text box. • Account (Optional): Enter the admin name of the network video monitoring device. • Password (Optional): Enter the password of the account.

3. Click **Add** to save the configurations.

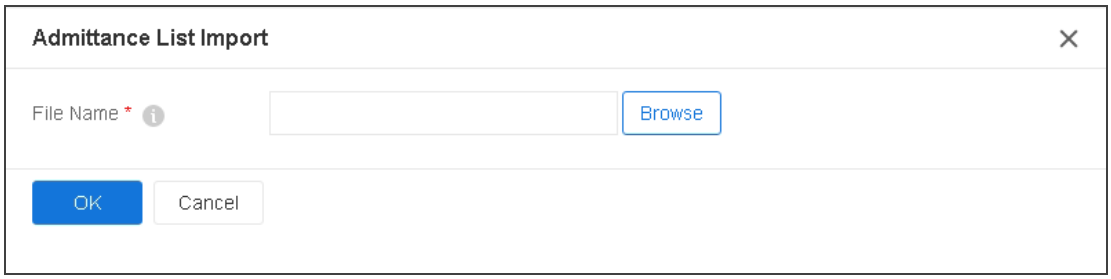
Notes: The admittance list of the specified type in one profile cannot be repeated, otherwise, an error will pop up. The repeat conditions for different types include:

- IP-MAC: The IP address and MAC address are the same.
- IP: There're repeated IP addresses in the IP/netmask or IP range.
- MAC: The MAC addresses are repeated.

Importing Admittance List

1. Click **Object** > **IoT Policy** > **Admittance List**.
2. (Optional) Click **Admittance List Template** and download the template in local.

3. Select an admittance list and click **Import**.



4. In the **Admittance List Import** dialog, click **Browse** and upload the admittance list in the local.

5. Click **OK**.

Adding to Admittance List

1. Click **Monitor** > **IoT Monitor** > **Details**.

2. Select the check box and click **Add to Admittance List**.

In the pop-up dialog, configure the options as follows.

Option	Description
Admittance List	Select the admittance list profile from the drop-down list that the selected item will be added to.
Type	Specify the type of the selected item that will be added as IP, MAC or IP/MAC.

3. Click **OK** to save the configurations.

Chapter 9 Zero Trust Network Access (ZTNA)

Introduction

Compared with the traditional VPN access mode, which allows an authorized user device to access any resources on the internal network, ZTNA (Zero Trust Network Access) starts with a default deny posture of zero trust on any entities, whether outside or inside the enterprise network perimeter. It grants controlled and least-privilege access to resources after assessment of user identity, device identity and other context-aware attributes, such as access time. It allows users to securely access private applications across clouds and data centers from any location and device.

Hillstone ZTNA solution supports management and control of user access based on dimensions including user identity, device identity and access time and grants access only to specific applications based on adaptive and granular policies. By persistently monitoring the state change of user endpoints, ZTNA solution flexibly adjusts the granted access range. ZTNA login process is as follows:

1. ZTNA user enters the server address, port number, user name and password on the client to request authentication and two-step verification, if any.
2. ZTNA server allocates private IP addresses to authenticated users and delivers the endpoint information collection script.
3. ZTNA client executes the script to collect endpoint information, such as OS version, firewall and anti-virus installation information, IE security level, process running, etc. and reports to the ZTNA server.
4. ZTNA server parses endpoint information to obtain the endpoint tag and sends the user name appended with the endpoint tag to the authentication module.
5. Authentication module creates authenticated users, attends the endpoint tag and acquires user group information.

6. ZTNA server matches the user name, user group, endpoint tag and other conditions with ZTNA policies to determine applications that users can access.
7. ZTNA client receives the popped-up ZTNA portal, displaying the icons of application resources that the client is granted and is not granted access. The icons will be displayed with the application resource name and URL address.

ZTNA requires a license to work. The firewall provides 8 concurrent-users authorization by default (128 for X series and K9180). The upper limit for the number of concurrent online ZTNA users varies from hardware platforms. If you want to have a larger user number, consult your local agents to purchase new ZTNA license. For more information about the license, please refer to System Management > License.

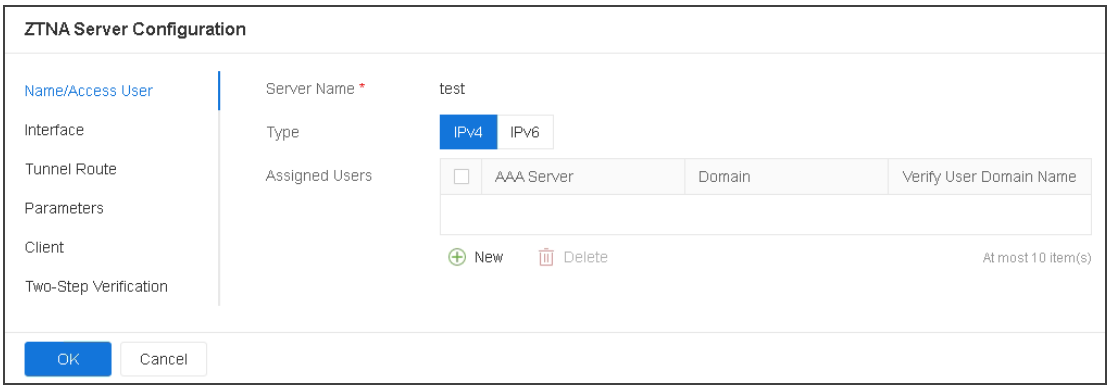
ZTNA shares the Hillstone Secure Connect client with SSL VPN. To access ZTNA, please download and install the latest Hillstone Secure Connect client. The client upgrade supports both ZTNA and SSL VPN access. The firewall supports ZTNA access from Windows, macOS, Linux, iOS and Android endpoints via corresponding clients. For information about client installation and usage on these endpoints, refer to:

- Hillstone Secure Connect Client for Windows
- Hillstone Secure Connect Client for macOS
- Hillstone Secure Connect Client for Linux
- Hillstone Secure Connect Client for iOS
- Hillstone Secure Connect Client for Android

Configuring ZTNA

To configure ZTNA, take the following steps:

1. Select **ZTNA** > **Gateway**.



In the Name/Access User tab, configure the corresponding options.

Option	Description
Server Name	Type the name of the ZTNA instance. The length is 1 to 31 characters.
Type	Select IPv4 or IPv6 to specify the service type of the ZTNA instance. The IPv6 option can only be configured when the version is IPv6.
Assigned Users (at most 10 items)	
AAA Server	Click **New** and select a AAA server from the **AAA Server** drop-down list. Or, you can click **New** in the drop-down list to create a AAA server.
Domain	Type the domain name into the **Domain** box. The domain name is used to distinguish the AAA server. The length is 1 to 31 characters.
Verify User Domain Name	After enabling this function, the system will verify the user name and its domain name.

In the Interface tab, configure the corresponding options.

Option	Description
Egress Interface	Specify the interface used to listen to the request from ZTNA clients. Select the interface from the drop-down list. Or, click **New** in the drop-down list to create an interface. At most 8 interfaces can be selected.
Service Port	Specify the ZTNA service port number. The value range is 1 to 65535.

Option	Description
Tunnel Interface	Specify the tunnel interface for the ZTNA instance. Select a tunnel interface from the drop-down list. Or, click **New** in the drop-down list to create a tunnel interface.
Address Pool	Specify the ZTNA address pool. Select an address pool from the drop-down list. Or, click **New** in the drop-down list to create a new address pool. When configuring IPv6 ZTNA, this option specifies the IPv6 ZTNA address pool.

In the Tunnel Route tab, configure the following options.

Tunnel Route	
A tunnel route created based on a network segment will be distributed to the ZTNA client. ZTNA client uses it to generate the route to the specified destination. A maximum of 128 tunnel routes based on network segments can be added for a ZTNA instance.	
New	Click **New** to add a route.
IP	Type the destination IP address.
Netmask	Type the netmask of the destination IP address.
Metric	Type the metric value. The value range is 1 to 9999.
Delete	Click **Delete** to delete the selected route.
Add Default Route	Click **Add Default Route** to add a default route with both the IP address and netmask being all 0.
Enable Domain Route	
After clicking the **Enable** button, the system will distribute the specified domain names to the ZTNA client, and the client will generate the route to the specified destination according to the resolving results from the DNS.	
Maximum	Specify the maximum numbers of routes that can be generated after obtaining the resolved IP addresses of the domain name. The value range is 1 to 10000. The default value is 1000.
New	Click **New** to add the domain name to the list and you can add up to 64 domain names.

Tunnel Route	
Domain	Specify the URL of the domain name. The URL cannot exceed 63 characters and it cannot end with a dot. Both wildcards and a single top level domain, e.g. com and .com are not supported.
Delete	Click **Delete** to delete the selected domain name.

In the Parameters tab, configure the corresponding options.

Security Kit	
SSL Version	Specify the SSL protocol version. The default is TLSv1.2. The option **any** indicates one of TLSv1.0, TLSv1.1, TLSv1.2 protocol will be used. If **TLSv1.2** or **any** is specified in ZTNA server, you need to convert the certificate that you are going to import to the browser or certificate in the USB Key to make it support the TLSv1.2 protocol before the digital certificate authentication via ZTNA client, so that the ZTNA server can be connected successfully when the Username/Password + Digital Certificate or Digital Certificate Only authentication method is selected. Prepare a PC with Windows or Linux system which has been installed with OpenSSL 1.0.1 or later before processing the certificate. We will take the certificate file named oldcert.pfx as an example, the procedure is as follows: 1. In the OpenSSL software interface, enter the following command to convert a certificate in .pfx format to a certificate in .pem format. **openssl pkcs12 -in oldcert.pfx -out cert.pem** 2. Enter the following command to convert the certificate in .pem format to a .pfx format cer-

	tificate that supports TLSv1.2 protocol. **openssl pkcs12 -export -in cert.pem -out newcert.pfx -CSP "Microsoft Enhanced RSA and AES Cryptographic Provider"** 3. Import the newly generated .pfx format certificate into your browser or USB Key.
Trust Domain	Specify the PKI trust domain. When the GMSSLv1.0 protocol is used, the specified PKI trust domain needs to include the SM2 signature certificate and its private key for the GMSSL negotiation. The default value is trust_domain_default.
Encryption Trust Domain	When using the GMSSLv1.0 protocol, you must configure this option. The specified encryption PKI trust domain needs to include the SM2 encryption certificate and its private key for the GMSSL negotiation.
Encryption	Specify the encryption algorithm of the ZTNA tunnel. **NULL** indicates no encryption. When using the GMSSLv1.0 protocol, you're recommended to select SM4 for the encryption algorithm. The default value is AES.
Hash	Specify the hash algorithm of the ZTNA tunnel. **NULL** indicates no hash. When using the GMSSLv1.0 protocol, you're recommended to select

	SM3 for the hash algorithm. The default value is MD5.
Compression	Specify the compression algorithm of the ZTNA tunnel. By default, no compression algorithm is used.
Client Connection	
Allow Download Client from Browser	Enable this function to allow downloading the ZTNA client via the browser WebUI. By default, the function is enabled. When this function is disabled, users can only download the ZTNA client from www.hillstonenet.com.cn. Note： The way to download the ZTNA client via the browser WebUI is :"https://IP-Address:Port-Number", the "IP-Address" is the address configured in Interface; The "Port-Number" is the service port number configured here.
Idle Time	Specify the time that a client stays online without any traffic with the server. After waiting for the idle time, the server will disconnect from the client. The value range is 1 to 1500 minutes. The default value is 30.
Multiple login	Click **Enable** to permit a user to log in from more than one place simultaneously.
Multiple login times	Specify the number of simultaneous login with the same username. The value range is 0 to 99,999,999. The value 0 indicates that the number of simultaneous login times is not limited. The default

	value is 0.
Advanced Parameters	
Anti-Replay	The anti-replay function is used to prevent replay attacks. The default value is 32.
DF-Bit	Specify whether to permit packet fragmentation on the device forwarding the packets. The actions include: • Set - Forbids packet fragmentation. • Copy - Copies the DF value from the destination of the packet. It is the default value. • Clear - Permits packet fragmentation.
Port (UDP)	Specify the UDP port number for the ZTNA connection. The value range is 1 to 65535.
Port (TCP)	Specify the TCP port number for the ZTNA connection. The value range is 1 to 65535.

In the Client tab, configure the corresponding options.

Client Configuration	
Change Password URL	Specify the URL address where the user will be redirected to modify the password. The length is 0 to 255 characters.
Forgot Password URL	Specify the URL address where the user will be redirected to reset the password. The length is 0 to 255 characters.

Redirect URL	This function redirects the client to the specified URL address after a successful authentication. The length is 0 to 255 characters. HTTP (http://) and HTTPS (https://) URLs are supported. Based on the type of the URL, the corresponding fixed format of URL is required. Take the HTTP type as the example: • For the UTF-8 encoding page - The format is URL+username=$USER&password=$PWD, e.g., http://www.- abc.- com/oa/- login.- do?username=$USER&password=$PWD • For the GB2312 page - The format is URL+user-name=$GBUSER&password=$PWD, e.g., http://www.- 443 Chapter 7 VPN abc.- com/oa/- login.- do?user-name=$GBUSER&password=$PWD • Other pages: - Type the URL directly, e.g., http://www.abc.com
Title	Specify description for the redirect URL. The length is 0 to 31 characters. This title will appear as a client menu item.
Client Certificate Authentication	
Authentication	Enable this function to request client certificate authentication. There are two options available:

	• Username/Password + Digital Certificate - To pass the authentication, you need to have the correct file certificate, or the USB Key that stores the correct digital certificate, and also type the correct username and password. The USB Key certificate users also need to type the USB Key password. • Digital Certificate only - To pass the authentication, you need to have the correct file certificate, or the USB Key that stores the correct digital certificate. The USB Key certificate users also need to type the USB Key password. No username or user's password is required. When **Digital Certificate only** is selected: • System can map corresponding roles for the authenticated users based on the CN or OU field of the USB Key certificate. For more information about the role mapping based on CN or OU, see Role. • System does not allow the local user to change the password. • System does not support SMS authentication. • The client will not re-connect automatically if

	the USB Key is removed.
USB KEY Download URL	When USB Key authentication is enabled, you can download the UKey driver from this URL. The length 0 to 63 characters.
Trust Domain Subject&Username Checking CN Matching OU Matching	To configure the trust domain and the subject & username check function: 1. From the **Trust domain** drop-down list, select the PKI trust domain that contains the CA (Certification Authority) certificate. If the client's certificate is the only one that matches to any CA certificate of the trust domain, then the authentication will succeed. 2. If necessary, select the **Subject&Username Checking** check box to enable the subject & username check function. After enabling it, when the user is authenticated by the USB Key certificate, system will check whether the subject CommonName in the client certificate is the same as the name of the login user. You can also enter the strings in the **CN Match** box and the **OU Matching** box to determine whether matches them. 3. You can click **New** to add more items. To delete an item, select the item you want to

	delete from the list, and then click **Delete**.

In the Two-Step verification tab, configure the corresponding options.

Option	Description
Two-Step Verification	Click **Enable** to enable two-step verification. It means that when a ZTNA user logs in by providing a "username/password" or a "username/password+Digital Certificate", the Hillstone device will implement the two-step verification by means of SMS authentication, token authentication or email authentication after the username and password are entered. The user must enter the random verification code received in order to log in and access intranet resources.
Type	Specify the verification type, including **SMS Authentication**, **Token Authentication** and **Email Authentication**: • SMS Authentication: Click **SMS Modem** or **SMS Gateway** to specify the authentication type, and configure corresponding options below as needed. • Token Authentication: Click **Token Authentication** and enter the prompt

Option	Description
	message as needed. The length is 0 to 255 characters. • Email Authentication: Configure corresponding options below as needed.
SMS Authentication	
SMS Auth Type	Select the **SMS Modem** or **SMS Gateway** to specify the SMS authentication type.
SMS Gateway Name	Select the SMS gateway name from the drop-down list. For more information about the SMS gateway, see SMS Gateway.
Lifetime of SMS Verification Code	Specify the lifetime of the SMS authentication code, in minutes. The value range is 1 to 10. The default value is 10. If the user does not enter the SMS authentication code within the specified time and does not apply for a new code, ZTNA server will disconnect the user.
Sender Name	Specify a message sender name to display in the message content. The length is 0 to 63 characters. **Notes:** Due to the limitation of UMS enterprise information platform, when the the

Option	Description
	 SMS gateway authentication is enabled, the sender name will be displayed on the name of the UMS enterprise information platform.
Verification Code Length	Specify the length of the SMS verification code. The value range is 4 to 8. The default value is 8.
SMS Temple	Specifies the SMS verification content. The input must contain " $ VRFYCODE" (This parameter is used to get the verification code). "$USERNAME" and "EXPIRATION" are optional. The value range is 9 to 500 characters.
Sign Name	If an ALIYUNSMS service provider name is specified for the **SMS Gateway Name** option, the sign name must be entered in this field and will be displayed in the message content. The range is 1 to 63 characters. This parameter should be the same with the sign name applied in the ALIYUNSMS.
Template Code	If an ALIYUNSMS service provider name is specified for the **SMS Gateway Name** option, the code of the SMS template must

Option	Description
	be entered in this field. The range is 1 to 30 characters. This parameter should be the same with the template code applied in the ALIYUNSMS.
Email Authentication	
Mail Server	Select an existing mail server from the drop-down list. Or, click **New** to create a mail server. For more information about the configuration of a mail server, see Mail Server.
Lifetime of Email Verification Code	Specify the lifetime of the Email verification code, in minutes. The value range is 1 to 10. The default value is 10. Each Email verification code has a period of validity. If the user neither types the verification code within the period nor applies for a new code, ZTNA server will disconnect the connection.
Sender Name	Specify a verification code sender name to display in the Email content. The range is 0 to 63 characters. In order to prevent the mail from being identified as spam, it's recommended that users configure the sender name.
Verification Code Length	Specify the length of the Email verification

Option	Description
	code. The value range is 4 to 8 . The default value is 8.
Email Verification Content	Specify the Email verification content. The input must contain " $ USERNAME" (This parameter is used to get the username) and " $ VRFYCODE" (This parameter is used to get the verification code). The length is 18 to 128 characters. The default content is "SCVPN user < $ USERNAME> email verification code: $ VRFYCODE. Do not reveal to anyone! If you did not request this, please ignore it.".
Multiple Gateways Address Config	
ZTNA supports configuration of multiple backup gateways for clients to select which to connect. When the ZTNA device is configured with backup gateways, ZTNA users can enable gateway detection on clients to select the connected ZTNA gateway.	
Name	Click **New** to add a backup gateway. Enter the gateway name. The range is 1 to 31 characters. Up to 24 backup gateways can be configured. The ZTNA configurations on the backup gateways need to be the same as those on the master ZTNA gateway.
Gateway Address	Specify the IPv4 address or domain name of

Option	Description
	the backup gateway. The range for a domain is 255 characters and the maximum length between the two periods (.) cannot exceed 63 characters.

2. Click **OK** to save the settings.

Secure Connect Client Management

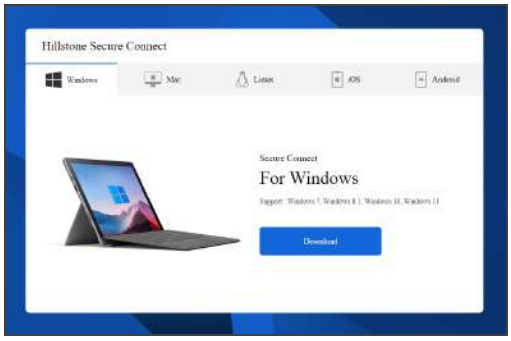
End users can download Secure Connect clients at the following addresses:

- Client download address on the device: https://IP-Address:Port-Number. The "IP-Address" and "Port-Number" refer to the IP address of the egress interface and HTTPS port number specified in the configuration of the SSL VPN or ZTNA instance.
- Client download address provided by Hillstone Networks Official Website https://www.hillstonenet.com/more/services/product-downloads/.

By default, the two addresses use the same download source, and the downloaded Secure Connect client is also the same.

Customizing Secure Connect Download Page

You can customize the title and background of the download address on the device. The default download page is shown as below:



To customize the Secure Connect download page, take the following steps:

1. Select **System > Secure Connect Client Management**.
2. In the "Configure Secure Connect Client Download Page" area, click **Upload Background Picture > Browse** to select the background picture. The picture needs to be PNG format. The recommended resolution is 1920px*1080px. The size cannot exceed 2MB.
3. Click **Upload** to upload the background picture to system. After uploading successfully, you will have completed the background picture modification.
4. Enter the title in the **Download Page Tittle** box to customize the title of the download page. The length is 1 to 63 characters.
5. Click **OK** to save the settings. Clicking **Cancel** will only affect the authentication page title modification.

If you want to restore the default picture, click **Restore Default Background** . Then click **OK**.

Customizing Client Download Source

By default, the client download source on the device is the same with that on Hillstone Networks Official Website. In the application scenario where you want end users to download and use specific Secure Connect clients, such as a client of the specified version or a customized client, you can import the client into the system to overwrite the default download source on the device. You can import Windows, macOS and Linux type clients.

To import the client, take the following steps:

1. Select **System > Secure Connect Client Management**.
2. In the "Secure Connect Client List" area, locate the type of client to be imported and click **Upload**.
3. In the "Upload Secure Connect Client for Windows/macOS/Linux" dialog box, click **Browse** and select the client file to be imported, and click **Upload**. The file name should be in the "xxx_version_check.exe/run/dmg/pkg" format. "xxx" indicates the file name; "version"indicates the client version, starting with the letter "v"; "exe" is the extension for Windows type client file; "run" is the extension for Linux type client file; "dmg" and "pkg" are the extensions for macOS type client file. The file size cannot exceed 100MB. An example is "secure-connect_v1.4.9.2000_1a6755fe.exe".
4. After uploading, the download source for this client will change from "Offical" to "Local" in the "Secure Connect Client List".
5. Click **Download** to check the downloaded client is the imported one.
6. Click **Delete** to delete the imported client. After the imported client is deleted, the download source will be resorted to "Official".

Managing Endpoint Items

Endpoint item management implements endpoint information collection configuration, script generation and delivery and persistent endpoint state monitoring. After a client logs in, the system will continuously monitor the endpoint state and update the attended endpoint tag and the granted resource access range, no matter whether the client accesses resources. The monitoring process is as follows:

1. The client periodically collects endpoint information based on the collection script and reports to the ZTNA server. By default, the client collects and reports collected endpoint information at the interval of 60 minutes. The interval can be modified as required via the **ztna-endpoint-information-monitor** command.

2. ZTNA server parses the received endpoint information and re-acquires the endpoint tag if the endpoint state changes. Then the endpoint tag attended to the authorized user will be updated, the ZTNA policy is re-matched and the resource access range granted to the user is updated as well. For existing sessions of this user, the system will process them based on the configuration of the **session-rematch** command.

Endpoint items include the predefined and custom ones. The predefined endpoint items are supported by the system by default and cannot be edited. You can add custom types to collect more endpoint items, so that ZTNA can obtain more endpoint information for better access control.

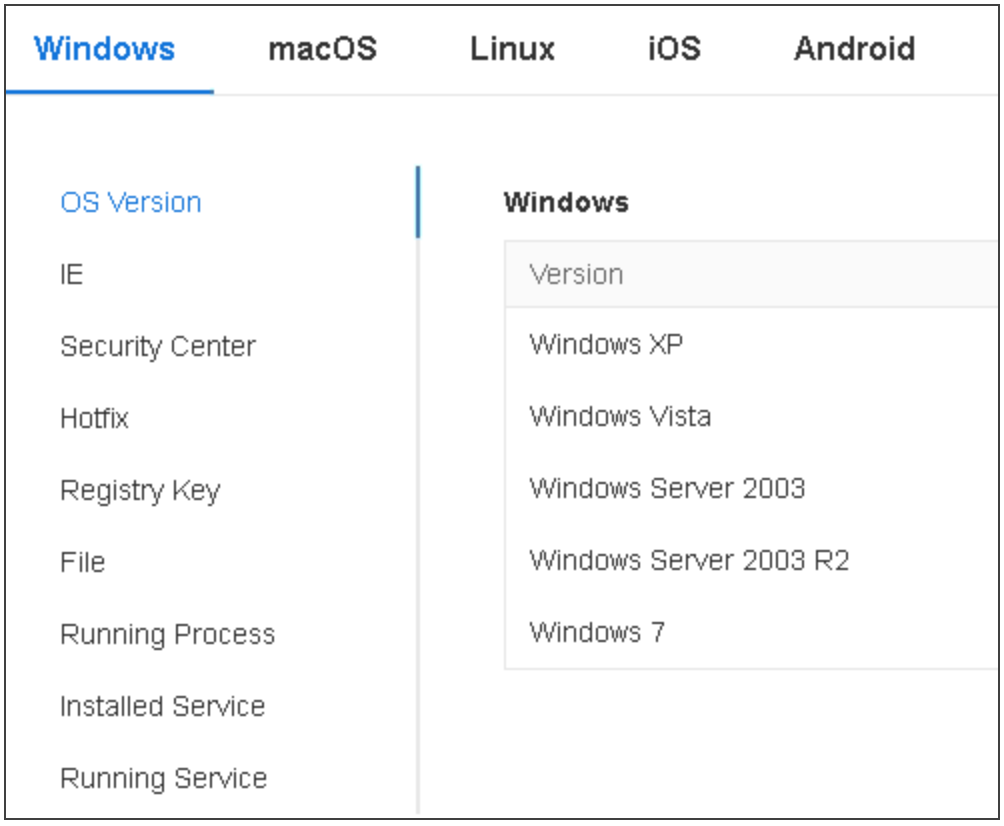
The system supports endpoint item management of the following operating systems:

- Windows endpoint item management
- macOS endpoint item management
- Linux endpoint item management
- iOS endpoint item management
- Android endpoint item management

Windows Endpoint Item Management

To manage Windows endpoint items, take the following steps

1. Select **ZTNA** > **Endpoint** > **Information** > **Windows**.



2. View the Window endpoint items that the system support to collect and configure custom items.

Windows Endpoint Items - Predefined

Option	Description
OS Version	Checks the OS version of the Windows endpoint. Click **OS Version** to view the Windows versions that the system supports to check, including:

Option	Description
	• Windows 7/8.1/10/11 • Windows server 2008 R2/2012/2012 R2/2016/2019/2022
IE	Checks the IE version and security level of the Windows endpoint. Click **IE** to view the IE versions and IE security levels that the system supports to collect: • IE Version: IE7 ~ IE11 • IE Security Level: custom define, low, medium low, medium, medium high, high
Security Center	Checks the system security of the Windows endpoint. Click **Security Center** to view the security items that the system supports to check: • Whether anti-spyware software is installed, enabled and updated. • Whether anti-virus software is installed, enabled and updated. • Whether firewall software is installed and enabled. • Whether windows-update is enabled.

Windows Endpoint Items - Custom

Option	Description
Hotfix	Checks whether the specified hot fix is installed in the Windows endpoint. You can add up to 5 hot fixes as Windows endpoint items. Click **Hotfix** and then **New** on the Hotfix page. Define hot fix information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the hot fix's alias. The length is 1 to 31 characters. • Hotfix: Specify the actual name of the hot fix. The length is 1 to 255 characters.
Registry Key	Checks whether the specified registry key exists in the Windows endpoint. You can add up to 5 registry keys as Windows endpoint items. Click **Registry Key** and then **New** on the Registry Key page. Define registry key information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the registry key's alias. The length is 1 to 31 characters. • Key: Specify the actual name of the registry key. The length is 1 to 255 characters.
File	Checks whether the specified file exists in the Windows endpoint. You can add up to 5 files as endpoint items. Click **File** and then **New** on the File page.

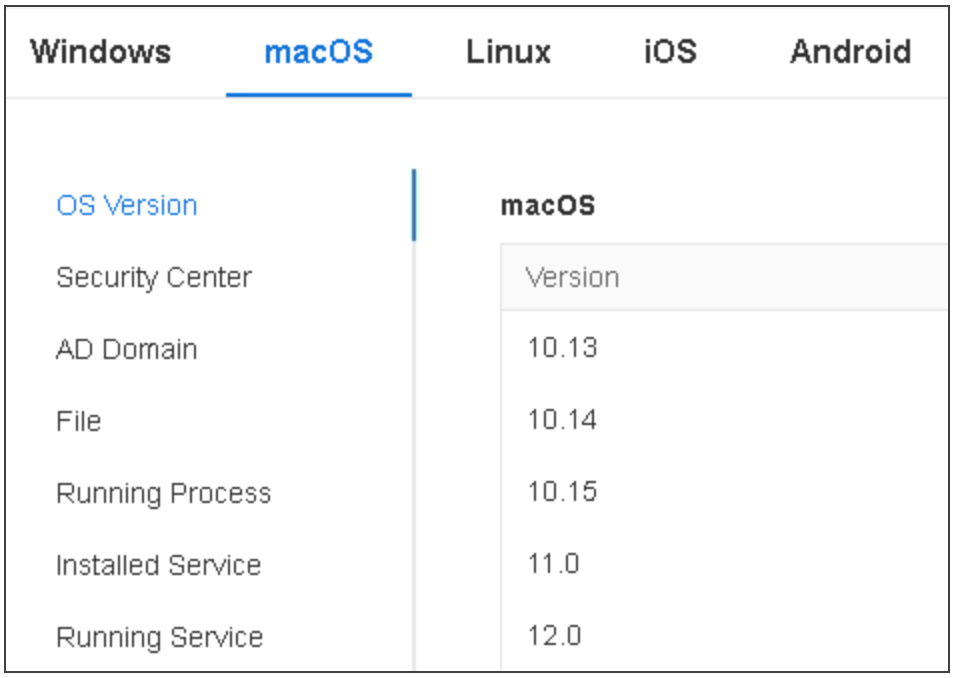
Option	Description
	Define file information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the file's alias. The length is 1 to 31 characters. • File Path: Specify the file's absolute path. The length is 1 to 255 characters.
Running Process	Checks whether the specified process is running in the Windows endpoint. You can add up to 5 running processes as Windows endpoint items. Click **Running Process** and then **New** on the Running Process page. Define process information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the process's alias. The length is 1 to 31 characters. • Running Process: Specify the actual name of the process. The length is 1 to 255 characters.
Installed Service	Checks whether the specified service is installed in the Windows endpoint. You can add up to 5 installed services as Windows endpoint items. Click **Installed Service** and then **New** on the Installed Service page. Define service information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the service's alias. The length is

Option	Description
	1 to 31 characters. • Installed Service: Specify the actual name of the service. The length is 1 to 255 characters.
Running Service	Checks whether the specified service is running in the Windows endpoint. You can add up to 5 running services as Windows endpoint items. Click **Running Service** and then **New** on the Running Service page. Define service information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the service's alias. The length is 1 to 31 characters. • Running Service: Specify the actual name of the service. The length is 1 to 255 characters.

macOS Endpoint Item Management

To manage macOS endpoint items, take the following steps

1. Select **ZTNA** > **Endpoint** > **Information** > **macOS**.



2. View the macOS endpoint items that the system support to collect and configure custom items.

macOS Endpoint Items - Predefined

Option	Description
OS Version	Checks the OS version of the macOS endpoint. Click **OS Version** to view the macOS versions that the system supports to check, including: • macOS High Sierra 10.13 • macOS Mojave 10.14 • macOS Catalina 10.15 • macOS Big Sur 11

Option	Description
	• macOS Monterey 12 • macOS Ventura 13
Security Center	Checks the system security of the macOS endpoint. Click **Security Center** to view the security items that the system supports to check, that is, whether FileVault is enabled.

macOS Endpoint Items - Custom

Option	Description
AD Domain	Checks the AD domain name of the macOS endpoint. You can add one AD domain name as the macOS endpoint item. Click **AD Domain** and then **New** on the AD Domain page. Define AD Domain information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the AD domain name's alias. The length is 1 to 31 characters. • AD Domain: Specify the AD domain name. The length is 1 to 255 characters.
File	Checks whether the specified file exists in the macOS endpoint. You can add up to 5 files as macOS endpoint items. Click **File** and then **New** on the File page. Define file information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the file's alias. The length is 1 to 31 characters. • File Path: Specify the file's absolute path. The length is 1 to 255 characters.
Running Process	Checks whether the specified process is running in the macOS endpoint. You can add up to 5 running processes as macOS endpoint items. Click **Running**

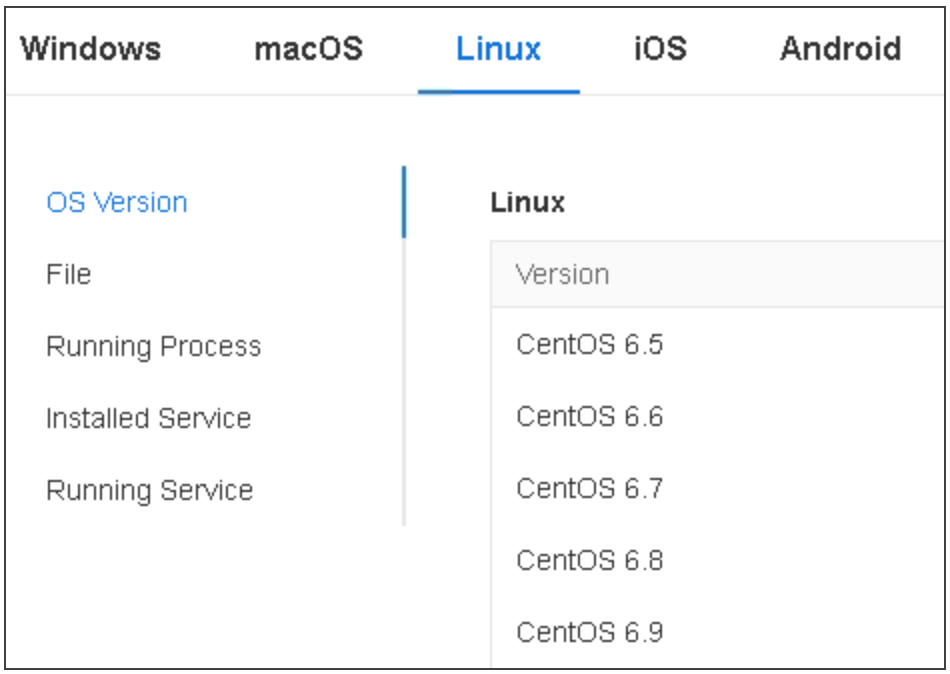
Option	Description
	Process and then **New** on the Running Process page. Define process information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the process's alias. The length is 1 to 31 characters. • Running Process: Specify the actual name of the process. The length is 1 to 255 characters.
Installed Service	Checks whether the specified service is installed in the macOS endpoint. You can add up to 5 installed services as macOS endpoint items. Click **Installed Service** and then **New** on the Installed Service page. Define service information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the service's alias. The length is 1 to 31 characters. • Installed Service: Specify the actual name of the service. The length is 1 to 255 characters.
Running Service	Checks whether the specified service is running in the macOS endpoint. You can add up to 5 running services as macOS endpoint items. Click **Running Service** and then **New** on the Running Service page. Define service information that needs to be collected and then click **OK** to save the configuration.

Option	Description
	• Alias: Specify the service's alias. The length is 1 to 31 characters. • Running Service: Specify the actual name of the service. The length is 1 to 255 characters.

Linux Endpoint Item Management

To manage Linux endpoint items, take the following steps

1. Select **ZTNA** > **Endpoint** > **Information** > **Linux**.



2. View the Linux endpoint items that the system support to collect and configure custom items.

Linux Endpoint Items - Predefined

Option	Description
OS Version	Checks the OS version of the Linux endpoint. Click **OS Version** to view the Linux versions that the system supports to check, including: • CentOS 7.6/7.7/7.8/7.9/8.0/8.1/8.2/8.3/8.4/8.5 • Ubuntu 18.04/18.10/19.04/19.10/20.04/20.10/21.04 • Ubuntu Kylin 18.04/20.04

Linux Endpoint Items - Custom

Option	Description
File	Checks whether the specified file exists in the Linux endpoint. You can add up to 5 files as Linux endpoint items. Click **File** and then **New** on the File page. Define file information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the file's alias. The length is 1 to 31 characters. • File Path: Specify the file's absolute path. The length is 1 to 255 characters.
Running Process	Checks whether the specified process is running in the Linux endpoint. You can add up to 5 running processes as Linux endpoint items. Click **Running Process** and then **New** on the Running Process page. Define process information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the process's alias. The length is 1 to 31 characters. • Running Process: Specify the actual name of the process. The length is 1 to 255 characters.
Installed Service	Checks whether the specified service is installed in the Linux endpoint. You can add up to 5 installed services as Linux endpoint items. Click **Installed Service**

Option	Description
	and then **New** on the Installed Service page. Define service information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the service's alias. The length is 1 to 31 characters. • Installed Service: Specify the actual name of the service. The length is 1 to 255 characters.
Running Service	Checks whether the specified service is running in the Linux endpoint. You can add up to 5 running services as Linux endpoint items. Click **Running Service** and then **New** on the Running Service page. Define service information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the service's alias. The length is 1 to 31 characters. • Running Service: Specify the actual name of the service. The length is 1 to 255 characters.

iOS Endpoint Item Management

To manage iOS endpoint items, take the following steps

1. Select **ZTNA** > **Endpoint** > **Information** > **iOS**.

2. View the iOS endpoint items that the system support to collect and configure custom items.

iOS Endpoint Items - Predefined

Option	Description
OS Version	Checks the OS version of the iOS endpoint. Click **OS Version** to view the iOS versions that the system supports to check, including iOS 12/13/14/15/16.

iOS Endpoint Items - Custom

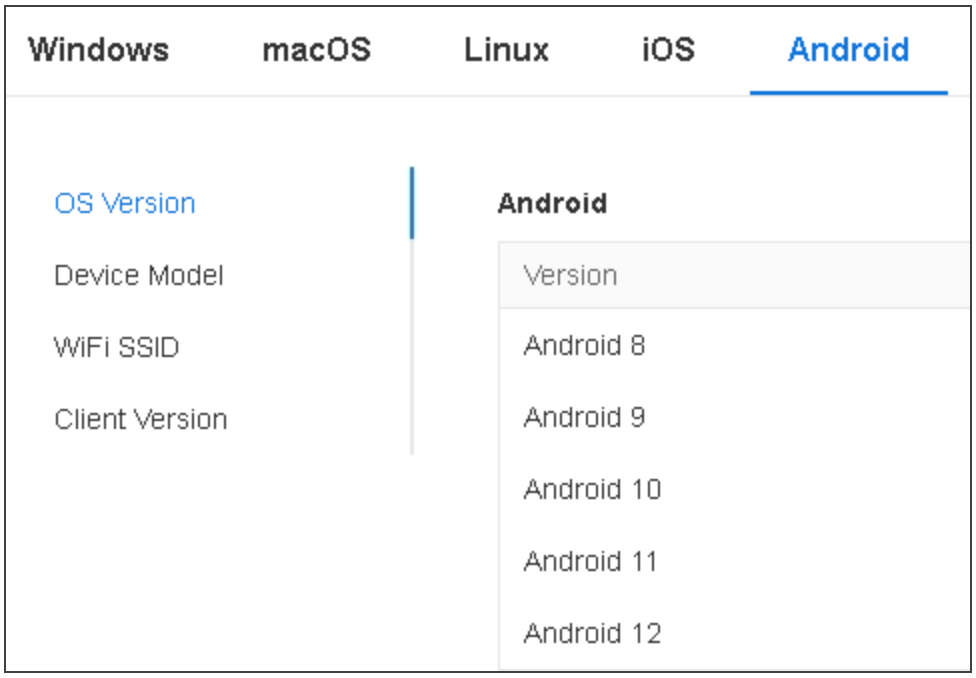
Option	Description
Device Model	Checks the device model of the iOS endpoint. You can add up to 5 device model numbers as iOS endpoint items. Click **Device Model** and then **New** on the Device Model page. Define device model information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the iOS device model's alias. The length is 1 to 31 characters. • Device Model: Specify the iOS device model number. The length is 1 to 255 characters.
WiFi SSID	Checks the connected WiFi SSID of the iOS endpoint. You can add up to 5 WiFi SSIDs as iOS endpoint items. Click **WiFi SSID** and then **New** on the WiFi SSID page. Define WiFi SSID information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the WiFi SSID's alias. The length is 1 to 31 characters. • WiFi SSID: Specify the WiFi SSID. The length is 1 to 255 characters.
Client Version	Checks the ZTNA client version of the iOS endpoint. You can add up to 5 ZTNA client versions as iOS endpoint items. Click **Client Version** and then

Option	Description
	New on the Client Version page. Define ZTNA client Version information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the client version's alias. The length is 1 to 31 characters. • Client Version: Specify the client version. The length is 1 to 255 characters.

Android Endpoint Item Management

To manage Android endpoint items, take the following steps

1. Select **ZTNA** > **Endpoint** > **Information** > **Android**.



2. View the Android endpoint items that the system support to collect and configure custom items.

Android Endpoint Items - Predefined

Option	Description
OS Version	Checks the OS version of the Android endpoint. Click **OS Version** to view the Android versions that the system supports to check, including Android 8/9/10/11/12/13.

Android Endpoint Items - Custom

Option	Description
Device Model	Checks the device model of the Android endpoint. You can add up to 5 device model numbers as Android endpoint items. Click **Device Model** and then **New** on the Device Model page. Define device model information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the Android device model's alias. The length is 1 to 31 characters. • Device Model: Specify the Android device model number. The length is 1 to 255 characters.
WiFi SSID	Checks the connected WiFi SSID of the Android endpoint. You can add up to 5 WiFi SSIDs as Android endpoint items. Click **WiFi SSID** and then **New** on the WiFi SSID page. Define WiFi SSID information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the WiFi SSID's alias. The length is 1 to 31 characters. • WiFi SSID: Specify the WiFi SSID. The length is 1 to 255 characters.
Client Version	Checks the ZTNA client version of the Android end-

Option	Description
	point. You can add up to 5 ZTNA client versions as Android endpoint items. Click **Client Version** and then **New** on the Client Version page. Define ZTNA client Version information that needs to be collected and then click **OK** to save the configuration. • Alias: Specify the client version's alias. The length is 1 to 31 characters. • Client Version: Specify the client version. The length is 1 to 255 characters.

Configuring Endpoint Tags

Endpoint tag identifies user endpoint information. The system attends an endpoint tag to a user based on user endpoint information carried in user traffic. The user carrying a particular endpoint tag will be granted access to specific resources only. In this way, ZTNA implements check and control of user access privilege.

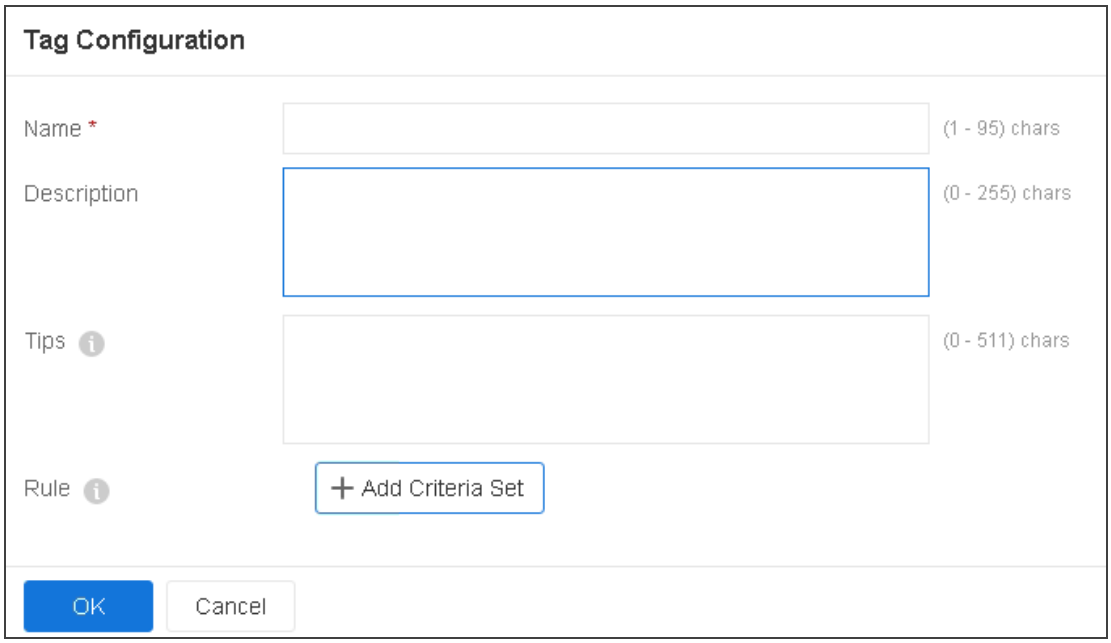
An endpoint tag is composed of one or multiple criteria sets, and a criteria set is composed of one or multiple conditions. Each endpoint tag contains at most 16 criteria sets and 16 conditions. The system supports up to 1024 endpoint tags and up to 128 endpoint tags for each VSYS.

- The logical relationship between criteria sets is Or. When a user's endpoint information matches any criteria set contained in an endpoint tag, the endpoint tag is considered to be matched.
- The logical relationship between the conditions contained in a criteria set is And. When a user's endpoint information matches all conditions contained in a criteria set, the criteria set is considered to be matched.

To configure an endpoint tag, take the following steps:

1. Select **ZTNA** > **Endpoint** > **Tag**.

2. Click **New**.



In the Tag Configuration tab, configure the corresponding options.

Option	Description
Name	Type the name of the endpoint tag. The length is 1 to 95 characters.
Description	Type description for the endpoint tag. The length is 1 to 255 characters.
Tips	Type the tip to be displayed on ZTNA Portal. The range is 0 to 511 characters. For application resources that an end user is not allowed to access because the endpoint device does not match an endpoint tag, configure a tip to let the end user know the reason and update the endpoint device to obtain the access privilege. URL addresses are supported in a tip. When it is displayed on the ZTNA

Option	Description
	portal, it will be presented as a hyperlink. By default, the tip for each endpoint tag is "Access Failed Contact your administrator". When a ZTNA policy binds multiple endpoint tags configured with tips: • If an end user matches any of the endpoint tags and is granted access to the application resource, no tip will be displayed for the corresponding application resource on the ZTNA portal. • If an end user is not granted access to the application resource because no endpoint tag is matched, all tips will be displayed for the corresponding application resource on the ZTNA portal. If all bound endpoint tags are not configured with tips, the default tip will be displayed.
Rule	Specify the criteria set and conditions. Each endpoint can contain up to 16 criteria sets and 16 conditions.
Add Criteria Set	Click **Add Criteria Set** to configure a criteria set and contained conditions for the endpoint tag. You can click the button to add more criteria sets.
Operating System	Select the operating system type. Currently, only windows is supported.
Endpoint Type	Select the endpoint item name, including all supported predefined and custom endpoint items. Then, select the operator and value. You can click **New** to add more conditions;

Option	Description
	click **Delete** to delete a selected condition.

3. Click **OK** to save the configuration.

4. On the Tag page, you can view the configuration information of all endpoint tags and the number of times an endpoint tag is referenced by a ZTNA policy.

5. By clicking the value in the "References" column, you can view the ZTNA policies that are bound to this endpoint tag.

6. By clicking the ZTNA policy ID, you can view ZTNA policy configuration details.

Configuring Application Resource/Application Resource Group

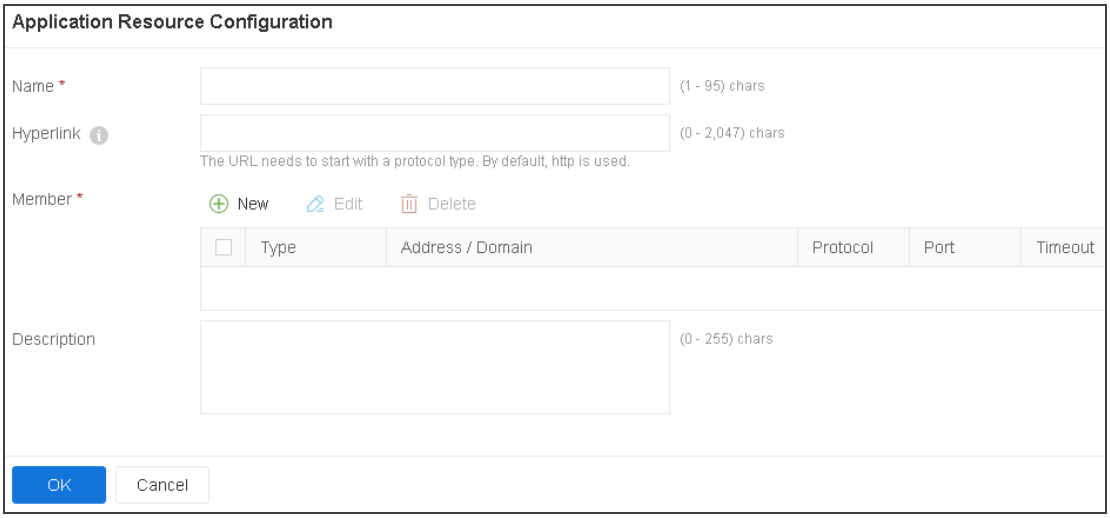
Application resource refers to the applications, contents, services, etc. that users want to access. You need to configure the address, protocol, port number and others to define an application resource entry. Each application resource can contain up to 16 application resource entries. Application resource group is a group of up to 16 application resources. The system supports a maximum of 256 application resources and 64 application resource groups.

The system supports the following ways to define an application resource entry:

- Based on IP address, protocol and port number
- Based on IP range, protocol and port number
- Based on domain name, protocol and port number

To configure an application resource, take the following steps:

1. Select **Object** > **Application Resource Book** > **Application Resource**. Or select **ZTNA** > **Application Resource Book** > **Application Resource**.
2. Click **New**.



In the Application Resource Configuration tab, configure the corresponding options.

Option	Description
Name	Type the name of the application resource. The length is 1 to 95 characters.
Hyperlink	Type the hyperlink of the application resource. The length is 0 to 2047 characters. On the ZTNA portal displayed after a user logs in, the user can copy the hyperlink to access an application resource in a browser if the application resource is configured with an hyperlink; or, the user can directly click the application resource icon to access it (make sure the link work). An application resource without a hyperlink configured will not be displayed on the ZTNA portal. If the specified hyperlink does not contain the protocol type, the default HTTP protocol will be used.
Member	Click **New** to add a resource entry and configure the options. Each application resource can contain up to 16 entries.

Option	Description
	• Type: Specify the address type of the resource entry, including IPv4/Netmask, IPv6/Prefix, IPv4 Range and IPv6 Range and Domain. • Address: Specify the IP address or IP range of the resource entry. • Protocol: Specify the protocol type of the resource entry. TCP and UDP are supported for application resources defined based on IP address. HTTP and HTTPS are supported for application resources defined based on domain name. • Port: Specify the port number of the resource entry. The value ranges from 1 to 65535. • Timeout: Specify the timeout value in seconds or days. The value range is 1 to 65535 when it is expressed in seconds and 1 to 1000 when in days. The default value is 1800s when the protocol is TCP, HTTP or HTTPS, and 60s when UDP.
Description	Specify description for the application resource. The length is 0 to 255 characters.

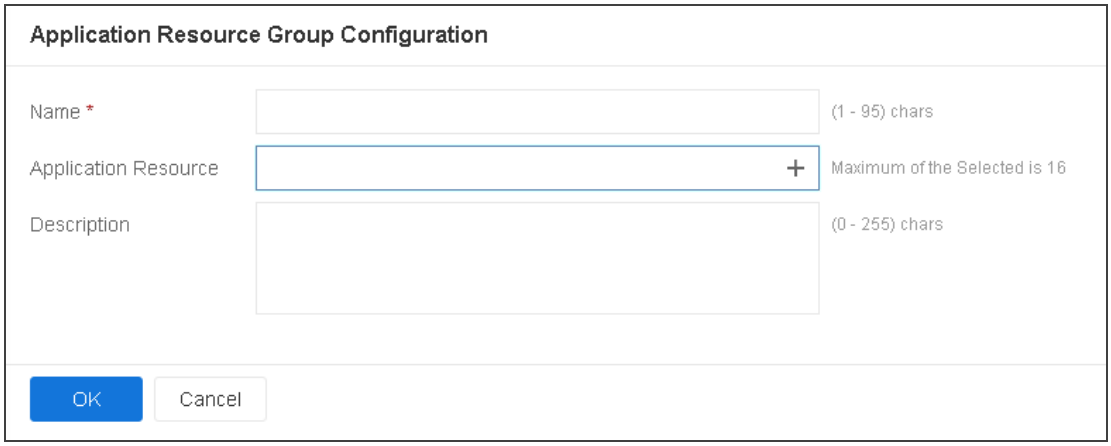
3. Click **OK** to save the configuration.

4. On the Application Resource page, by clicking the "+" button in the list to unfold an application resource, you can view more details about it, including the group it belongs to and the ZTNA policy ID that is bound to it.

To configure an application resource group, take the following steps:

1. Select **Object** > **Application Resource Book** > **Application Resource Group**. Or select **ZTNA** > **Application Resource Book** > **Application Resource Group**.

2. Click **New**.



In the Application Resource Group Configuration tab, configure the corresponding options.

Option	Description
Name	Type the name of the application resource group. The length is 1 to 95 characters.
Application Resource	Select existing application resources. Or, click **New** to create an application resource. You can add up to 16 application resources.
Description	Type description for the application resource group. The length is 0 to 255 characters.

3. Click **OK** to save the configuration.

4. On the Application Resource Group page, by clicking the "+" button to unfold an application resource group, you can view more details about it, including the ZTNA policy ID that is bound to it.

Configuring ZTNA Policy

ZTNA grants access to users based on ZTNA policies. The system supports up to 2000 ZTNA policies. A ZTNA policy functions based on the matching condition and action. It supports the following dimensions as matching conditions:

- User/User group: When a user/user group matches the one configured in the ZTNA policy, this user/user group is considered to meet the matching condition.
- Endpoint tag: When the endpoint tag carried with an authenticated user matches the one configured in the ZTNA policy, this endpoint tag is considered to meet the matching condition.
- Application resource/Application resource group: When a requested application resource/application resource group matches the one configured in the ZTNA policy, this application resource/application resource group is considered to meet the matching condition.
- Schedule: When the user access time matches the one configured in the ZTNA policy, the access time is considered to meet the matching condition.

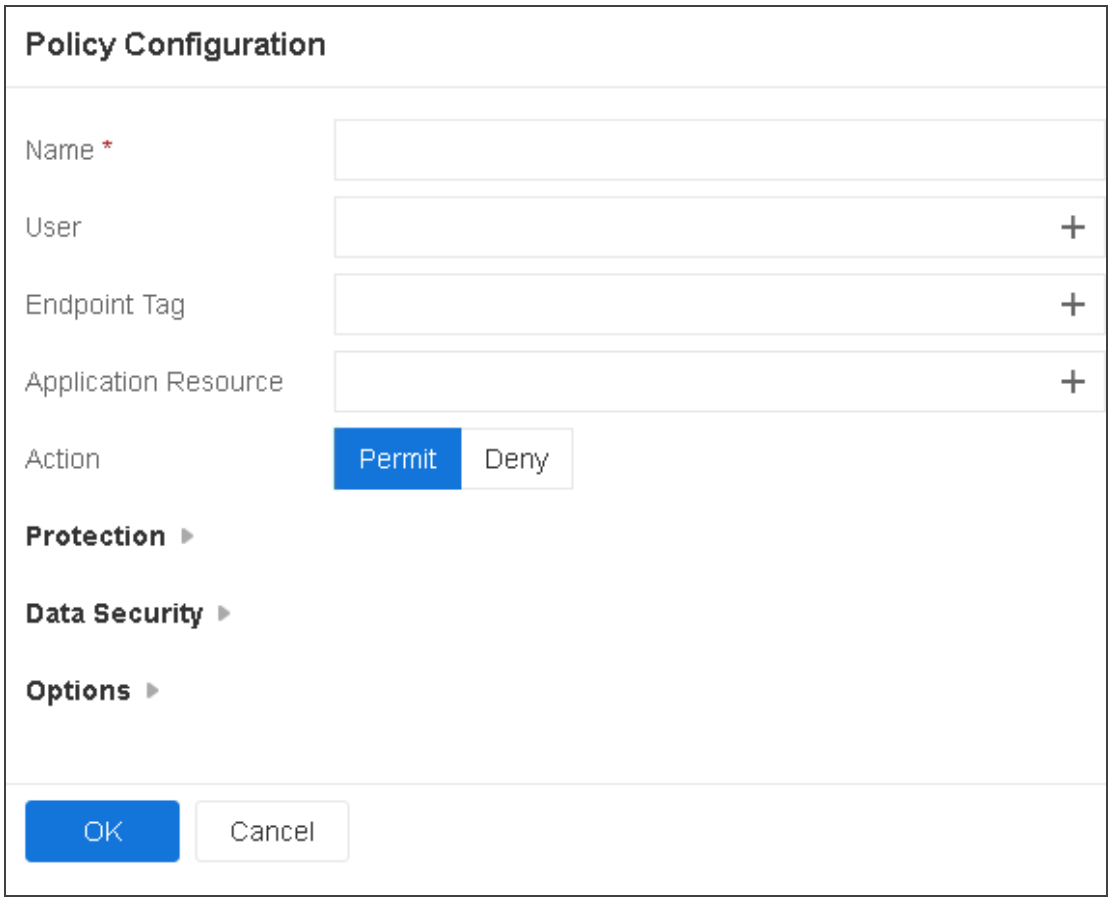
ZTNA policy can be configured with one or multiple matching conditions. For a ZTNA policy configured with multiple matching conditions, the policy is considered to be hit and the traffic will be processed based on the action specified in the policy only when all matching conditions are met. When a matching condition is not configured in a ZTNA policy, all objects are considered to meet this matching condition. The policy action includes two types (at least one must be configured):

- permit: User traffic hitting a specified ZTNA policy will be granted access to resources configured in the policy.
- deny: User traffic hitting a specified ZTNA policy will be denied access to resources configured in the policy.

User traffic that does not hit any ZTNA policies will hit the ZTNA default policy and be processed based on the default action.

To configure a ZTNA policy, take the following steps:

1. Select **ZTNA** > **Policy**.
2. Click **New**.



In the Policy Configuration tab, configure the corresponding options.

Option	Description
Name	Type the name of the ZTNA policy. The length is 1 to 95 characters.
User	Select the user/user group to be bound. • AAA Server: Specifies the AAA server that a user-/user group belongs to. Select an existing AAA

Option	Description
	server from the drop-down list. Or, click **New** to create a AAA server. For information about AAA server configuration, refer to Configuring AAA. • Select User/Select User Group: Select existing users/user groups. Or, click **New** to create a user/user group. • Input User/User Group: Type the user name/user group name, and then click **Add**. The user name length is 1 to 63 characters. The user group name length is 1 to 127 characters. At most 8 users and 8 user groups can be added.
Endpoint Tag	Select the endpoint tags to be bound. You can select from existing endpoint tags. Or, click **New** to create one. For information about endpoint tag configurations, see Configuring Endpoint Tags. Each policy can be bound with 10 endpoint tags.
Application Resource	Select the application resources/application resource groups to be bound. You can select from existing application resources and application resource groups. Or, click **New** to create one. For information about application resource/application resource group configurations, see Configuring Application Resource/Application Resource Group. Each policy can be bound with 10 application resources and 10 application resource groups.

Option	Description
Action	Select the action to be performed on user traffic hitting the policy, i.e. permitting or denying access to the bound application resources.

Click Threat Prevention to add threat prevention configurations

Option	Description
Anti-Virus	When the system is installed with the anti-virus license, click to enable the anti-virus function and bind an anti-virus profile to a ZTNA policy to achieve virus detection on traffic matching the ZTNA policy and process the detected viruses based on the Anti-Virus Profile. For information about file filter, please refer to Anti Virus.
Sandbox	When the system is installed with the sandbox license, click to enable the sandbox function and bind a sandbox profiles to a ZTNA policy to achieve sandbox detection on traffic matching the ZTNA policy. By using the cloud sandbox and the local sandbox technology, the system analyzes the suspicious file and collects the actions of the suspicious file, verifies the legality of the file, gives the analysis result to the system and deals with the malicious file based on the actions set by system. For information about file filter, please refer to Sandbox.
IPS	When the system is installed with the IPS license, click to enable the IPS function and bind an IPS profile to a ZTNA policy to detect network attacks in traffic matching the ZTNA policy and perform actions such as blocking on the attacks

Option	Description
	based on the IPS Profile. For information about file filter, please refer to Intrusion Prevention System.

Click Data Security to add data security configurations

Option	Description
File Filter	Click to enable the file filter function and bind a file filter profile to the ZTNA policy so as to perform file detection on traffic matching the ZTNA policy and perform control actions on the file matching the filter conditions based on the file filter profile. For information about file filter, please refer to File Filter.
File Content Filter	Click to enable the file content filter function and bind a file content filter profile to the ZTNA policy so as to perform file content detection on traffic matching the ZTNA policy and perform control actions such as blocking or logging based on the file content filter profile. For information about file filter, please refer to File Content Filter.

Click Options to configure advanced policy configurations.

Option	Description
Schedule	Specify the schedules to be matched. You can select from existing ones. Or, click **New** to create a schedule. For information about schedule configurations, see Creating a Schedule. Each policy can be configured with up to 10 schedules.

Option	Description
Log	You can log ZTNA policy matching in the system logs as required. Multiple options are available. • Deny: Generates logs when the traffic matching the policy is denied. • Session start: Generates logs when the traffic matching the policy starts its session. • Session end: Generates logs when the traffic matching the policy ends its session.
Position	Select a policy position from the **Position** drop-down list. Each ZTNA policy is labeled with a unique ID or name. When ZTNA traffic flows into a device, the device will query for the policy rules by turn, and processes the traffic according to the first matched rule. However, the policy ID is not related to the matching sequence during the query. The sequence displayed in ZTNA policy list is the query sequence for policy rules. The rule position can be an absolute position, i.e., at the top or bottom, or a relative position, i.e., before or after an ID or a name. The default position is the bottom.
Description	Type description for the policy. The length is 0 to 255 characters.

3. Click **OK** to save the configuration.

4. On the Policy page, you can view the configuration information of all policies and manage policy configurations.

Manage policy configurations on the Policy page

Option	Description
Filter	Select filter conditions from the drop-down list. The policy table will display the policies matching the filter conditions.
Edit	Select a policy and click **Edit** to change the policy configuration.
Delete	Select a policy and click **Delete** to delete the selected policy.
Copy, Paste	Select a policy, click **Copy** and then **Paste**. Select the position from the drop-down list to add a policy with the same configuration and place it at the specified position.
Move	Select a policy, click **Move** and select the position from the drop-down list to change the policy position.

Click " ¦ " and select an option.

Option	Description
Enable	Select a disabled policy and click **Enable** to enable it.
Disable	Select an enabled policy and click **Disable** to disable it.
Default Policy Action	Specify the action to be performed on user traffic that does not hit any ZTNA policies. Select this option. Then, in the displayed dialog box, you can view default policy statistics and configure the following options:

Option	Description
	• Default Action: Permit or deny access. • Log: Click this button to enable logging of traffic hitting the default policy.
Clearing Policy Hit Count	Select this option. In the displayed dialog box, you can clear corresponding policy statistics by selecting "All Policies", "Default Policy" or specifying the policy ID or name.

Configuring an Address Pool

The servers allocate the IPs in the address pools to the clients. After the client connects to the server successfully, the server will fetch an IP address along with other related parameters (e.g., DNS server address, and WIN server address) from the address pool and then allocate the IP and parameters to the client.

You can create an IP binding rule to meet the fixed IP requirement. The IP binding rule includes the IP-user binding rule and the IP-role binding rule. The IP-user binding rule binds the client to a fixed IP in the configured address pool. When the client connects to the server successfully, the server will allocate the binding IP to the client. The IP-role binding rule binds the role to an IP range in the configured address pool. When the client connects to the server successfully, the server will select an IP from the IP range and allocate the IP to the client.

After the client successfully connects to the server, the server will check the binding rules in a certain order to determine which IP to allocate. The order is shown as below:

- Check whether the IP-user binding rule is configured for the client. If yes, allocate the bound IP to the client; if no, the server will select an IP which is not bound or used from the address pool, then allocate it to the client.

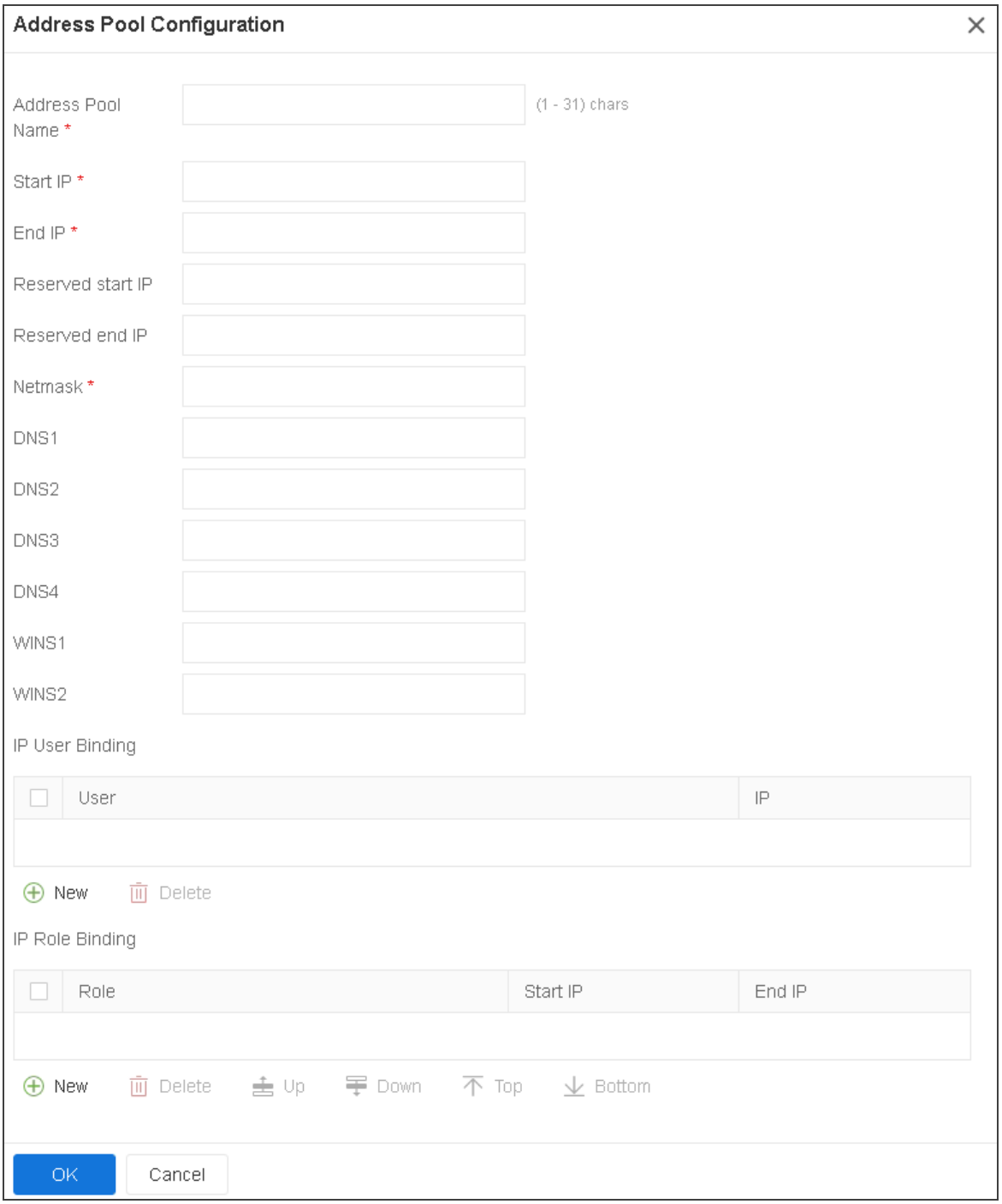
- Check whether the IP-role binding rule is configured for the client. If yes, get an IP from the IP range and allocate to the client; if no, the server will select an IP which is not bound or used from the address pool, then allocate it to the client.

Notes: IP addresses in the IP-user binding rule and the IP address in the IP-role binding rules should not overlap.

To configure an address pool, take the following steps:

1. Select **Object > Access Address Pool**.
2. Select the **IPv4** or **IPv6** tab, this option can only be configured in the IPv6 version.

3. Click **New**.



In the Access Address Pool Configuration tab, configure the following options.

Option	Description
Access Address Pool Name	Specifies the name of the address pool.
Start IP	Specifies the start IP of the address pool.
End IP	Specifies the end IP of the address pool.
Reserved start IP	Specifies the reserved start IP of the address pool.
Reserved end IP	Specifies the reserved end IP of the address pool.
Netmask	Specifies the netmask in the dotted decimal format.
Prefix Length	Specifies the prefix for this IPv6 address range. The range is 111 to 128.
DNS1/2/3/4	Specifies the DNS server IP address for the address pool. It is optional. 4 DNS servers can be configured for one address pool at most.
WINS1/2	Specifies the WIN server IP addresses for the address pool. It is optional. Up to 2 WIN servers can be configured for one address pool. This option can only be configured when the created IPv4 address pool.

In the IP User Binding tab, configure the corresponding options.

Option	Description
User	Type the user name into the **User** box.

IP	Type the IP address into the **IP** box.
New	Click **New** to add an IP user binding rule.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.

In the IP Role Binding tab, configure the corresponding options.

Option	Description
Role	Type the role name into the **Role** box.
Start IP	Type the start IP address into the **Start IP** box.
End IP	Type the end IP address into the **End IP** box.
New	Click **New**to add an IP role binding rule.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.
Up/Down/Top/Bottom	System will query IP role binding rules by turn, and allocate the IP address according to the first matched rule. You can move the location up or down at your own choice to adjust the matching sequence accordingly.

4. Click **OK** to save the settings.

When a user name is binding with multiple roles corresponding to IP role binding rules, the system will query IP role binding rules by turn, and allocate the IP address according to the first matched rule. To adjust the sequence of IP role binding rules, in the Access Address Pool page, select an address pool and click **Move IP-Role Binding**. In the **Move IP-Role Binding** dialog box, select the role to be adjusted and then click **Up/Down/Top/Bottom**.

Configuring Single Packet Authorization (SPA)

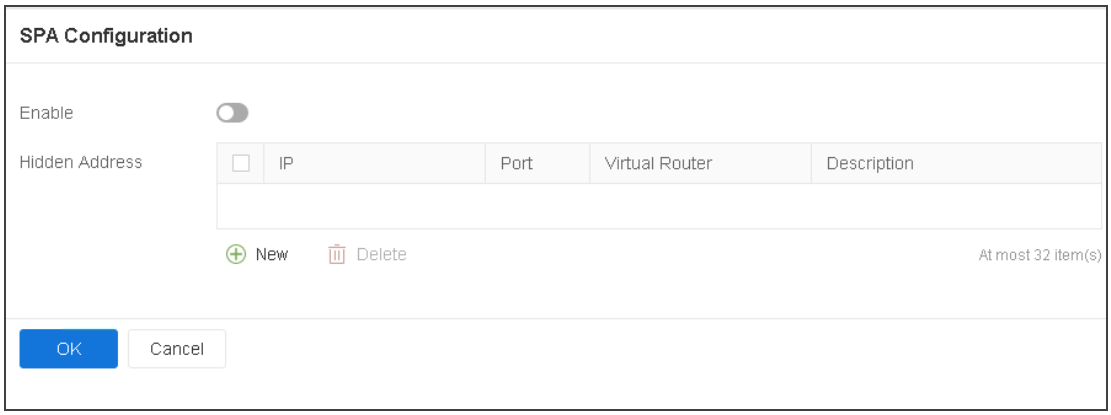
Single Packet Authorization (SPA) is a universal access technology concept. Its main purpose is to hide the host's port number and therefore the service running on it will be hidden. The system will open the port only for packets carrying expected information.

The ZTNA device supports enabling the SPA function and hiding the ZTNA service IP address and port number. ZTNA client also needs to enable the SPA function and pass the authorization before establishing a connection to the device. After SPA is configured, the SPA process for ZTNA users logging in through the client is as follows:

1. ZTNA client sends knock packets to ZTNA device with the knock port number being the destination port number.
2. ZTNA device checks the destination IP address of the knock packets. If the destination IP address is not a configured hidden IP address, it will be discarded. If it is a configured hidden IP address, ZTNA device will verify it and generate a permit entry with the destination IP address, destination port number and source IP address.
3. ZTNA client sends a connection request.
4. ZTNA device checks the requested IP address and port number. If they are hidden IP address and port number, ZTNA device will search for the matched permit entry. If a matched permit entry is found, the connection request is accepted. Otherwise, the request will be discarded.

To configure SPA for ZTNA, take the following steps:

1. Select **ZTNA** > **SPA** > **SPA Configuration**.



Configure the options

Option	Description
Enable	Click to enable the SPA function. By default, it is disabled.
Port	Specifies the local knock port where the ZTNA device listens for knock packets. The range is 1025 to 65535. The default knock port is 60001.
Hidden Address	Click **New** to add the hidden addresses. • IP: Specifies the IPv4 address to be hidden, i.e. the IPv4 address of the egress interface configured in Interface. • Port: Specifies the port number to be hidden, i.e. the service port configured in Interface. The range is 1 to 65535. • Virtual Router: Specifies the virtual router that the interface of the hidden IP address belongs to.

Option	Description
	• Description: Specifies the description. The range is 0 to 63 characters.

2. Click **OK** to save the configuration.

To view the SPA permit entries that the ZTNA device generates, select **ZTNA** > **SPA** > **SPA List**.

- Client IP: indicates the source IP address of the client.
- Service IP: indicates the hidden IP address, which is also the destination IP address.
- Virtual Router: indicates the virtual router that the interface of the hidden IP address belongs to.
- Port: indicates the hidden port number, which is also the destination port number.
- Life time (seconds): indicates the lifetime of the permit entry. After the lifetime elapses, the permit entry will be deleted.

ZTNA Portal

After a ZTNA user logs in, the user terminal will be prompted with the ZTNA portal page via the default browser, displaying the applications resources to which the user is granted access and not granted access.

- When the user's authentication information and endpoint tag match the ZTNA policy whose action is Permit, the user is granted access to the application resources bound with this policy.
- When the user's authentication information matches teh ZTNA policy but the endpoint tag does not match the ZTNA policy, the user is not granted access to the application resource bound with this policy.

For an application resource to which a user is granted access, the user can click the application resource icon on the ZTNA Portal page to switch to the desired URL address. Or, the user can copy the URL address to a browser to access the application resource. For an application resource to which a user is not granted access, the user can view the reason.

The ZTNA portal page does not display the following application resources:

- Application resources that the user is not allowed to access
- Application resources that the user is allowed to access, but no hyperlink is specified when the application resource is defined

After the ZTNA Portal page is closed, the user can select "Application Resource List" from the ZTNA client menu to obtain the ZTNA Portal page again.

Monitor

Select **ZTNA** > **Monitor** > **Summary** to enter the ZTNA monitor page.

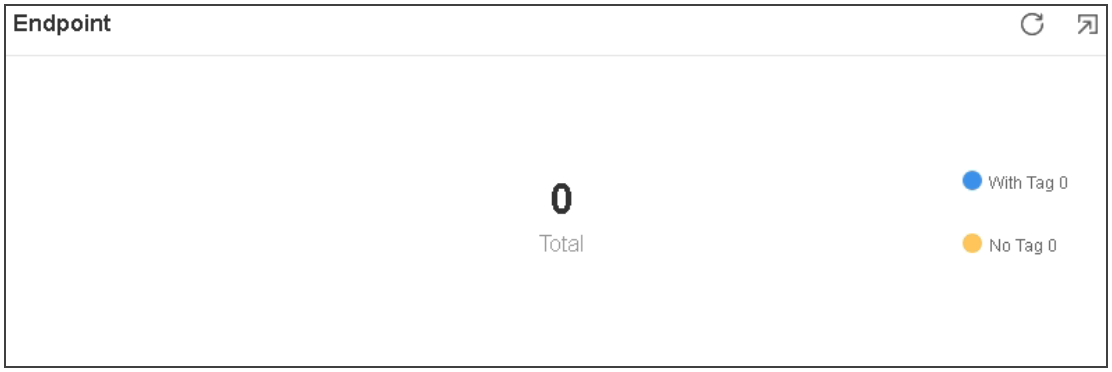
ZTNA License Usage

Click the refresh icon to obtain real-time ZTNA license usage.

- In the root VSYS mode, you can view the total ZTNA capacity, the number of used ZTNA licenses and the number of available ZTNA licenses. The number of used ZNTA licenses include all that are used by ZTNA and SCVPN users.
- In the non-root VSYS mode, you can view the total number of ZTNA licenses that can be shared by all VSYS and the total number of ZTNA licenses that are used by all VSYS.

Online Endpoint Statistics

After a ZTNA user logs in, the system will collect user endpoint information periodically and generate endpoint tags for the user based on endpoint tag criteria. A user endpoint can hit multiple or zero endpoint tags. The number of online endpoints include both the endpoints hitting one or more endpoint tags and the endpoints that do not hit any endpoint tags.



Click the refresh icon to obtain real-time statistics of online endpoints.

Endpoint Hit Top 10

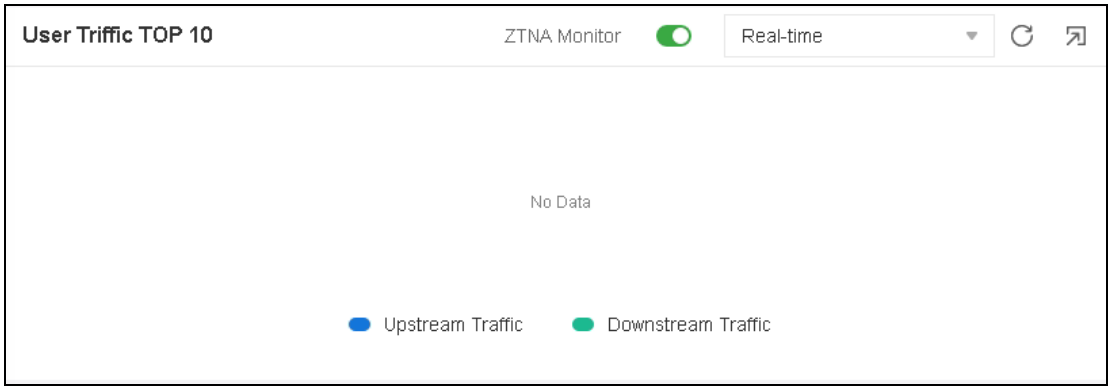
An endpoint tag can be hit multiple times or is not hit. Endpoint Hit Top 10 displays the names of the endpoint tags with top 10 hit counts in descending order since system startup.

Click the refresh icon to obtain real-time ranking of top 10 endpoint tag hits.

User Traffic Top 10

User traffic refers to data interaction generated with application resource access, including the total traffic, upstream traffic and downstream traffic. To view user traffic top 10 statistics, make sure the ZTNA monitor function is enabled.

You can view top 10 real-time ZTNA user traffic statistics as well as the ranking for the latest 1 hour, 1 day and 1 month.



Click **Upstream Traffic** or **Downstream Traffic**. When the Upstream Traffic icon turns gray, you can view the top 10 downstream traffic users. When the Downstream Traffic icon turns gray, you can view the top 10 upstream traffic users. By default, the ranking for the total traffic users is displayed.

Click the refresh icon to obtain real-time ranking.

Note: This function relies on the statistics set configuration of the monitor function. To view ZTNA user traffic top 10, make sure "User monitor" is enabled and the "Bandwidth" option for "User/IP Statistics" is selected on the **Monitor** > **Monitor Configuration** page.

Viewing and Managing Online Users

To manage and view the status information of all ZTNA online users, take the following steps:

1. Select **ZTNA** > **Monitor** > **User Status**.

    a. Login Time: indicates the login time of the online user;

    b. User Name: indicates the user name of the online user;

    c. AAA Server: indicates the AAA server name to which the online user belongs;

    d. ZTNA Server: indicates the ZTNA service name that the online user accesses;

    e. User IP: indicates the IP address of the online user that the ZTNA server assigns;

    f. Endpoint Name: indicates the user endpoint name;

g. Endpoint IP: indicates the user endpoint IP address, i.e. the public IP address of the user;

h. OS: indicates the operating system of the user endpoint;

i. Endpoint Tag: indicates the endpoint tag associated with the online user;

j. Allowed Application Resources: indicates the application resources that the online user is granted access;

k. Denied Application Resources: indicates the application resources that the online user is not granted access;

l. Upstream Speed: indicates the upstream speed of the online user;

m. Downstream Speed: indicates the downstream speed of the online user.

2. Click **Filter** to add filter conditions to view the detailed information of ZTNA online users that meet the filter conditions.

3. By selecting one or more users and clicking **Force Log Off**, you can force disconnecting a user with the ZTNA server.

Note: To view upstream and downstream speed statistics, make sure the ZTNA monitor function is enabled.

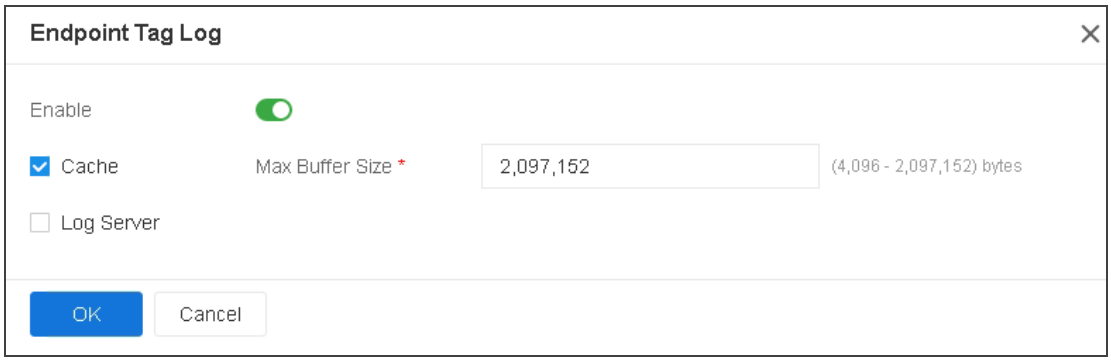
Endpoint Tag Log

The system support management of endpoint tag logs by using the endpoint tag log function. To configure and manage endpoint tag logs, take the following steps:

1. Select **Monitor** > **Log** > **Endpoint Tag Log** or select **ZTNA** > **Endpoint Tag Log**.

   - Time: indicates the endpoint tag log's generation time.
   - Type: indicates the endpoint tag log type, including login, logout, abnormal logout, endpoint tag update and application resource update.
   - User Name: indicates the user name.
   - User IP: indicates the user IP address.
   - AAA Server: indicates the AAA server to which the user belongs.
   - Endpoint Name: indicates the endpoint name.
   - Endpoint IP: indicates the endpoint IP address.
   - OS: indicates the operating system of the endpoint.
   - Endpoint Tags: indicates the endpoint tag associated with the user.
   - ZTNA Server: indicates the ZTNA service name that the user accesses.
   - Allowed Application Resources: indicates the application resources that the user are allowed to access.
   - Denied Application Resources: indicates the application resources that the user are not allowed to access.

2. Click **Configure** and enter the **Endpoint Tag Log** page.



Configure the options

Option	Description
Enable	Click the button to enable the endpoint tag log function and select the destinations where the endpoint tag logs will be sent to. You can select multiple destinations. By default, the endpoint tag log function is enabled and the logs will be sent to the memory buffer.
Cache	Select the check box to send endpoint tag logs to the memory buffer.
Max Buffer Size	When configuring the system to send endpoint tag logs to the memory buffer, you can define the memory buffer size for storing the endpoint tag logs. The range is 4096 to 2097152, in bytes. The default value is 2097152.
Log Server	Select the check box to send endpoint tag logs to the syslog server, in plaintext. You need to configure a syslog server first. Click the "" link to view all syslog servers that have been configured. For configuration information about syslog server, refer to Creating a Log Server.

3. Click **Filter** to view endpoint tag logs that match the specified filtering conditions.
4. Click **Clear** to clear all endpoint tag logs.

   Note: This option is not supported for devices that support sending log information to the local database.
5. Click **Export** to export all endpoint tag logs to a local file.

Chapter 10 Object

This chapter describes the concept and configuration of objects that will be referenced by other modules in system, including:

- "Address" on Page 1034: Contains address information, and can be used by multiple modules, such as policy rules, NAT rules, QoS, session limit rules, etc.
- "Host Book" on Page 1040: A collection of one domain name or several domain names.
- "Service Book" on Page 1044: Contains service information, and can be used by multiple modules, such as policy rules, NAT rules, QoS, etc.
- "Application Book" on Page 1055: Contains application information, and it can be used by multiple modules, such as policy rules, NAT rules, QoS, etc.
- "SLB Server Pool " on Page 1105: Describes SLB server configurations.
- "Schedule" on Page 1110: Specifies a time range or period. The functions (such as policy rules, QoS rules, host blacklist, connections between the PPPoE interface and Internet) that use the schedule will take effect in the time range or period specified by the schedule.
- "AAA Server" on Page 1113: Describes how to configure an AAA server.
- "User" on Page 1148: Contains information about the functions and services provided by a Hillstone device, and users authenticated and managed by the device.
- "Role" on Page 1160: Contains role information that associates users to privileges. In function configurations, different roles are assigned with different services. Therefore, the mapped users can gain the corresponding services as well.

- "Track Object" on Page 1169: Tracks if the specified object (IP address or host) is reachable or if the specified interface is connected. This function is designed to track HA and interfaces.
- " URL Filtering" on Page 1176: URL filter controls the access to some certain websites and records log messages for the access actions.
- "NetFlow" on Page 1257 : Collect the user's incoming traffic information according to the NetFlow profile, and send it to the server with NetFlow data analysis tool.
- "End Point Protection" on Page 1262: Obtain the endpoint data monitored by the endpoint security control center by interacting with it, and then specify the corresponding processing action according to the security status of endpoint, so as to control the endpoint network behavior.
- "IoT Policy" on Page 1275: Identify the network video monitoring devices, like IPC (IP Camera) and NVR (Network Video Recorder) via the flowing traffic, then monitor the identified devices and block illegal behaviors according to the configurations.

Address

IP address is an important element for the configurations of multiple modules, such as policy rules, NAT rules and session limit rules. Therefore, system uses an address book to facilitate IP address reference and flexible configuration. You can specify a name for an IP range, and only the name is referenced during configuration. The address book is the database in system that is used to store the mappings between IP ranges and the corresponding names. The mapping entry between an IP address and its name in the address book is known as an address entry.

System provides a global address book. You need to specify an address entry for the global address book. When specifying the address entry, you can replace the IP range with a DNS name. Interfaces of the configured IPs will be used as address entries and added to the address book automatically. You can use them for NAT conveniently. Furthermore, an address entry also has the following features:

- All address books contain the following default address entries named **Any** and **private_network**. The IP address of **Any** is 0.0.0.0/0, which is any IP address. **Any** can neither be edited nor deleted. The IP addresses of **private_network** are 10.0.0.0/8, 172.16.0.0/12, 192.168.0.0/16, that all private network address. The **private_network** can be edited and deleted.
- One address entry can contain another address entry in the address book.
- If the IP range of an address entry changes, StoneOS will update other modules that reference the address entry automatically.

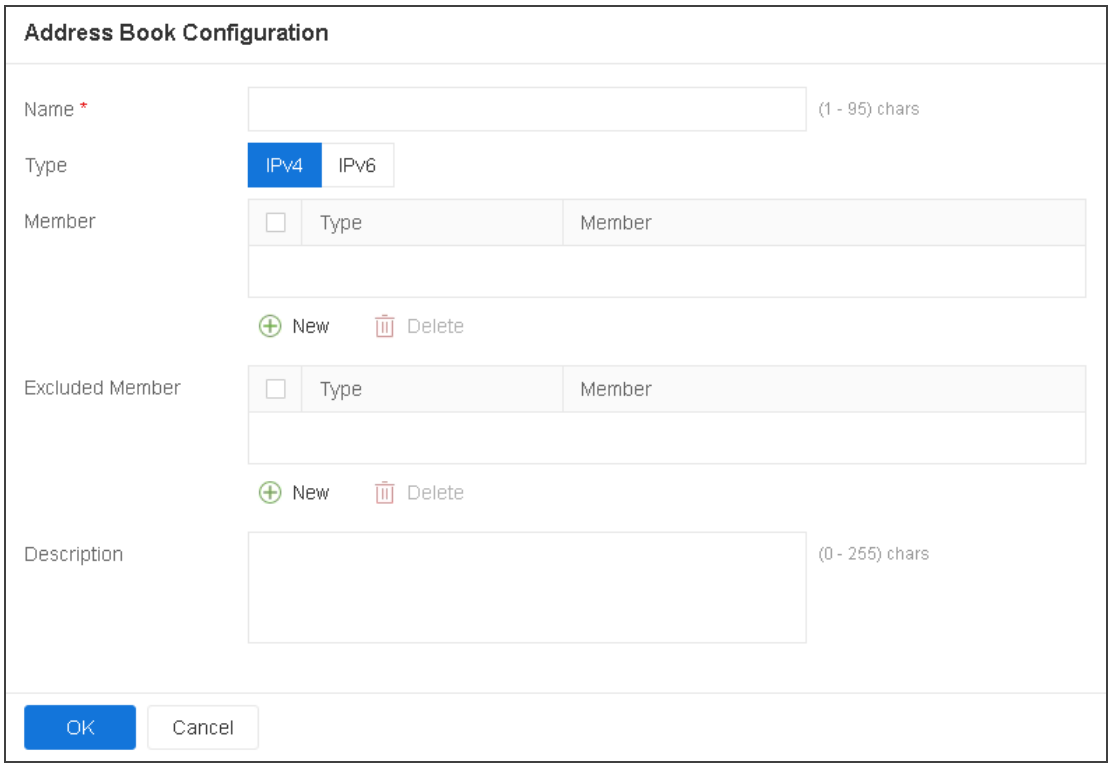
Address book supports IPv4 and IPv6 address. If IPv6 is enabled, you can configure IPv6 address entry.

Creating an Address Book

To create an address book, take the following steps:

1. Click **Object>Address Book**.

2. Click **New**.



In Address Book Configuration dialog box, enter the address entry configuration.

Basic	
Name	Type the address book name into the Name box.
Type	Select the IP type, including IPv4 or IPv6. Only the IPv6 firmware supports to configure IPv6 type.
Member	
Member	Click New to add a member . • When you select IPv4 type, configure IP/Netmask, IP Range, Hostname, Address Book, IP/Wildcard

Basic	
	or Country/Region as needed. • When you select IPv6 type, configure IPv6/prefix, IPv6 Range, Hostname, Address Book or IPv6/Wildcard as needed. Tips: • When you add the IP/Wildcard member, binary 1 indicates exact match and 0 indicates fuzzy match in wildcard netmask. The subnet mask format can not be configured. Meanwhile, the address book with the IP/Wildcard member cannot be referenced by QoS policy. • The address book with the Country/Region member can only be referenced by the security policy and the policy-based route rules. • The address book with the Country/Region member does not support the configuration of the **Excluded Member** settings. • When the type of the address entry member is IPv6/Wildcard, the 128bit wildcard mask must consist of consecutive 8 (or integer multiples of 8) zeros or consecutive 8 (or integer multiples of 8) 1s, such as FF00::FFFF. • A maximum of 8 address members of the IP/Wild-

Basic	
	card type or the IPv6/Wildcard type are allowed to be configured in each address book entry. • Only the security policy and the IPv6 address book support the address entry with the IPv6/Wildcard member added.
New	Click New to add the configured member to the list below. If it is needed, repeat the above steps to add more members.
Delete	Delete the selected member from the list.
Excluded Member	
Member	Specify the excluded member. Click New to add a member , and configure IP/netmask, IP/Prefix, or IP range as needed. **Note**: Excluded members' address range need to be in the address range of the members, otherwise the configuration cannot be completed.
New	Click New to add the configured excluded member to the list below. If needed, repeat the above steps to add more excluded members.
Delete	Delete the selected excluded member from the list.

3. Click OK.

Viewing Details

To view the details of an address entry, take the following steps, including the name, member, description and reference:

1. Click **Object>Address Book**.
2. In the Address Book dialog box, select "+" before an address entry from the member list, and view the details under the entry.

Searching Address Entries

Use the Filter to search for the address entries that match the filter conditions. The filter conditions include the address entry name, IP address of the members, the description, and whether the entry is referenced by other function modules.

1. Click **Object > Address Entry**.
2. At the top-right corner of the page, click **Filter**. Then a new row appears at the top.
3. Click **+Filter** to add a new filter condition. Then select a filter condition from the drop-down menu and enter a value.
4. Press **Enter** to search for the service entry that matches the filter conditions.
5. Repeat the above two steps to add more filter conditions. The relationship between each filter condition is **AND**.
6. To delete a filter condition, hover your mouse on that condition and then click the × icon.

   To close the filter, click the × icon on the right side of the row.

Save the filter conditions.

1. After adding the filter conditions, click the **+ Filter** after the next arrow, in the drop-down menu, click **Save Filters**.
2. Specifies the name of the filter condition to save, the maximum length of name is 32 characters, and the name supports only Chinese and English characters and underscores.
3. Click the **Save** button on the right side of the text box.
4. To use the saved filter condition, double click the name of the saved filter condition.
5. To delete the saved filter condition, click × on the right side of the filter condition.

Notes:

- You can add up to 20 filter conditions as needed.
- After the device has been upgraded, the saved filter condition will be cleared.

Host Book

You can specify a name to be a collection of one domain name or several domain names, and reference this host book when configuring. Host book is the database to store the relationships of domain integrations and the specified names in system.

The entry of the relationship of domain integrations and the specified name is called host entry.

Notes:

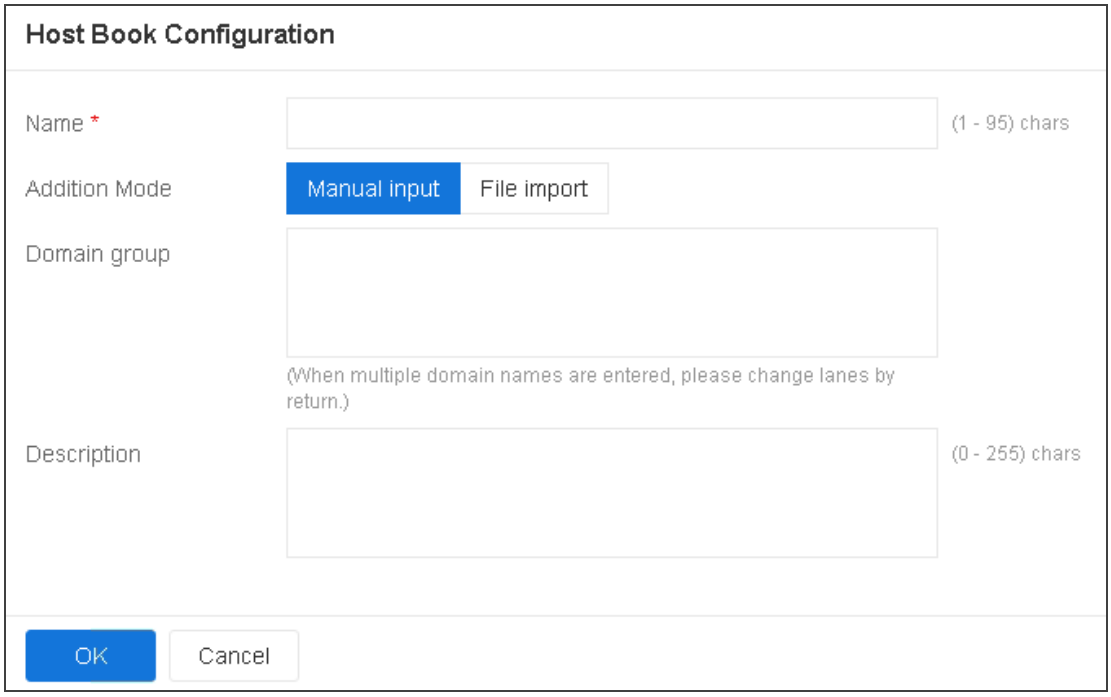
- The maximum number of host entries is one fourth of the maximum number of address entries.

Creating a Host Book

To create a host book, take the following steps:

1. Select **Object > Host Book**.

2. Click **New**.



Configure the following options.

Option	Description
Name	Type a name for the host book.
Description	Type the description of host book entry.
Addition Mode	Specify the mode for adding domain members. • Manual input: Add the domain member to the host book via inputting IP address or domain manually. • File import: Add a batch of domain members to the host book via importing the file.
Domain	When the "Manual input" is selected, enter the IP address

Option	Description
Group	or domain names of the domain member. **Note**: Press **Enter** to separate several domain members.
File Name	When the "File import" is selected, click **Browser** to upload a domain name file in the local. **Note**: Only the UTF-8 encoding file (*.txt or *.csv) can be imported currently.

3. Click **OK**.

Editing a Host Book

To edit a host book, take the following steps:

1. Select **Object** > **Host Book**, and enter the **Host Book** page.
2. In the host book list, select a host book entry to edit and click **Edit**.
3. In the **Host Book Configuration** dialog, edit the selected host book entry as needed.

Notes: When you edit a host book entry, if you add more domain members via importing a file, the domain in the file will cover all the domain members in the selected entry.

Deleting a Host Book

To delete a host book, take the following steps:

1. Select **Object** > **Host Book**, and enter the **Host Book** page.
2. In the host book list, select a host book entry to delete and click **Delete**.

Viewing Details

To view details about a host book entry, take the following steps:

1. Select **Object** > **Host Book**.
2. In the host book list, select "+" before a host book entry, and view the details under the entry.

Service Book

Service is an information stream designed with protocol standards. Service has some specific distinguishing features, like corresponding protocol, port number, etc. For example, the FTP service uses TCP protocol, and its port number is 21. Service is an essential element for the configuration of multiple StoneOS modules including policy rules, NAT rules, QoS rules, etc.

System ships with multiple predefined services/service groups. Besides, you can also customize user-defined services/service groups as needed. All these service/service groups are stored in and managed by StoneOS service book.

Predefined Service/Service Group

System ships with multiple predefined services, and identifies the corresponding application types based on the service ports. The supported predefined services may vary from different Hillstone device models. Predefined service groups contain related predefined services to facilitate user configuration.

User-defined Service

Except for the above predefined services, you can also create your own user-defined services easily. The parameters that will be specified for the user-defined service entries include:

- Name
- Protocol type
- The source and destination port for TCP or UDP service, and the type and code value for ICMP service.

User-defined Service Group

You can organize some services together to form a service group, and apply the service group to StoneOS policies directly to facilitate management. The service group has the following features:

- Each service of the service book can be used by one or more service groups.
- A service group can contain both predefined services and user-defined services.
- A service group can contain another service group. The service group of StoneOS supports up to 8 layers of nests.

The service group also has the following limitations:

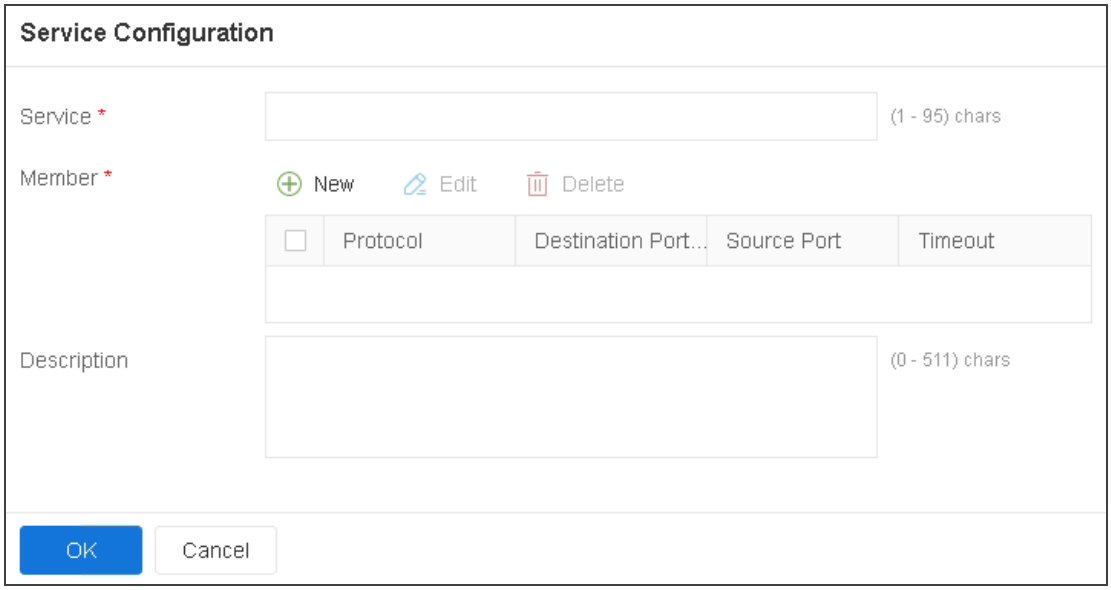
- The name of a service and service group should not be identical.
- A service group being used by any policy cannot be deleted. To delete such a service group, you must first end its relationship with the other modules.
- If a user-defined service is deleted from a service group, the service will also be deleted from all of the service groups using it.

Configuring a Service Book

This section describes how to configure a user-defined service and service group.

Configuring a User-defined Service

1. Select **Object > Service Book > Service**.
2. Click **New**.



Configure the following options.

Service Configuration	
Service	Type the name for the user-defined service into the text-box.
Member	Specify a protocol type for the user-defined service. The available options include TCP, UDP, ICMP, ICMPv6 and All. If needed, you can add multiple service items. Click **New** and the parameters for the protocol types are described as follows:
	TCP/UDP Destination port: • Min - Specifies the minimum port number of the specified service entry. • Max - Specifies the maximum port number of the specified service entry.

Service Configuration		
		The value range is 0 to 65535. Source port: • Min - Specifies the minimum port number of the specified service entry. • Max - Specifies the maximum port number of the specified service entry. The value range is 0 to 65535. **Notes:** • The minimum port number cannot exceed the maximum port number. • The "Min" of the destination port is required, and other options are optional. • If "Max " is not configured, system will use "Min" as the single code.
	ICMP	Type: Specifies an ICMP type for the service

entry. The value range is 0（Echp-Reply）, 3（Destination-Unreachable）, 4（Source Quench）, 5（Redirect）, 8（Echo）, 11（Time Exceeded）, 12（Parameter Problem）, 13（Timestamp）, 14（Timestamp Reply）, 15（Information Request）, 16（Information Reply）, 17（Address Mask Request）, 18（Address Mask Reply）, 30（Traceroute）, 31（Datagram Conversion Error）, 32（Mobile Host Redirect）, 33（IPv6 Where-Are-You）, 34（IPv6 I-Am-Here）, 35（Mobile Registration Request）, 36（Mobile Registration Reply）. Code: Specifies a minimum value and maximum value for ICMP code. The value range is 0 to 15, the default value is : min code - 0, max code - 15.

Notes:

- The minimum code cannot exceed the maximum code.
- If "Max " is not configured, system will

Service Configuration		
		use "Min" as the single code.
	ICMPv6	Type: Specifies an ICMPv6 type for the service entry. The value range is 1（Dest-Unreachable）, 2（Packet Too Big）, 3（Time Exceeded）, 4（Parameter Problem）, 5-99 (Unallocated Error message), 100（Private experimentation）, 101（Private experimentation）, 102-126 (Unallocated Error message), 127（Reserved for expansion of ICMPv6 error message）, 128（Echo Request）, 129（Echo Reply）, 130（Multicast Listener Query）, 131（Multicast Listener Report）, 132（Multicast Listener Done）, 133（Router Solicitation）, 134（Router Advertisement）, 135（Neighbor Solicitation）, 136（Neighbor Advertisement）, 137（Redirect Message）, 138（Router Renumbering）, 139（ICMP Node Information Query）, 140（ICMP Node Information Response）, 141（Inverse Neighbor Discovery Solicitation Message）, 142（Inverse Neighbor Dis-

Service Configuration		
		covery Advertisement Message）, 143（Version 2 Multicast Listener Report）, 144（Home Agent Address Discovery Request Massage）, 145（Home Agent Address Discovery Reply Massage）, 146（Mobile Prefix Solicitation）, 147（Mobile Prefix Advertisement ）, 148（Certification Path Solicitation Message）, 149（Certification Path Advertisement Message）, 150（ICMP message utilized by experimental mobility protocols such as Seamoby）, 151（Multicast Router Advertisement）, 152（Multicast Router Solicitation ）, 153（Multicast Router Termination）, 154（FMIPv6 Messages）, 200（Private experimentation）, 201（Private experimentation）and 255（Reserved for expansion of ICMPv6 informational）. Code: Specifies a minimum value and maximum value for ICMP code. The value range is 0 to 255, the default value is : min code - 0, max code - 255.
	All	Protocol: Specifies a protocol number for the service entry. The value range is 1 to 255.
Description	If it's needed, type the description for the service into the	

Service Configuration	
	text box.

3. Click **OK**.

Configuring a User-defined Service Group

1. Select **Object > Service Book > Service Group**.
2. Click **New**.

Configure the following options.

Service Group Configuration	
Name	Type the name for the user-defined service group into the text box.
Description	If needed, type the description for the service into the text box.
Member Type	Add services or service groups to the service group. System supports at most 8-layer nested service group.

Service Group Configuration	
	Expand Pre-defined Service or User-defined Service from the left pane, select services or service groups, and then click **Add** to add them to the right pane. To remove a selected service, select it from the right pane, and then click **Remove**.

3. Click **OK**.

Viewing Details

To view the details of a service entry, take the following steps, including the name, protocol, destination port and reference:

1. Click **Object>Service Book > Service**.
2. In the service dialog box, select an address entry from the member list, and view the details under the list.

Searching Service Entries

Use the Filter to search for the service entries that match the filter conditions. The filter conditions include service type, name, protocol, destination port and source port, and whether the service entry is referenced by other function modules.

1. Click **Object > Service Book > Service**.
2. At the top-left corner of the **Service** page, click **Filter**.
3. Click **+ Filter** to add a new filter condition. Then select a filter condition from the drop-down menu and enter a value.
4. Press **Enter** to search for the service entry that matches the filter conditions.

5. Repeat the above two steps to add more filter conditions. The relationship between each filter condition is **AND**.

6. To delete a filter condition, hover your mouse on that condition and then click the × icon.

   To close the filter, click the × icon on the right side of the row.

Save the filter conditions.

1. After adding the filter conditions, click the **+ Filter** after the next arrow, in the drop-down menu, click **Save Filters**.

2. Specifies the name of the filter condition to save, the maximum length of name is 32 characters, and the name supports only Chinese and English characters and underscores.

3. Click the **Save** button on the right side of the text box.

4. To use the saved filter condition, double click the name of the saved filter condition.

5. To delete the saved filter condition, click × on the right side of the filter condition.

Notes:

- You can add up to 20 filter conditions as needed.
- After the device has been upgraded, the saved filter condition will be cleared.

Searching Service Groups

Use the Filter to search for the service groups that match the filter conditions. The filter conditions include service group name, and whether the service group is referenced by other function modules.

1. Click **Object > Service Book > Service Group**.
2. At the top-left corner of the page, click **Filter**. Then a new row appears at the top.
3. Click **Filter** to add a new filter condition. Then select a filter condition from the drop-down menu and enter a value.
4. Press **Enter** to search for the service group that matches the filter conditions.
5. Repeat the above two steps to add more filter conditions. The relationship between each filter condition is **AND**.
6. To delete a filter condition, hover your mouse on that condition and then click the × icon.

   To close the filter, click the × icon on the right side of the row.

Save the filter conditions.

1. After adding the filter conditions, click the **Filter** after the next arrow, in the drop-down menu, click **Save Filters**.
2. Specifies the name of the filter condition to save, the maximum length of name is 32 characters, and the name supports only Chinese and English characters and underscores.
3. Click the **Save** button on the right side of the text box.
4. To use the saved filter condition, double click the name of the saved filter condition.
5. To delete the saved filter condition, click × on the right side of the filter condition.

Notes:

- You can add up to 20 filter conditions as needed.
- After the device has been upgraded, the saved filter condition will be cleared.

Application Book

Application has some specific features, like corresponding protocol, port number, application type, etc. Application is an essential element for the configuration of multiple device modules including policy rules, NAT rules, application QoS management, etc.

System ships with multiple predefined applications and predefined application groups. Besides, you can also customize user-defined application and application groups as needed. All of these applications and applications groups are stored in and managed by StoneOS application book.

If IPv6 is enabled, IPv6 applications will be recognized by StoneOS.

Editing a Predefined Application

You can view and use all the supported predefined applications and edit configurations such as TCP timeout, but cannot delete any of them. To edit a predefined application, take the following steps:

1. Select **Object > Application Book > Application**.
2. Select the application you want to edit from the application list, and click **Edit**.
3. In the Application Configuration dialog box, edit configurations such as TCP timeout and signatures for the application.

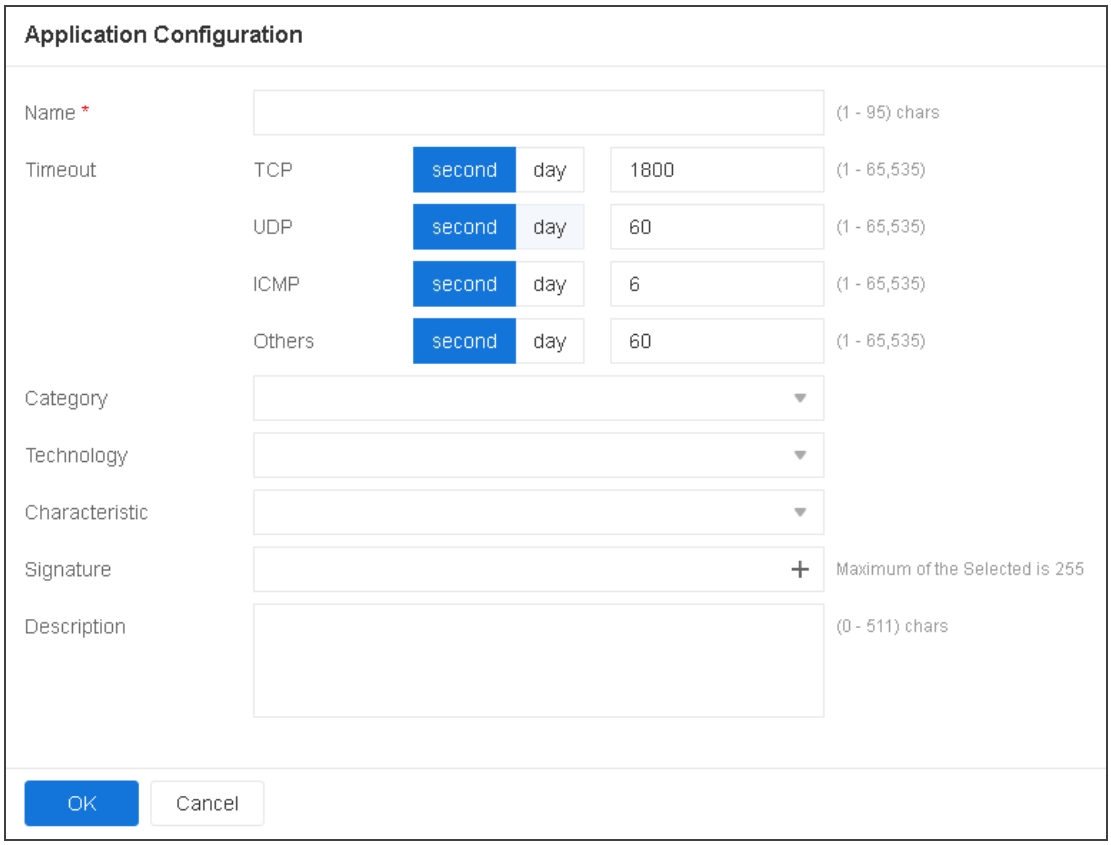
Creating a User-defined Application

You can create your own user-defined applications. By configuring the customized application signature rules, system can identify and manage the traffic that crosses into the device, thus identifying the type of the traffic.

To create a user-defined application, take the following steps:

1. Select **Object > Application Book > Application**.

2. Click **New**.



Configure the following options.

Option	Description
Name	Specifies the name of the user-defined application.
Timeout	Configures the application timeout value. If not, system will use the default value of the protocol.
Category	Specifies the category of the user-defined application. The categories and subcategories are maintained by the application signature database. The category corresponds

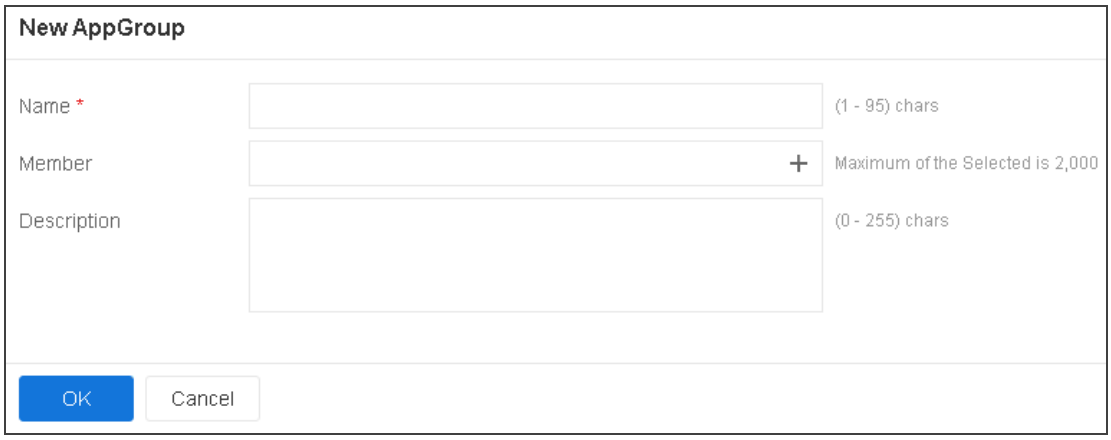
Option	Description
	to the application group of level 1 in the signature database and the subcategory corresponds to the application group of level 2 under level 1. You can configure a category for each user-defined application. By default, user-defined applications are not configured with a category.
Subcategory	Specifies the subcategory of the user-defined application. You can configure only one subcategory for the application. By default, user-defined applications are not configured with a subcategory.
Technology	Specifies the technology used by the user-defined application. The technologies used by applications are maintained by the application signature database. You can configure only one technology for the application. By default, user-defined applications are not configured with a technology.
Characteristic	Specifies the characteristic of the user-defined application. The characteristics are maintained by the application signature database. You can configure one or more characteristics. By default, user-defined applications are not configured with a characteristic.
Signature	Select the signature of the application and then click **Add**. To create a new signature, see "Creating a Signature Rule" on Page 1059.
Description	Specify the description of the user-defined application.

3. Click **OK**.

Creating a User-defined Application Group

To create a user-defined application group, take the following steps:

1. Select **Object > Application Book > Application Groups**
2. Click **New**.



Configure the following options.

Option	Description
Name	Specifies a name for the new application group.
Member	Select an application, application group, or application filter that you want to add to the application group. To search for an application, you can enter the name of the application. To delete an added application, click **X**.
Description	Specifies the description for the application group.

3. Click **OK**.

Creating an Application Filter Group

Application Filter Group allows you to create a group to filter applications according to application category, sub-category, technology, risk, and attributes.

To create an application filter group, take the following steps:

1. Select **Object > Application Book > Application Filters**.
2. Click **New**.
3. Type an application filter group name in the Name text box.
4. Specifies the filter condition. Choose the category, subcategory, technology, risk or characteristic from the drop-down list and then select a condition under the corresponding filter. You can add multiple filters based on your needs.
5. Click **OK**.

Creating a Signature Rule

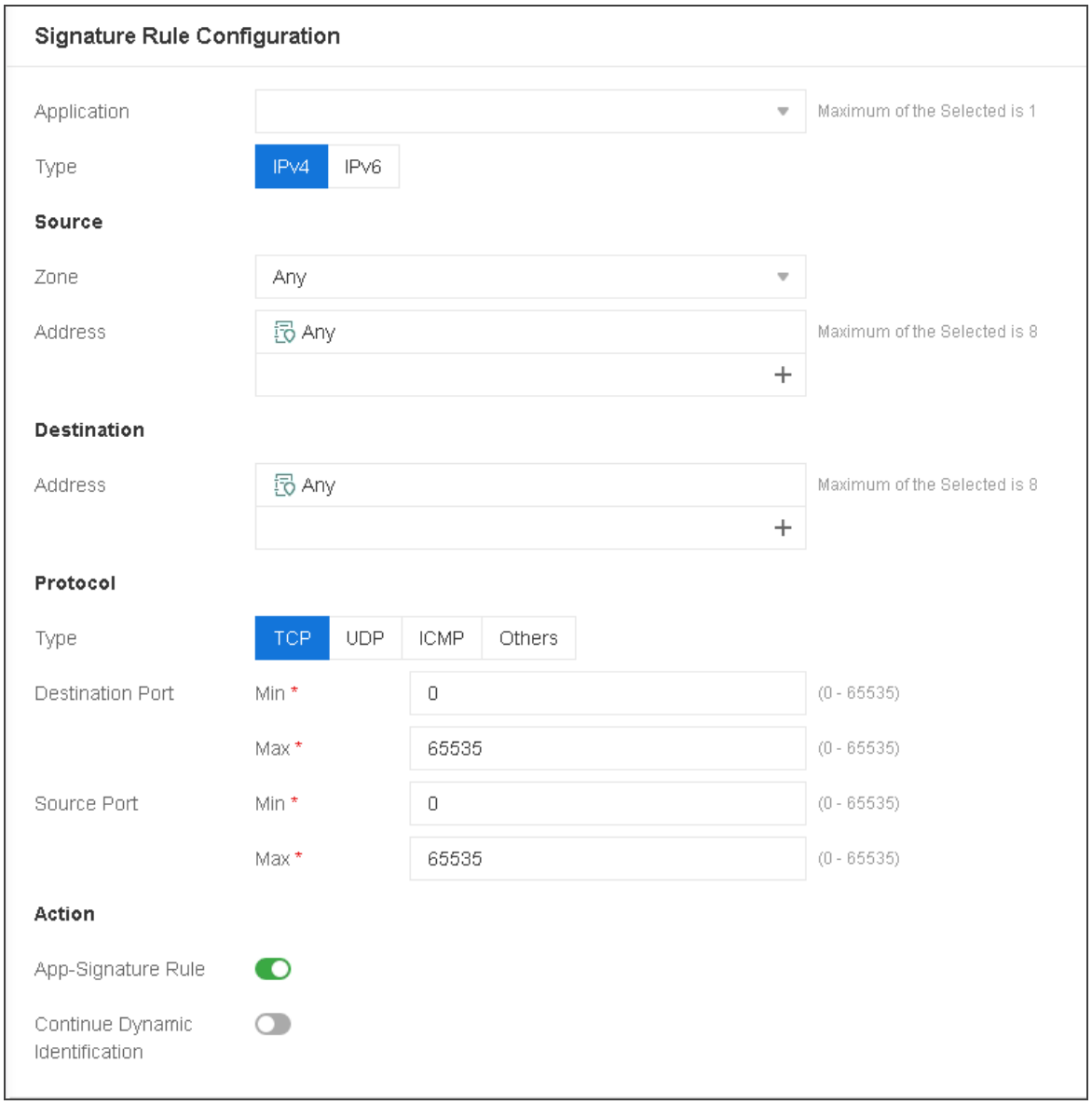
By configuring the customized application signature rules, system can identify and manage the traffic that crosses into the device. When the traffic matches all of the conditions defined in the signature rule, it hits this signature rule. Then system identifies the application type.

If IPv6 is enabled, traffic of IPv6 address will be recognized by StoneOS.

To create a new signature rule, take the following steps:

1. Select **Object > Application Book > Static Signature Rule**.

2. Click **New**.



Configure the following options.

Option	Description
Type	Specify the IP address type, including IPv4 and IPv6

Option	Description
	address. If IPv6 is enabled, traffic of IPv6 address will be recognized by StoneOS.
Source	
Zone	Specify the source security zone of the signature rule.
Address	Specify the source address. You can use the Address Book type or the IP/Netmask type. You can also perform the following operation: • You can click in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member

Option	Description
	1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched.
Destination	
Address	Specify the source address. You can use the Address Book type or the IP/Netmask type. You can also perform the following operation: • You can click in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be

Option	Description
	matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched.
Protocol	
Enable	Select the **Enable** button to configure the protocol of the signature rule.
Type	When selecting **TCP** or **UDP**, • Destination Port: Specify the destination port number of the user-defined application signature. If the destination port number is within a range, system will identify the value of min-port as the minimum port number and identify the value of max-port as the maximum port number. The range of destination port number is 0 to 66535. The port number cannot be 0. For example, the destination port number is in the range of 0 to 20, but it cannot be 0. • Source Port: Specify the source port number of the user-defined application signature. If the source port number is within a range, system will identify

Option	Description
	the value of min-port as the minimum port number and identify the value of max-port as the maximum port number. The range of source port number is 0 to 66535. When selecting **ICMP** or **ICMPv6**: • When IPv4 is selected, select **ICMP**: • Type: Specify the value of the ICMP type of the application signature. The options are as follows: is 0（Echp-Reply）, 3（Destination-Unreachable）, 4（Source Quench）, 5（Redirect）, 8（Echo）, 11（Time Exceeded）, 12（Parameter Problem）, 13（Timestamp）, 14（Timestamp Reply）, 15（Information Request）, 16（Information Reply）, 17（Address Mask Request）, 18（Address Mask Reply）, 30（Traceroute）, 31（Datagram Conversion Error）, 32（Mobile Host Redirect）, 33（IPv6 Where-Are-You）, 34（IPv6 I-Am-Here）, 35（Mobile Registration Request）, 36（Mobile Registration Reply）. • Min Code: Specify the value of the ICMP

Option	Description
	code of the application signature. The ICMP code is in the range of 0 to 15. The default value is 0. • When IPv6 is selected, select **ICMPv6**: • Type: Specify the value of the ICMPv6 type of the application signature. The options are as follows: 1（Dest-Unreachable）, 2（Packet Too Big）, 3（Time Exceeded）, 4（Parameter Problem）, 5-99 (Unallocated Error message), 100（Private experimentation）, 101（Private experimentation）, 102-126 (Unallocated Error message), 127（Reserved for expansion of ICMPv6 error message）, 128（Echo Request）, 129（Echo Reply）, 130（Multicast Listener Query）, 131（Multicast Listener Report）, 132（Multicast Listener Done）, 133（Router Solicitation）, 134（Router Advertisement）, 135（Neighbor Solicitation）, 136（Neighbor Advertisement）, 137（Redirect Message）, 138（Router Renumbering）, 139（ICMP Node Information Query）, 140（ICMP Node Information Response）,

Option	Description
	141（Inverse Neighbor Discovery Solicitation Message）, 142（Inverse Neighbor Discovery Advertisement Message）, 143（Version 2 Multicast Listener Report）, 144（Home Agent Address Discovery Request Massage）, 145（Home Agent Address Discovery Reply Massage）, 146（Mobile Prefix Solicitation）, 147（Mobile Prefix Advertisement ）, 148（Certification Path Solicitation Message）, 149（Certification Path Advertisement Message）, 150（ICMP message utilized by experimental mobility protocols such as Seamoby）, 151（Multicast Router Advertisement）, 152（Multicast Router Solicitation ）, 153（Multicast Router Termination）, 154（FMIPv6 Messages）, 200（Private experimentation）, 201（Private experimentation）and 255（Reserved for expansion of ICMPv6 informational）. • Min Code: Specify the value of the ICMPv6 code of the application signature. The ICMPv6 code is in the range of 0 to 255. The default value is 0.

Option	Description
	When selecting **Others**: • Protocol: Specifies the protocol number of the application signature. The protocol number is in the range of 1 to 255.
Action	
App-Signature Rule	Select **Enable** to make this signature rule take effect after the configurations. Otherwise, it will not take effect.
Continue Dynamic Identification	After enabling this function, if the traffic satisfies the user-defined signature rule and system has identified the application type, system will continue identifying the application. To be more accurate, you can enable this function to set the system to continue dynamically identification.

3. Click **OK**.

Viewing Details

To view the details of an application entry, including the name, category, subcategory, risk, technology, and reference, take the following steps:

1. Click **Object > Application Book > Application**.
2. In the application dialog box, select "+" before an address entry from the member list, and view the details under the entry.

Configuring Application Resource/Application Resource Group

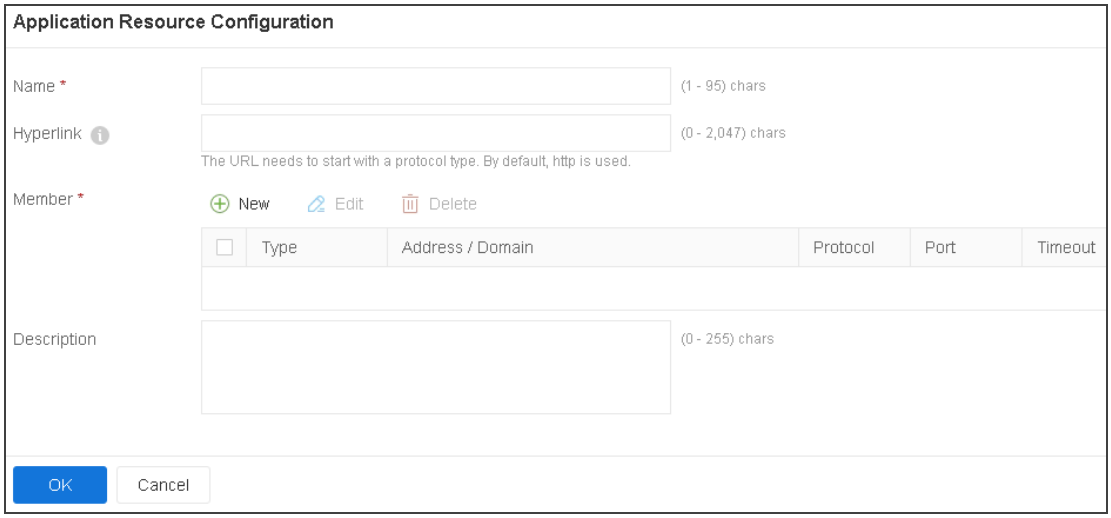
Application resource refers to the applications, contents, services, etc. that users want to access. You need to configure the address, protocol, port number and others to define an application resource entry. Each application resource can contain up to 16 application resource entries. Application resource group is a group of up to 16 application resources. The system supports a maximum of 256 application resources and 64 application resource groups.

The system supports the following ways to define an application resource entry:

- Based on IP address, protocol and port number
- Based on IP range, protocol and port number
- Based on domain name, protocol and port number

To configure an application resource, take the following steps:

1. Select **Object** > **Application Resource Book** > **Application Resource**. Or select **ZTNA** > **Application Resource Book** > **Application Resource**.
2. Click **New**.



In the Application Resource Configuration tab, configure the corresponding options.

Option	Description
Name	Type the name of the application resource. The length is 1 to 95 characters.
Hyperlink	Type the hyperlink of the application resource. The length is 0 to 2047 characters. On the ZTNA portal displayed after a user logs in, the user can copy the hyperlink to access an application resource in a browser if the application resource is configured with an hyperlink; or, the user can directly click the application resource icon to access it (make sure the link work). An application resource without a hyperlink configured will not be displayed on the ZTNA portal. If the specified hyperlink does not contain the protocol type, the default HTTP protocol will be used.
Member	Click **New** to add a resource entry and configure the options. Each application resource can contain up to 16 entries.

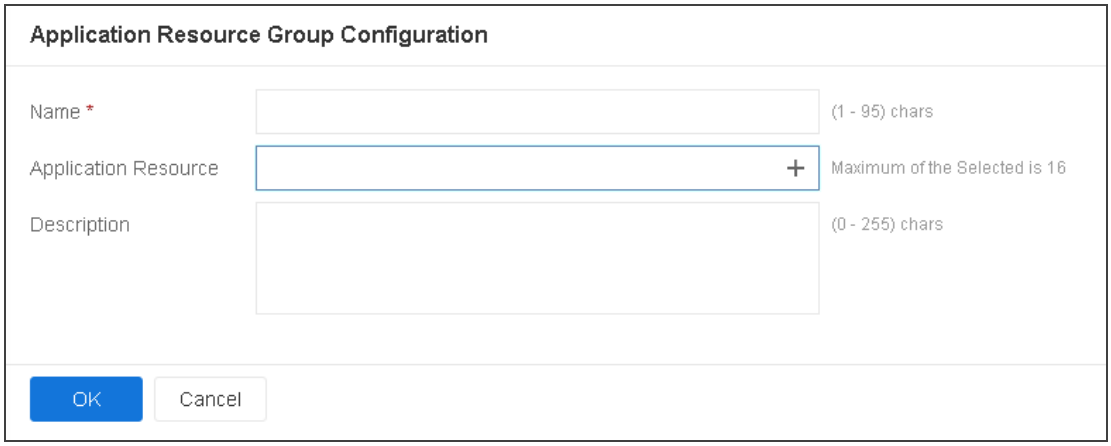
Option	Description
	• Type: Specify the address type of the resource entry, including IPv4/Netmask, IPv6/Prefix, IPv4 Range and IPv6 Range and Domain. • Address: Specify the IP address or IP range of the resource entry. • Protocol: Specify the protocol type of the resource entry. TCP and UDP are supported for application resources defined based on IP address. HTTP and HTTPS are supported for application resources defined based on domain name. • Port: Specify the port number of the resource entry. The value ranges from 1 to 65535. • Timeout: Specify the timeout value in seconds or days. The value range is 1 to 65535 when it is expressed in seconds and 1 to 1000 when in days. The default value is 1800s when the protocol is TCP, HTTP or HTTPS, and 60s when UDP.
Description	Specify description for the application resource. The length is 0 to 255 characters.

3. Click **OK** to save the configuration.
4. On the Application Resource page, by clicking the "+" button in the list to unfold an application resource, you can view more details about it, including the group it belongs to and the ZTNA policy ID that is bound to it.

To configure an application resource group, take the following steps:

1. Select **Object** > **Application Resource Book** > **Application Resource Group**. Or select **ZTNA** > **Application Resource Book** > **Application Resource Group**.

2. Click **New**.



In the Application Resource Group Configuration tab, configure the corresponding options.

Option	Description
Name	Type the name of the application resource group. The length is 1 to 95 characters.
Application Resource	Select existing application resources. Or, click **New** to create an application resource. You can add up to 16 application resources.
Description	Type description for the application resource group. The length is 0 to 255 characters.

3. Click **OK** to save the configuration.

4. On the Application Resource Group page, by clicking the "+" button to unfold an application resource group, you can view more details about it, including the ZTNA policy ID that is bound to it.

Configuring an Address Pool

The servers allocate the IPs in the address pools to the clients. After the client connects to the server successfully, the server will fetch an IP address along with other related parameters (e.g., DNS server address, and WIN server address) from the address pool and then allocate the IP and parameters to the client.

You can create an IP binding rule to meet the fixed IP requirement. The IP binding rule includes the IP-user binding rule and the IP-role binding rule. The IP-user binding rule binds the client to a fixed IP in the configured address pool. When the client connects to the server successfully, the server will allocate the binding IP to the client. The IP-role binding rule binds the role to an IP range in the configured address pool. When the client connects to the server successfully, the server will select an IP from the IP range and allocate the IP to the client.

After the client successfully connects to the server, the server will check the binding rules in a certain order to determine which IP to allocate. The order is shown as below:

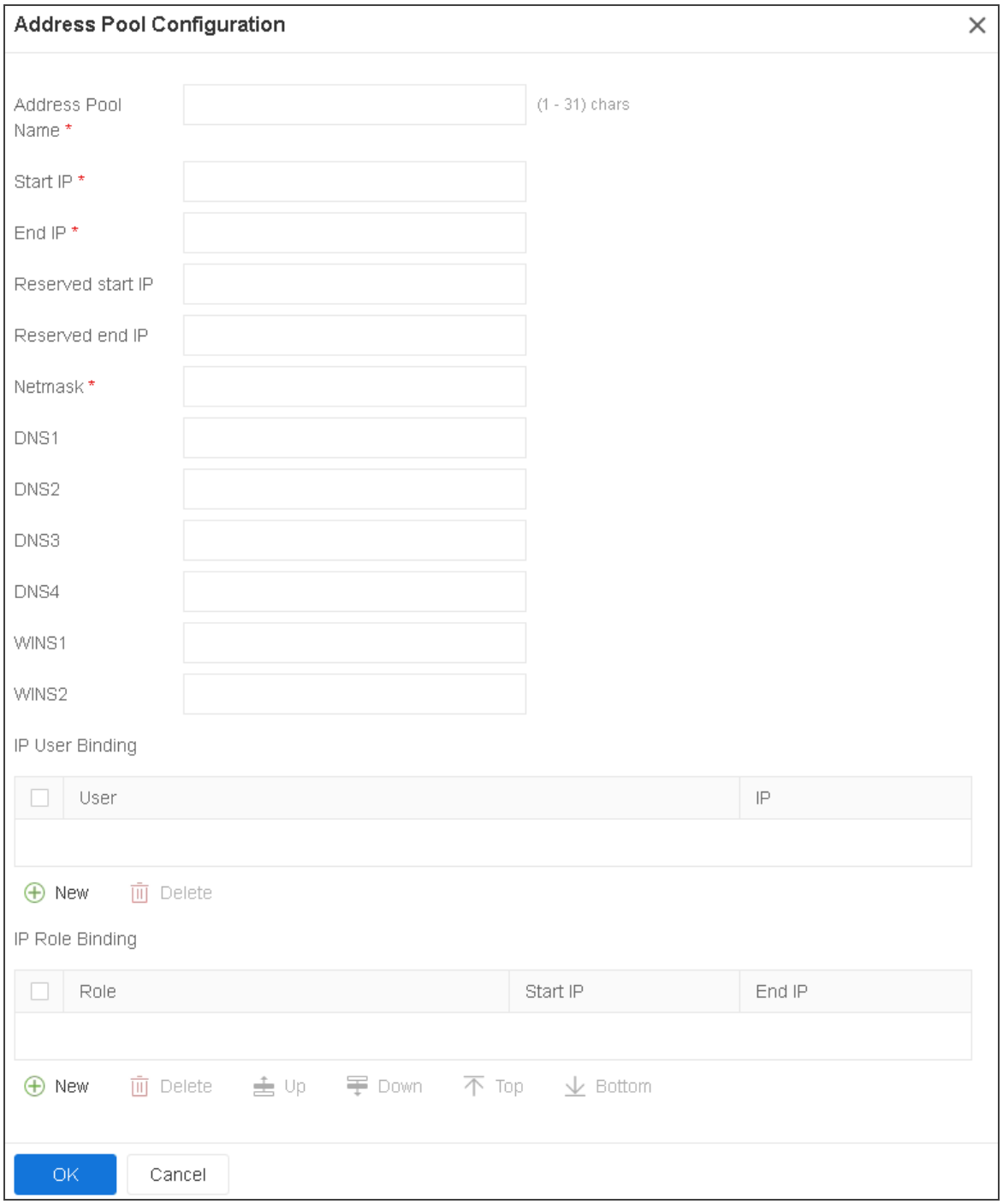
- Check whether the IP-user binding rule is configured for the client. If yes, allocate the bound IP to the client; if no, the server will select an IP which is not bound or used from the address pool, then allocate it to the client.
- Check whether the IP-role binding rule is configured for the client. If yes, get an IP from the IP range and allocate to the client; if no, the server will select an IP which is not bound or used from the address pool, then allocate it to the client.

Notes: IP addresses in the IP-user binding rule and the IP address in the IP-role binding rules should not overlap.

To configure an address pool, take the following steps:

1. Select **Object > Access Address Pool**.
2. Select the **IPv4** or **IPv6** tab, this option can only be configured in the IPv6 version.

3. Click **New**.



In the Access Address Pool Configuration tab, configure the following options.

Option	Description
Access Address Pool Name	Specifies the name of the address pool.
Start IP	Specifies the start IP of the address pool.
End IP	Specifies the end IP of the address pool.
Reserved start IP	Specifies the reserved start IP of the address pool.
Reserved end IP	Specifies the reserved end IP of the address pool.
Netmask	Specifies the netmask in the dotted decimal format.
Prefix Length	Specifies the prefix for this IPv6 address range. The range is 111 to 128.
DNS1/2/3/4	Specifies the DNS server IP address for the address pool. It is optional. 4 DNS servers can be configured for one address pool at most.
WINS1/2	Specifies the WIN server IP addresses for the address pool. It is optional. Up to 2 WIN servers can be configured for one address pool. This option can only be configured when the created IPv4 address pool.

In the IP User Binding tab, configure the corresponding options.

Option	Description
User	Type the user name into the **User** box.

IP	Type the IP address into the **IP** box.
New	Click **New** to add an IP user binding rule.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.

In the IP Role Binding tab, configure the corresponding options.

Option	Description
Role	Type the role name into the **Role** box.
Start IP	Type the start IP address into the **Start IP** box.
End IP	Type the end IP address into the **End IP** box.
New	Click **New**to add an IP role binding rule.
Delete	To delete a rule, select the rule you want to delete from the list and click **Delete**.
Up/Down/Top/Bottom	System will query IP role binding rules by turn, and allocate the IP address according to the first matched rule. You can move the location up or down at your own choice to adjust the matching sequence accordingly.

4. Click **OK** to save the settings.

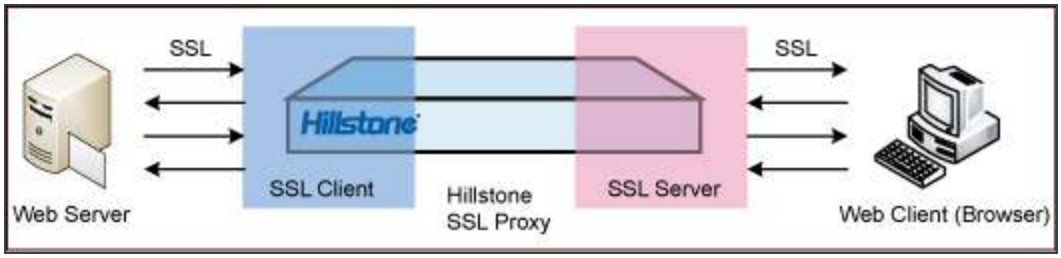
When a user name is binding with multiple roles corresponding to IP role binding rules, the system will query IP role binding rules by turn, and allocate the IP address according to the first matched rule. To adjust the sequence of IP role binding rules, in the Access Address Pool page, select an address pool and click **Move IP-Role Binding**. In the **Move IP-Role Binding** dialog box, select the role to be adjusted and then click **Up/Down/Top/Bottom**.

SSL Proxy

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

To assure the security of sensitive data when being transmitting over networks, more and more websites adopt SSL encryption to protect their information. The device provides the SSL proxy function to decrypt HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. The SSL proxy function works in the following two scenarios:

The first scenario, the device works as the gateway of Web clients. The SSL proxy function replaces the certificates of encrypted websites with the SSL proxy certificate to get the encrypted information and send the SSL proxy certificates to the client's Web browser. During the process, the device acts as an SSL client and SSL server to establish connections to the Web server and Web browser respectively. The SSL proxy certificate is generated by using the device's local certificate and re-signing the website certificate. The process is described as below:



The second scenario, the device works as the gateway of Web servers. The device with SSL proxy enabled can work as the SSL server, use the certificate of the Web server to establish the SSL connection with Web clients (Web browsers), and send the decrypted traffic to the internal Web server.

Work Mode

There are two work modes. For the first scenario, the SSL proxy function can work in the "Client Inspection - Proxy" mode ; for the second scenario, the SSL proxy function can work in the "Server Inspection - Offload" mode and "Server Inspection - Proxy" mode.

When the SSL proxy function works in the "Client Inspection - Proxy" mode, it can perform the SSL proxy on specified websites.

For the websites that do not need SSL proxy, it dynamically adds the IP address and port of the websites to a bypass list, and the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic will be bypassed.

For the websites proxied by the SSL proxy function, the device will check the parameters of the SSL negotiation. When a parameter matches an item in the checklist, the corresponding HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic can be blocked or bypassed according to the action you specified.

- If the action is Block, the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic will be blocked by the device.
- If the action is Bypass, the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic will not be decrypted. Meanwhile, the device will dynamically add the IP address and port number of the Website to the bypass list, and the HTTPS/POP3S/SMTPS/IMAPS traffic/RDPS/FTPS will be bypassed.

The device will decrypte the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic that are not blocked or bypassed.

When the SSL proxy function works in the "Server Inspection - Offload" mode, it will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, and send the HTTPS traffic as plaintext to the Web server.

When the SSL proxy function works in the "Server Inspection - Proxy" mode, it will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, and re-encrypt the traffic and send it to the Web server.

You can integrate SSL proxy function with the following:

- Integrate with the application identification function. Devices can decrypt the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic encrypted using SSL by the applications and identify the application. After the application identification, you can configure the policy rule, QoS, session limit, policy-based route.

- Support unilateral SSL proxy in WebAuth. SSL client can use SSL connection during authentication stage. When authentication is completed, SSL proxy will no longer take effect, and the client and server communicate directly without SSL encryption.
- Integrate with AV, IPS, Antispam, Sandbox , Content Filter , File Filter and URL. Devices can perform the AV protection, IPS protection, Sandbox protection, Content filter , File filter, File content cilter and URL filter on the decrypted HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, can perform the File content filter, Web content, Web posting, HTTP/FTP control on the decrypted HTTPS traffic, and can perform the Email filter on the decrypted POP3S/SMTPS/IMAPS/RDPS/FTPS traffic.

Working as the Gateway of Web Clients

To implement the SSL proxy, you need to bind an SSL proxy profile to the policy rule. After binding the SSL proxy profile to a policy rule, system will use the SSL proxy profile to deal with the traffic that matches the policy rule. To implement the SSL proxy, take the following steps:

1. Configure the corresponding parameters of SSL negotiation, including the following items: specify the PKI trust domain of the device certificates, obtain the CN value of the subject field from the website certificate, and import a device certificate to the Web browser.
2. Configure an SSL proxy profile, including the following items: choose the work mode, configure the actions to the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when its SSL negotiation matches the item in the checklist, enable the audit warning page, and so on.
3. Bind an SSL proxy profile to a proper policy rule. The device will decrypt the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic that matches the policy rule and is not blocked or bypassed by the device.

Configuring SSL Proxy Parameters

Configuring SSL proxy parameters includes the following items:

- Specify the PKI trust domain of the device certificate
- Obtain the CN value of the website certificate
- Import a device certificate to a Web browser

Specifying the PKI Trust Domain of Device Certificate

By default, the certificate of the default trust domain trust_domain_ssl_proxy_2048 will be used to generate the SSL proxy certificate with the Web server certificate together, and then system will issue the generated SSL proxy certificate to the client. You can specify another PKI trust domain in system as the trust domain of the device certificate. The specified trust domain must have a CA certificate, local certificate, and the private key of the local certificate. To specify a trust domain, take the following steps:

1. Click **Policy > SSL Proxy**.
2. At the top-right corner of the page, click **Trust Domain Configuration**.
3. Select a trust domain from the Trust domain drop-down list.
    - The trust domain of trust_domain_ssl_proxy uses RSA and the modulus size is 1024 bits.
    - The trust domain of trust_domain_ssl_proxy_2048 uses RSA and the modulus size is 2048 bits.
4. Click **OK** to save the settings.

Obtaining the CN Value

To get the CN value in the Subject field of the website certificate, take the following steps (take www.gmail.com as the example):

1. Open the IE Web browser, and visit https://www.gmail.com.
2. Click the **Security Report** button () next to the URL.
3. In the pop-up dialog box, click **View certificates**.
4. In the Details tab, click **Subject**. You can view the CN value in the text box.

Importing Device Certificate to Client Browser

In the proxy process, the SSL proxy certificate will be used to replace the website certificate. However, there is no SSL proxy certificate's root certificate in the client browser, and the client cannot visit the proxy website properly. To address this problem, you have to import the root certificate (certificate of the device) to the browser.

To export the device certificate to local PC firstly, take the following steps:

1. Export the device certificate to local PC. Select **System > PKI**.
2. In the Management tab in the PKI Management dialog box, configure the options as below:
   - Trust domain: trust_domain_ssl_proxy or trust_domain_ssl_proxy_2048
   - Content: CA certificate
   - Action: Export
3. Click **OK** and select the path to save the certificate. The certificate will be saved to the specified location.

Then, import the device certificate to the client browser. Take Internet Explorer as an example:

1. Open IE.
2. From the toolbar, select **Tools > Internet** Options.
3. In the **Content** tab, click **Certificates**.

4. In the Certificates dialog box, click the **Trusted Root Certification Authorities** tab.

5. Click **Import**. Import the certificate following the Certificate Import Wizard.

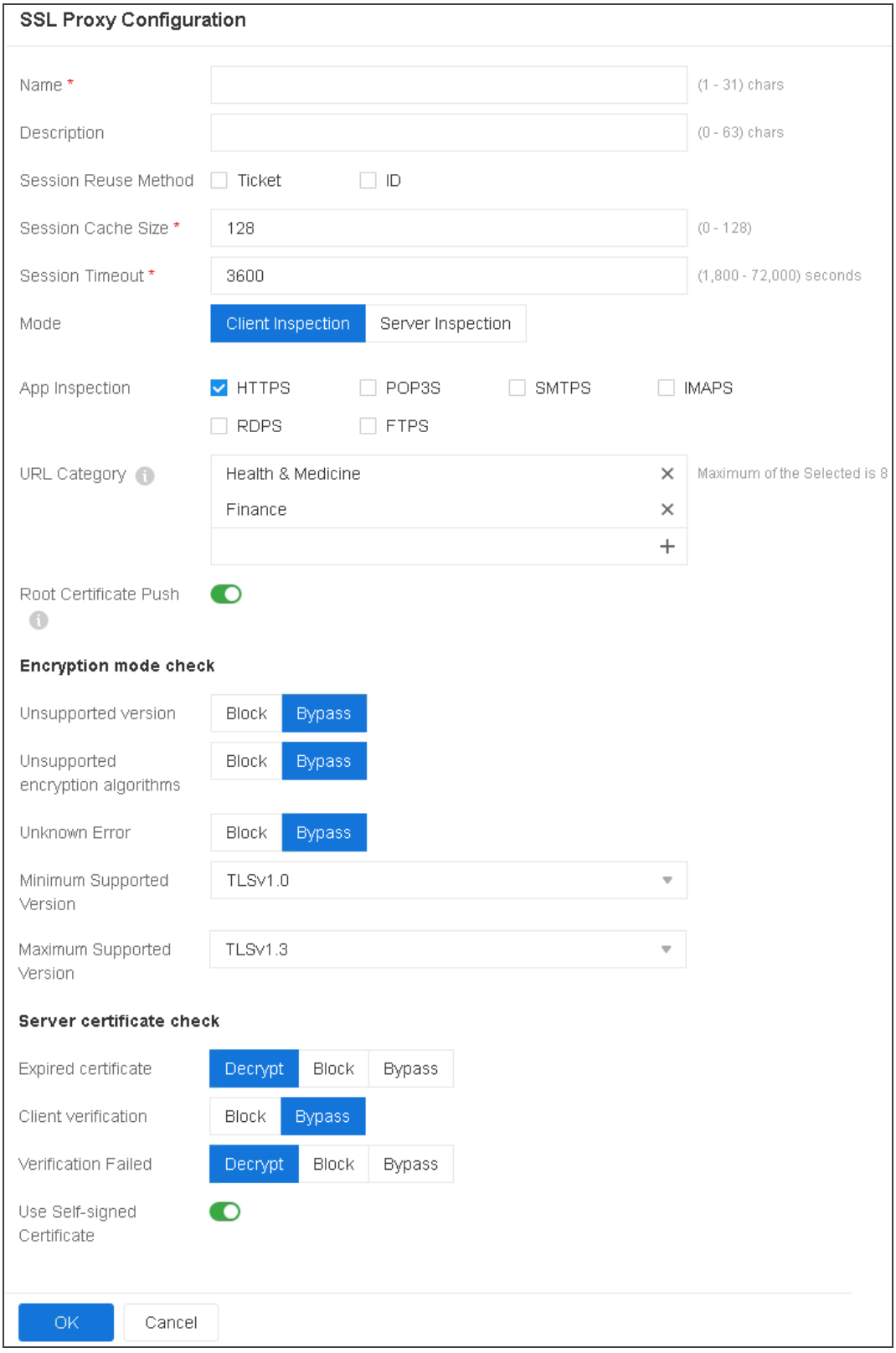
Configuring an SSL Proxy Profile

On the SSL Proxy Configuration page, you can configure the session reuse function, choose the work mode, configure the actions to the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when its SSL negotiation matches the item in the checklist, enable the audit warning page, and so forth. System supports up to 32 SSL proxy profiles.

To configure an SSL proxy profile, take the following steps:

1. Select **Object> SSL Proxy> SSL Proxy**.

2. Click **New**in the upper right corner to create a new SSL proxy profile.


SSL Proxy Configuration
Name *
(1 - 31) chars
Description
(0 - 63) chars
Session Reuse Method
Ticket
ID
Session Cache Size *
128
(0 - 128)
Session Timeout *
3600
(1,800 - 72,000) seconds
Mode
Client Inspection
Server Inspection
App Inspection
HTTPS
POP3S
SMTPS
IMAPS
RDPS
FTPS
URL Category
Health & Medicine
Finance
Maximum of the Selected is 8
Root Certificate Push
Encryption mode check
Unsupported version
Block
Bypass
Unsupported encryption algorithms
Block
Bypass
Unknown Error
Block
Bypass
Minimum Supported Version
TLSv1.0
Maximum Supported Version
TLSv1.3
Server certificate check
Expired certificate
Decrypt
Block
Bypass
Client verification
Block
Bypass
Verification Failed
Decrypt
Block
Bypass
Use Self-signed Certificate
OK
Cancel

In the Basic tab, configure the settings.

Option	Description
Name	Specify the name of the SSL proxy profile.
Description	Add the description of the SSL proxy file.
Session Reuse Method	After the Session Reuse function is enabled, when the client initiates an SSL connection request to the server, the server checks whether the request connection has been created, and if so, the previous SSL connection is resumed without the need for a complete TLS handshake, thereby reducing the time consumption during the handshake process. The system supports the following two session reuse methods: • Ticket: Select the check box to enable the session reuse based on session ticket. In this method, when an SSL connection is established between a client and a server for the first time, the server encapsulates the symmetric key and other status information generated in the TLS handshake into a session ticket which is encrypted, and then forwards the session ticket to the client, which is stored in the cache of the client. When the client initiates the SSL connection again (or initiates the connection request again after disconnection), the session ticket will first be sent to the server for decryption. If the server successfully decrypts and verifies the ticket, the first SSL connection will be resumed.

Option	Description
	• ID: Select the check box to enable the session reuse based on session ID. In this method, when an SSL connection is established between a client and a server for the first time, the session ID, symmetric key and other status information generated during the TLS handshake will be stored both in the cache of the client and the server. When the client initiates the SSL connection request again (or initiates the connection request again after disconnection), the server compares the session ID in the new request with the cached one and, if consistent, the first SSL connection will be resumed.  Notes: • When the device works as the gateway of Web clients, the Web servers need to support the session reuse function. • If session reuse based on session ticket and based on session ID are both configured, session reuse based on session ticket will be prioritized.
Session	Specifies the size of the session caches stored in the sys-

<table>
<tr><th>Option</th><th>Description</th></tr>
<tr><td>Cache Size</td><td>tem during session reuse based on session ticket or during session reuse based on session ID.

See the range and default values:<table><tr><th>Model</th><th>Range (Unit: piece)</th><th>Default value (Unit: piece)</th></tr><tr><td>SG-6000-E1600and below platforms of E series;</td><td>0 - 32. 0 means session cache information is not saved.</td><td>32</td></tr><tr><td>SG-6000-E1606 to SG-6000-E3968 of E series;</td><td>0 - 128. 0 means session cache information is not saved.</td><td>128</td></tr><tr><td>SG-6000-E3965 and above platforms of E series;</td><td>0-256. 0 means session cache information is not saved.</td><td>256</td></tr></table></td></tr>
<tr><td>Session Timeout</td><td>Specify the timeout value of the session caches stored in the system during session reuse based on session ticket or</td></tr>
</table>

Option	Description
	during session reuse based on session ID. If this timeout expires, the session caches will be deleted, and when the client establishes a SSL connection with the server, it needs a complete TLS handshake. The value range is 1800 to 72000 seconds. The default value is 3600 seconds.
Mode	When the device works as the gateway of Web clients, the SSL proxy function can work in the client-inspection proxy mode. When the device works as the gateway of Web servers, the SSL proxy function can work in the server-inspection proxy/offload mode. • In the client-inspection proxy mode, the device will proxy the SSL connection from the client, decrypt and inspect its data.. • In the server-inspection proxy mode, the device will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, re-encrypt the data and send the HTTPS traffic as plaintext to the Web server. • In the server-inspection offload mode, the device will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, and send the HTTPS traffic as plaintext to the Web server.

Option	Description
App Inspection	Select an application to be proxied by the SSL proxy function. Currently, system supports to perform SSL proxy on the HTTPS, POP3S, SMTPS, IMAPS, RDPS and FTPS traffic passing through the default port. By default, only the HTTPS traffic will be proxied, but you can select multiple applications as needed. To make sure the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic passing through user-defined ports will be proxied by the function, you can configure the user-defined ports in **Object > APP Book >** Static Signature Rule. **Note:** Only the predefined applications created in **Object > APP Book >** Application can be proxied by the SSL proxy function.
Root Certificate Push	Click the **Enable** button again to enable the Root Certificate Push. When the HTTPS traffic is decrypted by the SSL proxy function, the Install Root Certificate page will display in your Web browser. On the Install Root Certificate page, you can select **Download** or **Downloaded, Ignored** as needed. • Download: Click the button to download the root certificate to your local PC. For details on importing a root certificate to your Web browser, refer to Importing Device Certificate to Client Browser. • Downloaded, Ignored: If you click the button, sys-

Option	Description
	tem will no longer push the Install Root Certificate page, and will redirect you to the page you want to visit. **Notes:** • When the Install Root Certificate page appears, if you close the browser without selecting either **Download** or **Download, Ignored**, system will still push the page for your next HTTPS request. • You must install the root certificate. If you do not install the root certificate, system will prompt the access is not secure, therefore the access page may not be loaded completely. Click the **Enable** button to disable the Root Certificate Push. With the function disabled, when the client initiates an HTTPS request: • If the root certificate has been installed in your Web browser, you will be redirected to the page you want to visit. • If the root certificate has not been installed in your Web browser, you will see the prompted that you're visiting is not secure.

In the Decryption Configuration tab, configure the following options. After the system completes inspection of the SSL negotiation, the

HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic that is not blocked or bypassed will be decrypted. If the parameters match multiple items in the checklist and you have configured different actions for different items, the Block action will take effect, and the corresponding traffic will be blocked.

Encryption mode check	
Unsupported version	Check the SSL protocol version used by the server. • When the SSL protocol used by the SSL server is not supported in system, you can select **Block** to block its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Bypass** to bypass its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. The default action is to bypass the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. • When the SSL protocol used by the SSL server is supported, it will continue to check other items.
Unsupported encryption algorithms	Check the encryption algorithm used by the server. • When the encryption algorithm used by the SSL server is not supported in system, you can select **Block** to block its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Bypass** to bypass its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. The default action is to bypass the

	HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. • When the encryption algorithm used by the SSL server is supported, it will continue to check other items.
Unknown Error	Check the unknown error. • When SSL negotiation fails and the cause of failure can't be confirmed, you can select **Block** to block its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Bypass** to bypass its HTTPS/POP3S/SMTPS/IMAPS traffic. The default action is to bypass the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. • When system do not need check unknown failure, it will continue to check other items.
Minimum Supported Version	Specify the minimum SSL protocol version supported by the system. When the SSL protocol version used by the SSL server meets the requirements, the system can proxy its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic.
Maximum Supported Version	Specify the minimum SSL protocol version supported by the system. When the SSL protocol version used by the SSL server meets the requirements, the system can proxy

	its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic.
Server certificate check	
Expired certificate	Check the certificate used by the server. When the certificate is overdue, you can select **Block** to block its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Bypass** to bypass its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Decrypt** to decrypt the HTTPS/POP3S/SMTPS/IMAPS traffic. The default action is to decrypt the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic.
Client verification	Check whether the SSL server verifies the client certificate. • When the SSL server verifies the client certificate, you can select **Block** to block its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic, or select **Bypass** to bypass its HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. The default action is to bypass the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. • When the SSL server does not verify the client certificate, it will continue to check other items.
Verification	Verify the server certificate. You can configure an action

Failed	for the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when the certificate is failed to be verified. The default action is to decrypt the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic. • Decrypt: Decrypt the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when the certificate is failed to be verified, and select whether to use the self-signed certificate. • Use the self-signed certificate: Click the **Enable** button to use the self-signed certificate to complete the SSL negotiation with the Web browser. In this case, your browser will prompt a warning message. • Do not use the self-signed certificate: Click the **Enable** button again to disable the self-signed certificate. Then, the system will use the trusted certificate "SG6000" to complete the SSL negotiation with the Web browser. If the certificate "SG6000" has been installed, your browser will not prompt a warning message. • Block: Block the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when the certificate is failed to be verified.

	• Bypass: Bypass the HTTPS/POP3S/SMTPS/IMAPS/RDPS/FTPS traffic when the certificate is failed to be verified.

3. Click **OK** to save the settings.

Working as the Gateway of Web Servers

To implement an SSL proxy, you need to bind an SSL proxy profile to the policy rule. After binding the SSL proxy profile to a policy rule, the system will use the SSL proxy profile to deal with the traffic that matches the policy rule. To implement SSL proxy, take the following steps:

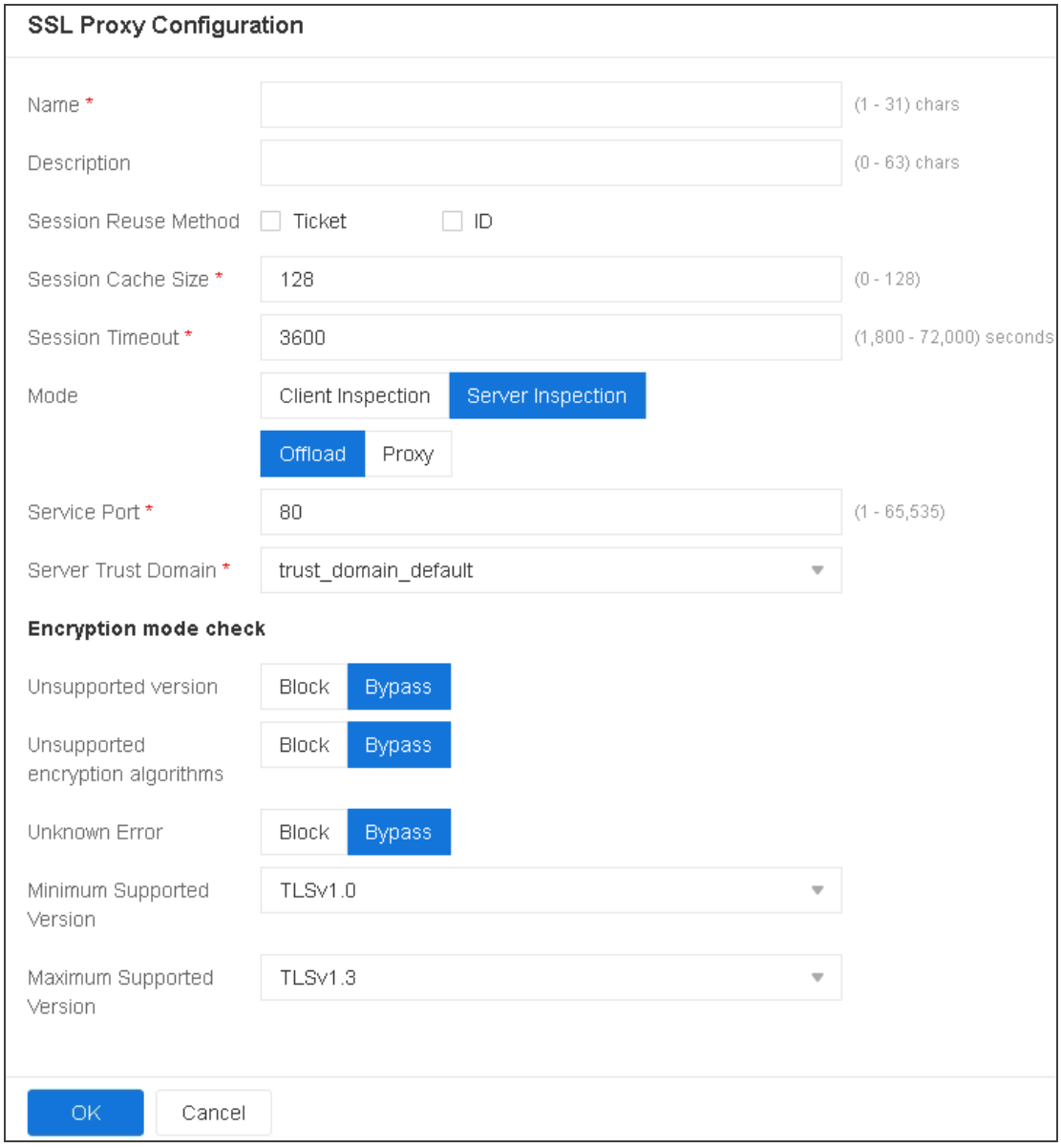
1. Configure an SSL proxy profile. You can choose the work mode, specify the trust domain of the Web server certificate and the HTTP port number of the Web server.
2. Bind an SSL proxy profile to a proper policy rule. The device will decrypt the HTTPS traffic that matches the policy rule.

Configuring an SSL Proxy Profile

On the SSL Proxy Configuration page, you can configure options such as the session reuse, the work mode, the trust domain of the Web server certificate, and the HTTP port number of the Web server.

To configure an SSL proxy profile, take the following steps:

1. Select **Policy > SSL Proxy > SSL Proxy**.
2. Click **New** in the upper right corner to create a new SSL proxy profile.



In the Basic tab, configure the following options.

Option	Description
Name	Specify the name of the SSL proxy profile.
Description	Add the description of the SSL proxy Profile.
Session	After the Session Reuse function is enabled, when the cli-

Option	Description
Reuse Method	ent initiates an SSL connection request to the server, the server checks whether the request connection has been created, and if so, the previous SSL connection is resumed without the need for a complete TLS handshake, thereby reducing the time consumption during the handshake process. The system supports the following two session reuse methods: • Ticket: Select the check box to enable the session reuse based on session ticket. In this method, when an SSL connection is established between a client and a server for the first time, the server encapsulates the symmetric key and other status information generated in the TLS handshake into a session ticket which is encrypted, and then forwards the session ticket to the client, which is stored in the cache of the client. When the client initiates the SSL connection again (or initiates the connection request again after disconnection), the session ticket will first be sent to the server for decryption. If the server successfully decrypts and verifies the ticket, the first SSL connection will be resumed. • ID: Select the check box to enable the session reuse based on session ID. In this method, when an SSL connection is established between a client and

Option	Description
	a server for the first time, the session ID, symmetric key and other status information generated during the TLS handshake will be stored both in the cache of the client and the server. When the client initiates the SSL connection request again (or initiates the connection request again after disconnection), the server compares the session ID in the new request with the cached one and, if consistent, the first SSL connection will be resumed.  Notes: • When the device works as the gateway of Web servers, the Web clients need to support the session reuse function. • If session reuse based on session ticket and based on session ID are both configured, session reuse based on session ticket will be prioritized.
Session Cache Size	Specifies the size of the session caches stored in the system during session reuse based on session ticket or during session reuse based on session ID.

<table>
<tr><th>Option</th><th>Description</th></tr>
<tr><td></td><td>See the range and default values:<table><tr><th>Model</th><th>Range (Unit: piece)</th><th>Default value (Unit: piece)</th></tr><tr><td>SG-6000-E1600and below platforms of E series;</td><td>0 - 32. 0 means session cache inform-ation is not saved.</td><td>32</td></tr><tr><td>SG-6000-E1606 to SG-6000-E3968 of E series;</td><td>0 - 128. 0 means session cache inform-ation is not saved.</td><td>128</td></tr><tr><td>SG-6000-E3965 and above platforms of E series;</td><td>0-256. 0 means session cache inform-ation is not saved.</td><td>256</td></tr></table></td></tr>
<tr><td>Session Timeout</td><td>Specify the timeout value of the session caches stored in the system during session reuse based on session ticket or during session reuse based on session ID. If this timeout expires, the session caches will be deleted, and when the</td></tr>
</table>

Option	Description
	client establishes a SSL connection with the server, it needs a complete TLS handshake. The value range is 1800 to 72000 seconds. The default value is 3600 seconds.
Mode	Select the server-inspection proxy/offload mode. When the device works as the gateway of Web servers, the SSL proxy function can work in this mode. • In the server-inspection proxy mode, the device will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, re-encrypt the data and send the HTTPS traffic as plaintext to the Web server. • In the server-inspection offload mode, the device will proxy the SSL connections initialized by Web clients, decrypt the HTTPS traffic, and send the HTTPS traffic as plaintext to the Web server.
Service Port	Specify the HTTP port number of the Web server when the device works in the server-inspection proxy/offload mode.
Server Trust Domain	Since the device will work as the SSL server and use the certificate of the Web server to establish the SSL connection with Web clients (Web browsers), you need to import the certificate and the key pair into a trust domain in the device. For more information about importing the

Option	Description
	certificate and the key pair, see "PKI" on Page 520. After you complete the importing, select the trust domain used by this SSL Profile.
Warning	Select **Enable** to enable the warning page. When the HTTPS traffic is decrypted by the SSL proxy function, the request to a HTTPS website will be redirected to a warning page of SSL proxy. In this page, system notifies the users that their access to HTTPS websites are being monitored and asks the users to protect their privacy.

3. Click **OK** to save the settings.

Binding an SSL Proxy Profile to a Policy Rule

After binding the SSL proxy profile to a policy rule, system will process the traffic that is matched to the rule according to the profile configuration. To bind the SSL proxy profile to a policy rule, see "Security Policy" on Page 1286.

Configuring Domain White List

Websites that do not need or support SSL proxy can be added to the domain white list. The system provides the predefined domain white list to save the sites that do not support SSL proxy. For example, sites that require client certificate authentication or sites with fixed website certificates. You can also add sites to the domain white list as needed. The sites on the predefined domain white list cannot be edited or deleted.

Creating a User-defined Domain White List

If you choose not to decrypt a site out of service concerns, privacy concerns, or other voluntary reasons, you can add it to the domain white list. The device will not perform the SSL proxy

function for the sites on the white list. To create a user-defined domain white list, take the following steps:

1. Select **Object > SSL Proxy > Domain White List**.
2. Click **New** to create a new domain white list.

On the Whitelist Configuration page, configure the following options.

Option	Description
Domain	Enter the domain of the domain white list. You can enter 1 to 63 characters and the domain is case sensitive. You can use the wildcard "*" in the domain. The wildcard "*" can only be used once and should be placed at the beginning of the domain, such as "*.hillstonenet.com".
Description	Enter the description of the user-defined domain white list. You can enter 1 to 63 characters.
Free Proxy	Click **Enable** or **Disable** button to enable or disable the domain white list.

3. Click **OK**.

Editing a User-defined Domain White List

To edit a user-defined domain white list, take the following steps:

1. Select **Object > SSL Proxy > Domain White List**.
2. On the domain white list, select the site that needs to be edited on the domain white list entry to edit and click **Edit**.
3. On the **Whitelist Configuration** page, edit the description information and the Free Proxy status of the selected site.
4. Click **OK**.

Deleting a User-defined Domain White List

To delete a user-defined domain white list, take the following steps:

1. Select **Object > SSL Proxy > Domain White List**.
2. 2. On the domain white list, select the site that needs to be deleted on the domain white list entry to delete and click **Delete**.
3. Click **Delete** in the pop-up dialog box to delete this site from the domain white list.

Exporting the Domain White List

The system exports the domain white list file in .csv format, of which the content is the real-time information of the domain white list in the system.

To export the domain white list from the system to local, take the following steps:

1. Select **Object > SSL Proxy > Domain White List**.
2. Click **Export**.

Configuring the IP Whitelist

The device will not perform the SSL proxy function for the traffic from the IPs listed on the IP whitelist. You can add the IP, the traffic from which does not need or support SSL proxy, to the IP whitelist. The IP whitelist contains dynamic IP whitelist and static IP whitelist.

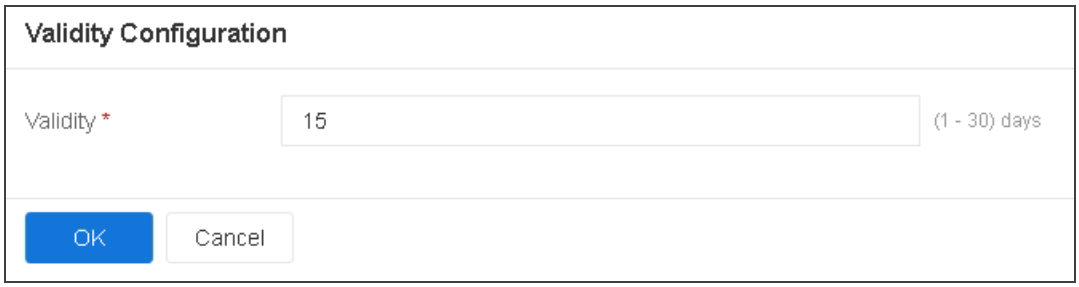
Configuring Dynamic IP Whitelist

When the device works as the gateway of Web clients, the system automatically adds the IP address to the dynamic IP whitelist in the following conditions: The traffic from this IP cannot be SSL proxied by the system and the action for this traffic is to bypass. In this scenario, the system will not perform the SSL proxy function for the traffic from the IPs listed on the IP whitelist in the future. For more information on the configuration of the SSL proxy profile, see Configuring an SSL Proxy Profile. The traffic from the IP, which is added to the dynamic IP whitelist because its traffic cannot be proxied by the device, will be re-proxied again after the validity time is due. You can configure the validity time of IPs on the dynamic IP whitelist. The system automatically deletes the existing dynamic IPs on the whitelist after their validity time is due. The system checks the dynamic IPs on the whitelist every hour to delete the IPs that expire.

Configuring the Validity Time of the Dynamic IP Whitelist

To configure the validity time of the dynamic IPs on the whitelist, take the following steps:

1. Select **Object > SSL Proxy > IP WhiteList**.
2. Click the **Validity Configuration**.



On the Validity Configuration page, configure the following options.

Option	Description
Validity	Specify the validity time of the dynamic IPs on the whitelist. The unit is by day. The range of the validity time is from 1 to 30 days. The default validity time is 15 days.

3. Click **OK**.

Notes: After you modify the SSL Profile policy or change the validity time of the dynamic IPs on the whitelist, the system deletes all current dynamic IPs on the whitelist.

Configuring the Dynamic IPs on the Whitelist to be Permanently Valid

To prevent the specified dynamic IPs on the whitelist from being automatically deleted by the system, you can configure the dynamic IP on the whitelist to be permanently valid. To configure a dynamic IP on the whitelist to be permanently valid, take the following steps:

1. Select **Object > SSL Proxy > IP WhiteList**.

2. On the IP whitelist, select the IP that needs to be set permanently valid and click **Set IP Persistent**.
3. Click **OK**.

Configuring Static IP Whitelist

The device will not perform the SSL proxy function for the traffic from the IPs on the IP whitelist. You can create a static IP on the whitelists as needed and the static IPs on the whitelist never expire. To create a static IP on the whitelist, take the following steps:

1. Select **Object > SSL Proxy > IP WhiteList**.
2. Click **New**.

On the IP Whitelist Configuration page, configure the following options.

Option	Description
Type	Specify the IP type of the static IP on the whitelist as IPv4 or IPv6.
IP	Specify the IP address of the static IP on the whitelist.
TCP Port	Specify the TCP port of the static IP on the whitelist.

3. Click **OK**.

Deleting IP Whitelist

To delete the IP on the whitelist, take the following steps:

1. Select **Object > SSL Proxy > IP WhiteList**.
2. On the IP whitelist page, select the IP that needs to be deleted and click **Delete**.
3. Click **Delete** in the pop-up dialog box to delete this IP from the IP whitelists.

Notes: The total number of IPs that can be listed on the whitelist varies on different platforms. When the number of IP addresses that can be listed on the whitelist exceeds its upper limit, the system generates event logs to remind you of clearing IPs on the whitelist.

SLB Server Pool

The SLB function uses the load balancing algorithm to distribute the traffic and this utilizes the resources of the intranet servers. You can use the following methods to balance the server load:

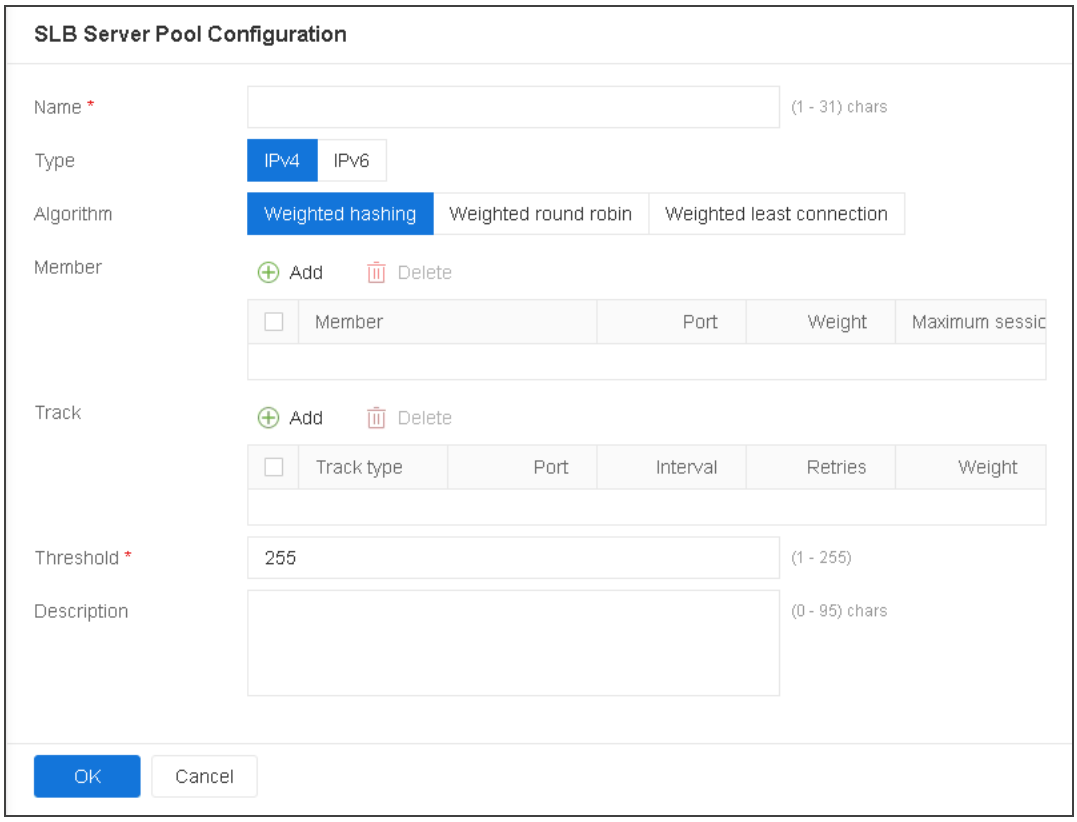
- Distribute the traffic to the specified port of each intranet server. This is applicable to the scenario that different intranet servers provide the same service via specified port at the same time.
- Distribute the traffic to different ports of an intranet server. This is applicable to the scenario that an intranet server provides the same service by running the same process at different ports.
- Combine the above two methods.

Configuring SLB Server Pool and Track Rule

To configure an SLB server pool and track rule, take the following steps:

1. Select **Object > SLB Server Pool**.

2. Click **New**. The SLB Server Pool Configuration dialog box appears.



In the SLB Server Pool Configuration dialog box, configure the following options.

Option	Description
Name	Specifies the name of the SLB server pool.
Type	Specifies the type of the SLB server pool, include IPv4 or IPv6.
Algorithm	Select an algorithm for load balancing.
Member	
Member	Specifies the member of the pool. You can type the IP range or the IP address and the netmask.

Option	Description
Port	Specifies the port number of the server.
Maximum Sessions	Specifies the allowed maximum sessions of the server. The value ranges from 0 to 1,000,000,000. The default value is 0, which represents no limitation.
Weight	Specifies the traffic forwarding weight during the load balancing. The value ranges from 1 to 255.
Add	Add the SLB address pool member to the SLB server pool. You can add up to 256 members.
Track	
Track Type	Selects a track type.
Port	Specifies the port number that will be tracked. The value ranges from 0 to 65535. • When the members in the SLB server pool have the same IP address and different ports, you don't need to specify the port when configuring the track rule. System will track each IP address and its port in the SLB server pool. • When there is a member whose port is not configured exists in the SLB sever pool, you must specify the port when configuring the track rule. System will track the specified port of the IP addresses in the SLB server pool. • When the members in the SLB server pool are all

Option	Description
	configured with IP addresses and ports and these configured IP addresses are different from each other, you can select whether to specify the port when configuring the track rule. If specified, system will track the specified port of these IP addresses. If not, system will track the configured ports of the IP addresses of the members.
Interface	Specify the source interface of the track rule. The system will use the IP address of the specified interface as the source IP address to send Ping/TCP/UDP messages.
Interval	Specifies the interval between each Ping/TCP/UDP packet. The unit is second. The value ranges from 3 to 255.
Retries	Specifies a retry threshold. If no response packet is received after the specified times of retries, System will determine this track entry fails, i.e., the track entry is unreachable. The value range is 1 to 255.
Weight	Specifies a weight for the overall failure of the whole track rule if this track entry fails. The value range is 1 to 255.
Add	Click **Add** to add the configured track rule to the list.
Threshold	Types the threshold for the track rule into the **Threshold** box. The value range is 1 to 255. If the sum of weights for failed entries in the track rule exceeds the threshold,

Option	Description
	system will conclude that the track rule fails.
Description	Types the description for this track rule.

3. Click **OK** to save the settings.

Viewing Details of SLB Pool Entries

To view the details of the servers in the SLB pool, take the following steps:

1. Click **Object > SLB Server Pool**.
2. Select "+" before an SLB pool entry.
3. In the Server List tab under the entry, view the information of the servers that are in this SLB pool.
4. In the Monitoring tab, view the information of the track rules.
5. In the Referenced tab, view the DNAT rules that use the SLB pool.

Schedule

System supports a schedule. This function allows a policy rule or NAT rule to take effect in a specified time and controls the duration of the connection between a PPPoE interface and the Internet. The schedule consists of a periodic schedule and an absolute schedule. The periodic schedule specifies a time point or time range for periodic schedule entries, while the absolute schedule decides a time range in which the periodic schedule will take effect.

Periodic Schedule

Periodic schedule is the collection of periods specified by all of the schedule entries within the schedule. You can add up to 16 schedule entries to a periodic schedule. These entries can be divided into 3 types:

- Daily: The specified time of every day, such as Everyday 09:00:30 to 18:00:20.
- Days: The specified time of a specified day during a week, such as Monday Tuesday Saturday 09:00:15 to 13:30:45.
- Period: A continuous period during a week, such as from Monday 09:30:30 to Wednesday 15:00:05.

Absolute Schedule

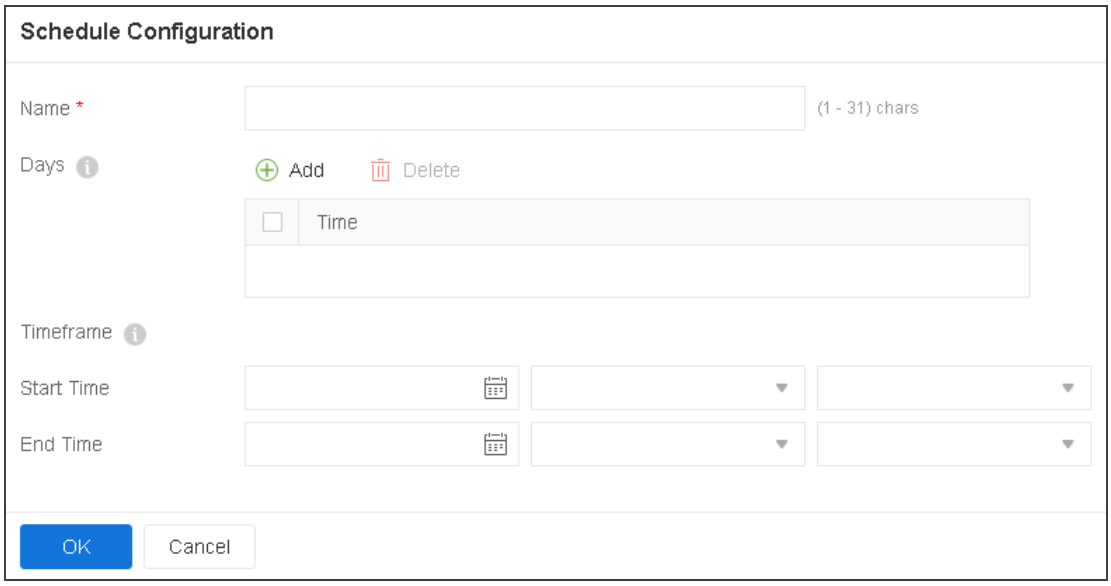
An absolute schedule is a time range in which a periodic schedule will take effect. If no absolute schedule is specified, the periodic schedule will take effect as soon as it is used by some module.

Creating a Schedule

To create a schedule, take the following steps:

1. Select **Object > Schedule**.

2. Click **New**.



Configure the following options.

Schedule Configuration Dialog Box		
Name	Specifies a name for the new schedule.	
Add	Specifies a type for the periodic schedule in Add Periodic Schedules section.	
	Type	• Daily - The specified time of every day. Click this radio button, and then, in the Time section, select a start time and end time from the Start time and End time drop-down list respectively. • Days - The specified time of a specified day during a week. Click this radio button, and then select a

Schedule Configuration Dialog Box	
	day/days in the Days and Time section, and finally select a start time and end time from the Start time and End time drop-down list respectively. • Duration - A continuous period during a week. Click this radio button, and then in the Duration section select a start day/time and end day/time from the Start time and End time drop-down list respectively. Preview — Preview the detail of the configured periodic schedule in the Preview section.
Delete	Select the entry you want to delete from the period schedule list below, and click **Delete**.
Absolute Schedule	The absolute schedule decides a time range in which the periodic schedule will take effect. Without configuring an absolute schedule, the periodic schedule will take effect as soon as it is used by some module.

3. Click **OK**.

Notes: In both absolute schedule and periodic schedule, the interval between the Start time and the End time should not be less than 1 minute.

AAA Server

An AAA server is a server program that handles user requests to access computer resources, and for an enterprise, this server provides authentication, authorization, and accounting (AAA) services. The AAA server typically interacts with network access and gateway servers and with databases and directories containing user information.

Here in StoneOS system, authentication supports the following five types of AAA server:

- Local server: a local server is the firewall itself. The firewall stores user identity information and handles requests. A local server authentication is fast and cheap, but its storage space is limited by the firewall hardware size.
- External servers:
  - Radius Server
  - LDAP Server
  - Active-Directory Server
  - TACACS+ Server

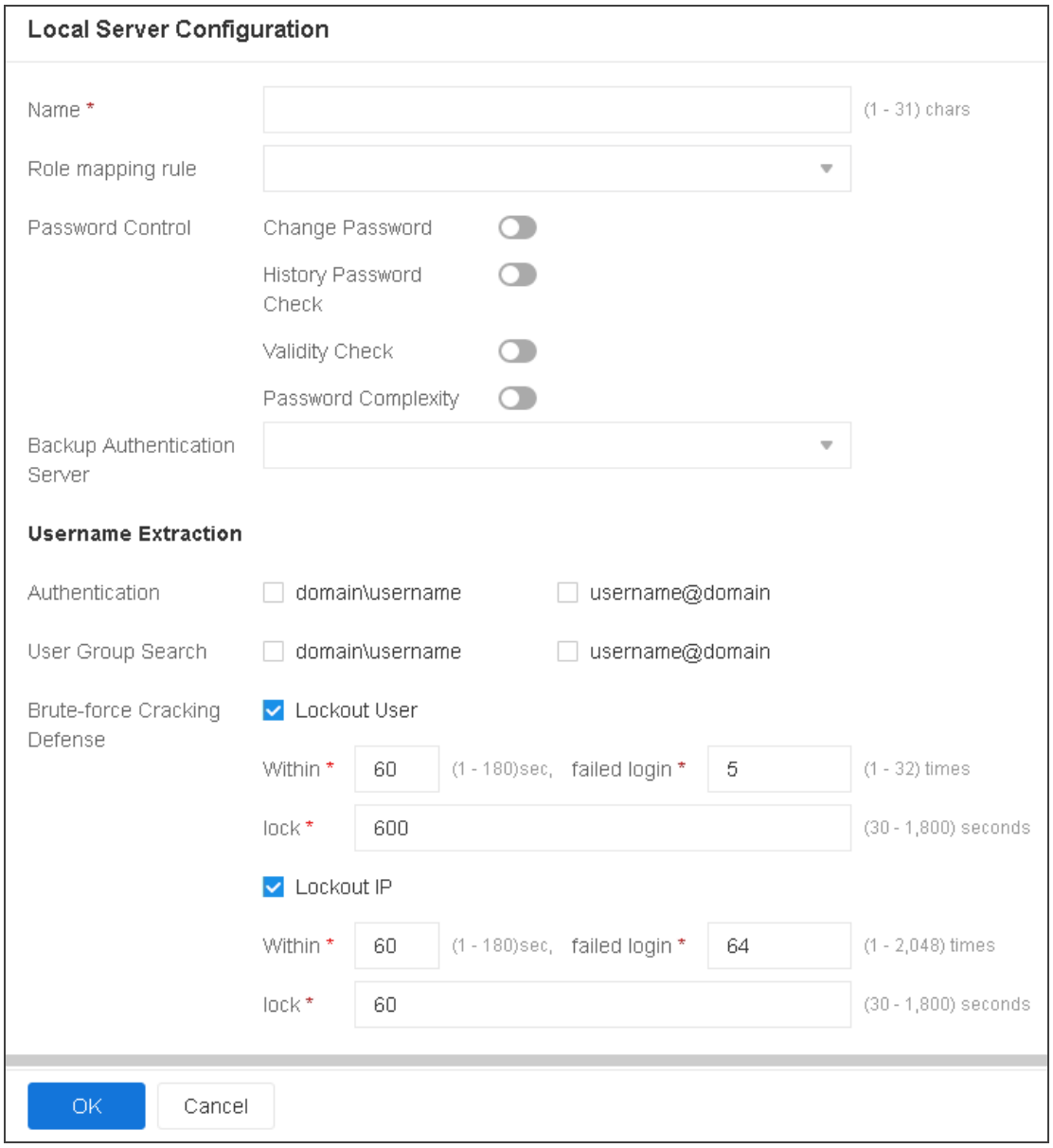
According to the type of authentication, you need to choose different AAA servers:

- "802.1x" on Page 513 : Only local and Radius servers support these two types of authentication.
- "Configuring IPSec-XAUTH Address Pool" on Page 583: Local, Radius, Ldap, AD and Tacacs+ servers are supported.
- Other authentication methods mentioned in this guide: all four servers can support the other authentication methods.

Configuring a Local AAA Server

1. Select **Object > AAA Server**, and click **New > Local Server**.

2. The **Local Server Configuration** page opens.



Configure the following.

Option	Description
Name	Type the name for the new server into the text box.
Role mapping rule	Specifies a role mapping rule for the server. With this option selected, system will allocate a role for the users who have been authenticated to the server according to the specified role mapping rule.
Password Control	To prevent account security problem, you can configure the password control function. • Change Password: Click the button to enable the Change Password function. With this function enabled, the system allows users to change their own passwords after the successful WebAuth or SCVPN authentication. • Change Password after First Login: Click the button to enable **Change Password after First Login**. Before enabling this function, you need to enable the **Change password** function first. With this function enabled, when you log in for web authentication for the first time, the prompt "Change the password for the first login" appears, forcing you to change the password according to the configured password complexity. When you log in to the SSL VPN for the first time, two modes are available for you: • Compatible Mode: ① If this function does

Option	Description
	not apply to the SSL VPN client, you can log in to the SSL VPN client for the first time without changing the password. ② If this function applies to the SSL VPN client, you need to change the login password immediately after logging in to the SSL VPN client for the first time. • Enforce Mode: Users need to change the login password immediately after logging in to the SSL VPN client for the first time.  Notes: • In case the Enforce Mode is configured, the SSL VPN client cannot be used if this function is not supported by the SSL VPN client. You are advised to upgrade the SSL VPN client or switch to the compatible mode. • The SSL VPN client versions that allow you to change the password upon the first login are as follows: SSL VPN Windows cli-

Option	Description
	 ent 1.4.9.1274 or later version, Linux 1.4.0 or later version, Android 4.5 or later version, and iOS 2.0.6 or later version. • Change Password after First Login function is not supported by SSL VPN Windows client (non-administrator) version 1.5.x. • History Password Check: Click the button to enable **History Password Check**. With the function enabled, when you change the password, the system verifies that whether the new password is the same as historical passwords. Specify the number of historical passwords to be verified. The value rage is from 1 to 5. The default value is 3, indicating that the new password cannot be the same as the last three historical passwords. • Validity Check: Click the button to enable **Validity Check**. With this function enabled, the system checks the validity of the password. Configure the valid period of password in the textbox. • Password Expiry Warning: Click the button to

Option	Description

	enable **Password Expiry Warning** and configure the warning period before password expiry. The value range is from 1 to 30 days. For example, if the value is set to 10, it indicates that you will get a warning about the approaching account expiry 10 days before the expiration date. The default value is 7.
	• Password Complexity: The lower the complexity of the password, the more likely it is to be cracked. Examples of low complexity are passwords containing username or short passwords. For security reasons, you can enable the password complexity configuration and configure the password complexity requirements to ensure that the user's password has high complexity. Click the button to enable **Password Complexity** configuration.
	  • Minimum Password Length: Specifies the minimum password length. The value range is 1 to 16. The default value is 1.
	  • Minimum Capital Letter Length: Specifies the minimum length of uppercase letters contained in the password. The value range

Option	Description
	is 0-16. The default value is 0. • Minimum Lowercase Letter Length: Specifies the minimum length of lowercase letters contained in the password. The value range is 0-16. The default value is 0. • Minimum Number Length: Specifies the minimum length of the number contained in the password. The value range is 0-16. The default value is 0. • Minimum Special Character Length: Specifies the minimum length of special characters (that is, non-numeric characters) contained in the password. The value range is 0-16. The default value is 0. • Password cannot contain username: Click the button to enable**Password cannot contain username**. Passwords are not allowed to contain the username.
Backup Authentication Server	To configure a backup authentication server, select a server from the drop-down list. After configuring a backup authentication server for the local server, the backup authentication server will take over the authentication task when the primary server malfunctions or

Option	Description
	authentication fails on the primary server. The backup authentication server can be any existing local, Active-Directory, RADIUS or LDAP server defined in system.
Username Extraction	
Authentication	Specifies the authentication user name format. During authentication, the system will extract the user name for authentication based on the configured authentication user name format. If the specified format is not available, the system will use the original user name. The supported format includes "domain\username" and "username@domain".
Search Group	Specifies the user name format when the system searches from the local storage. When implementing policy control based on user name or user groups, the system will search for the group of a user name in the organization units that are locally saved. The supported format includes "domain\username" and "username@domain".
Brute-force Cracking Defense	To prevent illegal users from obtaining user name and password via brute-forth cracking, you can configure the brute-force cracking defense by locking out user or IP. • Select the **Lockout User** check box to enable the user-based brute-force cracking defense. If the

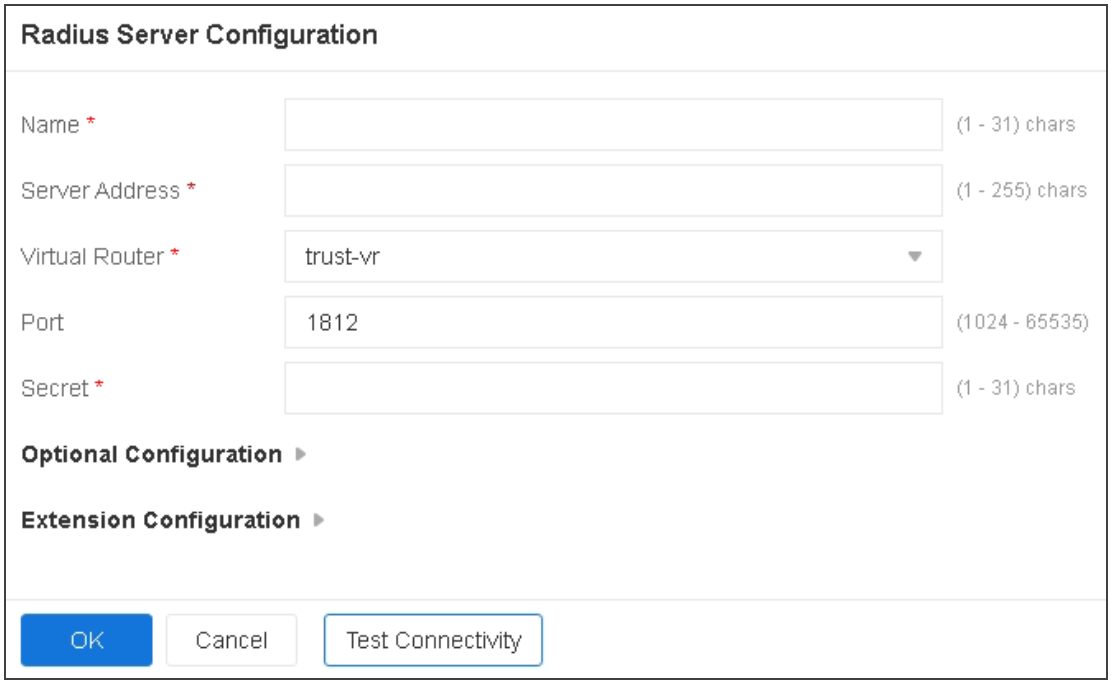
Option	Description
	failed attempts reached the specified times (1-32 times) within the specified period (1-180 seconds), the login user will be locked out for the specified time (30-1800 seconds). By default, within 60 seconds, if the failed attempts reached 5 times, the login user will be locked out for 600 seconds. • Select the **Lockout IP** check box to enable the IP-based brute-force cracking defense. If the failed attempts reached the specified times (1-2048 times) within the specified period (1-180 seconds), the IP will be locked out for the specified time (30-1800 seconds). By default, within 60 seconds, if the failed attempts reached 64 times, the IP will be locked out for 60 seconds.

3. Click **OK**.

Configuring Radius Server

1. Select **Object > AAA Server**, and click **New > Radius Server**.

2. The **Radius Sever Configuration** page opens.



Configure the following.

Basic Configuration	
Name	Specifies a name for the Radius server.
Server Address	Specifies an IP address (IPv4 or IPv6) or domain name for the Radius server.
Virtual Router	Specifies a VR for the Radius server.
Port	Specifies a port number for the Radius server. The value range is 1024 to 65535. The default value is 1812.
Secret	Specifies a secret for the Radius server. You can specify at most 31 characters.
Optional Configuration	
Authorization	When a user is authenticated by the Radius server, when

Basic Configuration	
Policy	the user is authenticated successfully, the Radius server will create a security policy for the authenticated user that includes the destination network segment, destination port, protocol, and behavior. This policy is called an authorization policy. System supports two authorization policies: "Authorization Policy During Authentication" and "Dynamic Authorization Policy". You can enable the authorization policy function to enable to obtain the authorization policy from the Radius server and add it to the system's policy list to make it effective. When the authenticated user is disconnected, the authorization policy will be deleted automatically. • By default, the authorization policy is disabled. Select the checkbox after **Authorization Policy** to enable the authorization policy. After the authorization policy of the Radius server is enabled, you add the obtained authorization policy to the aggregation policy that has been created, and arrange it as the member of aggregation policy at the end of aggregation policy, which is more convenient for the user to manage the authorization policy uniformly. If it is not added to the aggregation policy, the authorization policy will be added to the end of the system policy list by default.

Basic Configuration	
	• Select the aggregate policy name from the drop-down list.
Username Extraction	
Authentication	Specifies the authentication user name format. During authentication, the system will extract the user name for authentication based on the configured authentication user name format. If the specified format is not available, the system will use the original user name. The supported format includes "domain\username" and "username@domain".
Search Group	Specifies the user name format when the system searches from the local storage. When implementing policy control based on user name or user groups, the system will search for the group of a user name in the organization units that are locally saved. The supported format includes "domain\username" and "username@domain".
Role mapping rule	Specifies a role mapping rule for the server. With this option selected, system will allocate a role for the users who have been authenticated to the server according to the specified role mapping rule.
Backup server 1/ Backup server 2	Specifies an IP address or domain name for backup server 1 or backup server 2.

Basic Configuration	
Virtual Router1 / Virtual Router2	Specifies a VR for the backup server.
Retries	Specifies a retry time for the authentication packets sent to the AAA server. The value range is 1 to 10. The default value is 3.
Timeout	Specifies a timeout for the server response. The value range is 1 to 30 seconds. The default value is 3.
Backup Authentication Server	Specifies a backup authentication server. After configuring a backup authentication server for the Radius server, the backup authentication server will take over the authentication task when the primary server malfunctions or authentication fails on the primary server. The backup authentication server can be any existing local, Active-Directory, RADIUS or LDAP server defined in system.
LOCAL NAS IP	Specifies the LOCAL NAS IP address. This way, the source IP address of Radius authentication packets and accounting packets, as well as the *nas-ip-address* of the authentication packets are all changed to this specified IP address, ensuring that packets returned by the Radius server are received by the current device in the complex network environment. The LOCAL NAS IP should be the same as the interface IP of the device. Otherwise, Radius authentication packets or accounting packets may not be properly

<table>
<tr><th colspan="3">Basic Configuration</th></tr>
<tr><td></td><td colspan="2">sent.

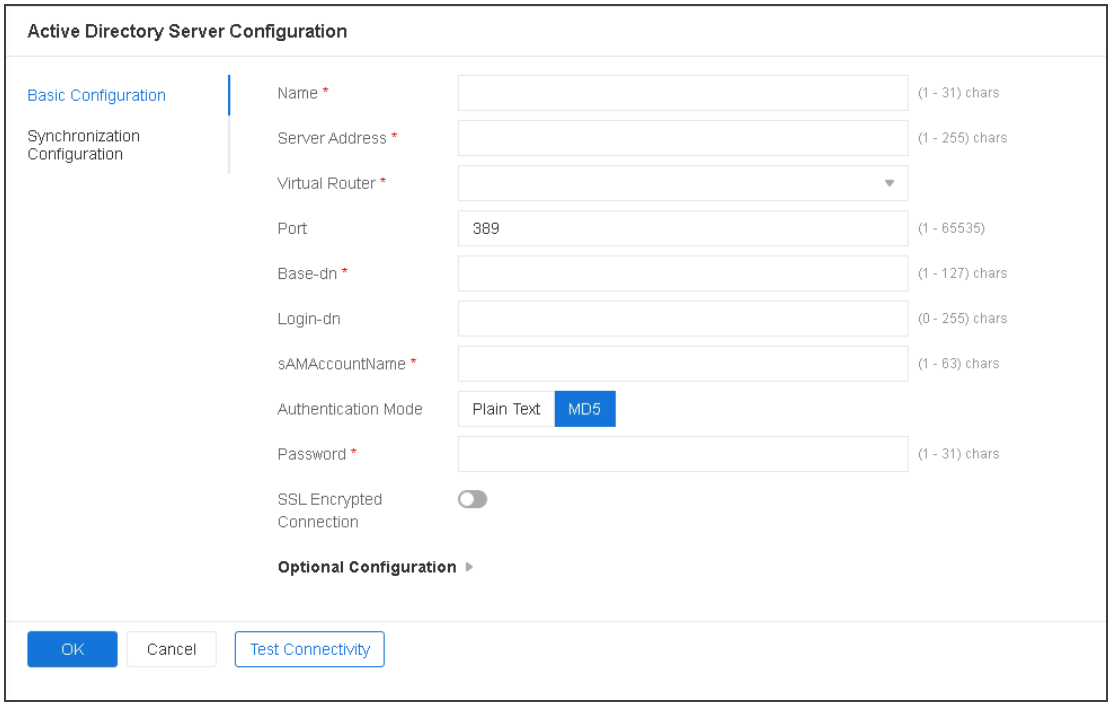
  Notes:
• In the HA environment, the configuration of the LOCAL NAS IP address is not synchronized to the backup device. Therefore, you need to configure it in both primary and backup devices.
• It should be ensured that there are reachable routes between the current device and the Radius server.</td></tr>
<tr><td>Enable Accounting</td><td colspan="2">Select the Enable checkbox to enable accounting for the Radius server, and then configure options in the sliding out area.</td></tr>
<tr><td></td><td>Server Address</td><td>Specifies an IP address or domain name for the accounting server.</td></tr>
<tr><td></td><td>Virtual Router</td><td>Specifies a VR for the accounting server.</td></tr>
<tr><td></td><td>Port</td><td>Specifies a port number for the accounting server. The value range is 1024 to 65535. The default value is</td></tr>
</table>

Basic Configuration		
		1813.
	Password	Specifies a password for the accounting server.
	Backup server 1/Backup server 2	Specifies an IP address or domain name for backup server 1 or backup server 2.
	Virtual Router-1/Virtual Router2	Specifies a VR for the backup server.
Extension Configuration		
Extended Password Encryption Algorithm	Specifies the SM4 extended password encryption algorithm for the Radius server. After configuration, the Radius server will use SM4 for the encrypted storage and encrypted transmission of passwords.	

3. Click **OK**.

Configuring Active Directory Server

1. Select **Object > AAA Server**, and click **New > Active Directory Server**.
2. The **Active Directory Server Configuration** page opens.



Configure the following.

Basic Configuration	
Name	Specifies a name for the Active Directory server.
Server Address	Specifies an IP address (IPv4 or IPv6) or domain name for the Active Directory server.
Virtual Router	Specifies a VR for the Active Directory server.
Port	Specifies a port number for the Active Directory server. The value range is 1 to 65535. The default value is 389.
Base-dn	Specifies a Base-dn for the AD server. The Base-dn is the starting point at which your search will begin when the AD server receives an authentication

Basic Configuration	
	request. For the example of abc.xyz.com as described above, the format for the Base-dn is "dc=a-abc,dc=xyz,dc=com".
Login-dn	Specifies authentication characteristics for the Login-dn (typically a user account with query privilege pre-defined by the AD server). When the authentication mode is plain, the Login-dn should be configured. DN (Distinguished name) is a username of the AD server who has a privilege to read user information. The format of the DN is"cn=xxx, DC=xxx,...". For example, the server domain is abc.xyz.com, and the AD server admin name is administrator who locates in Users directory. Then the login-dn should be "cn=a-administrator,cn=users,dc=abc,dc=xyz,dc=com".
sAMAccountName	When the authentication mode is MD5, the sAMAccountName should be configured. sAMAccountName is a username of the AD server who has a privilege to read user information. The format of sAMAccountName is "xxx". For example, the AD server admin name is administrator , and then the sAMAccountName should be "administrator".
Authentication Mode	Specifies an authentication or synchronization method (either plain text or MD5). The default

Basic Configuration	
	method is MD5. If the sAMAccountName is not configured after you specify the MD5 method, the plain method will be used in the process of synchronizing user from the server, and the MD5 method will be used in the process of authenticating the user.
Password	Specifies a password for the AD server.
SSL Encrypted Connection	Click the **Enable** button to enable the SSL encrypted connection function. With this function enabled, the system connects to the Active Directory authentication server through SSL.
Optional Configuration	
Authorization Policy	When a user is authenticated by the Radius server, when the user is authenticated successfully, the Radius server will create a security policy for the authenticated user that includes the destination network segment, destination port, protocol, and behavior. This policy is called an authorization policy. System supports two authorization policies: "Authorization Policy During Authentication" and "Dynamic Authorization Policy". You can enable the authorization policy function to enable to obtain the authorization policy from the Radius server and add it to

Basic Configuration	
	the system's policy list to make it effective. When the authenticated user is disconnected, the authorization policy will be deleted automatically. • By default, the authorization policy is disabled. Select the checkbox after **Authorization Policy** to enable the authorization policy. After the authorization policy of the Radius server is enabled, you add the obtained authorization policy to the aggregation policy that has been created, and arrange it as the member of aggregation policy at the end of aggregation policy, which is more convenient for the user to manage the authorization policy uniformly. If it is not added to the aggregation policy, the authorization policy will be added to the end of the system policy list by default. • Select the aggregate policy name from the drop-down list.
Username Extraction	
Authentication	Specifies the authentication user name format. During authentication, the system will extract the user name for authentication based on the configured authentication user name format. If the specified format is not available, the system will use the original user name. The supported format includes

Basic Configuration	
	"domain\username" and "username@domain".
Search Group	Specifies the user name format when the system searches from the local storage. When implementing policy control based on user name or user groups, the system will search for the group of a user name in the organization units that are locally saved. The supported format includes "domain\username" and "username@domain".
Role Mapping Rule	Specifies a role mapping rule for the server. With this option selected, system will allocate a role for users who have been authenticated to the server according to the specified role mapping rule.
Backup server 1/Backup server 2	Specifies an IP address or domain name for backup server 1 or backup server 2.
Virtual Router-1/Virtual Router2	Specifies a VR for the backup server.
Authentication Base-DN	Specifies an authentication Base-dn for the AD server. All users in the Base-DN (including those directly under the user group) will be allowed to pass the authentication. The format of the DN is"OU-U=xxx, DC=xxx,...".
Synchronization	Specifies a Synchronization Base-dn for the AD

Basic Configuration		
Base-DN	server. All users and user groups in the Base-DN will be synchronized to the local. The format of the DN is"OU=xxx, DC=xxx,...".	
Synchronization	Check the checkbox to enable the synchronization function; clear the checkbox to disable the synchronization function, and the system will stop synchronizing and clear the existing user information. By default, system will synchronize the user information on the configured Active-Directory server with the local server every 30 minutes.	
Automatic Synchronization	Click the radio button to specify the automatic synchronization.	
	Interval Synchronization	Specifies the time interval for automatic synchronization. The value range is 15 to 1440 minutes. The default value is 30.
	Daily Synchronization	Specifies the time when the user information is synchronized everyday. The format is HH:MM, HH and MM indicates hour and minute respectively.
	Once Synchronization	If this parameter is specified, system will synchronize automatically when the con-

Basic Configuration	
	figuration of Active-Directory server is modified. After executing this command , system will synchronize the user information immediately.
Synchronous Operation Mode	Specifies user synchronization mode, including Group Synchronization and OU Synchronization. By default, the user information will be synchronized with the local server based on the group.
Synchronization Object	Filter the synchronization information obtained and retain the information of the specified object. You can select the syn object as users or groups. By default, users and groups are both selected.
OU maximum depth	Specifies the maximum depth of OU to be synchronized. The value range is 1 to 12, and the default value is 12. OU structure that exceeds the maximum depth will not be synchronized, but users that exceed the maximum depth will be synchronized to the specified deepest OU where they belong to. If the total characters of the OU name for each level(including the “OU=” string and punctuation) is more than 128, OU information that exceeds the length will not be synchronized with the local server.

Basic Configuration	
User Filter	Specifies the user-filter conditions. System can only synchronize and authenticate users that are in accordance with the filtering condition on the authentication server. The length is 0 to 120 characters. For example, if the condition is configured to "memberOf=CN=Admin,DC=test,DC=com", system only can synchronize or authenticate user whose DN is "memberOf=CN=Admin,DC=test,DC=com". The commonly used operators are: =(equals a value)、&(and)、|(or)、!(not)、*(Wildcard: when matching zero or more characters)、~=(fuzzy query.)、>=Be greater than or equal to a specified value in lexicographical order.)、<=(Be less than or equal to a specified value in lexicographical order.).
Backup Authentication Server	Specifies a backup authentication server. After configuring a backup authentication server for the Radius server, the backup authentication server will take over the authentication task when the primary server malfunctions or authentication fails on the primary server. The backup authentication server can be any existing local, Active-Directory, RADIUS or LDAP server defined in system.
Synchronization Base-dn	Synchronization Base-DN is the starting point at

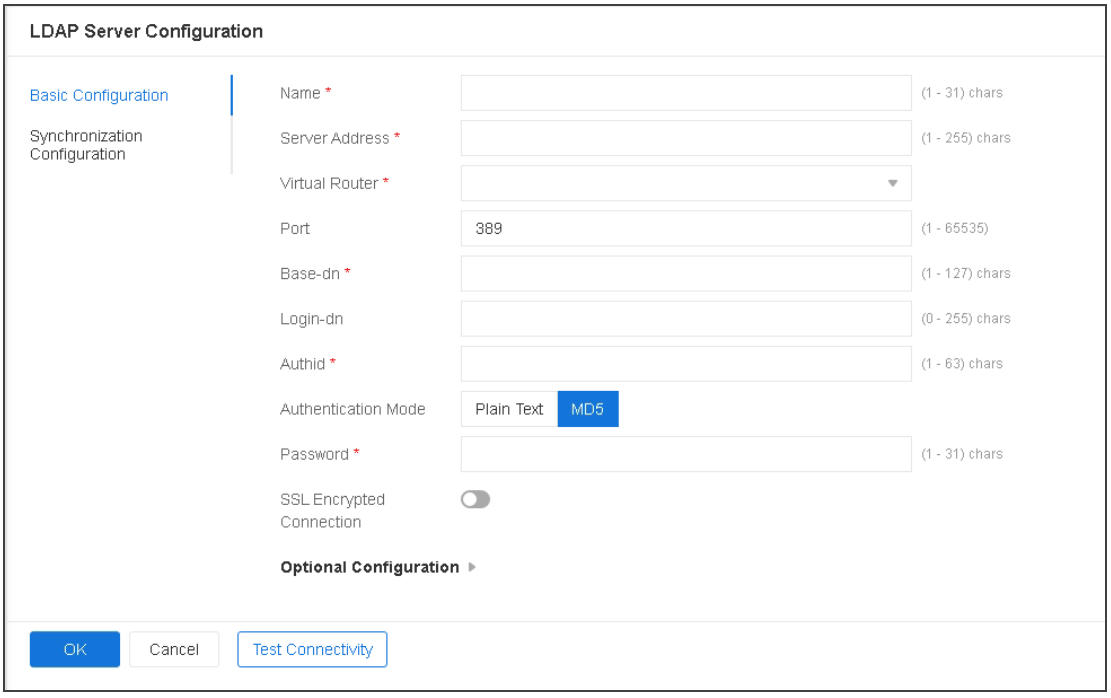
Basic Configuration	
	which the system synchronizes users and user groups from the Active Directory server. Click this field. In the **Server Directory** panel, select the path that you want to synchronize. This way, all users and user groups in the path are synchronized to the local. At most 32 paths can be selected.

3. Click **OK**.

Configuring LDAP Server

1. Select **Object > AAA Server**, and click **New > LDAP Server**.

2. The **LDAP Server Configuration** page opens.



Configure the following

Basic Configuration	
Server Name	Specifies a name for the LDAP server.
Server Address	Specifies an IP address (IPv4 or IPv6) or domain name for the LDAP server.
Virtual Router	Specifies a VR for the LDAP server.
Port	Specifies a port number for the LDAP server. The value range is 1 to 65535. The default value is 389.
Base-dn	Specifies the details for the Base-dn. The Base-dn is the starting point at which your search will begin when the LDAP server receives an authentication request.
Login-dn	Specifies authentication characteristics for the Login-dn (typically a user account with query privileges pre-defined by the LDAP server).
Authid	Specifies the Authid, which is a string of 1 to 63 characters and is case sensitive.
Authentication Mode	Specifies an authentication or synchronization method (either plain text or MD5). The default method is MD5. If the Authid is not configured after you specify the MD5 method, the plain method will be used in the process of synchronizing user from the server, and the MD5 method will be used in the process of authenticating user.
Password	Specifies a password for the LDAP server. This should correspond to the password for Admin DN.

Basic Configuration	
SSL Encrypted Connection	Click the **Enable** button to enable the SSL encrypted connection function. With this function enabled, the system connects to the LDAP authentication server through SSL.
Optional Configuration	
Username Extraction	
Authentication	Specifies the authentication user name format. During authentication, the system will extract the user name for authentication based on the configured authentication user name format. If the specified format is not available, the system will use the original user name. The supported format includes "domain\username" and "username@domain".
Search Group	Specifies the user name format when the system searches from the local storage. When implementing policy control based on user name or user groups, the system will search for the group of a user name in the organization units that are locally saved. The supported format includes "domain\username" and "username@domain".
Role Mapping Rule	Specifies a role mapping rule for the server. With this option selected, system will allocate a role for the users who have been authenticated to the server according

Basic Configuration	
	to the specified role mapping rule.
Backup server 1/Backup server 2	Specifies an IP address or domain name for backup server 1 or backup server 2.
Virtual Router-1/Virtual Router2	Specifies a VR for the backup server.
Authentication Base-DN	Specifies an authentication Base-dn for the AD server. All users in the Base-DN (including those directly under the user group) will be allowed to pass the authentication. The format of the DN is"OU=xxx, DC=xxx,...".
Synchronization Base-DN	Specifies a Synchronization Base-dn for the AD server. All users and user groups in the Base-DN will be synchronized to the local. The format of the DN is"OU-U=xxx, DC=xxx,...".
Synchronization	Check the checkbox to enable the synchronization function; clear the checkbox to disable the synchronization function, and system will stop synchronizing and clear the existing user information. By default, system will synchronize the user information on the configured LDAP server with the local every 30 minutes.
Automatic Syn-	Click the radio button to specify the automatic syn-

Basic Configuration		
chronization	chronization.	
	Interval Synchronization	Specifies the time interval for automatic synchronization. The value range is 15 to 1440 minutes. The default value is 30.
	Daily Synchronization	Specifies the time when the user information is synchronized everyday. The format is HH:MM, HH and MM indicates hour and minute respectively.
	Once Synchronization	If this parameter is specified, system will synchronize automatically when the configuration of LDAP server is modified. After executing this command , system will synchronize user information immediately.
Synchronous Operation Mode	Specifies the user synchronization mode, including Group Synchronization and OU Synchronization. By default, the user information will be synchronized with the local server based on the group.	
Synchronization Object	Filter the synchronization information obtained and retain the information of the specified object. You can select the syn object as users or groups. By default, users and groups are both selected.	

Basic Configuration	
OU maximum depth	Specifies the maximum depth of OU to be synchronized. The value range is 1 to 12, and the default value is 12. OU structure that exceeds the maximum depth will not be synchronized, but users that exceed the maximum depth will be synchronized to the specified deepest OU where they belong to. If the total characters of the OU name for each level(including the "OU=" string and punctuation) is more than 128, OU information that exceeds the length will not be synchronized with the local server.
User Filter	Specifies the user filters. System can only synchronize and authenticate users that match the filters on the authentication server. The length is 0 to 120 characters. For example, if the condition is configured to "(|(objectclass=inetOrgperson)(objectclass=person))", system only can synchronize or authenticate users which are defined as inetOrgperson or person. The commonly used operators are as follows: =(equals a value)、&(and) 、|(or)、!(not)、*(Wildcard: when matching zero or more characters)、~=(fuzzy query.)、>=(Be greater than or equal to a specified value in lexicographical order.)、<=(Be less than or equal to a specified value in lexicographical order.).

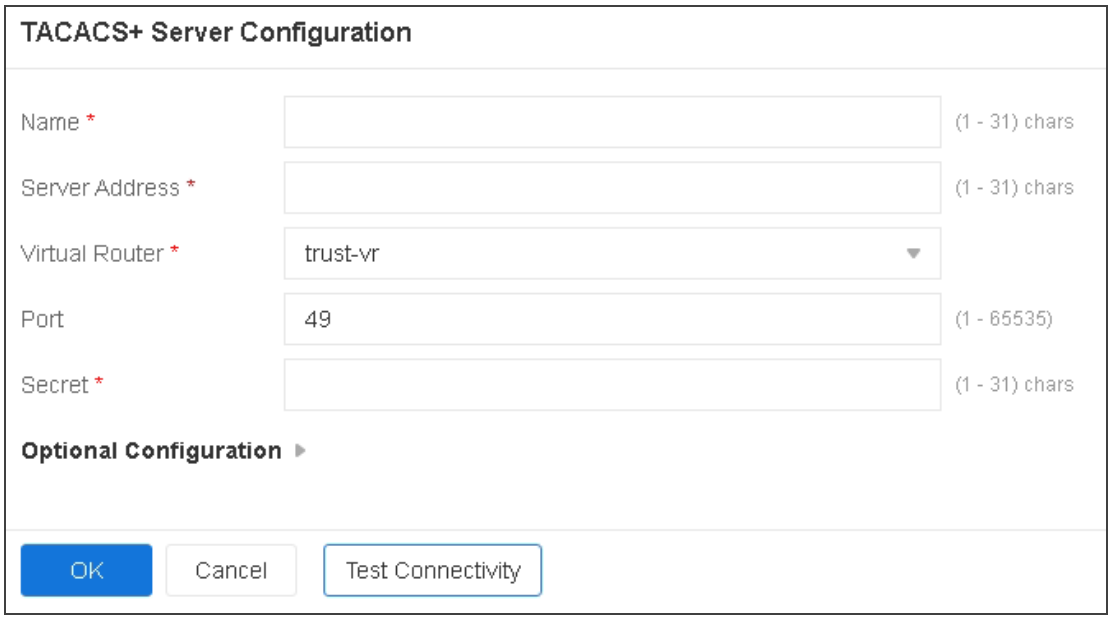
Basic Configuration	
Naming Attribute	Specifies a naming attribute for the LDAP server. The default naming attribute is uid.
Group Naming Attribute	Specifies a naming attribute of group for the LDAP server. The default naming attribute is uid.
Member Attribute	Specifies a member attribute for the LDAP server. The default member attribute is uniqueMember.
Group Class	Specifies a group class for the LDAP server. The default class is groupofuniquenames.
Backup Authentication Server	Specifies a backup authentication server. After configuring a backup authentication server for the LDAP server, the backup authentication server will take over the authentication task when the primary server malfunctions or authentication fails on the primary server. The backup authentication server can be any existing local, Active-Directory, RADIUS or LDAP server defined in system.
Synchronization Base-dn	Synchronization Base-DN is the starting point at which the system synchronizes users and user groups from the LDAP server. Click this field. In the **Server Directory** panel, select the path that you want to synchronize. This way, all users and user groups in the path are synchronized to the local. At most 32 paths can be selected.

3. Click **OK**.

Configuring TACACS+ Server

1. Select **Object > AAA Server**.

2. Click **New > TACACS+ Server**, and the **TACACS+ Server Configuration** page opens.



Configure the following.

Basic Configuration	
Server Name	Enter a name for the TACACS+ server.
Server Address	Specify the IP address or host name for the TACACS+ server.
Virtual Router	Specify the VRouter of TACACS+ server.
Port	Enter port number for the TACACS+ server. The default value is 49. The value range is 1 to 65535.
Secret	Enter the shared secret to connect the TACACS+ server.

Basic Configuration	
Optional	
Username Extraction	
Authentication	Specifies the authentication user name format. During authentication, the system will extract the user name for authentication based on the configured authentication user name format. If the specified format is not available, the system will use the original user name. The supported format includes "domain\username" and "username@domain".
Search Group	Specifies the user name format when the system searches from the local storage. When implementing policy control based on user name or user groups, the system will search for the group of a user name in the organization units that are locally saved. The supported format includes "domain\username" and "username@domain".
Role mapping rule	Select a role mapping rule for the server. With this option selected, system will allocate a role for the users who have been authenticated to the server according to the specified role mapping rule.
Backup Server 1 (2)	Enter the domain name or IP address for the backup TACACS+ server.
Virtual Router	Select the VRouter for the backup server.

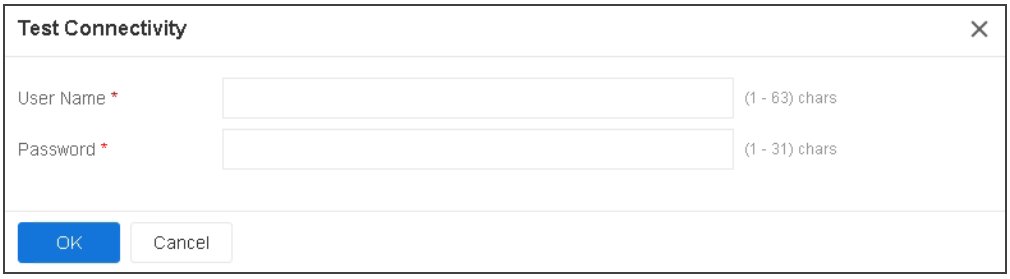
Basic Configuration	
1 (2)	

Connectivity Test

When AAA server parameters are configured, you can test if they are correct by testing server connectivity.

To test server connectivity, take the following steps:

1. Select **Object > AAA Server**, and click **New**.
2. Select your AAA server type, which can be Radius, AD, LDAP or TACACS+. The local server does not need the connectivity test.
3. After filling out the fields, click **Test Connectivity**.
4. For Radius or TACACS+ server, enter a username and password in the popped <Test Connectivity> dialog box. If the server is AD or LDAP, the login-dn and secret is used to test connectivity.



5. Click **Test Connectivity**. If "Test connectivity success" message appears, the AAA server settings are correct.

If there is an error message, here are the causes:

- Connect AAA server timeout: Wrong server address, port or virtual router.
- AAA server configuration error: Secret is wrong.
- Wrong name or password: Username or password for testing is wrong.

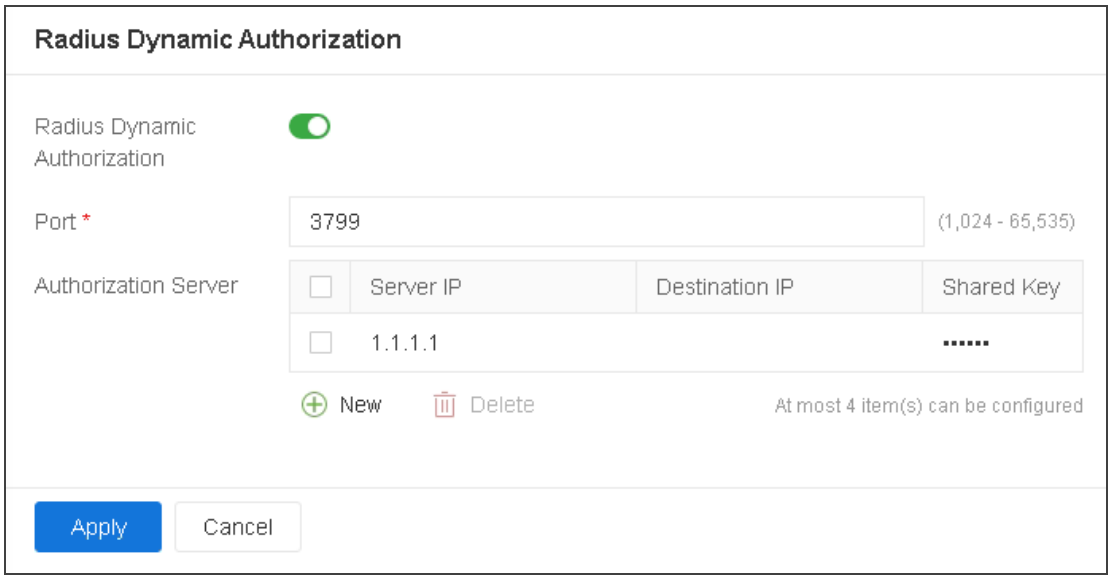
Radius Dynamic Authorization

The Radius dynamic authorization function, includes:

- When the user is authenticated successfully, the Radius server can send a Radius CoA (Change of Authorization) request message to the authority of the authenticated user to the device. The device automatically generates the security policy rule for the user. When the user goes offline, the device delete this user's security policy rule automatically
- When the SCVPN user is authenticated successfully, the Radius server can send a Radius DM (Disconnect Messages) request message to send the accounting user information (including the user name, user IP address, user accounting ID, etc.) to the device, and the device can disconnect the specified scvpn authentication user and end the accounting.

To configure the Radius dynamic authorization function, take the following steps:

1. Select **Object** > **Radius Dynamic Authorization**.



2. Click the **Enable** button after **Radius Dynamic Authorization** to enable the Radius dynamic authorization function.

3. Type the port number of the Radius dynamic authorization server into the **Port** textbox. The value range is 1024 to 65535. The default value is 3799.

4. In the Authorization Server section, click **New**, and then specify the IP address, destination IP and shared key of the Radius dynamic authorization server.

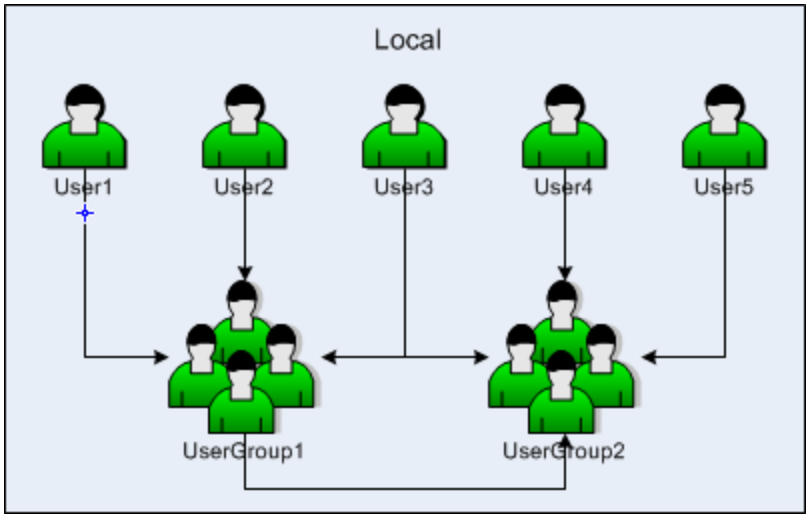
5. To delete the Radius dynamic authorization server, select the checkbox in the list, and then click **Delete**.

6. Click **Apply**.

Notes: If you need to use the Radius dynamic authorization function, first enable and configure the Radius accounting server. For the configuration, refer to Enable Accounting.

User

User refers to the user who uses the functions and services provided by the Hillstone device, or who is authenticated or managed by the device. The authenticated users consist of local user and external user. The local users are created by administrators. They belong to different local authentication servers, and are stored in system's configuration files. The external users are stored in external servers, such as AD server or LDAP server. System supports User Group to facilitate user management. Users belonging to one local authentication server can be allocated to different user groups, while one single user can belong to different user groups simultaneously; similarly, user groups belonging to one local authentication server can be allocated to different user groups, while one single user group can belong to different user groups simultaneously. The following diagram uses the default AAA server, Local, as an example and shows the relationship between users and user groups:



As shown above, User1, User2 and User3 belong to UserGroup1, while User3 also belongs to UserGroup2, and UserGroup2 also contains User4, User5 and UserGroup1.

Configuring a Local User

This section describes how to configure a local user and user group.

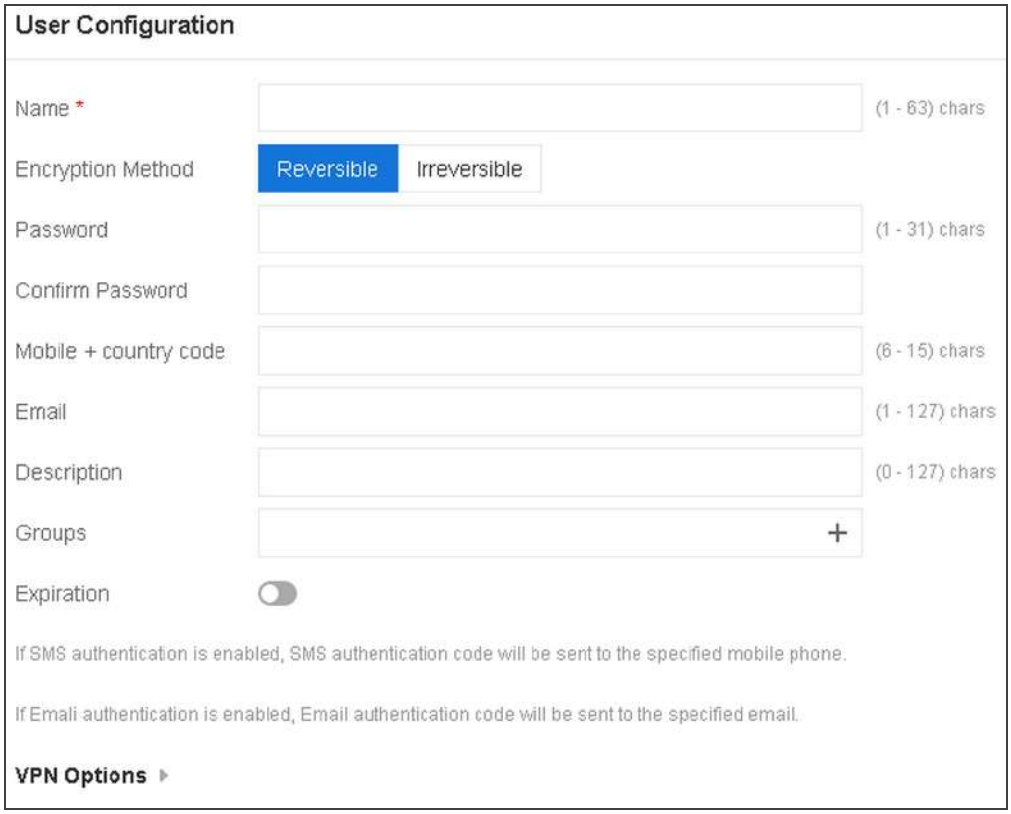
Click **Object > User > Local User** or **ZTNA > User > Local User**, some information and operations are provided as below:

- Click the "Local server" drop-down box in the upper left corner of the page to switch the local user's server.
- Red Expired, orange Will expire within a week and yellow Will expire within a month colors are used to mark the expired users , expired within a week, expired within a month in the list.
- Check the information of the local user in the list, including user, user group, expiration, mobile and description.

Creating a Local User

To create a local user, take the following steps:

1. Select **Object > User > Local User** or **ZTNA > User > Local User**.
2. Click **New > User**.



Configure the following.

Option	Description
Name	Specifies a name for the user.
Encryption Method	Specifies method to encrypt the user's password, that is, the encrypted algorithm of password is reversible or irreversible . • Reversible: System will use the reversible encryption algorithm AES to encrypt the user password. In some authentication scenarios, system can decrypt the password for authentication. • Irreversible: System will use the SHA irre-

Option	Description
	versible encryption algorithm to encrypt user passwords. The passwords cannot be decrypted. In this case, the user can not authenticate through CHAP (Challenge Handshake Authentication Protocol, which is used in L2TP VPN and 802.1X).
Password	Specifies a password for the user.
Confirm password	Type the password again to confirm.
Mobile+country code	Specifies the user's mobile number. When users log into the SCVPN client, system will send the verification code to the mobile number.
Email	Specifies the user's Email address. The value range is 1 to 127 characters. If the Email authentication function is enabled, users will receive the verification code via this Email. For more information about Email authentication, see Configuring an SSL VPN.
Description	If needed, type the description of the user.
Group	Add the user to a selected user group. Click + and the **User Group** list appears. Then, click the user group you want to add to. Note: When a user is added to more than 256 groups, only the first 256 group associations will take effect based on the association sequence. This principle also applies when the group associations are configured on an external authentication server.
Expiration	Click the button to enable **Expiration** for the user.

Option	Description
	Specify the expiration date and time. If the user expires, the user cannot be authenticated therefore is cannot be used in system. By default expiration is disabled.

Expand VPN Options, configure network parameters for the PnPVPN client.

Option	Description
IKE ID	Specifies a IKE ID type for dial-up VPN users. If FQDN or ASN1 is selected, type the ID's content in the text box below.
DHCP Start IP	Specifies a start IP for the DHCP address pool.
DHCP End IP	Specifies an end IP for the DHCP address pool.
DHCP Netmask	Specifies a netmask for the DHCP address pool.
DHCP Gateway	Specifies a gateway for the DHCP address pool. The IP address of the gateway corresponds to the IP address of PnPVPN client's Intranet interface and PC's gateway address. The PC's IP address is determined by the segment and netmask configured in the above DHCP address pool. Therefore, the gateway's address and DHCP address pool should be in the same segment.
DNS1	Specifies an IP address for the DNS server. You can specify one primary DNS server (DNS1) and up to three alternative DNS servers.
DNS2	
DNS3	
DNS4	
WINS1	Specifies an IP address for the WINS server. You can specify one primary WINS server (WINS1)and one alternative WINS server.
WINS2	

Option	Description
Tunnel IP 1	Specifies an IP address for the master PnPVPN client's tunnel interface. Select the **Enable SNAT** check box to enable SNAT.
Tunnel IP 2	Specifies an IP address for the backup PnPVPN client's tunnel interface.

3. Click **OK**.

Creating a User Group

To create a user group, take the following steps:

1. Select **Object > User > Local User** or **ZTNA > User > Local User**.
2. Click **New > User Group**.
3. Type the name of the user group into the Name box.
4. Specify members for the user group. Expand User or User Group in the Available list, select a user or user group and click **Add** to add it to the Selected list on the right. To delete a selected user or user group, select it in the Selected list and then click **Remove**. One user group can contain multiple users or user groups, but system only supports up to 5 layers of nested user groups and does not support the loopback nest. Therefore, a user group should not nest the upper-layer user group it belongs to.
5. Click **OK**.

Export User List

The system exports the user-list file in .csv format, of which the content is the real-time information of the user list in the system.

Export user binding list from system to local, take the following steps:

1. Select **Object > User > Local User** or **ZTNA > User > Local User**.
2. Click **Export User List** to open the **Export User List** page, and select the saved position in local.
3. Click **OK** to finish export.

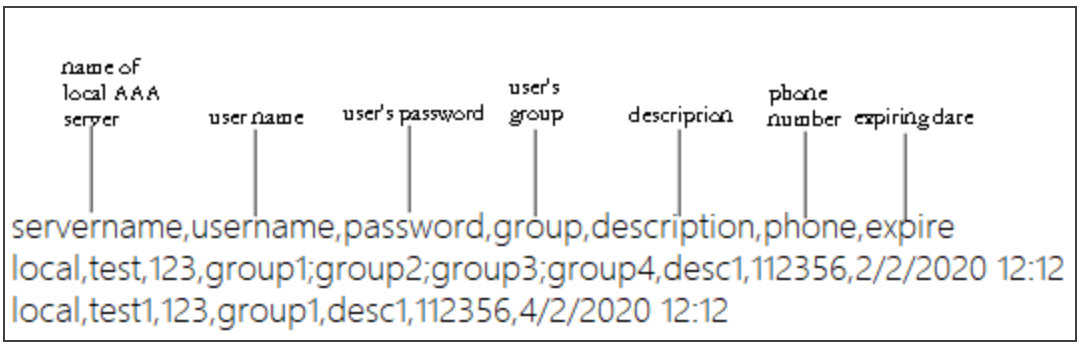
Import User List

The system supports the import of user-list files in UTF-8 or GBK ecoding with .csv format.csv format. When the user-list file is imported, the system will carry out validity test and complexity check of the user password. If the results turn out to be successful, the importing is successful; if the results turn out to be unsuccessful, the importing is unsuccessful.

The user-list in .csv file is illustrated in the figure below.

servername	username	password	group	description	phone	expire
local	test	testadfdgfadg	group1;group2;group3;group4	desc1	112356	2/2/2020 12:12
local	test1	testadfdgfadg	group	desc1	112356	2/2/2020 12:12
local	test2		group	desc1	112356	2/2/2020 12:12
local	test3	testadfdgfadg		desc1	112356	2/2/2020 12:12
local	test5	testadfdgfadg	group		112356	2/2/2020 12:12
local	test6	testadfdgfadg	group	desc1		17/1/2020 12:12
local	test7	testadfdgfadg	group	desc1	112356	
local	test8	testadfdgfadg	group	desc1	112356	1/1/2020 12:12

name of local AAA server | user name | user's password | user's group | description | phone number | expiring date



Notes: Before importing the user-list file, please read carefully the annotations in the above figures and fill in the user information according to the format.

Import user binding list to system, take the following steps:

1. Select **Object>User> Local User** or **ZTNA > User > Local User**.
2. Click **Import User List** to open the **Import User List** page.
3. Click **Browse** to select the file name needed to be imported.
4. Click **OK** to finish import.

Notes:

- The user password in the import/export file is not encrypted, unless the password strings match the AES encryption format.
- Please try to keep the import file format consistent with the export file.
- When imported, if the same user name exists under the same server, the original user information will be overwritten.
- When imported, if a user is new to the system, it and its user information will be added to the system automatically.
- In the imported user-list file, the "username" field should not contain slash/-comma/double quotation marks/question mark/@; the "group" field should not contain comma/double quotation marks/question mark.
- In the imported user-list file, the date in the "expire" field should be typed in the format of DD/MM/YYYY HH:SS.

Configuring a LDAP User

This section describes how to configure a LDAP user.

Synchronizing Users

To synchronize users in a LDAP server, firstly, you need to configure a LDAP server, refer to "Configuring LDAP Server" on Page 1136. To synchronize users:

1. Select **Object > User > LDAP User** or **ZTNA > User > LDAP User**.
2. Select a server from the LDAP Server drop-down list, and click **Sync Users**.

> **Notes:** By default, after creating a LDAP server, system will synchronize the users of the LDAP server automatically, and then continue to synchronize every 30 minutes.

Configuring an Active Directory User

This section describes how to configure an active directory (AD) user.

Synchronizing Users

To synchronize users in an AD server to the device, first you need to configure an AD server ,refer to "Configuring Active Directory Server" on Page 1127. To synchronize users, take the following steps:

1. Select **Object > User >AD User** or **ZTNA > User > AD User**.
2. Select an AD server from the Active Directory Server drop-down list, and click **Sync Users**.

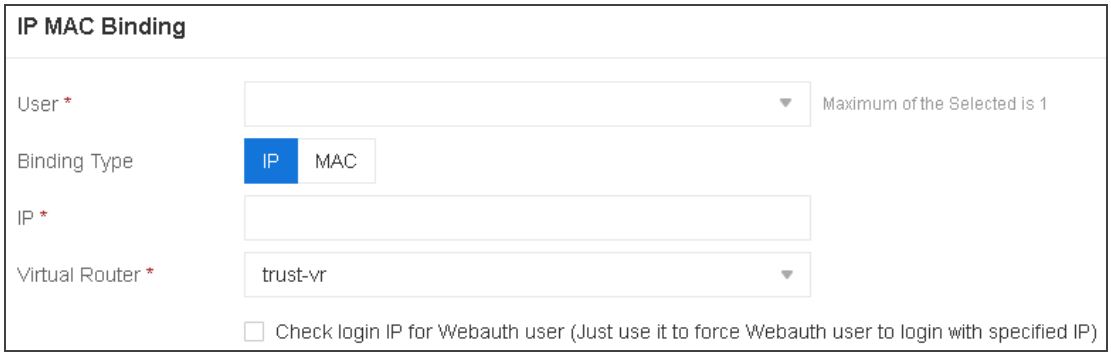
Notes: By default, after creating an AD server, system will synchronize the users of the AD server automatically, and then continue to synchronize every 30 minutes.

Configuring a IP-User Binding

Adding User Binding

To bind an IP or MAC address to a user, take the following steps:

1. Select **Object > User > IP-User Binding** or **ZTNA > User > IP-User Binding**.
2. Click **Add User Binding**.



Configure the following options.

User	
AAA Server	Select an AAA server from the drop-down list.
User	Select a user for the binding from the drop-down list.
Binding Type	
Binding Type	By specifying the binding type, you can bind the user to a IP address or MAC address. • IP - If IP is selected, type the IP address into the

User	
	IP text box. Both the IPv4 address and IPv6 address are supported. And select a VR from the Virtual Router drop-down list. Select the **Check WebAuth IP-User Mapping Relationship** check box to apply the IP-User mapping only to the check for IP-user mapping during Web authentication if needed. • MAC - If MAC is selected, type the MAC address into the MAC text box. And select a VR from the Virtual Router drop-down list.

3. Click **OK**.

Import Binding

Import user binding list to system, take the following steps:

1. Select **Object>User> IP-User Binding** or **ZTNA > User > IP-User Binding**..
2. Click **Import** , and the **Import User Binding List** dialog box pops up.
3. Click **Browse** to select the file name needed to be imported.
4. Click **OK** to finish import.

Export Binding

Export user binding list from system to local, take the following steps:

1. Select **Object>User> IP-User Binding** or **ZTNA > User > IP-User Binding**..
2. Select the exported user category(include local, LDAP, AD and all users) in the **Export** drop-down list to pop up the export dialog box, and select the saved position in local.
3. Click **OK** to finish export.

Role

Roles are designed with certain privileges. For example, a specific role can gain access to some specified network resources, or make exclusive use of some bandwidth. In StoneOS, users and privileges are not directly associated. Instead, they are associated by roles.

The mappings between roles and users are defined by role mapping rules. In function configurations, different roles are assigned with different services. Therefore, the mapped users can gain the corresponding services as well.

System supports role combination, i.e., the AND, NOT or OR operation on roles. If a role is used by different modules, the user will be mapped to the result role generated by the specified operation.

System supports the following role-based functions:

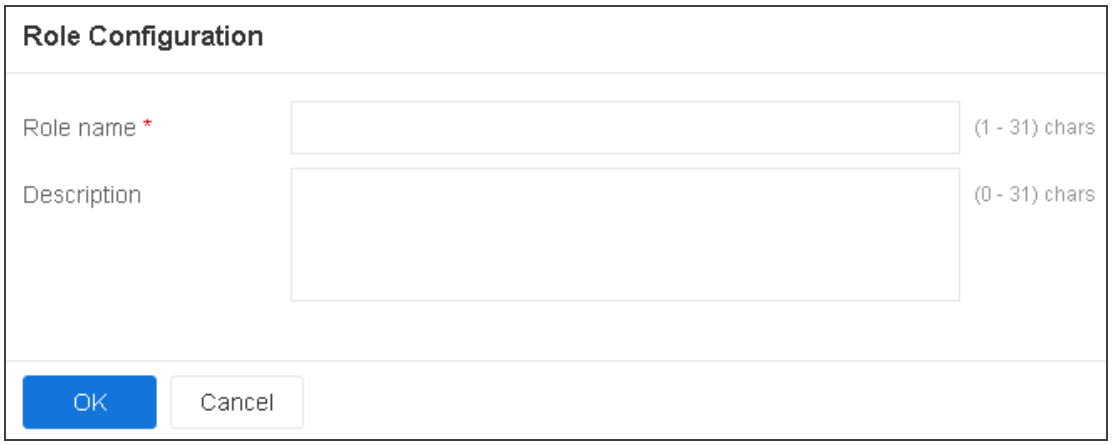
- Role-based policy rules: Implements access control for users of different types.
- Role-based QoS: Implements QoS for users of different types.
- Role-based statistics: Collects statistics on bandwidth, sessions and new sessions for users of different types.
- Role-based session limits: Implements session limits for specific users.
- SCVPN role-based host security detection: Implements control over accesses to specific resources for users of different types.
- Role-based PBR: Implements routing for users of different types.

Configuring a Role

Creating a Role

To create a role, take the following steps:

1. Select **Object > Role > Role**.
2. Click **New**.



Configure the following options.

Option	Description
Role Name	Type the role name into the Role Name box.
Description	Type the description for the role into the Description box.

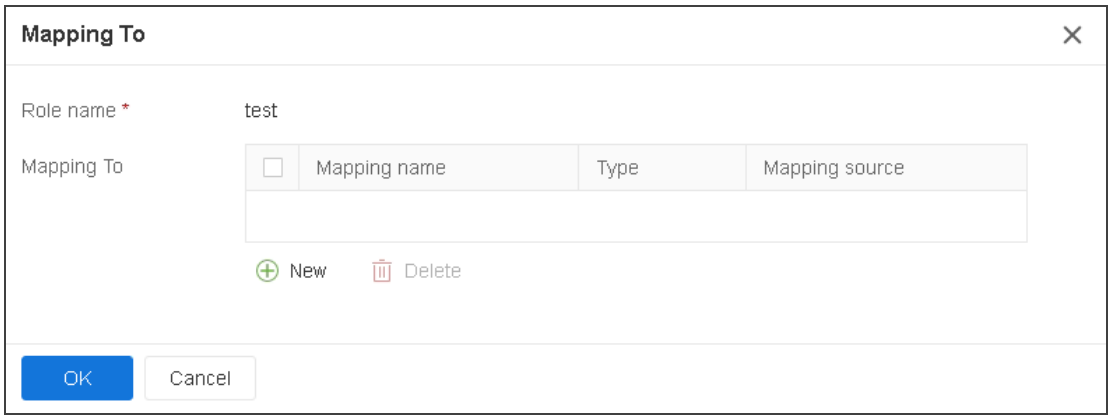
3. Click **OK**.

Mapping to a Role Mapping Rule

You can map the role to user, user group, CN, OU or the user attribute through this function or Creating a Role Mapping Rule. After Creating a Role Mapping Rule, you can click Mapping To to map the selected role again.

To map the selected role again, take the following steps:

1. Select **Object > Role > Role**.
2. Select the role need to be mapped, and click **Mapping To**.

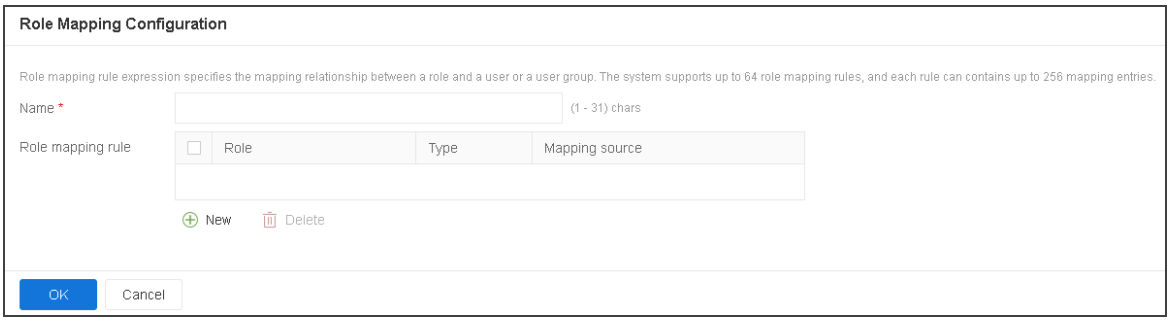


3. In the Mapping name section, select a created mapping rule name from the first drop-down list (For detailed information of creating a role mapping role, see Creating a Role Mapping Rule.), and then select a user, user group, certificate name (the CN field of USB Key certificate), organization unit (the OU field of USB Key certificate) , User Attributes, distinguished name (the DN Field of the USB Key Certificate) or any from the second drop-down list. If User, User group, CN, OU, User Attributes or DN is selected, also select or enter the corresponding user name, user group name, CN, OU, User Attributes or DN into the box behind.
4. Click **Add** to add to the role mapping list.
5. If needed, repeat Step 3 and Step 4 to add more mappings. To delete a role mapping, select the role mapping you want to delete from the mapping list, and click **Delete**.
6. Click **OK**.

Creating a Role Mapping Rule

To create a role mapping rule, take the following steps:

1. Select **Object > Role > Role Mapping** .
2. Click **New**.



3. Type the name for the rule mapping rule into the Name box.
4. In the Member section, select a role name from the first drop-down list, and then select a user, user group, certificate name (the CN field of USB Key certificate) or organization unit (the OU field of USB Key certificate) , User Attributes, , distinguished name (the DN Field of the USB Key Certificate) from the second drop-down list. If User, User group, CN, OU, User Attributes or DN is selected, also select or enter the corresponding user name, user group name, CN, OU, User Attributes or DN into the box behind.
5. Click **Add** to add to the role mapping list.
6. If needed, repeat Step 4 and Step 5 to add more mappings. To delete a role mapping, select the role mapping you want to delete from the mapping list, and click **Delete**.
7. Click **OK**.

Configuring a User Attribute Instance

To configure a user attribute instance, take the following steps:

1. Select **Object > Role > Role Mapping** .
2. Click **Configuration** in the upper-right corner, and select **User Attributes** to go to the User Attributes page.
3. Click **New** to go to the User Attributes Configuration page.

On the User Attributes Configuration page, configure the following options:

Option	Description
Name	Specifies the name of the user attribute instance.
Type	Specifies the protocol type, which can be RADIUS or AD/LDAP.
Rule Matching Policy	Specifies the rule matching policy of the user attribute instance, including: • The current rule is matched if any filter condition is met: The user

Option	Description
	is matched to the role mapped to the user attribute instance when the user hits any filter configured in the user attribute instance; • The current rule is matched if all filter conditions are met: The user is matched to the role mapped to the user attribute instance only when the user hits all filters configured in the user attribute instance.
Current Filter Conditions	Specifies the current filter conditions for this user attribute instance. Click **New** and enter the name of the user attribute in the Attributes textbox, or select a common user attribute from the dropdown list. Select the mapping operation from the **Operation** dropdown list. Enter the mapping value of the user attribute in the Value textbox.  Notes: • Each user attribute instance supports up to 8 filers. • When protocol type is specified as RADIUS, the mapping operation associated with string-typed user attributes can only be contain, start-with, end-with, or same-as. The mapping operation associated with number-typed user attributes can only be equal-to, greater-than, or less-than. • When the mapping operation is contain, start-with, end-with, or same-as, the mapping value can be strings or numbers. When the mapping oper-

Option	Description
	ation is equal-to, greater-than, or less-than, the mapping value can only be numbers.

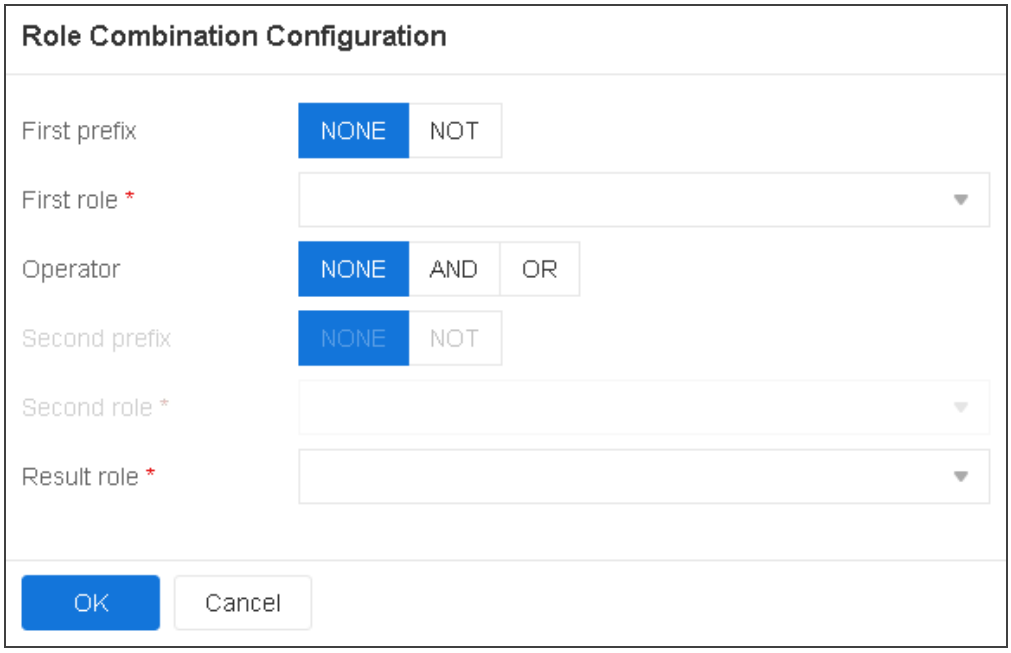
4. Click **OK** to complete the configuration. Newly created user attribute instance will be displayed on the **User Attributes** list
5. If needed, you can add more user attribute instances.
6. If you need to delete a user attribute instance, select the user attribute instance from the list, and click **Delete**.

Notes: The system supports up to 64 user attributes instances.

Creating a Role Combination

To create a role combination, take the following steps:

1. Select **Object > Role > Role Combination**.
2. Click **New**.



Configure the following options.

Option	Description
First Prefix	Specifies a prefix for the first role in the role regular expression.
First Role	Select a role name from the First Role drop-down list to specify a name for the first role in the role regular expression.
Operator	Specifies an operator for the role regular expression.
Second Prefix	Specifies a prefix for the second role in the role regular expression.
Second Role	Select a role name from the Second Role drop-down list to specify a name for the second role in the role regular expression.

Option	Description
Result Role	Select a role name from the Result Role drop-down list to specify a name for the result role in the role regular expression.

3. Click **OK**.

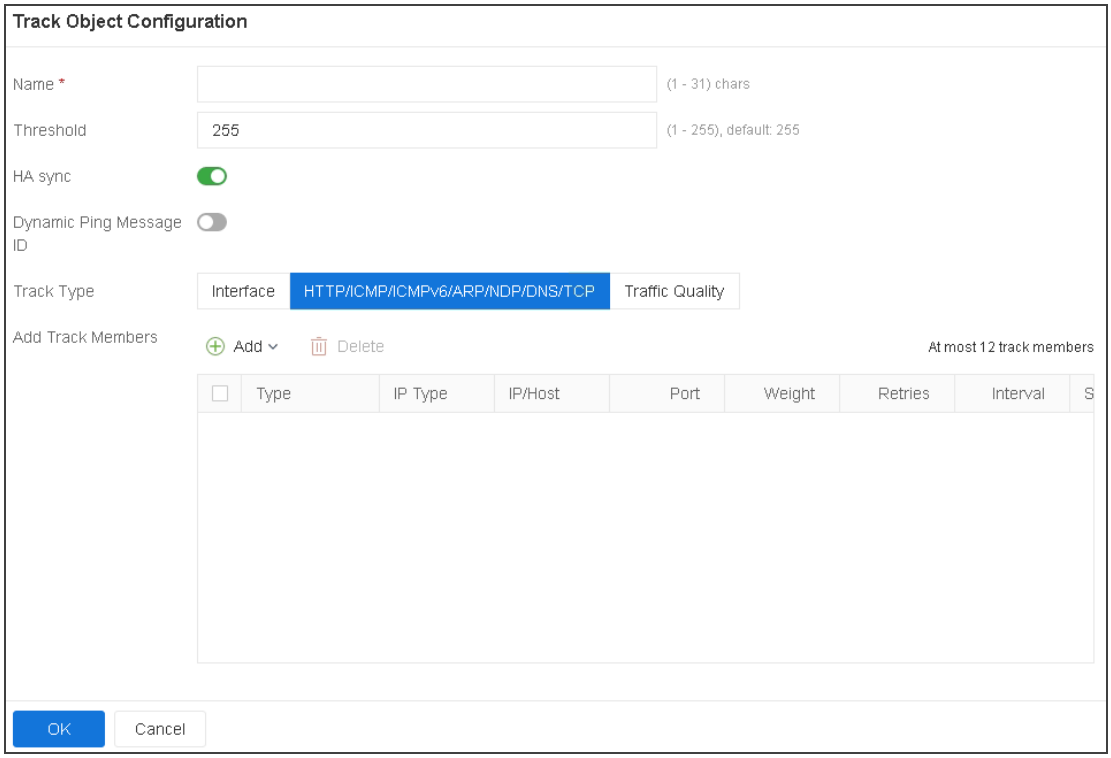
Track Object

The devices provide the track object to track if the specified object (IP address or host) is reachable or if the specified interface is connected. This function is designed to track HA and interfaces.

Creating a Track Object

To create a track object, take the following steps:

1. Select **Object > Track Object**.
2. Click **New**.



Configure the following options.

Option	Description
Name	Specifies a name for the new track object.

Option	Description
Threshold	Type the threshold for the track object into the text box. If the sum of weights for failed entries in the track object exceeds the threshold, system will conclude that the whole track object fails.

Track Type	Select a track object type. One track object can only be configured with one type. Select **Interface** radio button:
	• Click **Add** in Add Track Members section and then configure the following options in the Add Interfaces dialog box:
	  • Interface - Select a track interface from the drop-down list.
	  • Weight - Specifies a weight for the interface, i.e. the weight for overall failure of the whole track object if this track entry fails.
	Select **HTTP/ICMP/ICMPv6/ARP/NDP/DNS/TCP** radio button:
	• Click **Add**, select a packet type from the drop-down list, and then configure the following options in the Add HTTP/ICMP/ICMPv6/ARP/NDP/DNS/TCP Member dialog box:
	  • IP Type - Specifies the IP type for the track object when the track is implemented by HTTP/DNS/TCP packets.

Option	Description
	• IP/Host - Specifies an IP address or host name for the track object when the track is implemented by HTTP/ICMP/ICMPv6/TCP packets. IP - Specifies an IP address for the track object when the track is implemented by ARP/NDP packets. DNS - Specifies an IP address for the track object when the track is implemented by DNS packets. • Weight - Specifies a weight for overall failure of the whole track object if this track entry fails. • Retries: Specifies a retry threshold. If no response packet is received after the specified times of retries, system will determine this track entry fails, i.e., the track entry is unreachable. The value range is 1 to 255. The default value is 3. • Interval - Specifies an interval for sending packets. The value range is 1 to 255 seconds. The default value is 3. • Egress Interface - Specifies an egress interface from which

Option	Description
	HTTP/ICMP/ICMPv6/ARP/NDP/DNS/TC-P packets are sent. • Source Interface- Specifies a source interface for HTTP/ICMP/ICMPv6/ARP/DNS/TCP packets.
	Select **Traffic Quality** radio button: • Click **Add** in Add Track Members section and then configure the following options in the Add Traffic Quality Member dialog box: • IP Type - Specifies the address type of the traffic quality member, including IPv4 and IPv6. When "IPv4" is specified, only the IPv4 traffic of the tracked interface; when "IPv6" is specified, only the IPv6 traffic of the tracked interface. • Interface - Specifies the name of the tracked interface. • Interval - Specifies the duration of per track period. The unit is second. The value range is 1 to 255. The default value is 3. After a track period is finished, system will reset the tracked value of new session.

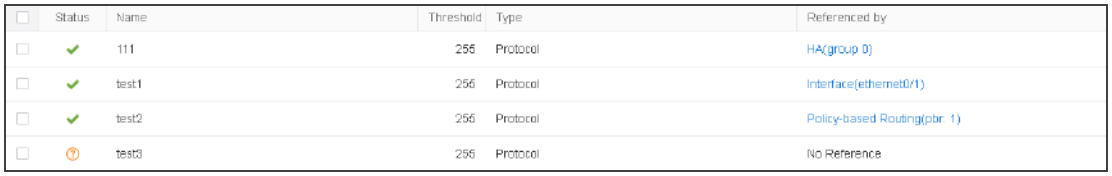
Option	Description
	• Retries - Specifies the threshold value which concludes the track entry is failed. The value range is 1 to 255. The default value is 3. • Weight - Specifies how important this track failure is to the judgment of track object failure. The value range is 1 to 255. The default value is 255. • Low Watermark - Specifies the failure threshold value of new session success rate. The value range is 0 to 100. The default value is 30. During a track period, when the new session success rate is below the specified low watermark, system will conclude the track is failed. • High Watermark- Specifies the failure threshold value of new session success rate. The value range is 0 to 100. The default value is 50. During a track period, when the new session success rate exceeds the specified low watermark, system will conclude the track is successful. **Note**: During a track period, when the new session success rate is equal to or exceeds the low watermark, and is equal to or below the low watermark,

Option	Description
	system will keep the previous track state.
HA sync	Select this check box to enable HA sync function. The primary device will synchronize its information with the backup device.
Dynamic Ping Message ID	Select this check box to enable the Dynamic Ping Message ID function. With this function enabled, the header ID of ICMP messages sent by the same track object is a dynamic value. This function is disabled by default. With this function disabled, the header ID of ICMP messages sent by the same track object is a fixed value.

3. Click **OK.** The created track object will be displayed in the track object list.

Track Object List

The track object list displays information about configured track objects in the system, including **Status**, **Name**, **Threshold**, **Type**, and **Referenced by**. The **Referenced by** column displays the functional module bound to the track object, which can be an interface, HA, policy-based route, or vsys-track-status (non-root VSYS). Click the functional module to view details about the module. When the module is unbound or unbound to the track object, the **Referenced by** column displays **No Reference**.



Notes:

- A track object can be bound to only one module.
- In the non-root VSYS, you need to create a track object before binding it. After binding, **vsys-track-status** is displayed in the **Referenced by** column of the track object list. You cannot view details about vsys-track-status.
- In the non-root VSYS, track objects can be bound by interfaces and policy-based routes, but cannot be bound by HA. After binding, you can view details about related items in the track object list.

For information on how interfaces, HA, policy-based routes, and non-root VSYS bind track objects, see:

- Interface: An Interface binds a track object.
- HA: A HA binds a track object.
- Policy-based Route: A policy-based route binds a track object.
- Non-root VSYS: A non-root VSYS binding a track object only support command line configuration. For details, refer to the chapter **Configuring VSYS** in the **StoneOS CLI User Guide**.

URL Filtering

URL filtering controls the access to some certain websites and records log messages for the access actions. URL filtering helps you control the network behaviors in the following aspects:

- Access control to certain category of websites, such as gambling and pornographic websites.
- Access control to certain category of websites during the specified period. For example, forbid to access IM websites during the office hours.
- Access control to the website whose URL contains the specified keywords. For example, forbid to access the URL that contains the keyword of game.

If IPv6 is enabled, you can configure URL and keyword for both IPv4 and IPv6 address. How to enable IPv6, see StoneOS_CLI_User_Guide_IPv6.

Configuring URL Filtering

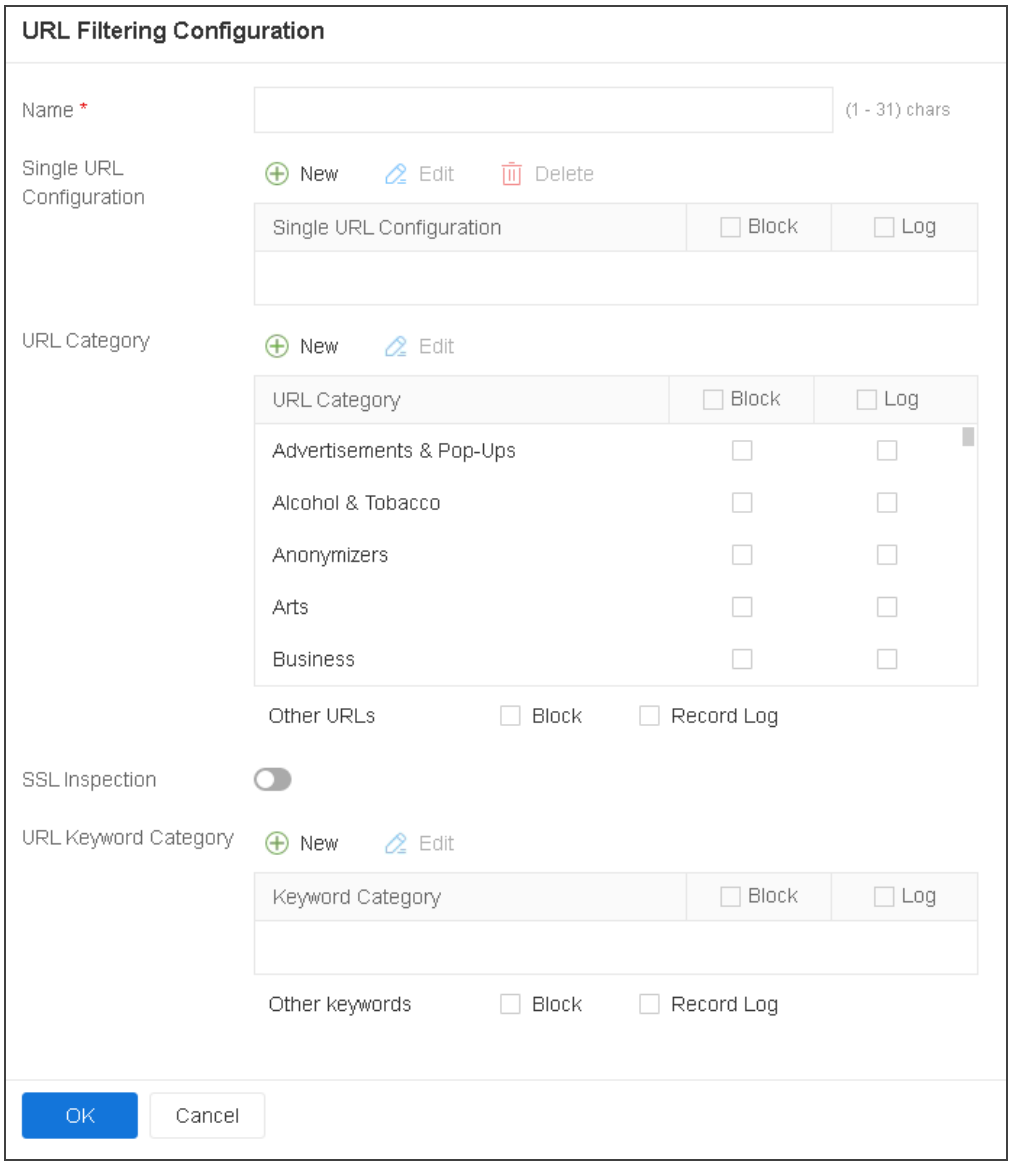
Configuring URL filtering contains two parts:

- Create a URL filtering rule
- Bind a URL filtering rule to a security zone or policy rule

Part 1: Creating a URL filtering rule

1. Select **Object > URL Filtering>Profile**.

2. Click **New**.



Configure the following options.

Option	Description
Name	Specifies the name of the rule. You can configure the same URL filtering rule name in different VSYSs.

Option	Description
Safe Search	Many search engines, such as Google, Bing, Yahoo!, Yandex, and YouTube, all have a "SafeSearch" setting, which can filter adult content, and then return search results at different levels based on the setting. The system supports the safe search function in the URL filtering Profile to detect the "SafeSearch" setting of search engine and perform corresponding control actions. Select the **Enable** check box to enable the safe search function to detect the settings of the search engine's "SafeSearch" and perform corresponding control actions.  Notes: • The safe search function only can be used in the following search engines currently: Google, Bing, Yahoo!, Yandex, and YouTube. • The safe search function only can be used in combination with the SSL proxy function because the search engine uses the HTTPS protocol. Therefore, when the "SafeSearch" is enabled, enable the SSL proxy function for the policy rule which is bound with

Option	Description
	 URL filter profile. • To ensure the valid "SafeSearch" function of Google, you need to configure policy rules to block the UDP 80 and UDP 443 port.
Control Action	Specifies the safe search action. o Block: Selects the check box to specify the action as block, When the " SafeSearch" setting of search engine is not set, users will be prevented from accessing the search page and a warn-ing page will pop up which provides users with the link for "SafeSearch" setting. o Enforce: Selects the check box to specify the action as execute. When the "SafeSearch" setting of search engine is not set, system will force to set it at the “strict” level.

3. In the **URL Category** part to configure the URL category control type for URL filtering rules to control the access to some certain category of website.

In the URL Category part, configure the following options.

Option	Description
New	Creates a new URL category. For more information about URL categories, see "User-defined URL DB" on Page 1189.
Edit	Selects a URL category from the list, and click **Edit** to

Option	Description
	edit the selected URL category. **URL Keyword Category** controls the access to the website whose URL contains the specific keywords. Click the **URL Keyword Category**option to configure. The options are: • New: Creates new keyword categories. For more information about keyword category, see "Keyword Category" on Page 1193. • Edit: Select a URL keyword category from the list, and click **Edit** to edit the selected URL keyword categories. • Keyword category: Shows the name of the configured keyword categories. • Block: Selects the check box to block access to the website whose URL contains the specified keywords. • Log: Selects the check box to log the access to the website whose URL contains the specified keywords. • Other URLS: Specifies the actions to the URLs that do not contain the keywords in the list, including **Block Access** and **Record Log**.
URL category	Shows the name of pre-defined and user-defined URL categories in the VSYS.

Option	Description
Block	Selects the check box to block access to the corresponding URL category.
Log	Selects the check box to log access to the corresponding URL category.
Other URLs	Specifies the actions to the URLs that are not in the list, including **Block Access** and **Record Log**.
SSL inspection	Select the **Enable** button to enable SSL negotiation packets inspection. For HTTPS traffic, system can acquire the domain name of the site which you want to access from the SSL negotiation packets after this feature is configured. Then, system will perform URL filtering in accordance with the domain name. If SSL proxy is configured at the same time, SSL negotiation packets inspection method will be preferred for URL filtering.

4. In the **URL Keyword Category** part to configure the URL keyword category control type for URL filtering rules to control the access to the website whose URL contains the specific keywords.

In the URL Keyword Category part, configure the following options.

Option	Description
New	Creates new keyword categories. The system supports predefined keyword categories and custom keyword categories. For more information about keyword category, see "Keyword Category" on Page 1193.

Option	Description
Edit	Select a URL keyword category from the list, and click **Edit** to edit the selected URL keyword categories.
Keyword category	Shows the name of the configured keyword categories.
Block	Selects the check box to block access to the website whose URL contains the specified keywords.
Log	Selects the check box to log the access to the website whose URL contains the specified keywords.
Other URLs	Specifies the actions to the URLs that do not contain the keywords in the list, including **Block Access** and **Record Log**.

5. Click **OK** to save the settings.

Notes: The control type of a URL filtering rule can configure both the URL category and the URL keyword category.

Part 2: Binding a URL filtering rule to a security zone or security policy rule

The URL filtering configurations are based on security zones or policies.

- If a security zone is configured with the URL filtering function, system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the URL filtering function, system will perform detection on the traffic that is destined to the policy rule you specified, and then respond.

- The threat protection configurations in a policy rule are superior to that in a zone rule if they are specified at the same time, and the URL filtering configurations in a destination zone are superior to that in a source zone if they are specified at the same time.
- To perform the URL filtering function on the HTTPS traffic, see the policy-based URL filtering.

To create the zone-based URL filtering, take the following steps:

1. Create a zone. For more information about how to create this, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog box, select the Threat Protection tab.
3. Enable the threat protection that you need, and select the URL filtering rules from the profile drop-down list below; you can click **Add Profile** from the profile drop-down list below to create a URL filtering rule. For more information, see "Part 1: Creating a URL filtering rule" on Page 1176.
4. Click **OK** to save the settings.

To create the policy-based URL filtering, take the following steps:

1. Configure a security policy rule. For more information, see "Configuring a Security Policy Rule" on Page 1287.
2. In the Protection tab, select the **Enable** check box of URL Filtering.
3. From the **Profile** drop-down list, select a URL filtering rule. You can also click **Add Profile** to create a new URL filtering rule.
4. To perform the URL filtering function on the HTTPS traffic, you need to enable the SSL proxy function for this security policy rule. System will decrypt the HTTPS traffic according to the SSL proxy profile and then perform the URL filtering function on the decrypted

traffic.

According to the various configurations of the security policy rule, system will perform the following actions:

Policy Rule Configurations	Actions
SSL proxy enabled URL filtering disabled	System decrypts the HTTPS traffic according to the SSL proxy profile but it does not perform the URL filtering function on the decrypted traffic.
SSL proxy enabled URL filtering enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the URL filtering function on the decrypted traffic.
SSL proxy disabled URL filtering enabled	System performs the URL filtering function on the HTTP traffic according to the URL filtering profile. The HTTPS traffic will not be decrypted and system will transfer it.

If the SSL proxy and URL filtering functions are enabled on a security policy rule but the control type of the selected URL filtering rule is the Web surfing record, the system will not record the GET and POST methods and the posted contents via HTTPS.

If the zone which the security policy rule binds with is also configured with a URL filtering, system will perform the following actions:

Policy Rule Configurations	Zone Configurations	Actions
SSL proxy enabled URL fil-	URL filtering enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the URL filtering function on the decrypted traffic according to the

Policy Rule Configurations	Zone Configurations	Actions
tering disabled		URL filter rule of the zone.
SSL proxy enabled URL filtering enabled	URL filtering enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the URL filtering function on the decrypted traffic according to the URL filtering rule of the policy rule.
SSL proxy disabled URL filtering enabled	URL filtering enabled	System performs the URL filtering function on the HTTP traffic according to the URL filtering rule of the policy rule. The HTTPS traffic will not be decrypted and system will transfer it.

5. Click **OK** to save the settings.

If necessary, you can go on to configure the functions of "Predefined URL DB" on Page 1188, "URL Lookup" on Page 1191, and "Warning Page" on Page 1195.

Object	Description
Predefined URL DB	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL categories.
URL Lookup	Use the URL lookup function to inquire URL information from the URL database, including the URL category and the category type.
Warning Page	• Block warning: When your network access is blocked, a warning page will prompt in the Web browser.

Object	Description
	• Audit warning: When your network access is audited, a warning page will prompt in the Web browser.

Notes:

- Only after canceling the binding can you delete the URL filtering rule.
- To get the latest URL categories, you are recommended to update the URL database first. For more information about URL database, see "Predefined URL DB" on Page 1188.
- You can export the log messages to specified destinations. For more information about log messages, see "Log Configuration" on Page 1713.

Cloning a URL filtering Rule

System supports the rapid clone of a URL filtering rule. You can clone and generate a new URL filtering rule by modifying some parameters of the one current URL filtering rule.

To clone a URL filtering rule, take the following steps:

1. Select **Object > URL Filtering**.
2. Select a URL filtering rule in the list.
3. Click the **Clone** button above the list, and the **Name** configuration box will appear below the button. Then enter the name of the new URL filtering rule.
4. The cloned URL filtering rule will be generated in the list.

Viewing URL Hit Statistics

The URL access statistics includes the following parts:

- Summary: The statistical information of the top 10 user/IPs, the top 10 URLs, and the top 10 URL categories during the specified period of time are displayed.
- User/IP: The user/IP and detailed hit count are displayed.
- URL: The URL and detailed hit count are displayed.
- URL Category: The URL category and detailed hit count and traffic are displayed.

To view the URL hit statistics, see "URL Hit" on Page 1629 in Monitor.

- To view the URL hit statistics, enable **URL Hit** in "Monitor Configuration" on Page 1670.
- To view the traffic of the URL category, enable **URL Hit** and **URL Category Bandwidth** in "Monitor Configuration" on Page 1670.

Viewing Web Surfing Records

To view the Web surfing records, view "URL Log" on Page 1704. Before you view the Web surfing records, see "Log Configuration" on Page 1713 to enable URL Log function.

Configuring URL Filtering Objects

When using URL filtering function, you need to configure the following objects:

Object	Description
Predefined URL DB	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL categories.
User-defined URL DB	The user-defined URL database is defined by you and you can use it to specify the URL category.
URL Lookup	Use the URL lookup function to inquire URL information from the URL database.

Object	Description
Keyword Category	Use the keyword category function to view the predefined keyword categories and customize the keyword categories. For more information about keyword category, see Keyword Category in URL Filtering.
Warning Page	Enable or disable the warning page. • Block warning: When your network access is blocked, a warning page will prompt in the Web browser. • Audit warning: When your network access is audited, a warning page will prompt in the Web browser.

Predefined URL DB

System contains a predefined URL database.

Notes: The predefined URL database is controlled by a license . Only after a URL license is installed, the predefined URL database can be used.

The predefined URL database provides URL categories for the configurations of a URL filtering. It includes dozens of categories and tens of millions of URLs .

When identifying the URL category, the user-defined URL database has a higher priority than the predefined URL database.

Configuring Predefined URL Database Update Parameters

By default, system updates predefined URL database everyday. You can change the update parameters according to your own requirements. Currently, two default update servers are provided: https://update1.hillstonenet.com and https://update2.hillstonenet.com. Besides, you can update the predefined URL database from your local disk. For more information about how to change the update parameters, see Updating Signature Database.

Upgrading Predefined URL Database Online

To upgrade the URL database online, take the following steps:

1. Select **System > Upgrade Management > Signature Database Update**.
2. In the URL category database update section, click **Update** to update the predefined URL database.

Upgrading Predefined URL Database from Local

To upgrade the predefined URL database from local, take the following steps:

1. **System > Upgrade Management > Signature Database Update**
2. In the URL category database update section, click **Browse** to select the URL database file from your local disk.
3. Click **Upload** to update the predefined URL database.

Notes: You can not upgrade the predefined URL database from local in non-root VSYS.

User-defined URL DB

Besides categories in predefined URL database, you can also create user-defined URL categories, which provides URL categories for the configurations of URL filtering. When identifying the URL category, the user-defined URL database has a higher priority than the predefined URL database.

System provides three predefined URL categories: custom1, custom2, custom3. You can import your own URL lists into one of the predefined URL categories.

Notes: You can not import your own URL lists into one of the predefined URL category in non-root VSYS.

Configuring User-defined URL DB

To configure a user-defined URL category, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog box will appear.
3. Click **New**. The URL Category dialog box will appear.

4. Type the category name in the **Category** box. URL category name cannot only be a hyphen (-). And you can create at most 16 user-defined categories.
5. Type a URL into the **URL http(s)://** box.
6. Click **Add** to add the URL and its category to the table.
7. To edit an existing one, select it and then click **Edit**. After editing it, click **Add** to save the changes.
8. Click **OK** to save the settings.

Importing User-defined URL

System supports to batch imported user-defined URL lists into the predefined URL category named custom1/2/3. To import user-defined URL, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog box will appear.
3. Select one of the predefined URL category(custom1/2/3), and then click **Import**.
4. In the Batch Import URL dialog box, click **Browse** button to select your local URL file. The file should be less than 1 M, and have at most 1000 URLs. Wildcard is supported to use once in the URL file, which should be located at the start of the address.
5. Click **OK** to finish importing.

Clearing User-defined URL

In the predefined URL category named custom1/2/3, clear a user-defined URL, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog box will appear.
3. Select one of the predefined URL categories(custom1/2/3), and then click **Clear**. The URL in the custom 1/2/3 will be cleared from the system.

URL Lookup

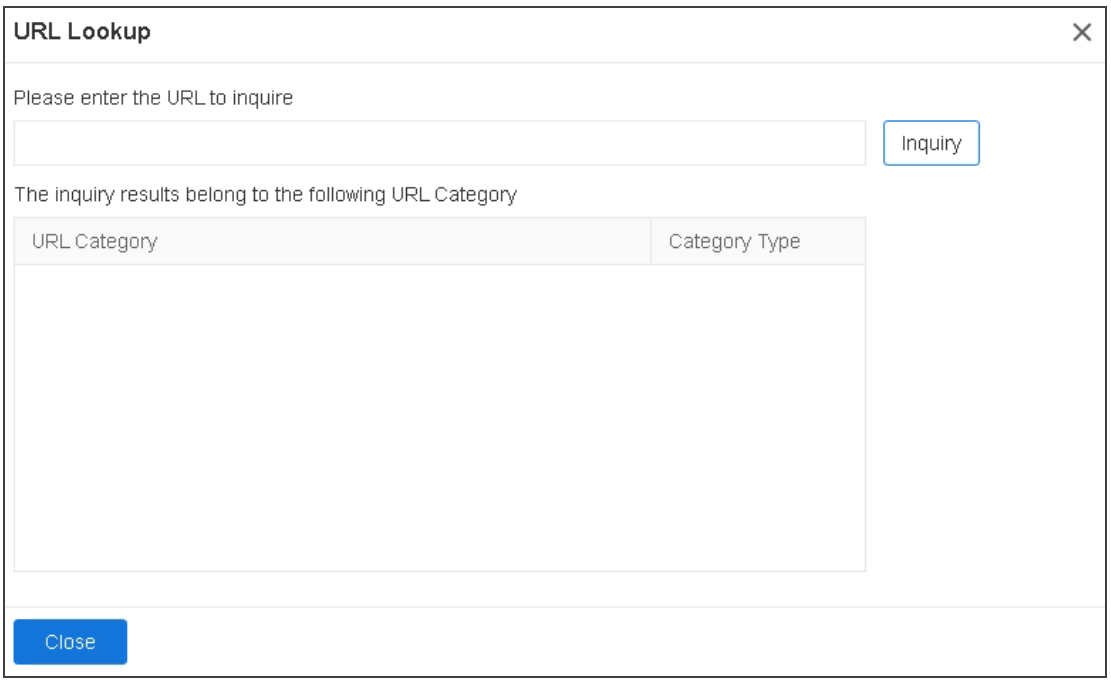
You can inquire a URL to view the details by URL lookup, including the URL category and the category type.

Inquiring URL Information

To inquiry URL information, take the following steps:

1. Select **Object > URL Filtering**.

2. At the top-right corner, click **Configuration > URL Lookup**. The URL Lookup dialog box will appear.



3. Type the URL into the **Please enter the URL to inquire** box.

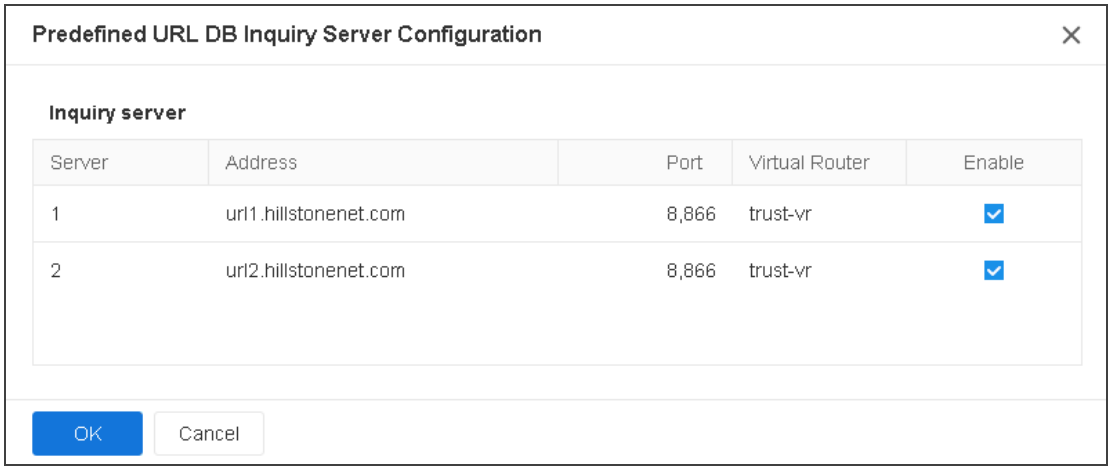
4. Click **Inquire**, and the results will be displayed at the bottom of the dialog box.

Configuring URL Lookup Servers

URL lookup server can classify an uncategorized URL (URL is neither in predefined URL database nor in user-defined URL database) you have accessed, and then add it to the URL database during database updating. Two default URL lookup servers are provided: url1.hillstonenet.com and url2.hillstonenet.com. By default, the URL lookup servers are enabled.

To configure a URL lookup server, take the following steps:

1. Select **Object > URL Filtering>Profile**.
2. At the top-right corner, Select **Configuration > Predefined URL DB**. The Predefined URL DB dialog box will appear.
3. Click **Inquiry Server Configuration**. The Predefined URL DB Inquiry Server Configuration dialog box will appear.



4. In the Inquiry server section, double-click the cell in the IP/Port/Virtual Router column of Server1/2 and type a new value.
5. Select the check box in the **Enable** column to enable this URL lookup server.
6. Click **OK** to save the settings.

Keyword Category

Keyword categories include predefined keyword categories and custom keyword categories, which are used in the URL filtering function. You can use predefined keyword categories or customize the keyword category as needed. System provide four predefined keyword categories, which are **predef_bank_card** (keyword for bank card number), **predef_email_address** (keyword for email address), **predef_cellphone_number** (keyword for mobile phone number), and **predef_mainland_id_card** (keyword for ID number), which cannot be edited or deleted.

After configuring a URL filtering rule, system will scan traffic according to the configured keywords and calculate the trust value for the hit keywords. The calculating method is: adding up the results of *times * trust value* of each keyword that belongs to the category. Then system compares the sum with the threshold 100 and performs the following actions according to the comparison result:

- If the sum is larger than or equal to category threshold (100), the configured category action will be triggered;
- If more than one category action can be triggered and there is block action configured, the final action will be Block;
- If more than one category action can be triggered and all the configured actions are Permit, the final action will be Permit.

For example, a URL filtering rule contains two keyword categories C1 with action block and C2 with action permit. Both of C1 and C2 contain the same keywords K1 and K2. Trust values of K1 and K2 in C1 are 20 and 40. Trust values of K1 and K2 in C2 are 30 and 80.

If system detects 1 occurrence of K1 and K2 each on a URL, then C1 trust value is 20*1＋40*1-1=60<100, and C2 trust value is 30*1+80*1=110>100. As a result, the C2 action is triggered and the URL access is permitted.

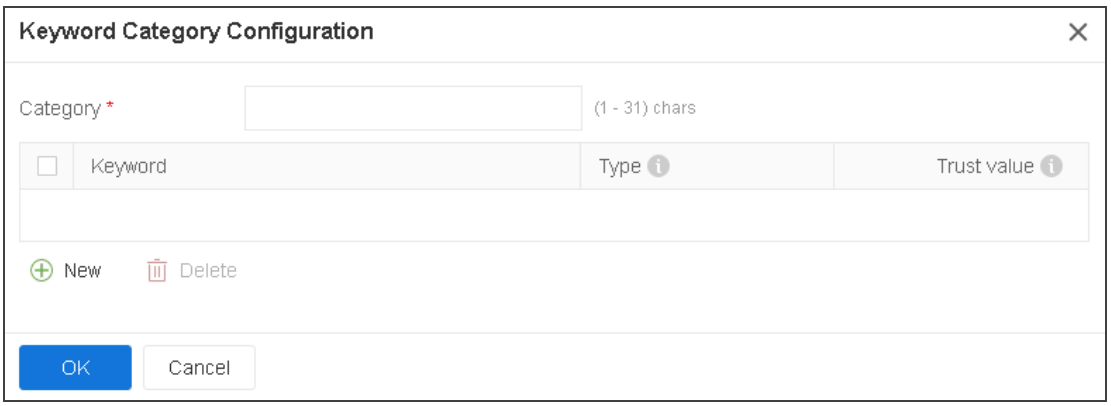
If system detects 3 occurrences of K1 and 1 occurrence of K2 on a URL, then C1 trust value is 20*3+40*1=100, and C2 trust value C2 is 30*3+80*1=170>100. Conditions for both C1 and C2 are satisfied, but the block action for C1 is triggered, so the web page access is denied.

Configuring a Keyword Category

To configure a keyword category, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, select **Configuration > Keyword Category**. The Keyword Category page will appear.

3. Display predefined keyword categories and created custom keyword categories in the Keyword Category page.
4. Click **New**. The **Keyword Category Configuration** page will appear.



5. Type the category name.
6. Click **New** and specify the keyword, character matching method (simple/regular expression), and trust value (100 by default).
7. Repeat the above steps to add more keywords.
8. To delete a keyword, select the keyword you want to delete from the list and click **Delete**.
9. Click **OK** to save your settings.

Warning Page

The warning page shows the user block information and user audit information. You can enable or disable the warning page as needed.

The warning page include predefined warning page and user-defined warning page.

- Predefined warning page: Displays the predefined warning information content, including prompt information and warning reasons.

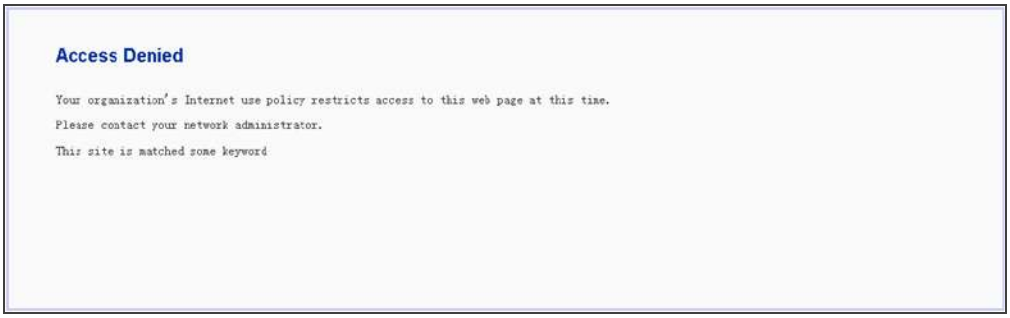
- User-defined warning page: You can customize the warning page by custom warning information and pictures. For details, please refer to "Warning Page Management" on Page 1837..

Enabling/ Disabling the Block Warning

The block warning is disabled by default. If the internet behavior is blocked by the URL filtering function, the Internet access will be denied. The information of Access Denied will be shown in your browser, and some web surfing rules will be shown to you on the warning page at the same time. According to the different network behaviors, the predefined warning page includes the following two situations:

- Visiting a certain type of URL.

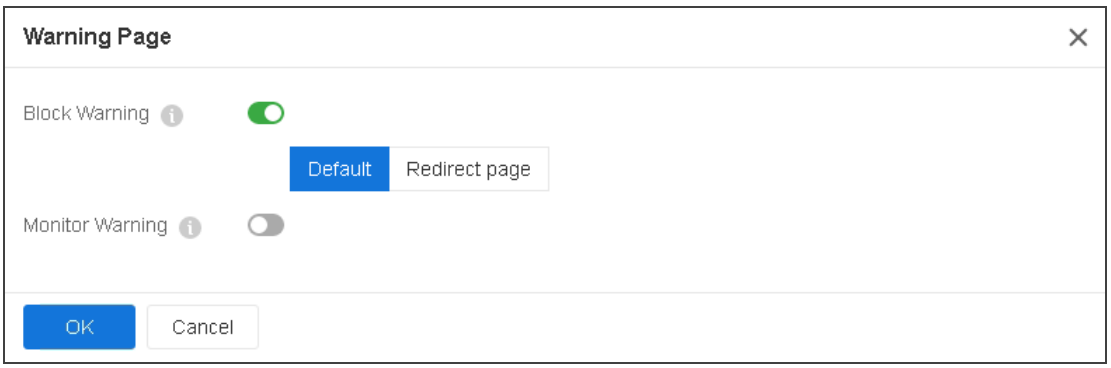
- Visiting the URL that contains a certain type of keyword category.



To enable or disable the block warning , take the following steps:

1. Click **Object > URL Filtering > Profile**.

2. At the top-right corner, select **Configuration > Warning Page**. The Warning Page dialog box will appear.



3. In the Block Warning section, select **Enable**. To disable this function, unselect the **Enable** check box.

4. Configure the display information in the blocking warning page.

Option	Description
Default	Use the default blocking warning page as shown above. After selecting the **Default** radio button: • If the user-defined warning page is not configured, the predefined warning page will be used. • If the user-defined warning page is configured and enabled, the user-defined warning page will be used.
Redirect page	Redirect to the specified URL. Type the URL in the **URL http://** box. You can click Detection to verify whether the URL is valid.

5. Click **OK** to save the settings.

Enabling/ Disabling the Audit Warning

The audit warning function is disabled by default. After enabling the audit warning function, when your network behavior matches the configured URL filtering rule, your HTTP request will be redirected to a warning page where the audit and privacy protection information is displayed. See the picture below:

To enable or disable the audit warning function, take the following steps:

1. Select **Object > URL Filtering**.
2. At the top-right corner, select **Configuration > Warning Page**. The Warning Page dialog box will appear.
3. In the Audit Warning section, select **Enable**.To disable this function, unselect the **Enable** check box.
    - If the user-defined warning page is not configured, the predefined warning page will be used.
    - If the user-defined warning page is configured and enabled, the user-defined warning page will be used.

    For details, please refer to "Warning Page Management" on Page 1837..
4. Click **OK** to save the settings.

First Access of Uncategorized URL

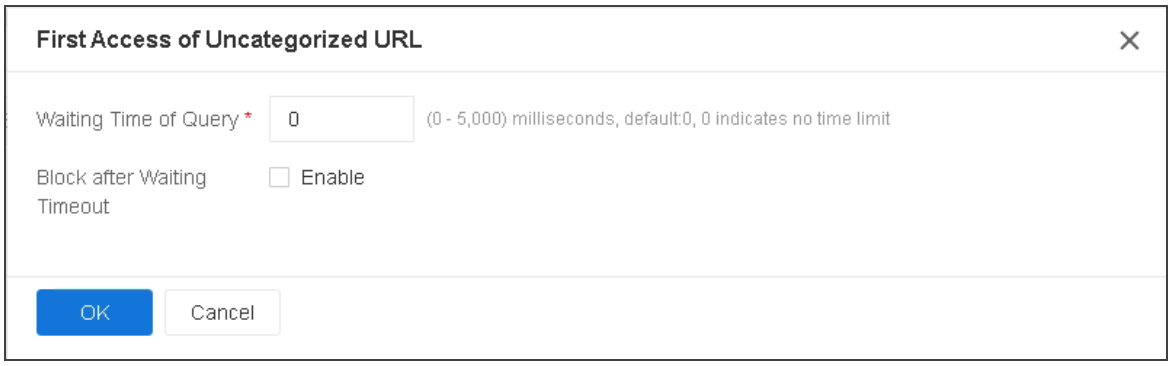
For the uncategorized URL that you visit for the first time, that is, the URL which is neither in the system's predefined URL database nor in the user-defined URL database, system will continue to query the category of the URL in the cloud. Because the query may takes a litter while, system cannot process the uncategorized URL immediately until the query result is returned.

To solve the above problem, you can specify the waiting time of query and enable the block action when waiting times out. After the waiting time of query is exceeded, system will block the access to the uncategorized URL.

To configure related content of the first access of an uncategorized URL, take the following steps:

Select **Object** > **URL Filtering** > **Profile**.

At the top-right corner, select **Configuration** > **First Access of Uncategorized URL**. The First Access of Uncategorized URL dialog box will appear.



Type the waiting time value of query into the Waiting Time of Query text box. The range is 0 to 5000ms. The default value is 0, which means there is no wait time limit.

Select the Enable check box after Block after Waiting Timeout to enable the block action, after the waiting time of query is exceeded, system will block the access of uncategorized URL. After clearing the Enable check box, after the waiting time of query is exceeded, system will continue to perform URL filtering according to the configuration of URL filtering profile.

Click **OK** to save the settings.

Configuring the URL Blacklist/Whitelist

You can further control the access to some websites by configuring URL blacklists and whitelists.

- After the URL blacklist is configured, when you send an access request to the specified URL in the blacklist, the system will block the request.
- After the URL whitelist is configured, when you send an access request to the specified URL in the whitelist, system will not perform URL filtering for the access request and let the request pass
- The URL blacklist, the URL whitelist and the URL filtering rule all configured with URL categories, the matching priority for URL category filtering is: the URL blacklist > the URL whitelist > the URL filtering rule.

Notes:

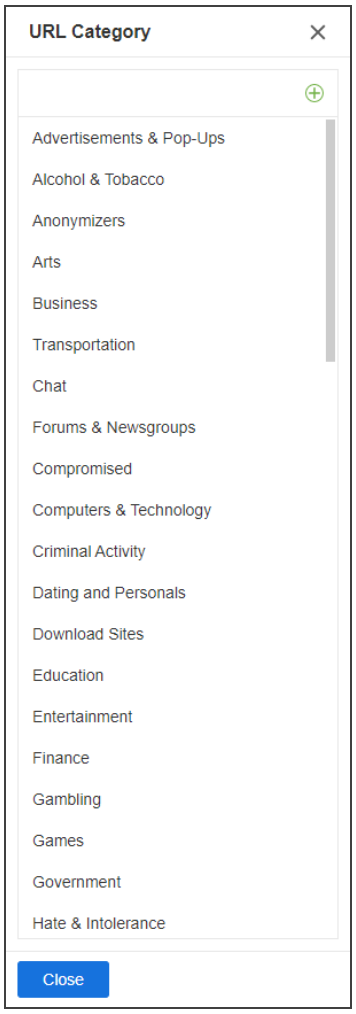
- An URL category can only be referenced by an object (URL blacklist, URL whitelist or URL filtering profile). For example, when the URL category "Advertisement" has been added to the URL blacklist, this URL category cannot be added to the URL whitelist, and it will not be referenced in the URL filtering profile.
- Non-root VSYS does not support the URL blacklist\whitelist function, and the URL blacklist/whitelist configuration under root VSYS does not take effect and has no effect on non-root VSYS.

Configuring the URL Blacklist

To configure the URL blacklist, take the following steps:

1. Select **Object > URL Filtering > URL Blacklist/Whitelist**.
2. Select **URL Blacklist** tab to open the URL blacklist page, which displays all URL categories that have been added to the URL blacklist and the corresponding URL type and description.

3. Click "+" , and select the add the URL category needed to add to the URL black list.



4. The "URL category" on the left contains all URL categories that can be referenced (pre-defined URL DB and user-defined URL DB). You can also click ⊕ to create a new URL category. For specific steps, see Configuring User-defined URL DB.

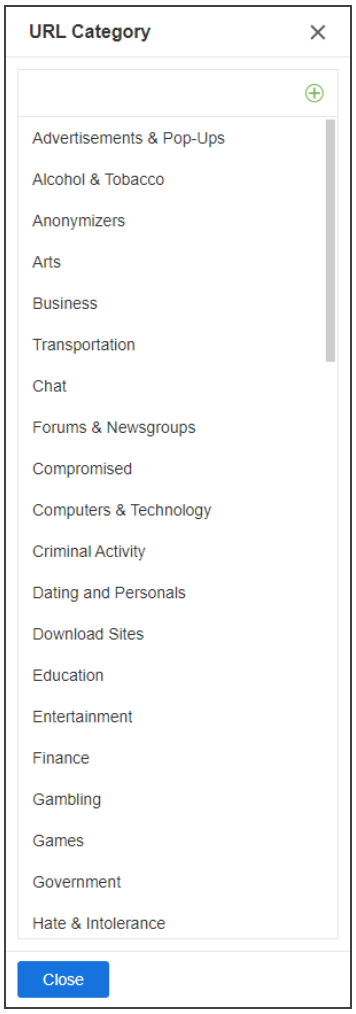
5. If you need to delete the URL category entry in the URL blacklist, in the "URL blacklist" list on the right, select the URL category entry you want to delete and click ✕ .

6. Click **OK**.

Configuring the URL Whitelist

To configure the URL whitelist, take the following steps:

1. Select **Object > URL Filtering > URL Blacklist/Whitelist**.
2. Select **URL Whitelist** tab to open the URL whitelist page, which displays all URL categories that have been added to the URL whitelist and the corresponding URL type and description.
3. Click "+" , and select the add the URL category needed to add to the URL white list.



4. The "URL category" on the left contains all URL categories that can be referenced (pre-defined URL DB and user-defined URL DB). You can also click ⊕ to create a new URL category. For specific steps, see Configuring User-defined URL DB.
5. If you need to delete the URL category entry in the URL whitelist, in the "URL whitelist" list on the right, select the URL category entry you want to delete and click ✕ .
6. Click **OK**.

Data Security

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

The data security function allows you to flexibly configure control rules to comprehensively control and audit (by behavior logs and content logs) on user network behavior.

Data security can audit and filter in the following network behaviors:

Function	Description
File filter	Checks the files transported through HTTP(S), FTP, SMTP (S), IMAP(S), POP3(S), SMB protocols and control them according to the file filter rules.

Content filter	• File content filter: Detect sensitive keywords carried in the file content of the specified protocol type and file type, and can log or block them.
	• Web content :Controls the network behavior of visiting the webpages that contain certain keywords, and log the actions.
	• Web posting: Controls the network behavior of posting on websites and posting specific keywords, and logs the posting action and posted content.
	• Email filter: Controls and audit SMTP(S)/POP3 (S)/IMAP(S)mails :
	  • Control and audit all the behaviors of sending emails;
	  • Control and audit the behaviors of sending emails

Function	Description
	that contain specific sender, recipient, keyword or attachment. • Application behavior control: Controls and audits the actions of HTTP(S), FTP and TELNET applications: • FTP contents and methods, including Login, Get, and Put; • HTTP(S) methods, including Connect, Get, Put, Head, Options, Post, and Trace; • Request content initiated by the TELNET client.
Network Behavior Record	Audits the IM applications behaviors and record log messages for the access actions.

Configuring Objects

Objects mean the items referenced during Content Filter rules. When using the data security function, you need to configure the following objects:

Object	Description
Predefined URL DB	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
User-defined URL DB	The user-defined URL database is defined by yourself and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
URL Lookup	Use the URL lookup function to inquire URL information from the URL database.
Keyword Category	Use the keyword category function to view the predefined keyword categories and customize the keyword categories. You can use it to specify the keyword for the File Content Filter/Web Content/Web Posting/Email filter/HTTP(S)/FTP Control functions. For more information about keyword category, see Keyword Category in Data Security.
Warning Page	Enable or disable the warning page. • Block warning: When your network access is blocked, a warning page will prompt in the Web browser. • Audit warning: When your network access is audited, a warning page will prompt in the Web browser.

Object	Description
Bypass Domain	Domains that are not controlled by the internet behavior control rules.
Exempt User	Users that are not controlled by the internet behavior control rules.

Predefined URL DB

The system contains a predefined URL database.

Notes: The predefined URL database is controlled by a license controlled. Only after a URL license is installed, the predefined URL database can be used.

The predefined URL database provides URL categories for the configurations of Web content/Web posting. It includes dozens of categories and tens of millions of URLs .

When identifying the URL category of a URL, the user-defined URL database has a higher priority than the predefined URL database.

Configuring Predefined URL Database Update Parameters

By default, the system updates predefined URL database everyday. You can change the update parameters according to your own requirements. Currently, two default update servers are provides: https://update1.hillstonenet.com and https://update2.hillstonenet.com. Besides, you can update the predefined URL database from your local disk. For more information about how to change the update parameters, see Updating Signature Database.

Upgrading Predefined URL Database Online

To upgrade the URL database online:

1. Select **System > Upgrade Management > Signature Database Update**.

2. In the URL category database update section, click **Update** to update the predefined URL database.

Upgrading Predefined URL Database from Local

To upgrade the predefined URL database from local:

1. **System > Upgrade Management > Signature Database Update**
2. In the URL category database update section, click **Browse** to select the URL database file from your local disk.
3. Click **Upload** to update the predefined URL database.

User-defined URL DB

Besides categories in predefined URL database, you can also create user-defined URL categories, which provides URL categories for the configurations of Web content/Web posting. When identifying the URL category, the user-defined URL database has a higher priority than the predefined URL database.

System provides three predefined URL categories: custom1, custom2, custom3. You can import your own URL lists into one of the predefined URL category.

Configuring User-defined URL DB

To configure a user-defined URL category:

1. Select **Object > URL Filtering> Profile**.
2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog appears.

3. Click **New**. The URL Category dialog appears.

4. Type the category name in the **Category** box. URL category name cannot only be a hyphen (-). And you can create at most 16 user-defined categories.
5. Type a URL into the **URL http(s)://** box.
6. Click **Add** to add the URL and its category to the table.
7. To edit an existing one, select it and then click **Edit**. After editing it, click **Add** to save the changes.
8. Click **OK** to save the settings.

Importing User-defined URL

System supports to batch import user-defined URL lists into the predefined URL category named custom1/2/3. To import user-defined URL:

1. Select **Object > URL Filter**.
2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog appears.
3. Select one of the predefined URL category(custom1/2/3), and then click **Import**.

4. In the Batch Import URL dialog, click **Browse** button to select your local URL file. The file should be less than 1 M, and has at most 1000 URLs. Wildcard is supported to use once in the URL file, which should be located at the start of the address.

5. Click **OK** to finish importing.

Clearing User-defined URL

In the predefined URL category named custom1/2/3, clear user-defined URL:

1. Select **Object > URL Filter**.

2. At the top-right corner, select **Configuration > User-defined URL DB**. The User-defined URL DB dialog appears.

3. Select one of the predefined URL category(custom1/2/3), and then click **Clear**, the URL in the custom 1/2/3 will be cleared from the system.

URL Lookup

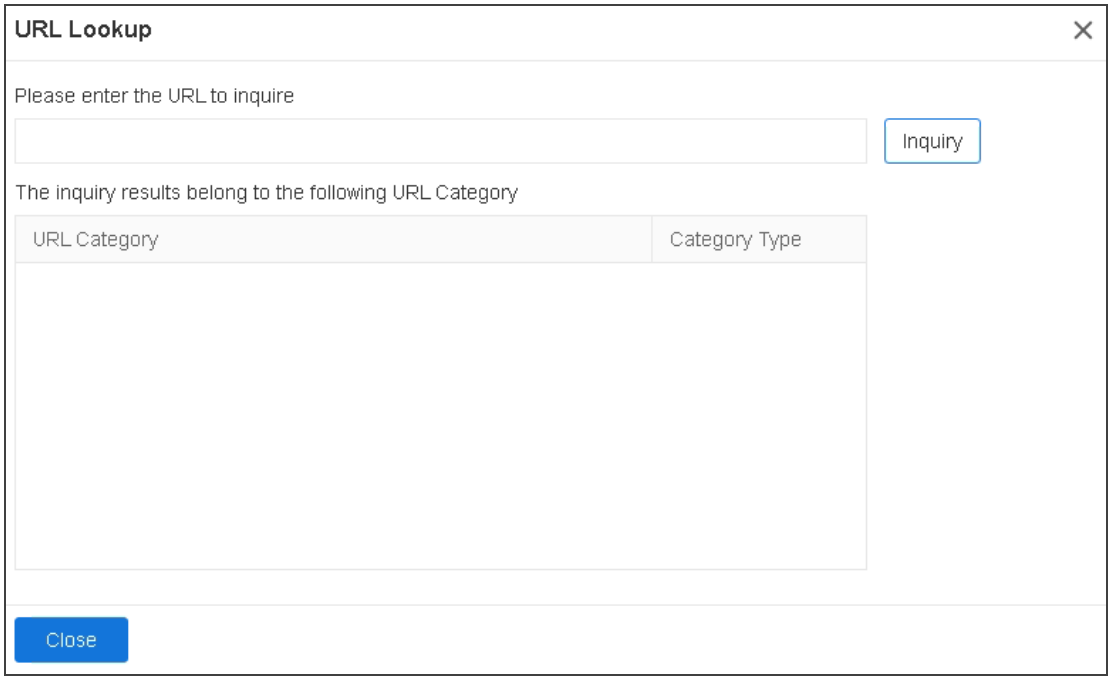
You can inquire a URL to view the details by URL lookup, including the URL category and the category type.

Inquiring URL Information

To inquiry URL information:

1. Select **Object > URL Filtering> Profile**.

2. At the top-right corner, click **Configuration > URL Lookup**. The URL Lookup dialog appears.



3. Type the URL into the **Please enter the URL to inquire** box.

4. Click **Inquire**, and the results will be displayed at the bottom of the dialog.

Configuring URL Lookup Servers

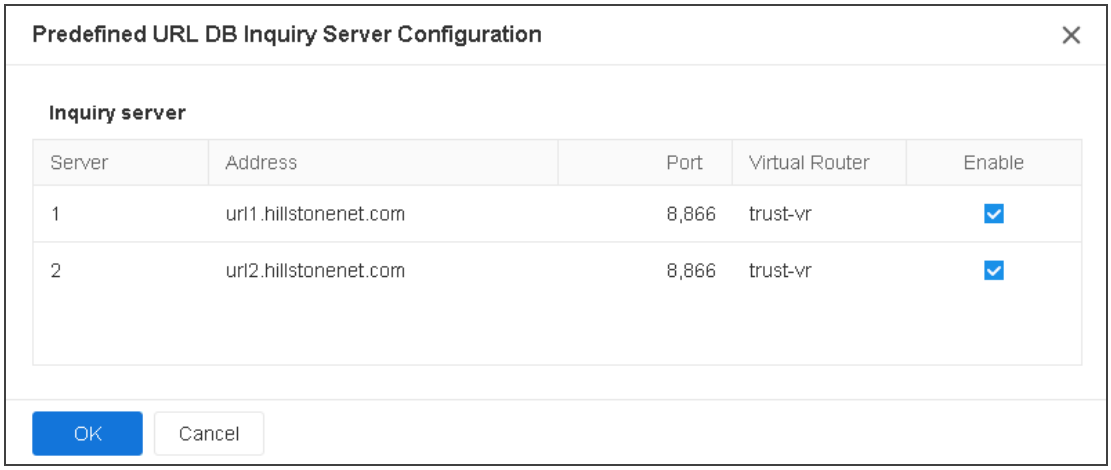
URL lookup server can classify an uncategorized URL (URL is neither in predefined URL database nor in user-defined URL database) you have accessed, and then add it to the URL database during database updating. Two default URL lookup servers are provided: url1.hillstonenet.com and url2.hillstonenet.com. By default, the URL lookup servers are enabled.

To configure a URL lookup server:

1. Select **Object > URL Filtering> Profile**.

2. At the top-right corner, Select **Configuration > Predefined URL DB**. The Predefined URL DB dialog appears.

3. Click **Inquiry Server Configuration**. The Predefined URL DB Inquiry Server Configuration dialog appears.



4. In the Inquiry server section, double-click the cell in the IP/Port/Virtual Router column of Server1/2 and type a new value.
5. Select the check box in the **Enable** column to enable this URL lookup server.
6. Click **OK** to save the settings.

Keyword Category

Keyword categories include predefined keyword categories and custom keyword categories, which are used in the URL filtering function. You can use predefined keyword categories or customize the keyword category as needed. System provide four predefined keyword categories, which are **predef_bank_card** (keyword for bank card number), **predef_email_address** (keyword for email address), **predef_cellphone_number** (keyword for mobile phone number), and **predef_mainland_id_card** (keyword for ID number), which cannot be edited or deleted.

After configuring a internet behavior control rule, the system will scan traffic according to the configured keywords and calculate the trust value for the hit keywords. The calculating method is: adding up the results of *times * trust value* of each keyword that belongs to the category. Then the system compares the sum with the threshold 100 and performs the following actions according to the comparison result:

- If the sum is larger than or equal to category threshold (100), the configured category action will be triggered;
- If more than one category action can be triggered and there is block action configured, the final action will be Block;
- If more than one category action can be triggered and all the configured actions are Permit, the final action will be Permit.

For example, a web content rule contains two keyword categories C1 with action block and C2 with action permit. Both of C1 and C2 contain the same keywords K1 and K2. Trust values of K1 and K2 in C1 are 20 and 40. Trust values of K1 and K2 in C2 are 30 and 80.

If the system detects 1 occurrence of K1 and K2 each on a web page, then C1 trust value is 20*1＋40*1=60<100, and C2 trust value is 30*1+80*1=110>100. As a result, the C2 action is triggered and the web page access is permitted.

If the system detects 3 occurrences of K1 and 1 occurrence of K2 on a web page, then C1 trust value is 20*3+40*1=100, and C2 trust value C2 is 30*3+80*1=170>100. Conditions for both C1 and C2 are satisfied, but the block action for C1 is triggered, so the web page access is denied.

Configuring a Keyword Category

To configure a keyword category:

1. Select **Object > URL Filtering> Profile**.
2. At the top-right corner, Select **Configuration > Keyword Category**. The Keyword Category page appears.
3. Display predefined keyword categories and created custom keyword categories in the Keyword Category page.

4. Click **New**. The **Keyword Category Configuration** page appears.

5. Type the category name.
6. Click **New** and specify the keyword, character matching method (simple/regular expression), and trust value (100 by default).
7. Repeat the above steps to add more keywords.
8. To delete a keyword, select the keyword you want to delete from the list and click **Delete**.
9. Click **OK** to save your settings.

Warning Page

The warning page shows the user block information and user audit information. You can enable or disable the warning page as needed.

The warning page includes predefined warning page and user-defined warning page.

- Predefined warning page: Displays the predefined warning information content, including prompt information and warning reasons.
- User-defined warning page: You can customize the warning page by custom warning information and pictures. For details, please refer to "Warning Page Management" on Page 1837..

Enabling/ Disabling the Block Warning

The block warning is disabled by default. If the internet behavior is blocked by the internet behavior control function, the Internet access will be denied. The information of Access Denied will be shown in your browser, and some web surfing rules will be shown to you on the warning page at the same time. The predefined warning page below:

After enabling the block warning function, block warning information will be shown in the browser when one of the following actions is blocked:

- Visiting the web page that contains a certain type of keyword category
- Posting information to a certain type of website or posting a certain type of keywords
- HTTP actions of Connect, Get, Put, Head, Options, Post, and Trace.

To enable or disable the block warning:

1. Click **Object > URL Filtering> Profile**.
2. At the top-right corner, Select **Configuration > Warning Page**. The Warning Page dialog appears.

3. In the Block Warning section, select **Enable**.To disable this function, unselect the **Enable** check box.

    - If the user-defined warning page is not configured, the predefined warning page will be used.
    - If the user-defined warning page is configured and enabled, the user-defined warning page will be used.

    For details, please refer to "Warning Page Management" on Page 1837..

4. Click **OK** to save the settings.

Enabling/ Disabling the Audit Warning

The audit warning function is disabled by default. After enabling the audit warning function, when your internet behavior matches the configured internet behavior rules, your HTTP request will be redirected to a warning page, on which the audit and privacy protection information is displayed. See the picture below:

To enable or disable the audit warning function:

1. Select **Object > Data Security>Content Filter> Web Content/Web Posting/Email Filter/HTTP/FTP Control**.

2. At the top-right corner, Select **Configuration > Warning Page**. The Warning Page dialog appears.

3. In the Audit Warning section, select **Enable**.To disable this function, unselect the **Enable** check box.

   - If the user-defined warning page is not configured, the predefined warning page will be used.
   - If the user-defined warning page is configured and enabled, the user-defined warning page will be used.

   For details, please refer to "Warning Page Management" on Page 1837..

4. Click **OK** to save the settings.

Bypass Domain

Regardless of internet behavior control rules, requests to the specified bypass domains will be allowed unconditionally.

To configure a bypass domain:

1. Select **Object > Data Security>Content Filter> Web Content/Web Posting/Email Filter/HTTP/FTP Control**.
2. At the top-right corner, Select **Configuration > Bypass Domain**. The Bypass Domain dialog appears.

3. Click **New**.In the text box, type the domain name. The domain name will be added to the system and displayed in the bypass domain list.

4. Click **OK** to save the settings.

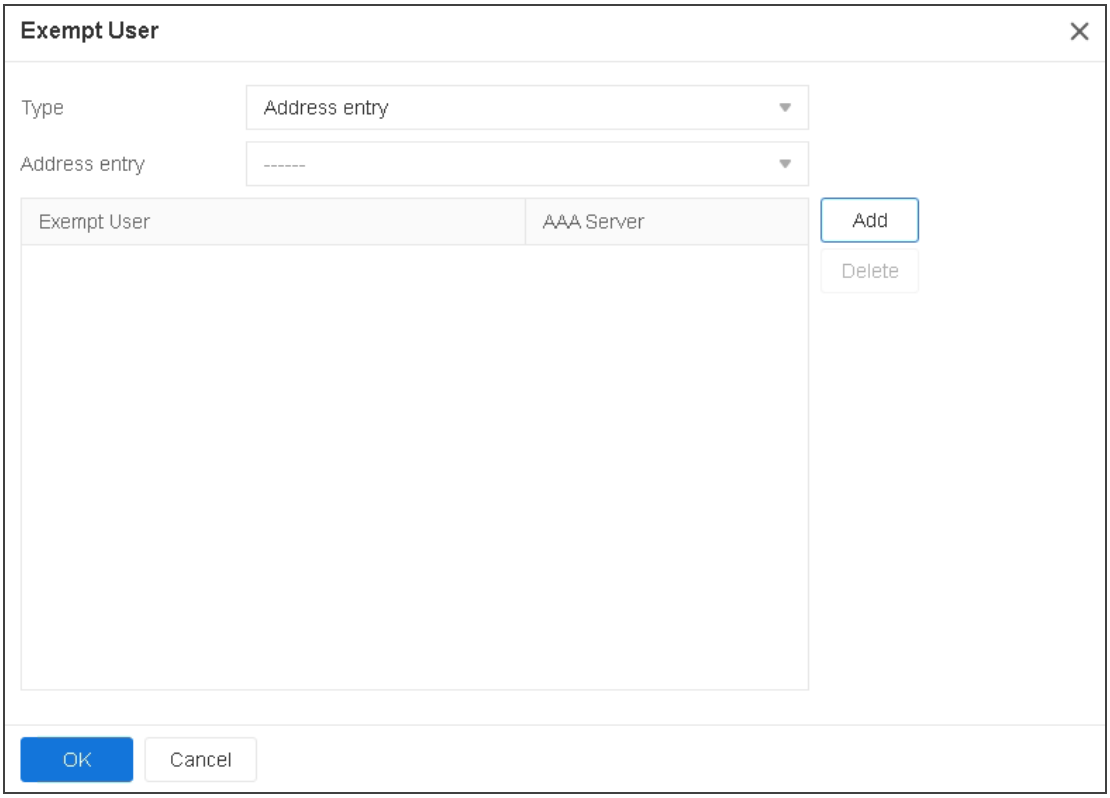
Exempt User

The Exempt User function is used to specify the users who will not be controlled by the internet behavior control rules. The system supports the following types of exempt user: IP, IP range, role, user, user group, and address entry.

To configure the user exception:

1. Select **Object > Data Security>Content Filter> Web Content/Web Posting/Email Filter/HTTP/FTP Control**.

2. At the top-right corner, Select **Configuration > Exempt User**. The Exempt User dialog appears.



3. Select the type of the user from the **Type** drop-down list.
4. Configure the corresponding options.
5. Click **Add**. The user will be added to the system and displayed in the exempt user list.
6. Click **OK** to save the settings.

File Filter

The file filter function checks the files transported through HTTP(S), FTP, SMTP(S), IMAP(S), POP3(S), SMB protocols and control them according to the file filter rules.

- Be able to check and control the files transported through GET and POST methods of HTTP (S), FTP, SMTP(S), IMAP(S), SMB, and POP3(S). If SMB protocol type is used, the system supports the detection and controlling of files in break-point resumption scenarios.
- Support file type filter conditions.
- Support block, log, and permit actions.

After you bind the file filter profile to a policy rule, the system will process the traffic that matches the rule according to the profile. The system also supports binding the file filter profile to a ZTNA policy to perform file detection and processing on the traffic matching the ZTNA policy. For configuration information, refer to Configuring ZTNA Policy.

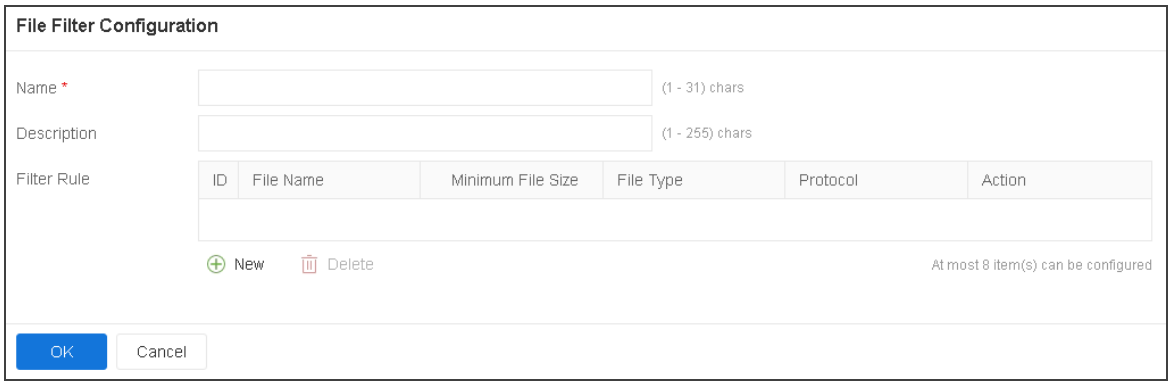
Creating File Filter Rule

Use the file filter rule to specify the protocol that you want to check, the filter conditions, and the actions.

To create a file filter rule:

1. Select **Object > Data Security > File Filter**.

2. Click **New**.



3. In the dialog box, enter values.

Option	Description
Name	Specifies the name of the file filter rule.
Description	Specifies the description of the file filter rule.
Filter Rule	
ID	The ID of file filter rule item. There can be up to 8 items in each file filtering rule. Click the + button to add a file filter rule item. If one filter rule item is configured with the block action and the file happens to match this rule, then the system will block the uploading/downloading of this file.
Minimum File Size	When the size of the transported file reaches the specified file size, the system will trigger the actions. The range is from 1 to 512,000. The unit is KB.
File Type	Specify the file type. Click on the column's cells and

Option	Description
	select from the drop-down menu. You can specify more than one file types. To control the file type that not supported, you can use the UNKNOWN type. When the transmitted file is a particular type, the system will trigger the actions. The file filter function can identify the following file types: 7Z, AI, APK, ASF, AVI, BAT, BMP, CAB, CATPART, CDR, CIN, CLASS, CMD, CPL, DLL, DOC, DOCX, DPX, DSN, DWF, DWG, DXF, EDIT, EMF, EPS, EPUB, EXE, EXR, FLA, FLV, GDS, GIF, GZ, HLP, HTA, HTML, IFF, ISO, JAR, JPG, KEY, LNK, LZH, MA, MB, MDB, MDI, MIF, MKV, MOV, MP3, MP4, MPEG, MPKG, MSI, NUMBERS, OCX, PAGES, PBM, PCL, PDF, PGP, PIF, PL, PNG, PPT, PPTX, PSD, RAR, REG, RLA, RMVB, RPF, RTF, SGI, SH, SHK, STP, SVG, SWF, TAR, TDB, TIF, TORRENT, TXT, VBE, WAV, WEBM, WMA, WMF, WMV, WRI, WSF, XLS, XLSX, XML, XPM, ZIP, BZ2, UNKNOWN
Protocol	Specifies the protocols. http-get represents to check the files transported through the GET method of HTTP. http-post represents to check the files transported through the POST method of HTTP. ftp represents to check the files transported through FTP. smtp represents to check the files transported through SMTP. imap rep-

Option	Description
	resents to check the files transported through IMAP. pop3 represents to check the files transported through POP3. You can specify more than one protocol types. This option is required.
Action	Specify the action to control the files that matches the filter conditions. You can specify block or log. This option is required.

4. Click **OK**.

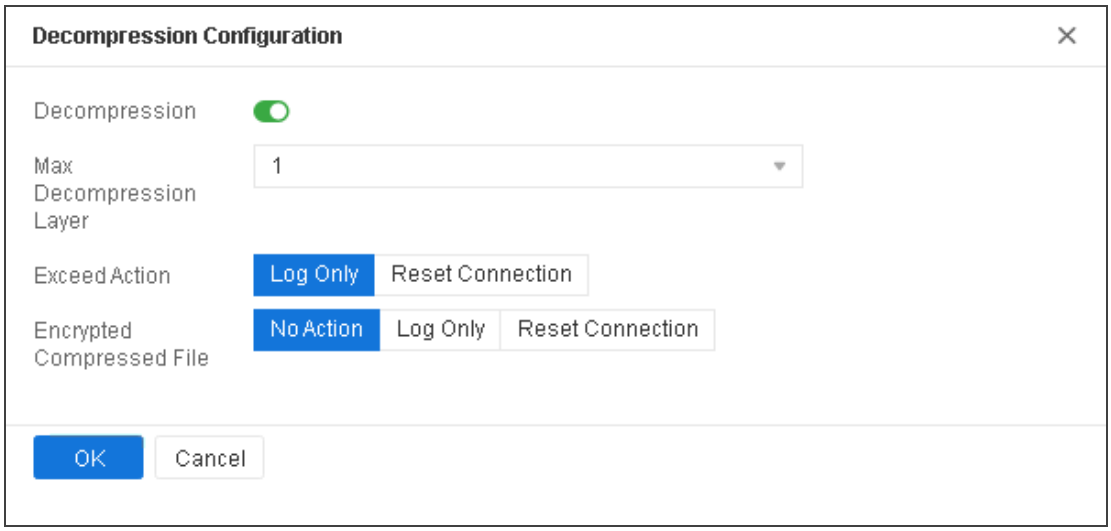
Configuring Decompression Control Function

After configuring the decompression control function, StoneOS can decompress the transmitted compressed files, and can handle the files that exceed the max decompression layer as well as the encrypted compressed files in accordance with the specified actions. This function supports to decompress the files in type of RAR, ZIP, TAR, GZIP, and BZIP2.

To configure the decompression control function, take the following steps:

1. Select **Object > Data Security > File Filter**.

2. At the top-right corner, click **Compression Configuration**.



In the Compression Configuration dialog box, configure the following options.

Option	Description
Decompression	Select / clear the **Enable** check box to enable / disable the decompression function.
Max Decompression Layer	By default, StoneOS can check the files of up to 5 decompression layers. To specify a decompression layer, select a value from the drop-down list. The value range is 1 to 5.
Exceed Action	Specifies an action for the compressed files that exceed the max decompression layer. Select an action from the drop-down list: • Log Only - Only generates logs but will not check and control the files. This action is enabled by

Option	Description
	default. • Reset Connection - Resets connections for the files.
Encrypted Compressed File	Specifies an action for encrypted compressed files: • ------ - Will not take any actions against the files, but might further check and control the files according to the file filter rule. • Log Only - Only generates logs but will not check and control the files. • Reset Connection - Resets connections for the files.

3. Click **OK**.

Notes: For compressed files containing docx, pptx, xlsx, jar, and apk formats, when **Exceed Action** is specified as **Reset Connection**, the maximum compression layers should be added one more layer to prevent download failure.

Viewing File Filter Logs

To view the file filter logs, refer to "File Filter Log" on Page 1707.

Content Filter

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

Includes:

- "File Content Filter" on Page 897: Detect and control the behavior of sensitive keywords carried in the file content of the specified transmission protocol type and file type.
- "Web Content" on Page 1227: Controls the network behavior of visiting the webpages that contain certain keywords, and log the actions.
- "Web Posting" on Page 1233: Controls the network behavior of posting on websites and posting specific keywords, and logs the posting action and posted content.
- "Email Filter" on Page 1239: Controls and audit SMTP(S)/POP3(S)/IMAP(S) mails :
  - Control and audit all the behaviors of sending emails.
  - Control and audit the behaviors of sending emails that contain specific sender, recipient, keyword or attachment.
- "APP Behavior Control" on Page 1245:Controls and audits the actions of HTTP(S) and FTP applications:
  - FTP methods, including Login, Get, and Put.
  - HTTP(S) methods, including Connect, Get, Put, Head, Options, Post, Delete and Trace.
  - Request content initiated by the TELNET client.

Web Content

The web content function is designed to control the network behavior of visiting the websites that contain certain keywords. For example, you can configure to block the access to website that contains the keyword "gamble", and record the access action and website information in the log.

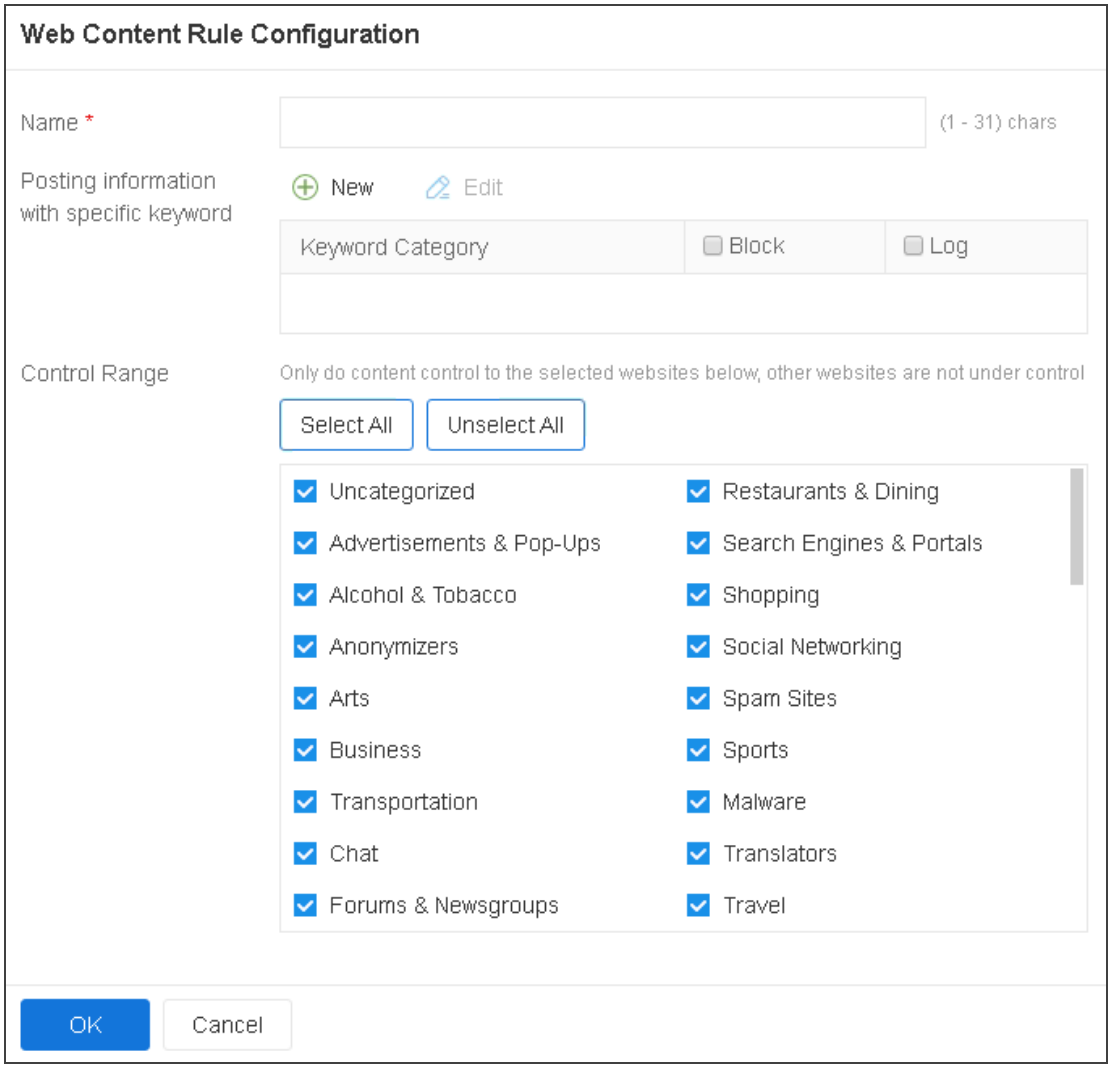
Configuring Web Content

Configuring Web Content contains two parts:

- Create a Web Content rule
- Bind a Web Content rule to a security zone or policy rule

Part 1: Creating a web content rule

1. Select **Object > Data Security > Content Filter > Web Content**.
2. Click **New**.



In the Web Content Rule Configuration dialog box, enter values.

Option	Description
Name	Specifies the rule name.
Posting information with specific keyword	Defines the action when a keyword is matched. • New: Creates new keyword categories. For more information about keyword category, see "Configuring Objects" on Page 1206.

Option	Description
	• Edit: Edits selected keyword category. • Keyword category: Shows the name of configured keyword categories. • Block: Select the check box to block the web pages containing the corresponding keywords. • Log: Select the check box to record log messages when visiting the web pages containing the corresponding keywords. • Record contents: Select the check box to record the keyword context. This option is available only when the device has a storage media (SD card, U disk, or storage module provided by Hillstone) with the NBC license installed.
Control Range	Specify the coverage of this rule. By default, the rule applies to all website. 1. Click **Control Range**. 2. Select or unselect the websites you want to monitor and control. 3. Click **OK**.

3. Click **OK**.

Part 2: Binding a Web Content rule to a security zone or security policy rule

The Web content configurations are based on security zones or policies.

- If a security zone is configured with the Web content function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the Web content function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the Web content configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based Web Content:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, click Data Security to expand the option.
3. Enable the Web content, and select a Web content rules from the profile drop-down list below; or you can click ⊕ from the profile drop-down list below, to create a Web content rule, see Creating a Web content rule.
4. Click **OK** to save the settings.

To realize the policy-based Web content:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. Click **Data Security** to expand the option, click the **Enable** button ofWeb Content.
3. From the **Profile** drop-down list, select a Web Content rule. You can also click ⊕to create a new Web Content rule.
4. Click **OK** to save the settings.

If necessary, you can configure some additional features by going to the right top corner and click **Configuration**.

Option	Description
Predefined URL DB	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
User-defined URL DB	The user-defined URL database is defined by yourself and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
URL Lookup	Use the URL lookup function to inquire URL information from the URL database.
Warning Page	• Block warning: When your network access is blocked, you will be prompted with a warning page in the Web browser. • Audit warning: When your network access is audited, you will be prompted with a warning page in the Web browser.
Bypass Domain	Domains that are not controlled by the internet behavior control rules.
User Exception	Users that are not controlled by the internet behavior control rules.

Notes:

- To enusre you have the latest URL database, it is better to update your

database first. Refer to "Configuring Objects" on Page 1206.

- You can export logs to a designated destination. Refer to "Log Configuration" on Page 1713.
- By default, a rule will immediately take effect after you click **OK** to complete configuration.

Viewing Monitored Results of Keyword Blocking in Web Content

If you have configured email filter with keyword blocking, you can view the monitored results of blocking those words.

Select **Monitor > Keyword Block > Web Content**, you will see the monitored results. For more about monitoring, refer to "Web Content" on Page 1648.

Viewing Logs of Keyword Blocking in Web Content

To see the system logs of keyword blocking in web content, please refer to the "Content Filter Log" on Page 1708.

Web Posting

The web posting function can control the network behavior of posting on websites and posting specific keywords, and can log the posting action and posting content. For example, forbid the users to post information containing the keyword X, and record the action log.

Configuring Web Posting

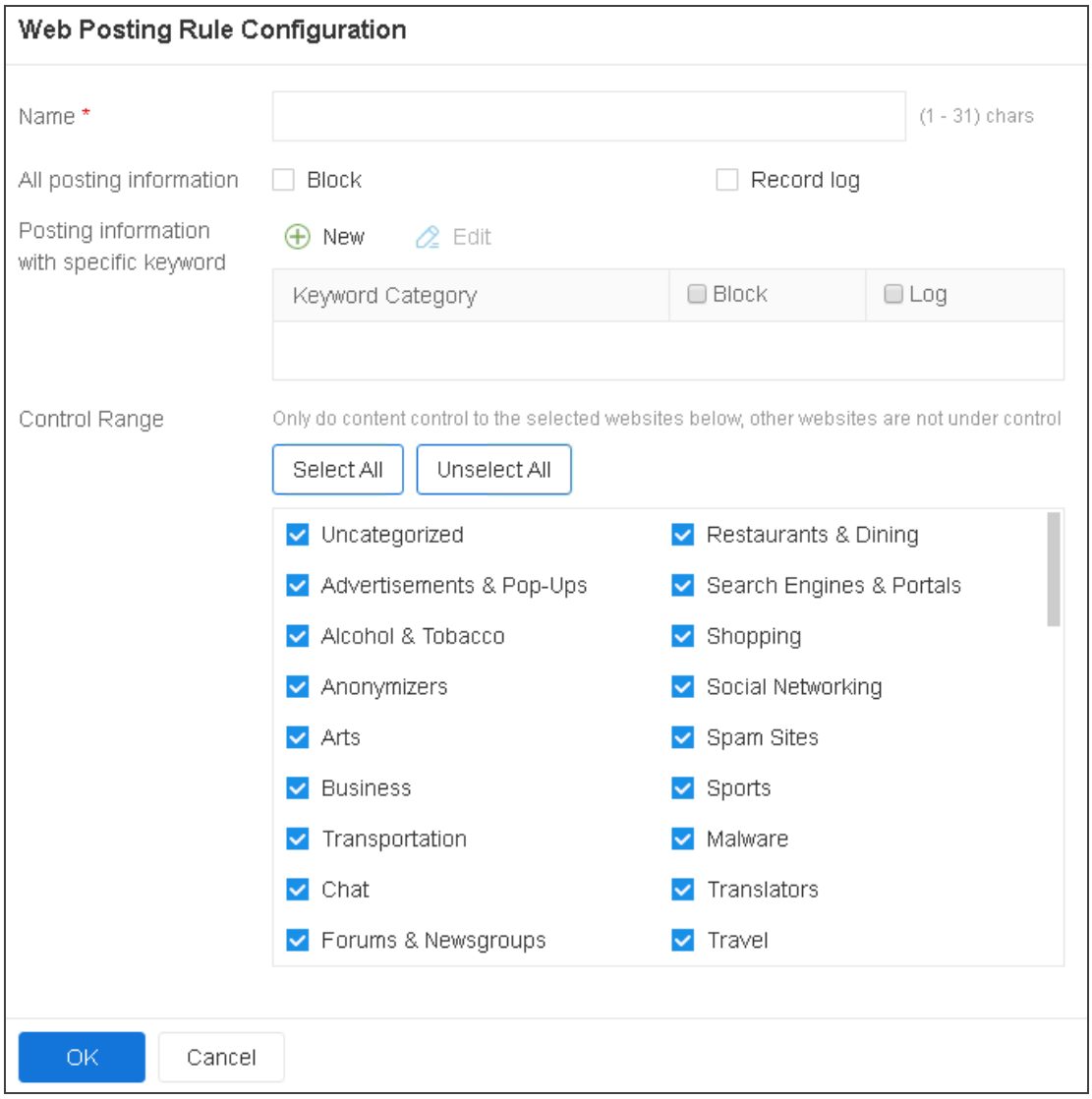
Configuring Web Posting contains two parts:

- Create a web posting rule
- Bind a web posting rule to a security zone or policy rule

Part 1: Creating a web posting rule

1. Select **Object > Data Security > Content Filter > Web Posting**.

2. Click **New**.



In the Web Posting Rule Configuration dialog, enter values.

Option	Description
Name	Specifies the rule name.
All posting information	The action applies to all web posting content.

Option	Description
	• Block: Select to block all web posting behaviors. • Record Log: Select to record all logs about web posting.
Posting information with specific keyword	Controls the action of posting specific keywords. The options are: • New: Creates new keyword categories. For more information about keyword category, see "Keyword Category" on Page 1212. • Edit: Edits selected keyword category. • Keyword category: Shows the name of configured keyword categories. • Block: Blocks the posting action of the corresponding keywords. • Log: Records log messages when posting the corresponding keywords.
Control Range	Specify the coverage of this rule. By default, the rule applies to all website. 1. Click **Control Range**. 2. Select or unselect the websites you want to monitor and control. 3. Click **OK**.

3. Click **OK**.

Part 2: Binding a Web Posting rule to a security zone or security policy rule

The web posting configurations are based on security zones or policies.

- If a security zone is configured with the web posting function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the web posting function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the web posting configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based web posting:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, select Data Security tab.
3. Enable the threat protection you need, and select a Web content rules from the profile drop-down list below; or you can click **Add Profile** from the profile drop-down list below, to create a Web content rule, see Creating a web posting rule.
4. Click **OK** to save the settings.

To realize the policy-based web posting:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. In the Data Security tab, select the **Enable** check box of web posting.
3. From the **Profile** drop-down list, select a web posting rule. You can also click **Add Profile** to create a new web posting rule.
4. Click **OK** to save the settings.

If necessary, you can configure some additional features by going to the right top corner and click **Configuration**.

Option	Description
Predefined URL DB	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
User-defined URL DB	The user-defined URL database is defined by yourself and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
URL Lookup	Use the URL lookup function to inquire URL information from the URL database.
Warning Page	• Block warning: When your network access is blocked, you will be prompted with a warning page in the Web browser. • Audit warning: When your network access is audited, you will be prompted with a warning page in the Web browser.
Bypass Domain	Domains that are not controlled by the internet behavior control rules.
User Exception	Users that are not controlled by the internet behavior control rules.

Notes:

- To enusre you have the latest URL database, it is better to update your

database first. Refer to "Configuring Objects" on Page 1206.

- If there is an action conflict between setting for "all websites" and "specific keywords", when a traffic matches both rules, the "deny" action shall prevail.
- You can export logs to a designated destination. Refer to "Log Configuration" on Page 1713.
- By default, a rule will immediately take effect after you click **OK** to complete configuration.

Viewing Monitored Results of Keyword Blocking in Web Posts

If you have configured web posting rule with keyword blocking, you can view the monitored results of blocking those words.

Select **Monitor > Keyword Block > Web Posting**, you will see the monitored results. For more about monitoring, refer to "Keyword Block" on Page 1647.

Viewing Logs of Keyword Blocking in Web Posts

To see the system logs of keyword blocking in web posts, please refer to the "Content Filter Log" on Page 1708.

Email Filter

The email filter function is designed to control the email sending actions according to the sender, receiver, email content and attachment, and record the sending log messages. Both the SMTP (S)/POP(S)/IMAP(S) emails and the web mails can be controlled.

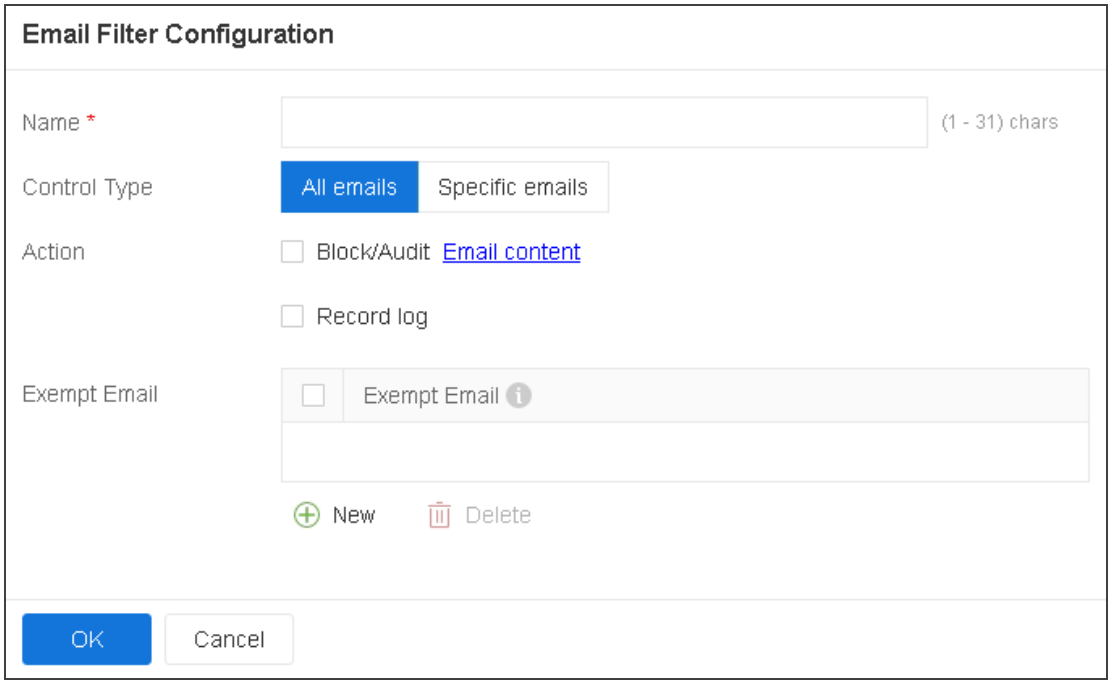
Configuring Email Filter

Configuring email filter contains two parts:

- Create an email filter rule
- Bind an email filter rule to a security zone or policy rule

Part 1: Creating an email filter rule

1. Select **Object > Data Security > Content Filter > Email Filtering Log**.
2. Click **New**.



In the dialog box, enter values.

Option	Description
Name	Specifies the rule name.
Control Type	All emails - This option applies to all the sending emails. • Record Log - Select this check box if you want all emails to be logged.
	Specific mail items - This option applies to specific mail items. To configure the email sender: 1. Click **Sender**. 2. In the prompt, enter sender's email address. 3. Click **Add**. 4. You may select to block the sender or keep a record. 5. Click **OK**. To configure the email receiver: 1. Click **Recipient**. 2. In the prompt, enter email receiver's email address. 3. Click **Add**. 4. You may select to block the receiver or keep a record. 5. Click **OK**.

<table>
<tr><th>Option</th><th>Description</th></tr>
<tr><td></td><td>1. Click email content.
2. In the prompt, click Add. See the Keyword Category part in "Configuring Objects" on Page 1206.
3. You may select to block the email containing keywords or keep a record.
<table><tr><td>Other emails</td><td>Select an action for emails other than which are added above.</td></tr></table></td></tr>
<tr><td colspan="2">Exempt Email</td></tr>
<tr><td>Exempt Email</td><td>To configure mail addresses that do not follow the regulations of email filter:
1. Click Exempt Email.
2. In the prompt, enter emails that do not obey email filter.
3. Click Add, and you can add more.
4. Click OK.</td></tr>
</table>

Part 2: Binding an Email filter rule to a security zone or security policy rule

The email filter configurations are based on security zones or policies.

- If a security zone is configured with the email filter function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.

- If a policy rule is configured with the email filter function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the email filter configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based email filter:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, select Threat Protection tab.
3. Enable the threat protection you need, and select an email filter rules from the profile drop-down list below; or you can click **Add Profile** from the profile drop-down list below, to create an email filter rule, see Creating an email filter rule.
4. Click **OK** to save the settings.

To realize the policy-based email filter:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. In the Protection tab, select the **Enable** check box of email filter.
3. From the **Profile** drop-down list, select an email filter rule. You can also click **Add Profile** to create a new email filter rule.
4. Click **OK** to save the settings.

If needed, you can also configure SSL proxy, keyword category, warning page, bypass domain and user exempt user.

To configure those features, click **Configuration** on the right top corner of the Email Filtering Log list page.

Option	Description
Keyword Category	Use the keyword category function to customize the keyword categories. You can use it to specify the keyword for the URL category/Web posting/email filter functions.
Warning Page	• Block warning: When your network access is blocked, you will be prompted with a warning page in the Web browser. • Audit warning: When your network access is audited, you will be prompted with a warning page in the Web browser.
Bypass Domain	Domains that are not controlled by the internet behavior control rules.
Exempt User	Users that are not controlled by the internet behavior control rules.

Notes:

- If an email filter rule has added all three of Audit/Block Sender, Receiver and email content, the rule will take effect when one of them is hit.
- You can export logs to a designated destination. Refer to "Log Configuration" on Page 1713.
- By default, a rule will immediately take effect after you click **OK** to complete configuration.

Viewing Monitored Results of Email Keyword Blocking

If you have configured email filter with keyword blocking, you can view the monitored results of blocking those words.

Select **Monitor > Keyword Block > Email Content**, you will see the monitored results. For more about monitoring, refer to "Email Content" on Page 1649.

Viewing Logs of Emails Keyword Blocking

To see the system logs of email's keywords, please refer to the "Content Filter Log" on Page 1708.

APP Behavior Control

The APP behavior control function is designed to control and audit (record log messages) the actions of FTP, HTTP(S) and TELNET applications, including:

- Controlling and auditing the FTP content and Login, Get, and Put actions;
- Controlling and auditing the Connect, Get, Put, Head, Options, Post, Trace, Delete actions of HTTP(S);
- Controlling and auditing the request content initiated by TELNET client.

Configuring APP Behavior Control

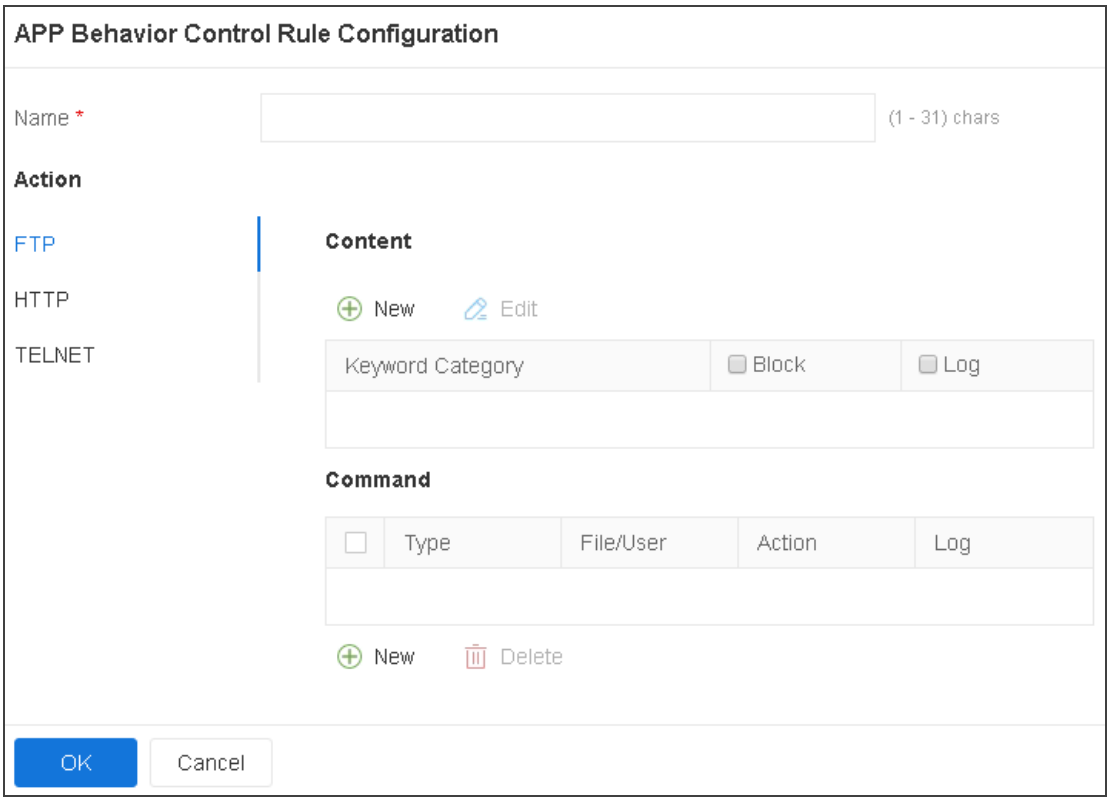
Configuring behavior control contains two parts:

- Creating an application behavior control rule
- Binding an application behavior control rule to a security zone or policy rule

Part 1: Creating an APP behavior control rule

1. Select **Object > Data Security > Content Filter > APP Behavior Control**.

2. Click **New**.



In the APP Control Rule Configuration dialog box, enter values.

Option	Description
Name	Specifies the rule name.
Action	
FTP	Content: Controls the FTP content. If the content matches the specified keyword categories, system will execute the specified action, including **Block** or **Log**. Expand the **Content**, and configure the control options. • **New**: Click the button to create a keyword category. For how to create the category, refer to the Keyword Category of Configuring Objects.

Option	Description
	• **Edit**: Select one keyword from the list and edit the category. • **Keyword Category**: Displays the keyword categories in system. • **Block**: Select the check box to block the FTP content matching the keyword category. • **Log**: Select the check box to record logs when the FTP content matches the keyword category. Command: Controls the FTP methods, including Login, Get, and Put. Expand the **Command**, and configure the control options. • From the first drop-down list, select the method to be controlled, it can be GET, PUT, or Login. • Type the file name (for the method of GET or PUT) or user name (for the method of Login) into the next box. • From the second drop-down list, select the action. It can be Block or Permit. • From the third drop-down list, specify whether to record the log messages. • Click **Add**. • Repeat Step 1 to 5 to add more control entries.

Option	Description
	To edit/delete a control entry, select the entry from the list, and then click **Edit** or **Delete**.
HTTP	Comment: Controls the HTTP(S) methods, including Connect, GET, PUT, Head, Options, Post, Trace, and Delete. Expand HTTP(S), and configure the HTTP(S) control options. • From the first drop-down list, select the method to be controlled, it can be Connect, GET, PUT, Head, Options, Post, Trace, or Delete. • Type the domain name into the next box. • From the second drop-down list, select the action. It can be Block or Permit. • From the third drop-down list, specify whether to record the log messages. • Click **Add**. • Repeat Step 1 to 5 to add more control entries. To edit/delete a control entry, select the entry from the list, and then click **Edit** or **Delete**.
TELNET	Content: Controls the request content initiated by the TELNET client. If the content matches the specified keyword categories, system will execute the specified action, including **Block** or **Log**. Expand the **Content**, and configure the control options.

Option	Description
	• **New**: Click the button to create a keyword category. For how to create the category, refer to the Keyword Category of Configuring Objects. • **Edit**: Select one keyword from the list and edit the category. • **Keyword Category**: Displays the keyword categories in system. • **Block**: Select the check box to block the request content matching the keyword category. • **Log**: Select the check box to record logs when the request content matches the keyword category.

3. Click **OK**.

Part 2: Binding an APP behavior control rule to a security zone or security policy rule

The APP behavior control configurations are based on security zones or policies.

- If a security zone is configured with the APP behavior control function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the APP behavior control function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the APP behavior control configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based APP behavior control:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, select Data Security tab.
3. Enable the threat protection you need, and select an email filter rules from the profile drop-down list below; or you can click **Add Profile** from the profile drop-down list below, to create an APP behavior control rule, see Creating an APP behavior control rule.
4. Click **OK** to save the settings.

To realize the policy-based APP behavior control:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. In the Data Security tab, select the **Enable** check box of APP behavior control.
3. From the **Profile** drop-down list, select a APP behavior control rule. You can also click **Add Profile** to create a new APP behavior control rule.
4. Click **OK** to save the settings.

If necessary, you can configure some additional features by going to the right top corner and click **Configuration**.

Option	Description
Predefined URL database	The predefined URL database includes dozens of categories and tens of millions of URLs and you can use it to specify the URL category and URL range for the URL category/Web posting functions.
User-defined URL database	The user-defined URL database is defined by yourself and you can use it to specify the URL category and URL range for the URL category/Web posting functions.

Option	Description
URL lookup	Use the URL lookup function to inquire URL information from the URL database.
Keyword category	Customizes keyword categories as needed.
Warning Page	• Block warning: When your network access is blocked, you will be prompted with a warning page in the Web browser. • Audit warning: When your network access is audited, you will be prompted with a warning page in the Web browser.
Bypass Domain	Domains that are not controlled by the internet behavior control rules.
Exempt User	Users that are not controlled by the internet behavior control rules.

Notes:

- You can export logs to a designated destination. Refer to "Log Configuration" on Page 1713.
- By default, a rule will immediately take effect after you click **OK** to complete configuration.

Viewing Logs of APP Behavior Control

To see the system logs of APP behavior control, please refer to the "Content Filter Log" on Page 1708.

Network Behavior Record

Network behavior record function audits the IM applications behaviors and record log messages for the access actions, includes:

- Audits the QQ, WeChat and sinaweibo user behaviors.
- Log the access behaviors.

Configuring Network Behavior Recording

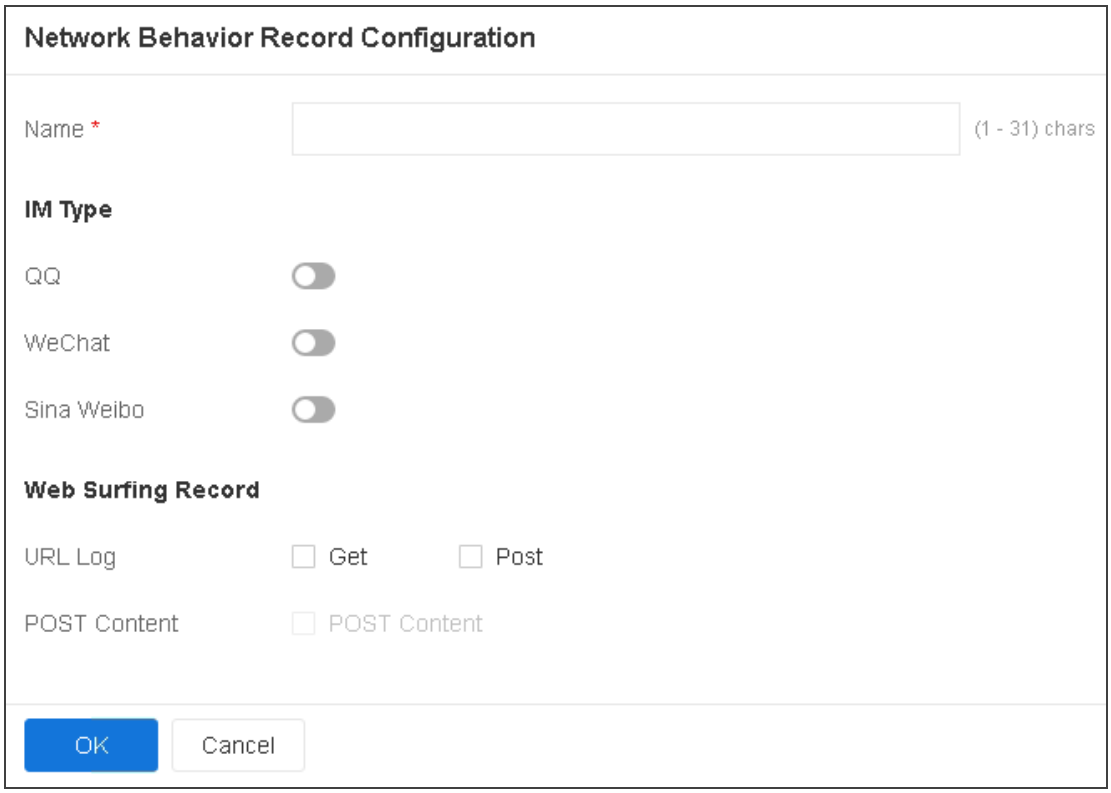
Configuring network behavior record contains two parts:

- Create a network behavior record rule
- Bind a network behavior record rule to a security zone or policy rule

Part 1: Creating a NBR rule

1. Select **Object > Data Security > Network Behavior Record**.

2. Click **New**.



In the Network Behavior Record Configuration dialog box, enter values.

Option	Description
Name	Specifies the rule name.
IM	
QQ	To audits the QQ behavior. 1. Select the **QQ** checkbox. 2. Timeout: Specifies the timeout value. The unit is minute. The default value is 10. During the timeout period, the IM user traffic of the same UID will not trigger the new logs and after the

Option	Description
	timeout reaches, it will trigger new logs.
WeChat	To audits the WeChat behavior. 1. Select the **Wechat** checkbox. 2. Timeout: Specifies the timeout value. The unit is minute. The default value is 20. During the timeout period, the IM user traffic of the same UID will not trigger the new logs and after the timeout reaches, it will trigger new logs.
Sina Weibo	To audits the sina weibo behavior. 1. Select the **Sina Weibo** checkbox 2. Timeout: Specifies the timeout value. The unit is minute. The default value is 20. During the timeout period, the IM user traffic of the same UID will not trigger the new logs and after the timeout reaches, it will trigger new logs.
Web Surfing Record	
URL Log	logs the GET and POST methods of HTTP. • Get: Records the logs when having GET methods. • Post: Records the logs when having POST methods.
POST Content	Post Content: Records the posted content.

3. Click **OK**.

Part 2: Binding a network behavior record rule to a security zone or security policy rule

The network behavior record configurations are based on security zones or policies.

- If a security zone is configured with the network behavior record function, the system will perform detection on the traffic that is destined to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the network behavior record function, the system will perform detection on the traffic that is destined to the policy rule you specified, and then response.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the network behavior record configurations in a destination zone is superior to that in a source zone if specified at the same time.

To realize the zone-based network behavior record:

1. Create a zone. For more information about how to create, refer to "Security Zone" on Page 169.
2. In the Zone Configuration dialog, select Data Security tab.
3. Enable the threat protection you need, and select a network behavior record rules from the profile drop-down list below; or you can click **Add Profile** from the profile drop-down list below, to create a network behavior record rule, see Creating a network behavior record rule.
4. Click **OK** to save the settings.

To realize the policy-based network behavior record:

1. Configure a security policy rule. See "Configuring a Security Policy Rule" on Page 1287.
2. In the Data Security tab, select the **Enable** check box of network behavior record.

3. From the **Profile** drop-down list, select a network behavior record rule. You can also click **Add Profile** to create a new network behavior record rule.

4. Click **OK** to save the settings.

Notes:

- You can export logs to a designated destination. Refer to "Log Configuration" on Page 1713
- By default, a rule will immediately take effect after you click **OK** to complete configuration

Viewing Logs of Network Behavior Recording

To see the logs of network behavior recording, please refer to the "Network Behavior Record Log" on Page 1709.

NetFlow

NetFlow is a data exchange method, which records the source /destination address and port numbers of data packets in the network. It is an important method for network traffic statistics and analysis.

Hillstone NetFlow supports the NetFlow Version 9. With this function configured, the device can collect user's ingress traffic according to the NetFlow profile, and send it to the server with NetFlow data analysis tool, so as to detect, monitor and charge traffic.

Related Topics:

- "Configuring NetFlow" on Page 1258

Configuring NetFlow

The NetFlow configurations are based on interfaces.

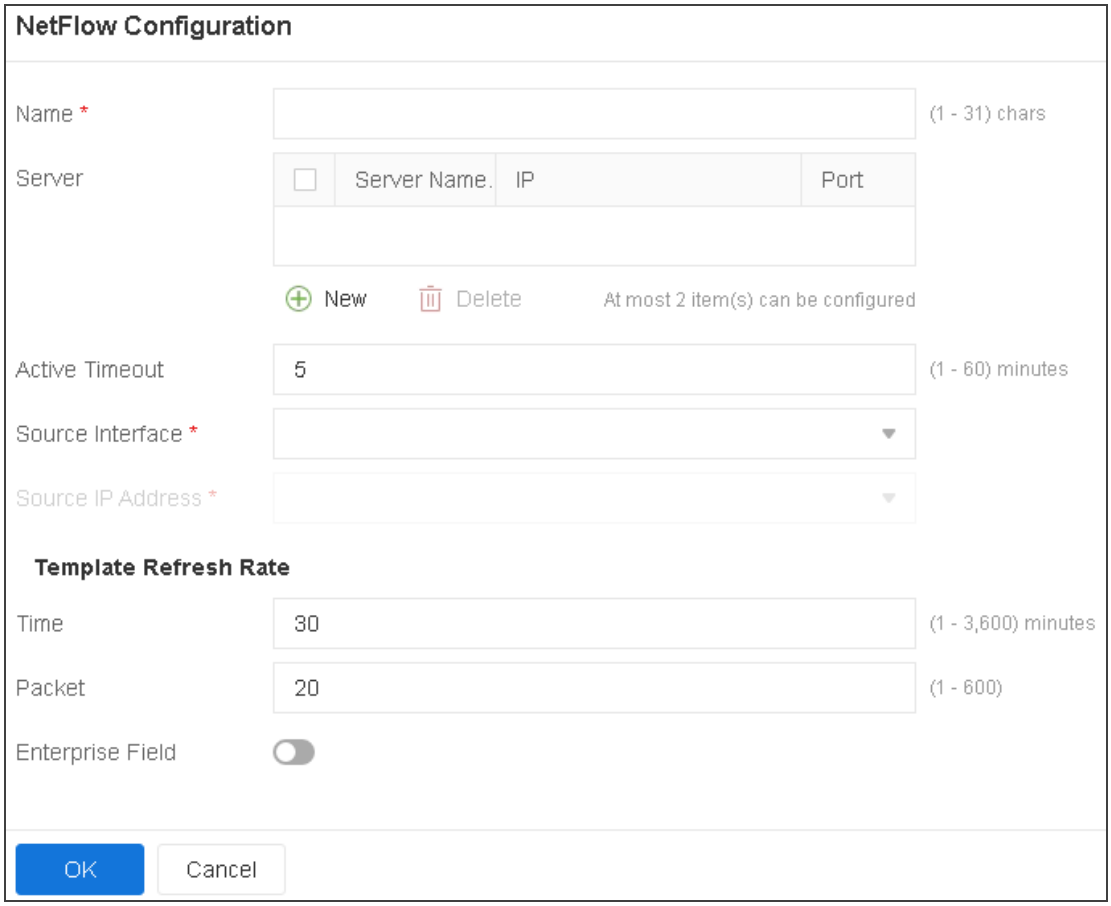
To configure the interface-based NetFlow, take the following steps:

1. Click **Object > NetFlow > Configuration**. Select **Enable** check box to enable the NetFlow function.
2. Click **Object > NetFlow > Profile** to create a NetFlow rule .
3. Bind the NetFlow rule to an interface. Click **Network > Interface**. Select the interface you want to bind or click **New** to create a new interface. In the Interface Configuration dialog box, select the **Basic** tab and then select a NetFlow rule from the **NetFlow configuration** drop-down list.

Configuring a NetFlow Rule

To configure the NetFlow rule, take the following steps:

1. Click **Object > NetFlow > Profile**.
2. Click **New** to create a new NetFlow rule. To edit an existing one, select the check box of this rule and then click **Edit**.



In the NetFlow Configuration dialog box, configure the following options

Option	Description
Name	Enter the name of the NetFlow rule.
Server	To configure the NetFlow server, take the following steps: 1. Type the server name, IP address and port number into the **Server Name**, **IP** and **Port** box respectively. 2. Click **New** to add a NetFlow server which will be

Option	Description
	displayed in the list below. 3. Repeat the above steps to add more servers. You can add up to 2 servers. To delete a server, select the server check box you want to delete from the list and click **Delete**.
Active Timeout	The active timeout value is the time after which the device will send the collected NetFlow traffic information to the specified server once. Type the active timeout value into the **Active Timeout** box. The range is 1 to 60 minutes. The default value is 5 minutes.
Source Interface	Select the source interface for sending NetFlow traffic information in the **Source Interface** drop-down list.
Source IP Address	After specifying the source interface, the system will automatically acquire and display the management IP address or the secondary IP address of the source interface in the drop-down list.
Template Refresh Rate	You can configure the NetFlow template refresh rate by time or number of packets, after which system will refreshes the NetFlow rule. • Time: Specifies the time after which system refreshes the NetFlow rule. The range is 1 to 3600 minutes. The default value is 30 minutes. • Packets: Specifies the number of packets. When

Option	Description
	the number of NetFlow packets exceeds the specified value, system will refreshes the NetFlow rule. The range is 1 to 600. The default value is 20.
Enterprise Field	Select the **Enterprise Field** check box, and the collected NetFlow traffic information will contain enterprise field information.

3. Click **OK** to save the settings.

NetFlow Global Configurations

To configure the NetFlow global configurations, take the following steps:

1. Select **Object > NetFlow > Configuration**.
2. Select the **Open NetFlow** check box of NetFlow to enable the NetFlow function. Clear the check box to disable the NetFlow function. The NetFlow function will take effect after rebooting.

End Point Protection

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

The endpoint security control center is used to monitor the security status of each access endpoint and the system information of the endpoint.

When the end point protection function is enabled, the device can obtain the endpoint data monitored by the endpoint security control center by interacting with it, and then specify the corresponding processing action according to the security status of endpoint, so as to control the endpoint network behavior.

Notes:

- At present, end point protection function only supports linkage with "JIANGMIN" endpoint security control center.
- End point protection is controlled by license. To use end point protection, apply and install the EPP license.

Related Topics:

- "Configuring End Point Protection" on Page 1263
- "Configuring End Point Security Control Center Parameters" on Page 1269
- "End Point Monitor" on Page 1618
- "EPP Log" on Page 1705

Configuring End Point Protection

This chapter includes the following sections:

- Preparation for configuring end point protection function.
- Configuring end point protection function.

Preparing

Before enabling end point protection, make the following preparations:

1. Make sure your system version supports end point protection.
2. Import an EPP license and reboot.

Configuring End Point Protection Function

The end point protection configurations are based on security zones or policies.

To realize the zone-based end point protection, take the following steps:

1. Create a zone. For more information, refer to "Security Zone" on Page 169.
2. In the **Zone Configuration**page, select **End Point Protection** tab.
3. Enable the end point protection you need and select an end point protection rule from the profile drop-down list below; or you can click **Add Profile** from the profile drop-down list. To create an endpoint protection rule, see Configuring End Point Protection Rule.
4. Click **OK** to save the settings.

To realize the policy-based endpoint protection, take the following steps:

1. Create a security policy rule. For more information, refer to "Security Policy" on Page 1286.
2. In the Policy Configuration page, expand Protection.

3. Select the **Enable** check box of **End Point Protection**. Then select an endpoint protection rule from the Profile drop-down list, or you can click **Add Profile** from the Profile drop-down list to create an end point protection rule. For more information, see Configuring End Point Protection Rule.

4. Click **OK** to save the settings.

Notes: When the zone and policy bind the same end point protection rule, the priority is policy > zone.

Configuring End Point Protection Rule

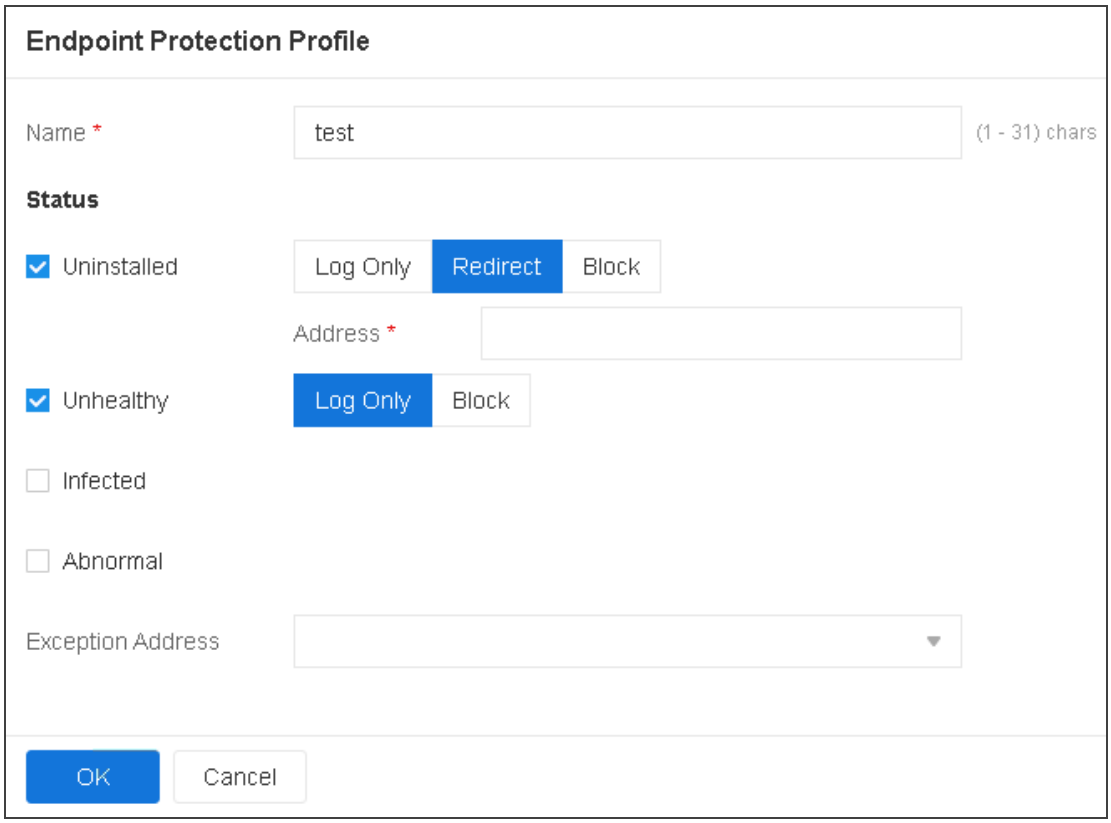
System has two default end point protection rules: **predef_epp** and **no_epp**.

- **predef_epp**: Execute the **Logonly** action for the endpoint whose status is "Uninstall" and "Unhealthy". Execute the **Block** action for the endpoint whose status is "Infected" and "Abnormal", and the block time is 60s.
- **no_epp**:No protective action is executed on all endpoints by default.

To configure an end point protection rule, take the following steps:

1. Click **Object> End Point Protection > Profile**.

2. Click **New**.



In End Point Protection Rule page, enter the end point protection rule configurations.

Option	Description
Name	Specifies the rule name.
Status	Specifies the protection action corresponding to the end-point status. • Uninstalled: Specifies the protection action for the endpoint which doesn't install an anti-virus client. Select the **Uninstalled** check box, and select the protection action in the drop-down list.

Option	Description
	• Redirect - Redirects the endpoint to the specified URL. Enter the URL in the **Address** text box. • Logonly - System will pass traffic and record logs only. • Block - Block the endpoint connection, and specifies the block time in the **Block time** text box. The unit is second. The value ranges from 60 to 65535. • Unhealthy: Specifies the protection action for the unhealthy endpoint. Select the **Unhealthy** check box, and select the protection action in the drop-down list. • Logonly - System will pass traffic and record logs only. • Block - Block the endpoint connection, and specifies the block time in the **Block time** text box. The unit is second. The value ranges from 60 to 65535. • Infected: Specifies the protection action for the infected endpoint. Select the **Infected** check box, and select the protection action in the drop-down

Option	Description
	list. • Logonly - System will pass traffic and record logs only. • Block - Block the endpoint connection, and specifies the block time in the **Block time** text box. The unit is second. The value ranges from 60 to 65535. • Abnormal: Specifies the protection action for the abnormal endpoint. Select the **Abnormal** check box, and select the protection action in the drop-down list. • Logonly - System will pass traffic and record logs only. • Block - Block the endpoint connection, and specifies the block time in the **Block time** text box. The unit is second. The value ranges from 60 to 65535.
Exception Address	The exception address is not controlled by the end point protection rule. Select the address book name in the drop down list. **Notes:** Before selecting the exception address, you need to add the exception

Option	Description
	endpoint address to the address book. For configuration, see "Address" on Page 1034.

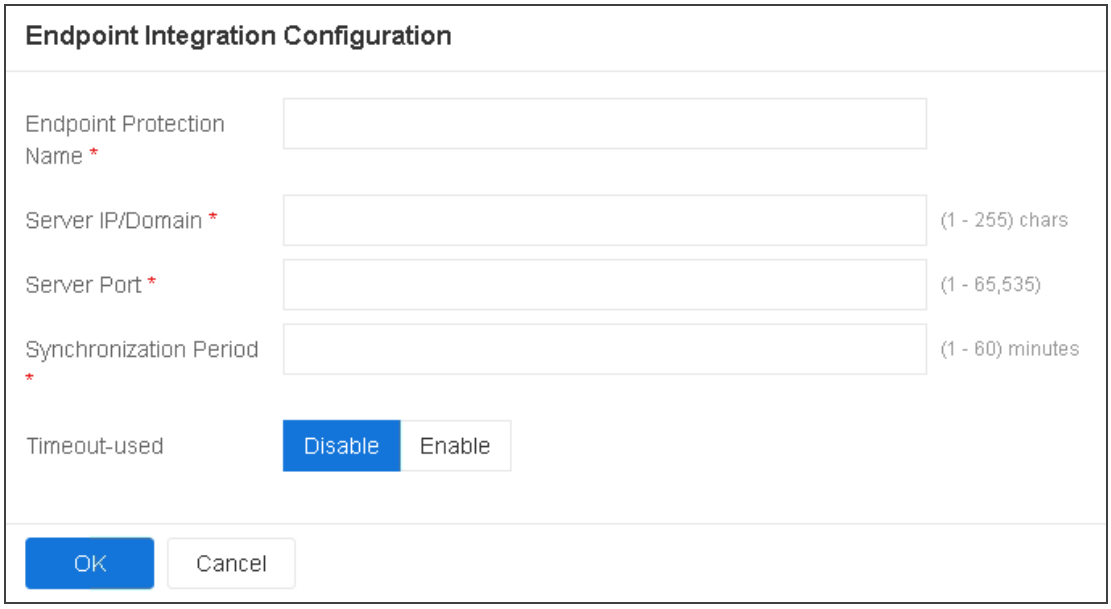
3. Click **OK** to save the settings.

Configuring End Point Security Control Center Parameters

To configure the endpoint security control center parameters, take the following steps:

1. Go to **System > Third Party Linkage**.

2. Click **New**.



In the End Point Linkage Configuration page, enter values.

Option	Description
Endpoint Prevention Name	Display the end point protection type as Jiangmin. Only one endpoint security control center server with the same type can be configured.
Server IP/Domain	Specifies the address or domain name of the endpoint security control center server. The range is 1 to 255 characters.
Server Port	Specifies the port of the endpoint security control center server. The range is 1 to 65535.
Synchronization Period	Specifies the synchronization period of endpoint data information. The range is 1 to 60 minutes. The default value is 10 minutes.
Timeout-used	• Disable: When the endpoint security control center is disconnected with the device and doesn't restore to connection in two synchronization periods, the synchronized endpoint data information will be cleared. By default, the timeout entry is disabled. • Enable: When the endpoint security control center is disconnected with the device and doesn't restore to connection in two synchronization periods, the endpoint data information that the system has been synchronized the last time continues to be used.

3. Click **OK**.

ACL

System supports ACL (Access Control List) based on MAC addresses and DSCP. You can create access control profile based on MAC addresses and bind the profile to security policies to achieve access control of the specific MAC addresses and DSCP. With the combination of security policy and ACL rules, system can achieve accurate access controlling.

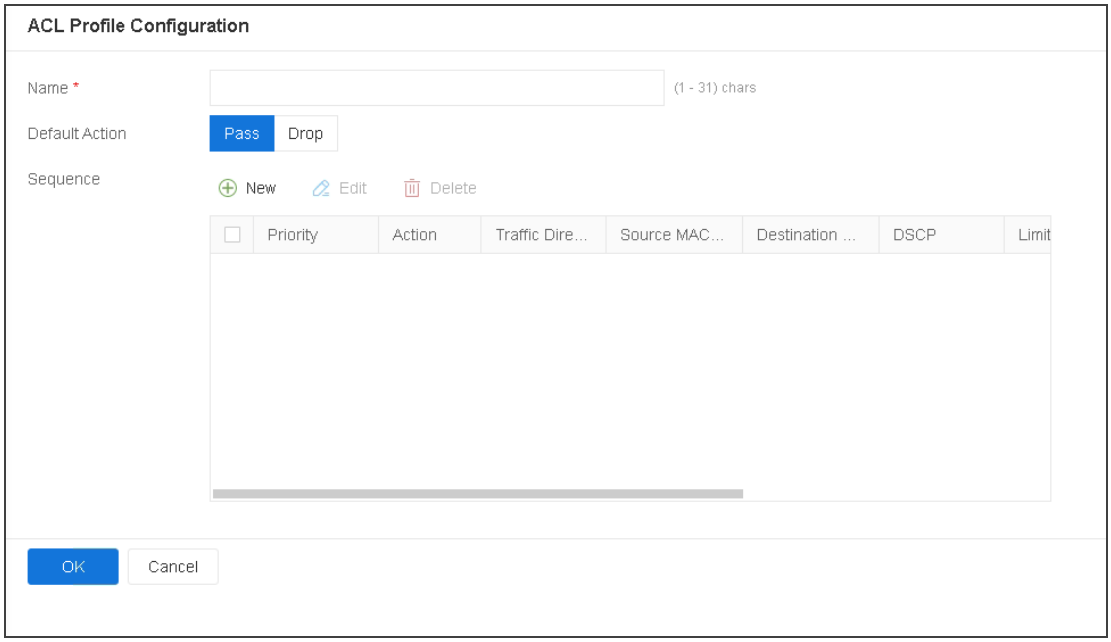
ACL Profile

The ACL profile consists of one or more access control rules. In the access rule, you can set the source MAC address and destination MAC address and DSCP to filter the packets flowing through the device, and set access control action for the matched packets, pass or discard. The configured access control profiles will take effect only when they are bound to security policies.

To configure an ACL profile, take the following steps:

1. Select **Object** > **ACL** > **Profile**.

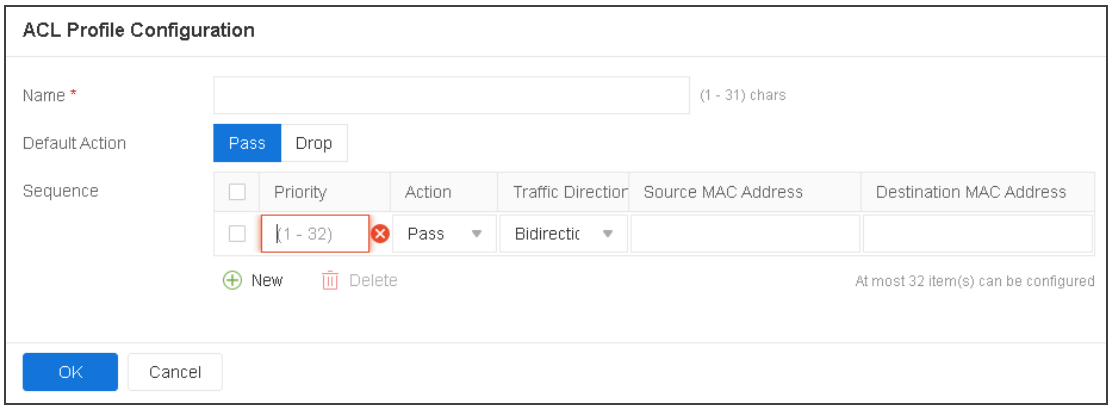
2. Click **New** and the ACL Profile Configuration dialog box will appear.



In the ACL Profile Configuration dialog, configure the corresponding options.

Option	Description
Name	Specify the name of the ACL profile.
Default Action	Specify the default action of access control. For the packets which match the access control rule in the list below, it will be processed according to the action set in the access control rule; for the packets which fail to match the access control rule, it will be processed according to the default action set here. Default control actions include: • Pass: By default, packets will be allowed to pass the detection of access control, but still need to be detected via IPS, Anti-virus and so on. • Block: By default, packets will be blocked directly and will not pass through the device.

3. Click New on the ACL Profile Configuration, and the ACL Rule Configuration dialog pops up.



In the <ACL Rule Configuration> dialog, configure the corresponding options.

Option	Description
Priority	Specify the priority of ACL rules to be matched, ranging from 1 to 32. The bigger the value, the higher the priority.
Action	Specify the action to be executed after the ACL rules have been matched, including: • Pass: Packets will be allowed to pass the detection of access control, but still need to be detected via IPS, Anti-virus and so on. • Block: Packets will be blocked directly and will not pass through the device.
Traffic Direction	Specify the traffic direction of the ACL rule. **Forward** indicates the traffic direction where the session is initiated. **Backward** indicates traffic direction where the session is responded. **Bidirectional** indicates the direction of both Forward and Backward. By default, system matches the bidirectional traffic.
Source MAC Address	Specify the source MAC address of packets to be matched.
Destination MAC Address	Specify the destination MAC address of packets to be matched.
DSCP	Specify the DSCP value to be matched. The range is 0-63.
Limit Type	Specify the limit type that the access control rules match for the extension headers of IPv6 messages, including Total

Option	Description
	Header Number, Single Header Number and Header Order.
	• Total Header Number: Select this option and then specify the Total Header Number and Comparison Mode. The system will count and limit the total number of extension headers in IPv6 message. If the restriction requirements are met, the system will process according to the action of this rule. • Single Header Number: Select this option, and then specify the Header and Comparison Mode. The system will count and limit the specify header in IPv6 message. If the restriction requirements are met, the system will process according to the action of this rule. • Header Order:Select this option, and then specify the Header Order:Positive Sequence and out of order-.Positive Sequence means that the extension headers should be arranged in order. " Out of order" means that the extension headers are arranged in non order, that is, out of order. If the restriction requirements are met, the system will process according to the action of the rule.
Log	System will log when the messages matching the access control rules.

4. Click **OK**.

IoT Policy

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

IoT, the abbreviation of Internet of Things, is the extension of Internet connectivity into physical devices and everyday objects.

The IoT policy in system can identify the network video monitoring devices, like IPC (IP Camera) and NVR (Network Video Recorder) via the flowing traffic, then monitor the identified devices and block illegal behaviors according to the configurations.

Notes:

- Only the IPC and NVR devices of Hikvision, Dahua and Uniview are supported currently.
- The IoT Policy function is available only when the IoT license is installed on the system.
- The network video monitoring devices in the NAT scenario cannot be identified with the IoT policy.

Links:

- Configuring IoT Policy
- Configuring Admittance List
- IoT Monitor
- IoT Log

Configuring IoT Policy

The chapter introduces the following topics:

- Preparations for IoT Policy Configuration
- Configuring IoT Policy

Preparations for IoT Policy Configuration

Before configuring the IoT policy, ensure the following conditions have been met.

1. The IoT Policy function is supported for the system version.
2. The IoT license has been installed and you log in to the device again.

Configuring IoT Policy

System supports the configuration of IoT policy based on the zone.

To configure the IoT policy based on the zone, take the following steps:

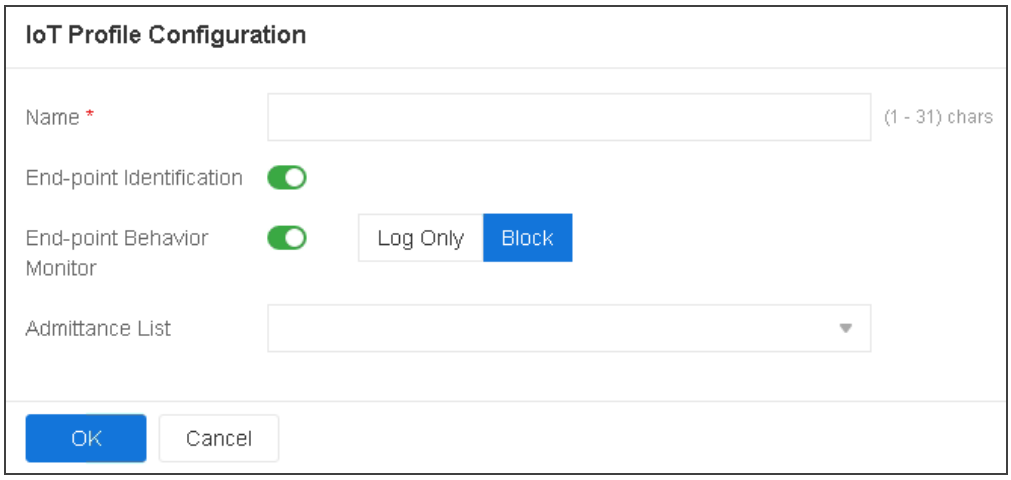
1. For how to create or edit the zone, refer to Zone.
2. In the **Zone Configuration** dialog, click the **IoT Monitor** tab.
3. Select the **Enable** check box. You can select a configured IoT profile from the **Profile** drop-down list, or click **Add Profile** in the drop-down list to create an IoT profile. For how to configure the IoT policy profile, refer to Configuring IoT Profile.
4. Click **OK** to save the configurations.

Configuring IoT Profile

To create an IoT profile, take the following steps:

1. Click **Object** > **IoT Policy** > **Profile**.

2. Click **New** and the **IoT Profile Configuration** dialog pops up.



In the dialog, configure the options as follows:

Option	Description
Name	Specify the name of the IoT profile.
End-point Identification	Select the **Open** check box to enable the end-point identification. When the function is enabled, system will probe the end-point IP in the IoT monitoring list actively, and identify the information of manufacturer and model of the network video monitoring devices according to the returned packets. Then the information will be displayed in the IoT monitoring list. The end-point identification will be triggered • when a new end-point IP adds into the IoT monitoring list. • when the network video monitoring device logs in

Option	Description
	again. • when the network video monitoring device has been online, and the function will be triggered every 5 minutes.
End-point Behavior Monitor	Select the **Open** check box to enable the end-point behavior monitoring. When the function is enabled, system can check whether the devices behaviors are illegal. If illegal behaviors are detected, you can execute the following operation: • Log Only: System will let the traffic flowing through the end-point device pass and record logs. • Block: System will block the traffic flowing through the end-point device.
Admittance List	You can select a configured admittance list profile from the drop-down list, or click **Add Profile** in the drop-down list to Configure Admittance List.

3. Click **OK** to save the configurations.

Notes: To ensure the normal performance of IoT policy, the network video monitoring devices should:

- enable ONVIF service and multi-cast detection function.
- communicate with the Hillstone devices.

Configuring Admittance List

For the traffic flowing through the zone bound with the IoT policy profile, systems supports to control it by configuring the admittance list of the IP, MAC and IP/MAC types, that is, only the traffic matches the type in the admittance list is allowed to pass. By default, all the traffic flowing through the zone bound with the IoT policy profile is allowed to pass.

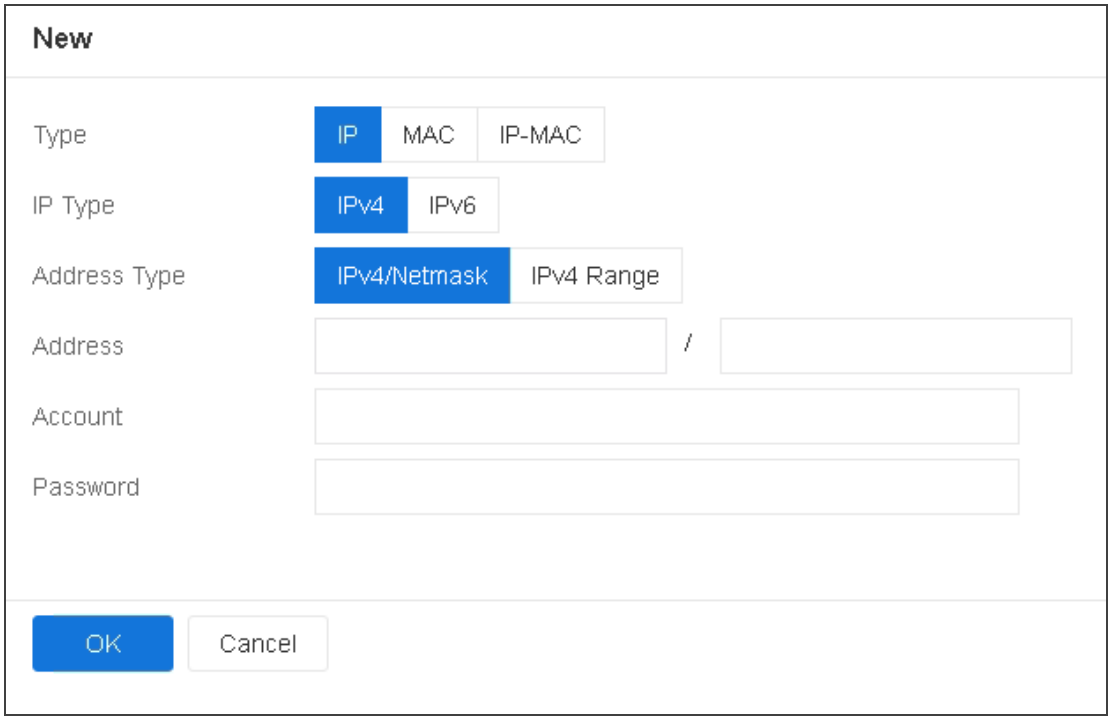
When the admittance lists of the IP/MAC, IP and MAC types are all configured, traffic matches the admittance lists in the sequence of IP/MAC > IP > MAC. Traffic can pass in the following conditions.

- Traffic first matches the admittance list of IP/MAC type, and both the IP and MAC types are matched.
- Traffic first matches the admittance list of IP/MAC type, while only the IP type is matched. Then traffic tries to match the admittance list of IP and MAC type in order, and both the IP and MAC types are matched.

You can configure the admittance list with the following methods:

Creating Admittance List Profile

1. Click **Object** > **IoT Policy** > **Admittance List**.
2. Click **New**, and the **Admittance List Configuration** dialog pops up. Enter the name of the admittance list into the **Name** text box. Click **Add** and the **Add** dialog pops up.



Configure the options as follows:

Option	Description
Mode	Specify the type of the admittance list, including IP, MAC and IP-MAC. Note: When the network video monitoring devices and the Hillstone devices are not in the same broadcast domain, the obtained MAC address in the packets may not be true. Then the network video monitoring devices cannot match the admittance list. Therefore, you're suggested to configure the admittance list of IP type.
IP	Specify the type of admittance list as IP and configure the following items:

Option	Description

	• IP Type: Select the IP address type of the network video monitoring device, including IPv4 and IPv6.
	  • IPv4/Netmask: Enter the IPv4 address and netmask.
	  • IPv4 Range: Enter the start IPv4 address and end IPv4 address.
	  • IPv6/Prefix: Enter the IPv6 address and prefix.
	  • IPv6 Range: Enter the start IPv6 address and end IPv6 address.
	• Account (Optional): Enter the admin name of the network video monitoring device.
	• Password (Optional): Enter the password of the account.

MAC	Specify the type of admittance list as MAC and configure the MAC address of the network video monitoring device.
IP-MAC	Specify the type of admittance list as IP/MAC and configure the following items: • IP Type: Select the IP address type of the network video monitoring device, including IPv4 and IPv6. • IPv4: Enter the IPv4 address into the text box.

Option	Description
	• IPv6: Enter the IPv6 address into the text box. • MAC: Enter the MAC address into the text box. • Account (Optional): Enter the admin name of the network video monitoring device. • Password (Optional): Enter the password of the account.

3. Click **Add** to save the configurations.

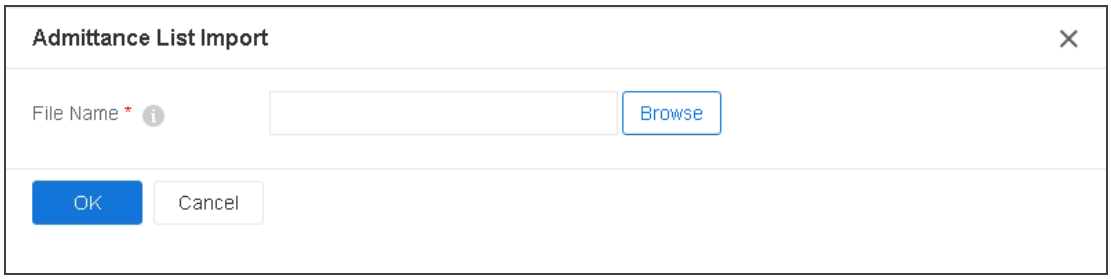
Notes: The admittance list of the specified type in one profile cannot be repeated, otherwise, an error will pop up. The repeat conditions for different types include:

- IP-MAC: The IP address and MAC address are the same.
- IP: There're repeated IP addresses in the IP/netmask or IP range.
- MAC: The MAC addresses are repeated.

Importing Admittance List

1. Click **Object** > **IoT Policy** > **Admittance List**.
2. (Optional) Click **Admittance List Template** and download the template in local.

3. Select an admittance list and click **Import**.



4. In the **Admittance List Import** dialog, click **Browse** and upload the admittance list in the local.

5. Click **OK**.

Adding to Admittance List

1. Click **Monitor** > **IoT Monitor** > **Details**.

2. Select the check box and click **Add to Admittance List**.

In the pop-up dialog, configure the options as follows.

Option	Description
Admittance List	Select the admittance list profile from the drop-down list that the selected item will be added to.
Type	Specify the type of the selected item that will be added as IP, MAC or IP/MAC.

3. Click **OK** to save the configurations.

Chapter 11 Policy

The Policy module provides the following functions:

- Security policy: Security policy the basic function of devices that are designed to control the traffic forwarding between security zones/segments. By default all traffic between security zones/segments will be denied.
- NAT: When the IP packets pass through the devices or routers, the devices or routers will translate the source IP address and/or the destination IP address in the IP packets.
- QoS: QoS is used to provide different priorities to different traffic, in order to control the delay and flapping, and decrease the packet loss rate. QoS can assure the normal transmission of critical business traffic when the network is overloaded or congested.
- Session limit: The session limit function limits the number of sessions and controls the session rate to the source IP address, destination IP address, specified IP address, service, or role/user/user group, thereby protecting from DoS attacks and control the bandwidth of applications, such as IM or P2P.
- Internet behavior control: The Internet behavior control allows you to flexibly configure control rules to comprehensively control and audit (by behavior logs and content logs) on user network behavior.
- Perimeter Traffic Filtering: It can filter the perimeter traffic based on known IP of black-/white list, and take block action on the malicious traffic that hits the blacklist.

Security Policy

Security policy is the basic function of devices that is designed to control the traffic forwarding between security zones/segments. Without security policy rules, the devices will deny all traffic between security zones/segments by default. After configuring the security policy rule, the device can identify what traffic between security zones or segments will be permitted, and the others will be denied.

The basic elements of policy rules:

- The source zone and address of the traffic
- The destination zone and address of the traffic
- The service type of the traffic
- Actions that the devices will perform when processing the specific type of traffic, including Permit, Deny, Tunnel, From tunnel, WebAuth, and Portal server.

Generally a security policy rule consists of two parts: filtering conditions and actions. You can set the filtering conditions by specifying traffic's source zone/address, destination zone/address, service type, and user. Each policy rule is labeled with a unique ID which is automatically generated when the rule is created. You can also specify a policy rule ID at your own choice. All policy rules in system are arranged in a specific order. When traffic flows into a device, the device will query for policy rules by turn, and processes the traffic according to the first matched rule.

The max global security policy rule numbers may vary in different models.

Security policy supports IPv4 and IPv6 address. If IPv6 is enabled, you can configure IPv6 address entry for the policy rule.

This section contains the following contents:

- Configure a security policy rule

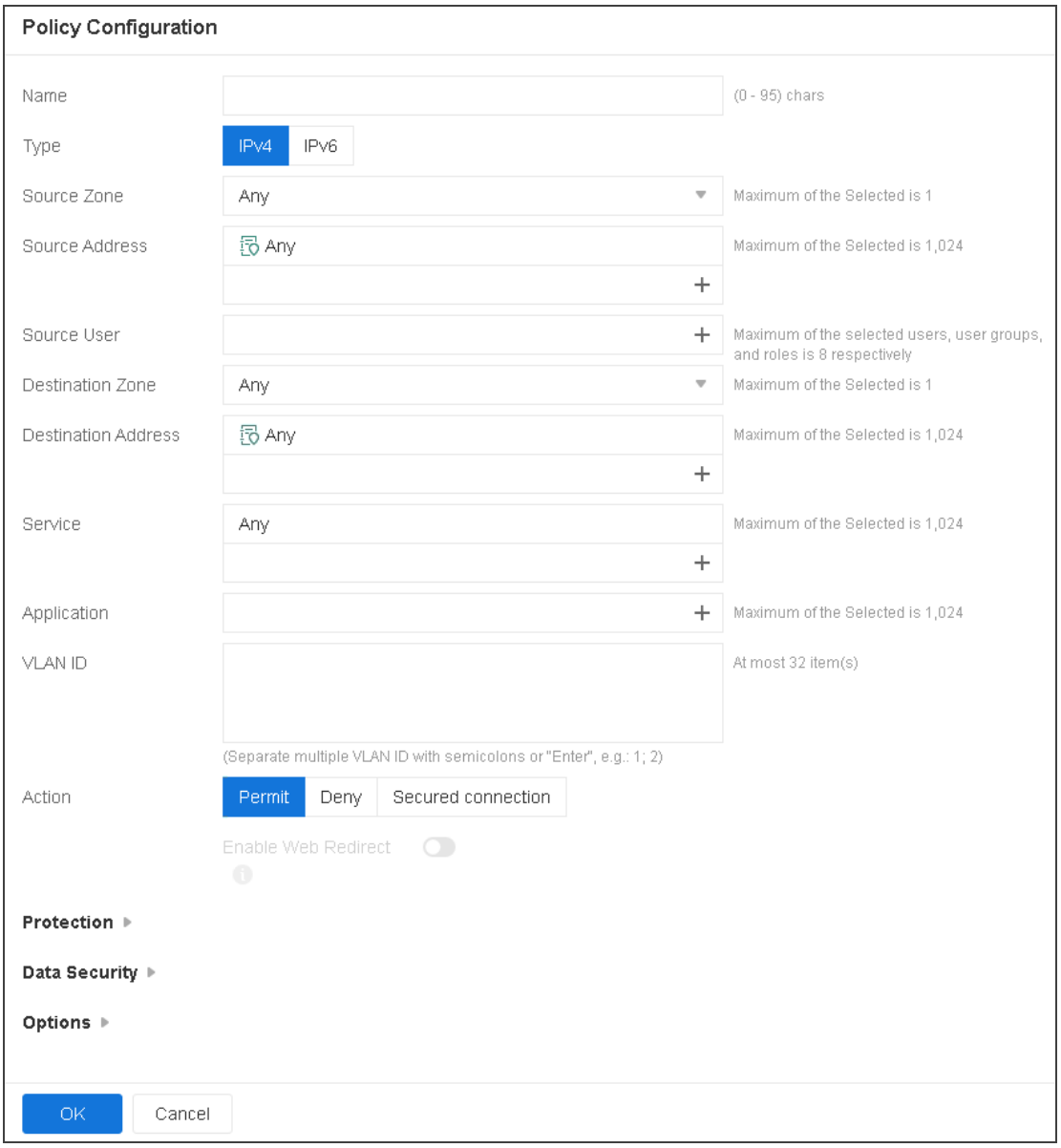
- Manage the security policy rules: enable/disable a policy rule, clone a policy rule, adjust security rule position, configure default action, view and clear policy hit count, hit count check, rule redundancy check, importing /exporting policy rule searching policy rules .
- Configure an aggregate policy
- Configure a security policy group
- Configure a mini policy
- View and search the security policy rules/ security policy groups
- Configure the policy assistant

Configuring a Security Policy Rule

To configure a security policy rule, take the following steps:

1. Select **Policy > Security Policy > Policy**.

2. At the top-left corner, click **New** to open the **Policy Configuration** page.



Configure the corresponding options.

Option	Description
Name	Type the name of the security policy.
Type	Select the IP type, including IPv4 or IPv6. Only the IPv6

Option	Description
	firmware can configure the IPv6 type. If IPv6 is selected, all of the IPv6/prefix, IP range, and addressbook should be configured in the IPv6 format.
Source Information	
Zone	Specifies a source zone. In the single-zone mode, select a zone from the **Source Zone** dropdown list. If the multi-zone mode is enabled, take the following steps: 1. Click **Source Zone** to go to the pop-out Zone list. 2. Click the zones you need. You can select up to 16 zones. 3. Click **OK**. You can also perform the following operations: • When selecting the zones, you can click ⊕ to create new zones. • Any is the default zone. Enable Any to restore to the default.
Address	Specifies the source addresses. 1. Select an address type from the **Address** drop-down list. 2. Select or type the source addresses based on the

Option	Description
	selected type. 3. Click **Add** to add the addresses to the left pane. 4. After adding the desired addresses, click **Close** to complete the source address configuration. You can also perform other operations: • When selecting the **Address Book** type, you can click  icon to create a new address entry. • You can click in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that

Option	Description
	contains the address member whose hostname is aaa may be matched. • The default address configuration is any. To restore the configuration to this default one, select the **any** check box.
User	Specifies a role, user or user group for the security policy rule. 1. From the **User** drop-down menu, select the AAA server where the users and user groups reside. To specify a role, select **Role** from the **AAA Server-/Role** drop-down list. 2. Based on the type of AAA server, you can execute one or more actions: search a user/user group/role, expand the user/user group list, enter the name of the user/user group. 3. After selecting users/user groups/roles, click the selected users/user groups/roles to add them to the left pane. 4. After adding the desired objects, click **Close** to complete the user configuration.
Destination	
Zone	Specifies a destination zone. In the single-zone mode, select a zone from the **Destin-**

Option	Description
	ation Zone dropdown list. If the multi-zone mode is enabled, take the following steps: 1. Click **Destination Zone** to go to the pop-out Zone list. 2. Click the zones you need. You can select up to 16 zones. 3. Click **OK**. You can also perform the following operations: • When selecting the zones, you can click ⊕ to create new zones. • Any is the default zone. Enable Any to restore to the default.
Address	Specifies the destination addresses. 1. Select an address type from the **Address** drop-down list. 2. Select or type the destination addresses based on the selected type. 3. Click **Add** to add the addresses to the left pane. 4. After adding the desired addresses, click **Close** to complete the destination address configuration. You can also perform other operations: • When selecting the **Address Book** type, you can

Option	Description
	click  icon to create a new address entry. • You can click in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched. • The default address configuration is any. To restore the configuration to this default one, select the **any** check box.
Other Information	

Option	Description
Service	Specifies a service or service group. 1. From the **Service** drop-down menu, select a type: Service, Service Group. 2. You can search the desired service/service group, expand the service/service group list. 3. After selecting the desired services/service groups, click the selected services/service groups to add them to the left pane. 4. After adding the desired objects, click **Close** to complete the service configuration. You can also perform other operations: • To add a new service or service group, click **User-defined** from the **Predefined** drop-down menu, and click  icon. • The default service configuration is any. To restore the configuration to this default one, select the **any** check box. Specifies a service rule. When configuring the service rule of the policy rule, you can add a predefined or user-defined service that have been configured in the service book. When the required service does not exist in the service book, the administrator can specify the protocol type and port number of

Option	Description
	the service by configuring the service rules, thus simplifying the configuration steps of the policy. Specify a protocol type for the user-defined service. The available options include TCP, UDP, ICMP, SCTP and Others. If needed, you can add multiple service items. The parameters for the protocol types are described as follows: 1. From the **Service** drop-down menu, select a type: Service Rule. 2. From the **Protocol Type**drop-down menu, select a protocol type: TCP, UDP, ICMP, ICMPv6 and All. The parameters for the protocol types are described as follows: **TCP/UDP**: • Destination port: • Min - Specifies the minimum port number of the specified service rule. • Max - Specifies the maximum port number of the specified service rule. The value range is 0 to 65535. • Source port:

Option	Description
	• Min - Specifies the minimum port number of the specified service rule. • Max - Specifies the maximum port number of the specified service rule. The value range is 0 to 65535.  Notes: • The minimum port number cannot exceed the maximum port number. • The "Min" of the destination port is required, and other options are optional. • If "Max " is not configured, system will use "Min" as the single code. ICMP: • Type: Specifies an ICMP type for the service rule. The value range is 0（Echp-Reply）, 3（Destination-Unreachable）, 4（Source Quench）, 5（Redirect）, 8（Echo）, 11（Time Exceeded）, 12

Option	Description
	（Parameter Problem），13（Timestamp），14（Timestamp Reply），15（Information Request），16（Information Reply），17（Address Mask Request），18（Address Mask Reply），30（Traceroute），31（Datagram Conversion Error），32（Mobile Host Redirect），33（IPv6 Where-Are-You），34（IPv6 I-Am-Here），35（Mobile Registration Request），36（Mobile Registration Reply）. • Code: Specifies a minimum value and maximum value for ICMP code. The value range is 0 to 15, the default value is : min code - 0, max code - 15.  Notes: • The minimum code cannot exceed the maximum code. • If "Max " is not configured, system will use "Min" as the single code. ICMPv6:

Option	Description
	• Type: Specifies an ICMPv6 type for the service rule. The value range is 1（Dest-Unreachable）, 2（Packet Too Big）, 3（Time Exceeded）, 4（Parameter Problem）, 5-99 (Unallocated Error message), 100（Private experimentation）, 101（Private experimentation）, 102-126 (Unallocated Error message), 127（Reserved for expansion of ICMPv6 error message）, 128（Echo Request）, 129（Echo Reply）, 130（Multicast Listener Query）, 131（Multicast Listener Report）, 132（Multicast Listener Done）, 133（Router Solicitation）, 134（Router Advertisement）, 135（Neighbor Solicitation）, 136（Neighbor Advertisement）, 137（Redirect Message）, 138（Router Renumbering）, 139（ICMP Node Information Query）, 140（ICMP Node Information Response）, 141（Inverse Neighbor Discovery Solicitation Message）, 142（Inverse Neighbor Discovery Advertisement Message）, 143（Version 2 Multicast Listener Report）, 144（Home Agent Address Discovery

Option	Description
	Request Massage）, 145（Home Agent Address Discovery Reply Massage）, 146（Mobile Prefix Solicitation）, 147（Mobile Prefix Advertisement ）, 148（Certification Path Solicitation Message）, 149（Certification Path Advertisement Message）, 150（ICMP message utilized by experimental mobility protocols such as Seamoby）, 151（Multicast Router Advertisement）, 152（Multicast Router Solicitation ）, 153（Multicast Router Termination）, 154（FMIPv6 Messages）, 200（Private experimentation）, 201（Private experimentation）and 255（Reserved for expansion of ICMPv6 informational）. • Code: Specifies a minimum value and maximum value for ICMP code. The value range is 0 to 255, the default value is : min code - 0, max code - 255. SCTP: • Destination port • Min- Specifies the minimum port number of the specified service rule.

Option	Description

	• Max- Specifies the maximum port number of the specified service rule. The value range is 0 to 65535.
	• Source port
	  • Min - Specifies the minimum port number of the specified service rule.
	  • Max - Specifies the maximum port number of the specified service rule. The value range is 0 to 65535.
	  Notes:
	  • The minimum port number cannot exceed the maximum port number.
	  • The "Min" of the destination port is required, and other options are optional.
	  • If "Max " is not configured, system will use "Min" as the single code.

Option	Description
	ALL: • Protocol: Specifies a protocol name for the service rule. If it is a unknown protocol, you can directly enter the corresponding protocol number. .  Notes: • The minimum code cannot exceed the maximum code. • If "Max " is not configured, system will use "Min" as the single code. 3. Click **Add** to add the configured service rules to the list on the left. 4. Click **Close** .
Application	Specifies an application/application group/application filters. 1. From the **Application** drop-down menu, you can search the desired application/application group/application filter, expand the list of applications/application groups/application filters.

Option	Description
	2. After selecting the desired applications/application groups/application filters, click the selected applications/application groups/application filters to add them to the left pane. 3. After adding the desired objects, click **Close** to complete the application configuration. You can also perform other operations: • To add a new application group, select **Application Groups** from the **Application** drop-down menu and click ⊕ icon. • To add a new application filter, select **Application Filters** from the **Application** drop-down menu and click ⊕ icon.
VLAN ID	Specifies the VLAN ID that is matched to the policy rule. The value range is from 1 to 4,094. If multiple VLAN IDs are specified, separate them with semicolons. Each policy rule supports up to 32 VLAN IDs.
Action	Specifies an action for the traffic that is matched to the policy rule, including: • Permit - Select **Permit** to permit the traffic to pass through. • Deny - Select **Deny** to deny the traffic.

Option	Description
	• WebAuth - Performs Web authentication on the matched traffic. Select **WebAuth** from the drop-down list after selecting the **Secured Connection** option, and then select an authentication server from the following drop-down list. • From tunnel (VPN) - For the traffic from a peer to local, if this option is selected, system will first determine if the traffic originates from a tunnel. Only such traffic will be permitted. Select **From tunnel (VPN)** from the drop-down list after selecting the **Secured Connection** option, and then select a tunnel from the following drop-down list. • Tunnel (VPN) - For the traffic from local to a peer, select this option to allow the traffic to pass through the VPN tunnel. Select **Tunnel (VPN)** from the drop-down list after selecting the **Secured Connection** option, and then select a tunnel from the following drop-down list. • Portal server - Performs portal authentication on the matched traffic. Select **Portal server** from the drop-down list after selecting the **Secured Connection** option, and then type the URL address of the portal server.
Enable Web	Enable the Web redirect function to redirect the HTTP

Option	Description
Redirect	request from clients to a specified page automatically. With this function enabled, system will redirect the page you are requesting over HTTP to a prompt page. 1. Click the **Enable Web Redirect** button. 2. Type a redirect URL into the **Notification page URL** box. When using Web redirect function, you need to configure the Web authentication function. For more configurations, see "User Online Notification" on Page 1353.

Expand Protection, configure the corresponding options.

Option	Description
Antivirus	Specifies an antivirus profile. The combination of security policy rule and antivirus profile enables the devices to implement fine-grained application layer policy control.
IPS	Specifies an IPS profile. The combination of security policy rule and IPS profile enables the devices to implement fine-grained application layer policy control.
URL Filtering	Specifies a URL filter profile. The combination of security policy rule and URL filter profile enables the devices to implement fine-grained application layer policy control.
Sandbox	Specifies a sandbox profile. The combination of security policy rule and sandbox profile enables the devices to implement fine-grained application layer policy control.

Option	Description
Botnet Prevention	Specifies a botnet prevention profile. The combination of security policy rule and botnet prevention profile enables the devices to implement fine-grained application layer policy control.

Expand Data Security, configure the corresponding options.

Option	Description
File Filter	Specifies a file filter profile. The combination of security policy rule and file filter profile enables the devices to implement fine-grained application layer policy control.
File Content Filter	Specifies a file content filter profile. The combination of security policy rule and file content filter profile enables the devices to implement fine-grained application layer policy control.
File Content Filter	Specifies a file content filter profile. The combination of security policy rule and file content filter profile enables the devices to implement fine-grained application layer policy control.
Web Content	Specifies a web content profile. The combination of security policy rule and Web Content profile enables the devices to implement fine-grained application layer policy control.
Web Posting	Specifies a web posting profile. The combination of security policy rule and web posting profile enables the devices to implement fine-grained application

Option	Description
	layer policy control.
Email Filter	Specifies an email filter profile. The combination of security policy rule and email filter profile enables the devices to implement fine-grained application layer policy control.
APP Behavior Control	Specifies an app behavior control profile. The combination of security policy rule and app behavior control profile enables the devices to implement fine-grained application layer policy control.
Network Behavior Record	Specifies a NBR profile. The combination of security policy rule and NBR profile enables the devices to implement fine-grained application layer policy control.

Expand Options, configure the corresponding options.

Option	Description
Schedule	Specifies a schedule when the security policy rule takes effect. Select a desired schedule from the **Schedule** drop-down list. This option supports fuzzy search. After selecting the desired schedules, click the blank area in this page to complete the schedule configuration. To create a new schedule, click ⊕ icon.
Log	You can log policy rule matching in the system logs according to your needs. • For the policy rules of Permit, logs will be generated in two conditions: the traffic that is matched to the policy rules starts and ends its session.

Option	Description
	• For the policy rules of Deny, logs will be generated when the traffic that is matched to the policy rules is denied. Select one or more check boxes to enable the corresponding log types. • Deny - Generates logs when the traffic that is matched to the policy rules is denied. • Session start - Generates logs when the traffic that is matched to the policy rules starts its session. • Session end - Generates logs when the traffic that is matched to the policy rules ends its session.
SSL Proxy	Specifies a SSL proxy profile. The combination of security policy rule and SSL proxy profile enables the devices to decrypt the HTTPS traffic.
Policy Assistant	Click the **Enable** button to enable policy assistant. After enabling the policy assistant, you can specify the policy ID as the traffic hit policy. System can analyze the traffic data hit the specified policy ID, and aggregate the traffic list according to the user-defined aggregation rules, and finally the security policy rules that meet your expectations can be generated. For how to use policy assistant, see Configuring the Policy Assitant.
ACL	Click the **Enable** button to enable the access control func-

Option	Description
	tion and select the ACL profile. With the combination of security policy and ACL rules, system can achieve accurate access controlling.
Aggregate Policy	Click the Aggregate Policy drop-down menu, and select the aggregate policy to be added to the aggregate policy to which you want to add.
Position	Select a rule position from the Position drop-down list. Each policy rule is labeled with a unique ID or name. When traffic flows into a device, the device will query for the policy rules by turn, and processes the traffic according to the first matched rule. However, the policy rule ID is not related to the matching sequence during the query. The sequence displayed in policy rule list is the query sequence for policy rules. The rule position can be an absolute position, i.e., at the top or bottom, or a relative position, i.e., before or after an ID or a name.
Description	Type descriptions into the **Description** box.

3. Click **OK** to save your settings.

Managing Security Policy Rules

Managing security policy rules include the following matters: enable/disable a policy rule, clone a policy rule, adjust security rule position, configure default action, view and clear policy hit count, hit count check, and rule redundancy check.

Enabling/Disabling a Policy Rule

By default the configured policy rule will take effect immediately. You can terminate its control over the traffic by disabling the rule.

To enable/disable a policy rule:

1. Select **Policy > Security Policy > Policy**.
2. Select the security policy rule that you want to enable/disable.
3. Click ⋮ icon , and then select **Enable** or **Disable** to enable or disable the rule.

The disabled rule will not display in the list. Click ⋮ icon , and then select **Show Disabled Policies** to show them.

Cloning a Policy Rule

When there are a large number of policy rules in system, to create a policy rule which is similar to an configured policy rule easily, you can copy the policy rule and paste it to the specified location.

To clone a policy rule, take the following steps:

1. Select **Policy > Security Policy > Policy**.
2. Select the security policy rule that you want to clone and click **Copy**.
3. Click **Paste**. In the drop-down list, select the desired position. Then the rule will be cloned to the desired position.

Adjusting Security Policy Rule Position

To adjust the rule position, take the following steps:

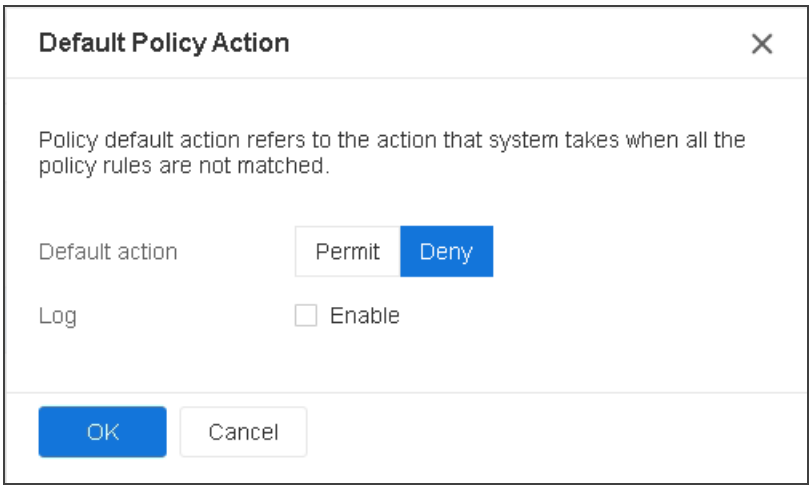
1. Select **Policy > Security Policy > Policy**.
2. Select the check box of the security policy whose position will be adjusted.
3. Click **Move**.
4. In the drop-down list, type the rule ID or name , and click **Top**, **Bottom**, **Before ID** , **After ID** , **Before Name** ,or **After Name**. Then the rule will be moved to the top, to the bottom, before or after the specified ID or name.

Configuring Default Action

You can specify a default action for the traffic that is not matched with any configured policy rule. System will process the traffic according to the specified default action. By default system will deny such traffic.

To specify a default policy action, take the following steps:

1. Select **Policy > Security Policy > Policy**.
2. Click ⋮ icon and select **Default Policy Action**.



Configure the following options.

Option	Description
Default action	Specify a default action for the traffic that is not matched with any configured policy rule. • Click **Permit** to permit the traffic to pass through. • Click **Deny** to deny the traffic.
Log	Configure to generate logs for the traffic that is not matched with any configured policy rule. By default system will not generate logs for such traffic. To enable log, click the **Enable** button, and system will generate logs for such traffic.

3. Click **OK** to save your changes.

Policy Global Configuration

In the Policy Global Configuration, you can switch to multi-zone or single-zone mode. In the single-zone mode, one policy supports only one source zone and one destination zone. In the multi-zone mode, one policy supports multiple zones. In this case, users can manage policies more easily when there are fewer policies needed configuring in the system. By default, the system applies the single-zone mode.

To switch to multi-zone or single-zone mode, take the following steps:

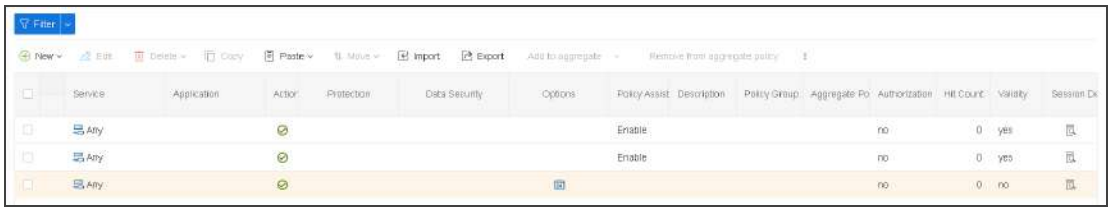
1. Click **Policy** > **Security Policy** > **Policy**.
2. Click ⋮ and select **Policy Global Configuration** to go to the **Policy Global Configuration** page.
3. Enable **Multi Zone**. If you disable multi-zone mode, the system switches to the single-zone mode.
4. Click **OK**.

Schedule Validity Check

In order to make sure that the policies based on schedule are effective, system provides a method to check the validity of policies. After checking the policy, the invalid policies based on schedule will be highlighted by yellow.

To check schedule validity:

1. Select **Policy > Security Policy > Policy** .
2. Click ⋮ icon and select **Schedule Validity Check**. After check, system will highlight the invalid policy based on schedule by yellow. Meanwhile, you can view the validity status in the policy list.



Showing Disabled Policies

To show disabled policies:

1. Select **Policy > Security Policy > Policy** .
2. Click ⋮ icon and select **Show Disabled Policies**. The disabled policies will be highlighted by gray in the policy list.

Notes:

- By default(the "Schedule Validity Check" and "Show Disabled Policies" are not selected), the policy list only displays the enabled policies which are not highlighted.
- When you select both "Schedule Validity Check" and "Show Disabled Policies", the policy is managed as follows:
  - The policy list will display the "Validity" column, which shows the validity status of policies.
  - The invalid policy based on schedule will be highlighted by yellow no matter if the policy is disabled or not.
  - If the valid policy based on schedule is disabled, it will be highlighted by gray.

Importing Policy Rule

You can import the configuration file of the local policy rules into the device to avoid creating policy rules manually. Only the DAT format file is supported currently.

To import the configuration file of policy rules, take the following steps:

1. Click **Policy** > **Security Policy** > **Policy**.

2. Click the **Import** button to open the **Import** page.

3. Click **Browse** and select the local configuration file of policy rule to upload.

4. Click **OK**, and the imported policy rule will be displayed in the list.

Notes:

- If there's an error during import, system will stop importing immediately and roll back configurations automatically.
- The imported policy will be displayed on the bottom of the policy list.

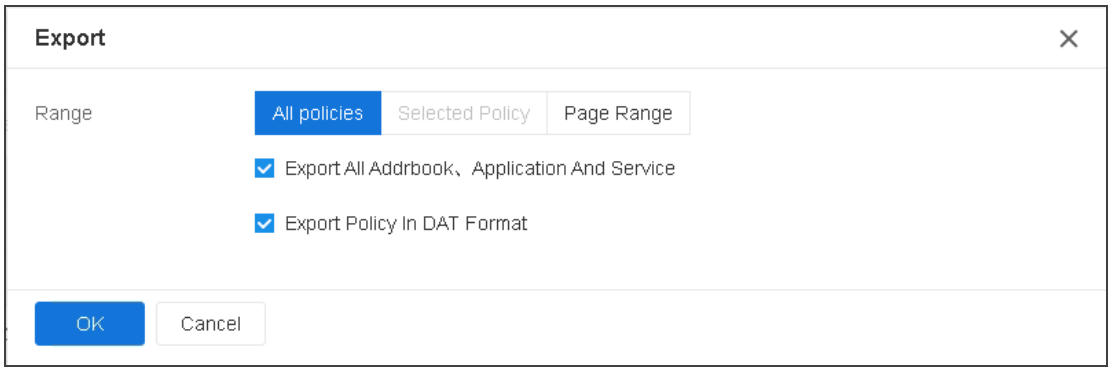
Exporting Policy Rule

You can export the policy rules existing on the device to the local in the format of HTML or DAT formats. At the same time, all the custom objects such as address book, service book and application can be exported.

To export the policy rules, take the following steps:

1. Click **Policy** > **Security Policy** > **Policy**.

2. Click **Export** to open the **Export** page.



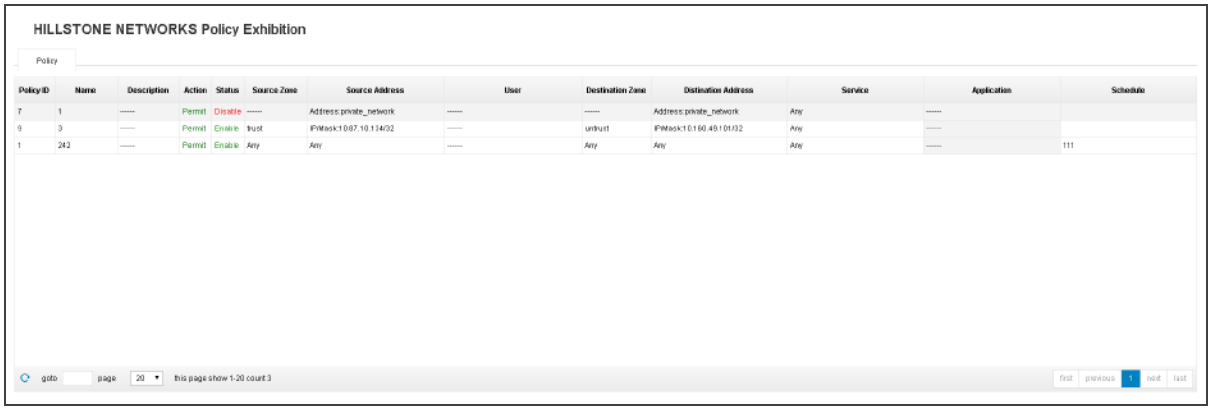
Configure the options as follows:

Option	Description
Range	Specify the range of policy rules to be exported. • All Policy: Select the radio button and export all policy rules on the device. • Selected Policy: In the policy list, select the policy to be exported, and then click **Export** > **Selected Policy**. • Page Range: Select the radio button, and enter the page number or page range of the policy list to be exported. **Note**: Separate the page number or range with semicolons, e.g. "3;5-8".
Export Address, Service, APP Book	Select the check box to export all the custom objects including address book, service book and application book, and a Zip file named "book+-exported time" will be generated.
Export Policy in	Select the check box to export the policy configurations in the format of

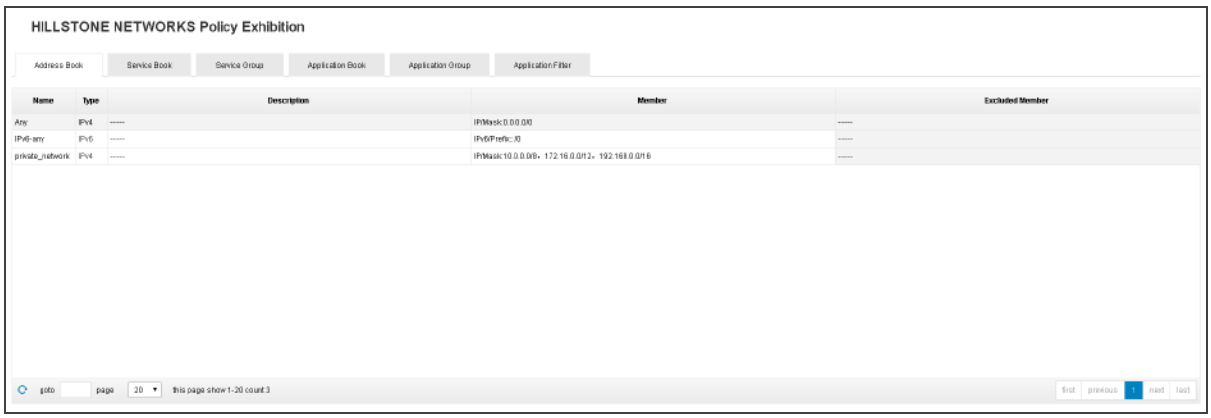
Option	Description
DAT Format	DAT.

3. Click **OK** to download the exported files. There're four kinds of files: policyExport.html, " policy+exported time.zip", "book+exported time.zip" and the policy configurations in the DAT format.

4. Double-click the policyExport.html, click **Import File** and import the " policy+exported time.zip" to view the table of exported policies.



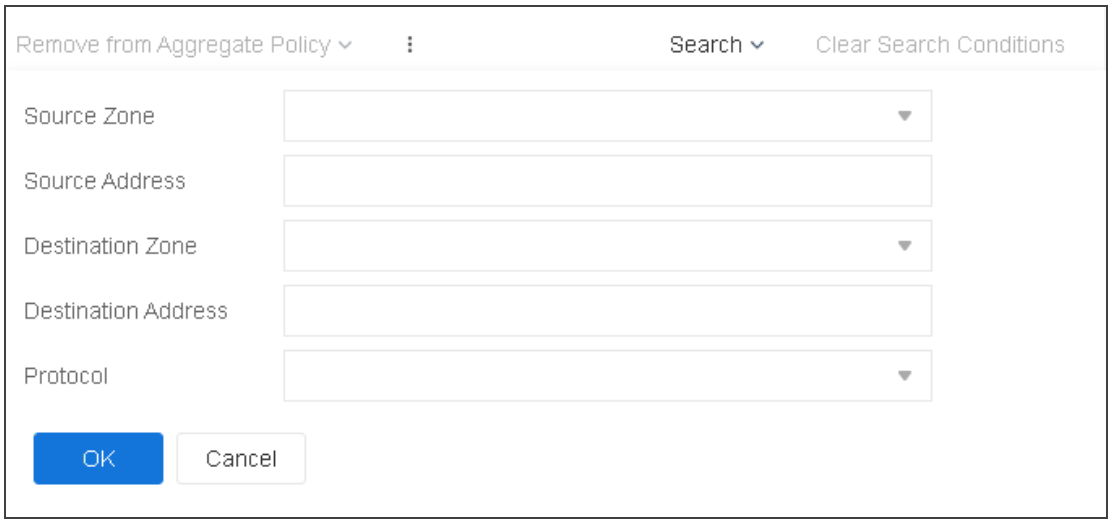
5. Double-click the policyExport.html, click **Import File** and import the "book+exported time.zip" to view the table of object configurations.



Searching Policy Rule

You can view the detailed information of the policy matching the five-tuple filtering conditions (including source IP address, destination IP address, protocol, source port and destination port), take the following steps:

1. Click **Policy** > **Security Policy** > **Policy**.
2. Click **Search** to open the configuration page.



Configure the options as follows:

Option	Description
Source Zone	Click the drop-down list to select the specified source zone, and search the policy rules that comply with the specified source zone.
Source Address	Enter the source address in the text box to search the policy rules that comply with the specified source address. The source address supports fuzzy matching, and can search the policy rules containing the input address.

Option	Description
Destination Zone	Click the drop-down list to select the specified destination zone, and search the policy rules that comply with the specified destination zone.
Destination Address	Enter the source address in the text box to search the policy rules that comply with the specified destination address. The destination address supports fuzzy matching, and can search the policy rules containing the input address.
Protocol	Select the protocol type in the **Protocol** drop-down list to search the policy rules that comply with the specified protocol. • When the protocol is specified as TCP or UDP, you can specify the source/destination port range, the value range is 0-65535, if you specify the same minimum and maximum source/destination port number, system will use this port number as the single source/destination port number. • When the protocol is specified as ICMP, the type and code range can be specified. If you specify the same minimum and maximum code value, the system will use the code value as a single code value. The value range of the code is 0-15. • When the protocol is specified as ICMPv6, the type and code range can be specified. If you specify

Option	Description
	the same minimum and maximum code value, the system will use the code value as a single code value. The value range of the code is 0-255. • When the protocol is specified as another protocol type, it does not support configuring the port range or code range. **Note:** If you specify a port range or code range, the maximum port number/code value and the minimum port number/code value must be configured at the same time.

3. Click the **OK**, the list will display the search results.
4. If you need to clear the configuration and display all the policy rules, click **Clear Search Conditions**.

Notes: The search function and the filter conditions are mutually exclusive and cannot be configured at the same time. When the search function is configured, the filter condition configuration will be cleared, and vice versa.

Configuring an Aggregate Policy

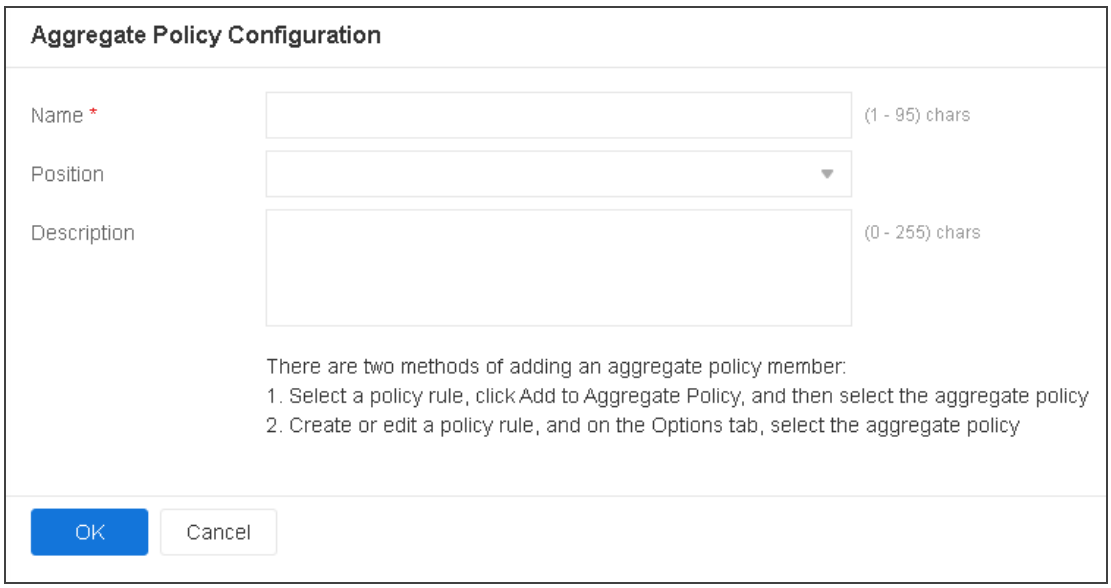
According to the needs of different scenarios, you can create an aggregate policy, and add some policy rules with the same effect or the same attributes to the aggregation policy. If the administrator adjusts the position of an aggregate policy, the positions of all its members will be adjusted accordingly, so as to manage policy rules in bulk.

Configuring an aggregate policy includes: creating an aggregate policy, adding an aggregate policy member, removing an aggregate policy member, deleting an aggregate policy, adjusting the position of an aggregate policy, and enabling/disabling an aggregate policy.

Creating an Aggregate Policy

To create an aggregate policy, take the following steps:

1. Click **Policy** > **Security Policy** > **Policy**.
2. Click the **New** drop-down list, and select **Aggregate Policy** to open the **Aggregate Policy Configuration** page .



On the Aggregate Policy Configuration tab, complete the basic configuration information.

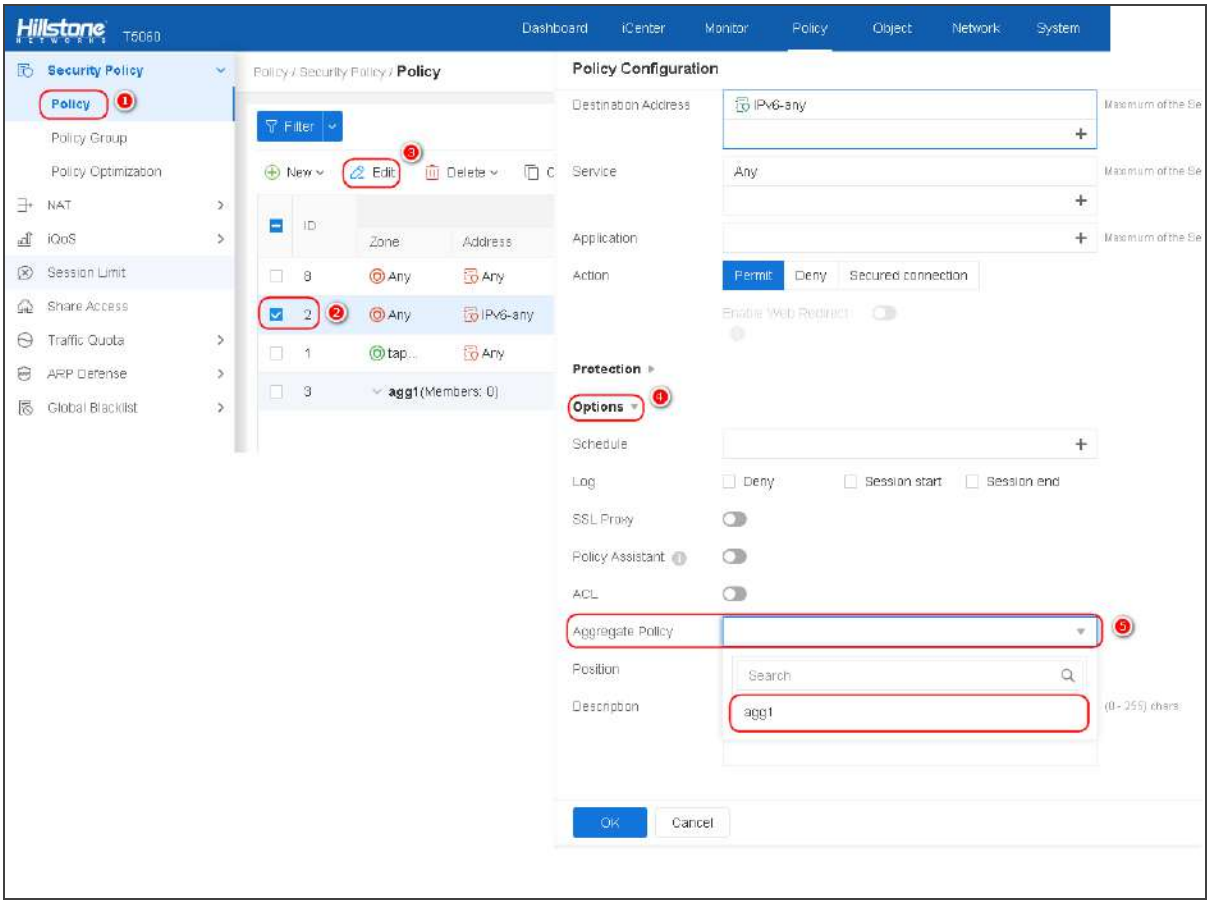
Option	Description
Name	Specifies the name of an aggregate policy. The range is 1 to 95 characters.
Position	The rule position can be an absolute position, i.e., at the top or bottom, or a relative position, i.e., before or after an ID or a name. In the **Position** drop-down list, you can select a position for the aggregate policy.
Description	Type descriptions into the **Description** box.

3. Click **OK** to save your settings.

Adding an Aggregate Policy Member

After creating an aggregate policy, the administrator can add a policy rule to the aggregate policy to be an aggregate policy member. There are two methods for adding an aggregate policy member.

- **Editing the policy configuration**:



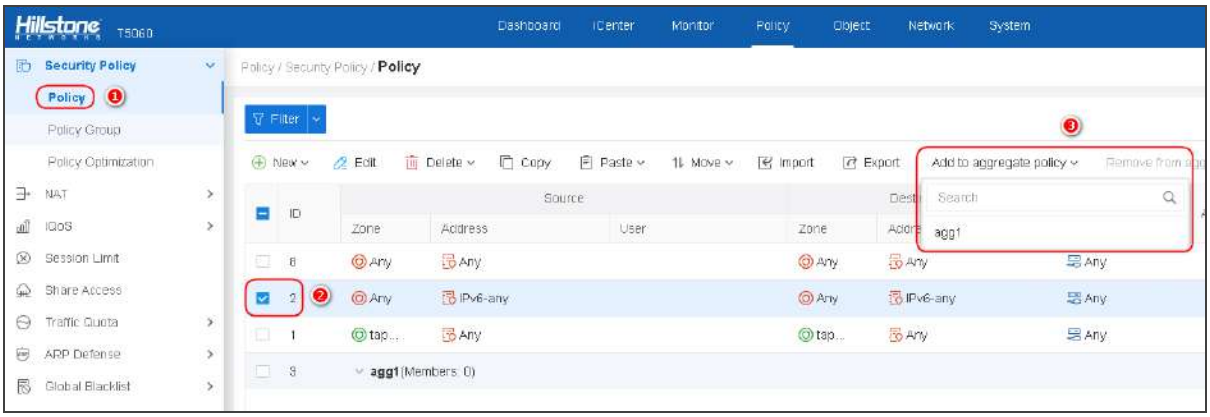
As shown above, take the following steps:

1. Click **Policy** > **Security Policy** > **Policy**.

2. Select the policy rule that you want to add to an aggregate policy from the list.

3. Click **Edit** to open the **Policy Configuration** page.
4. Click **Options** to expand the relevant configuration items.
5. Click the **Aggregate Policy** drop-down menu, and select the aggregate policy to be added to the aggregate policy to which you want to add.
6. Click **OK**.

- **Selecting a policy rule you want to add**:

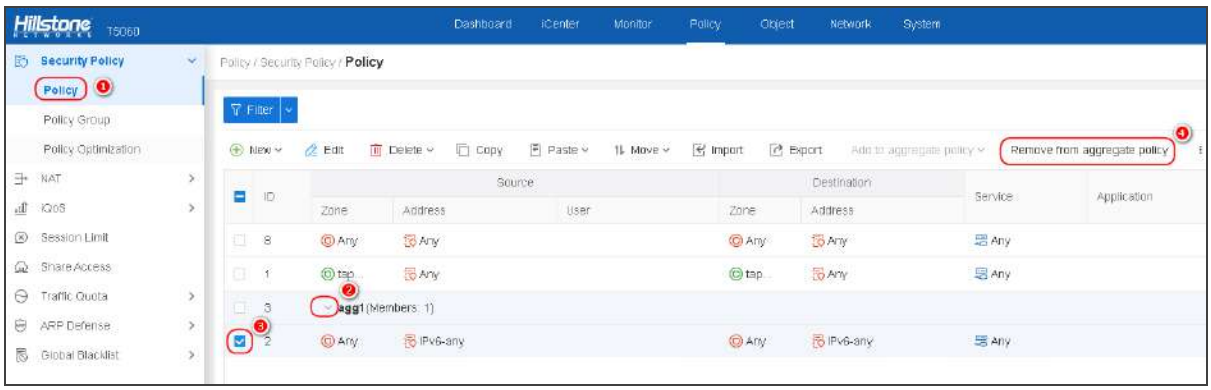


As shown above, take the following steps:

1. Click **Policy** > **Security Policy** > **Policy**.
2. Select the policy rule that you want to add to an aggregate policy from the list. You can select multiple policy rules at a time
3. Click the **Add to aggregate policy** drop-down list, and select the aggregate policy to which you want to add.

Removing an Aggregate Policy Member

To remove a member from an aggregate policy, take the following steps:



1. Click **Policy** > **Security Policy** > **Policy**.
2. In the list, click the arrow before an aggregate policy to expand it
3. Select the aggregate policy member that you want to remove. You can select multiple policy rules at a time.
4. Click the **Move out from aggregate policy** button.

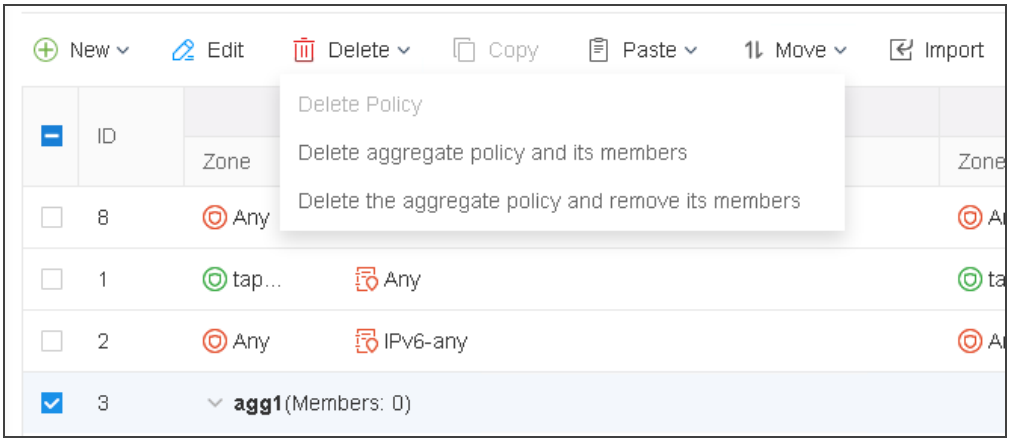
Notes:

- If the member at the top position is removed from an aggregate policy, the removed member will be put before the aggregate policy.
- If a member at a non-top position is removed from an aggregate policy, the removed member will be put after the aggregate policy.
- If several aggregate policy members (including the member at the top position) in consecutive order are removed, they will be put before the policy all together.

Deleting an Aggregate Policy

To delete an aggregate policy, take the following steps:

1. Click **Policy** > **Security Policy** > **Policy**.
2. Select the aggregate policy that you want to delete from the list.
3. Click **Delete**.
4. Select a deletion method from the drop-down list.



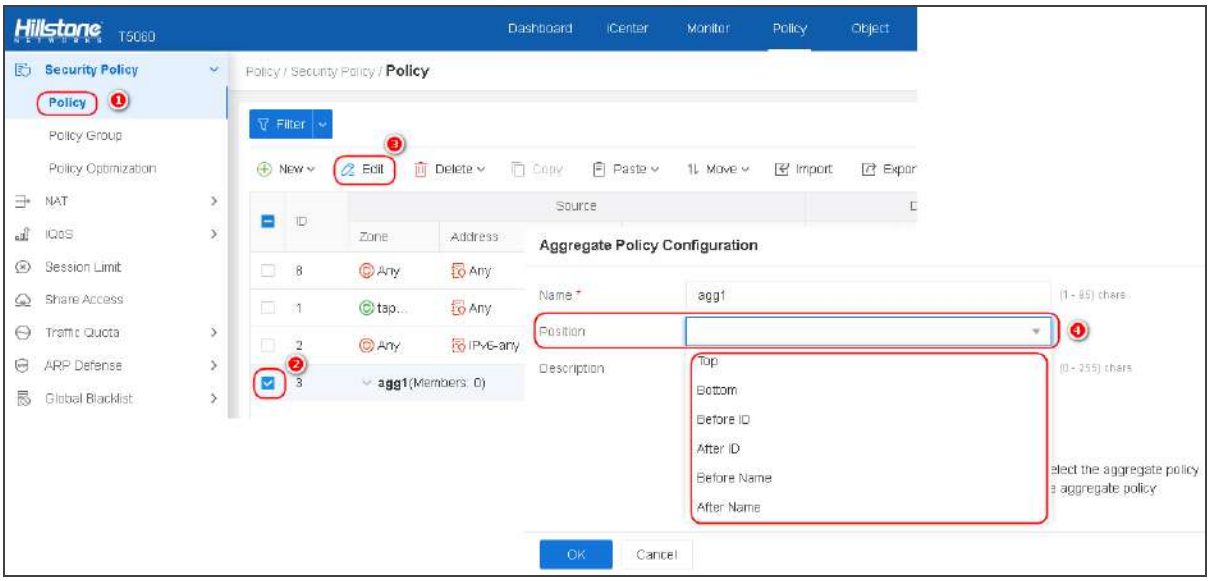
   - Delete aggregate policy and members: When deleting an aggregate policy, the members in it will also be deleted.
   - Delete aggregate policy, unbind members: When deleting an aggregate policy, all members in it will be removed.

5. Click **OK**.

Adjusting Position of an Aggregate Policy

The administrator can adjust the position of an aggregate policy by the following two methods. After the adjustment, the positions of all its members will be adjusted accordingly.

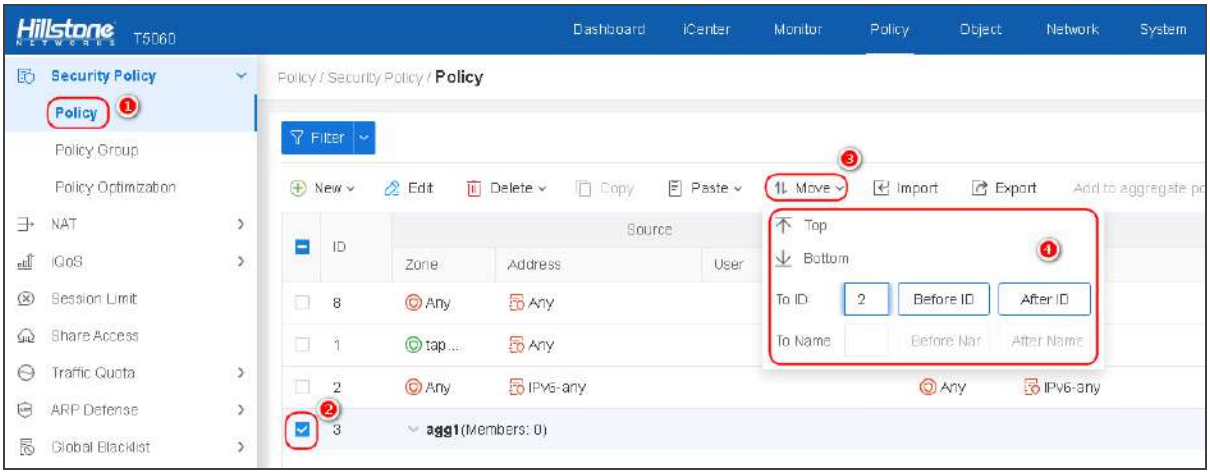
- Editing the aggregate policy configuration:



As shown above, take the following steps:

1. Click **Policy** > **Security Policy** > **Policy**.
2. Select the aggregate policy whose position that you want to adjust from the list.
3. Click **Edit** to open the **Aggregate Policy Configuration**page.
4. Click the **Position** drop-down list, select a position for the aggregate policy.

- Adjust directly in the policy list:



As shown above, take the following steps:

1. Click **Policy** > **Security Policy** > **Policy**.
2. Select the aggregate policy whose position that you want to adjust from the list.
3. Click **Move**.
4. In the pop-up menu, click **Top**, **Bottom** or type the rule ID /name , and click **Before ID** , **After ID** , **Before Name** or **After Name**. Then the rule will be moved before or after the specified ID or name.

Notes:

- The method for adjusting the position of an aggregate policy member is the same as the method for adjusting the position of an aggregate policy.
- The position adjustment for an aggregate policy member can only be performed in the aggregate policy to which it belongs.
- It is not supported to add a policy rule to or remove a policy rule from an aggregate policy by adjusting the position of the policy rule.

Enabling/Disabling an Aggregate Policy

By default, the configured aggregate policy will take effect immediately. By disabling an aggregate policy, the administrator can terminate its control over the traffic.

To enable/disable an aggregate policy, take the following steps:

1. Click **Policy** > **Security Policy** > **Policy**.
2. Select the aggregate policy that you want to enable/disable from the list.
3. Click ⋮, and then select **Enable** or **Disable** to enable or disable the aggregate policy.

The disabled rule will not display in the list. Click ⋮, and then select **Show Disabled Policies** to show them.

Notes:

- After disabling an aggregate policy, its members will be disabled too.
- After enabling an aggregate policy, the original status (enabled/disabled) of its members will remain unchanged. For example, if the original status of an aggregate policy member is "disabled", the status will remain unchanged after the policy to which it belongs is enabled.

Configuring a Policy Group

You can organize some policy rules together to form a policy group, and configure the policy group directly.

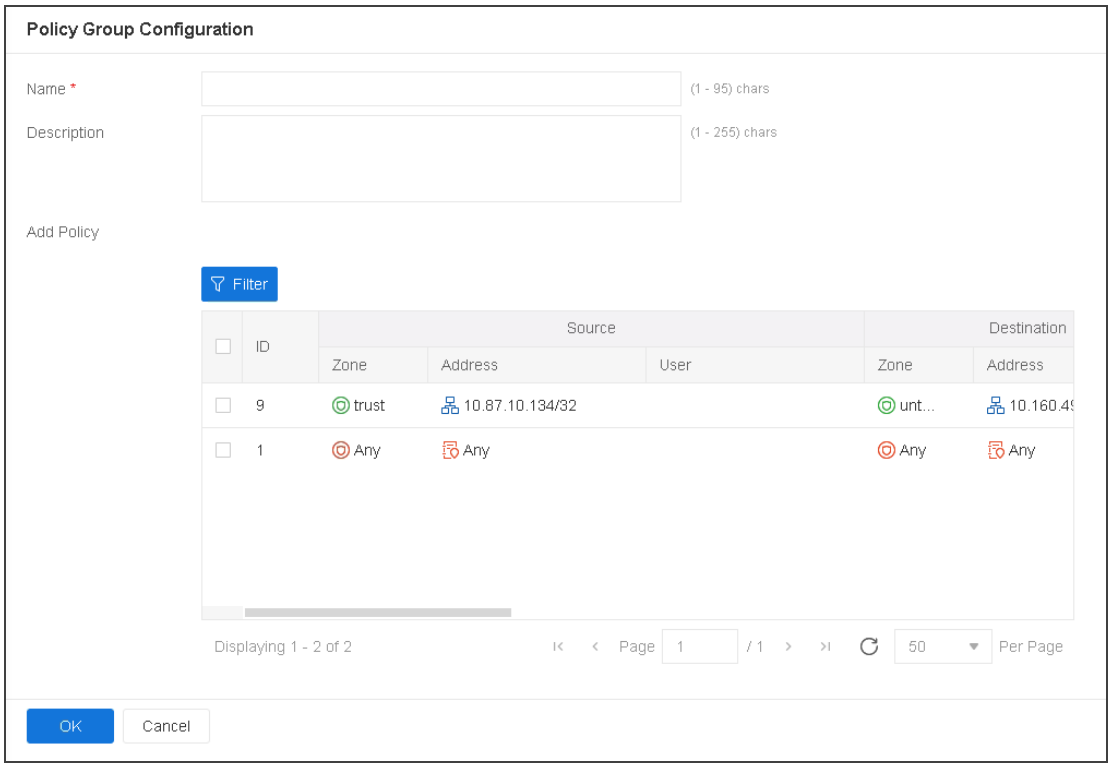
Configuring a security policy group include the following matters: creating a policy group, deleting a policy group, enable/disable a policy group, add/delete a policy rule member, edit a policy group and show disabled policy group.

Creating a Policy Group

To create a policy group, take the following steps:

1. Select **Policy > Security Policy > Policy Group** .

2. Click **New** to open the **Policy Group Configuration** page.



Configure the corresponding options.

Option	Description
Name	Specifies the name of the policy group. The length is 1 to 95 characters.
Description	Specifies the new description. You can enter at most 255 characters.
Add Policy	In the policy rules list, select the security policy rule that you want to add to the policy group.

3. Click **OK** to save your settings.

Deleting a Policy Group

To delete a policy group, take the following steps:

1. Select **Policy > Security Policy > Policy Group** .
2. Select the check box of the policy group that you want to delete, and click **Delete**.

Enabling/Disabling a Policy Group

By default the configured policy group will take effect immediately.

To enable/disable a policy group, take the following steps:

1. Select **Policy > Security Policy > Policy Group** .
2. Select the check box of the policy group that you want to enable or disable, and click the enable button under **Status** column. The enabled state is displayed as  , and the disabled state is displayed as  .

Adding/Deleting a Policy Rule Member

To add a policy rule member to the policy group, take the following steps:

1. Select **Policy > Security Policy > Policy Group** .
2. In the policy group list, click the "+" in front of the policy group item to expand the member list of the policy group.
3. Click **Add Members** button to open the **Policy Group-Add policy** page, which displays the list of policy rules that are not added to policy group.

4. Select the check box of the policy rules that you want to add to the policy group.
5. Click **OK** to save your settings.


Notes: A policy rule only can be added to a policy group.

To delete a policy rule member to the policy group, take the following steps:

1. Select **Policy > Security Policy** .
2. At the top-right corner of list, click **Policy Group** to enter the **Security Policy Group** page.
3. In the policy group list, click the "+" in front of the policy group item to expand the member list of the policy group.
4. Select the check box of the policy group that needs to be deleted, and click **Delete**.

Editing a Policy Group

To modify the name or description of policy group, take the following steps:

1. Select **Policy > Security Policy > Policy Group** .
2. Select the check box of the policy group that you want to edit, and click **Edit**.
3. Modify the name or description of policy group in the **Policy Group Configuration** page.

Showing Disabled Policy Group

To show disabled policy groups, take the following steps:

1. Select **Policy > Security Policy > Policy Group**.

2. Select the check box of **Show Disabled Policy Group**. The disabled policy group will be displayed in the policy group list, otherwise the policy group list will show only the enabled policy group.

Mini Policy

Mini policy is a kind of policy rule which only uses source / destination address, protocol, destination port, source / destination zone as traffic filtering conditions, and allows (Permit) or denies (Deny) as processing behavior. At the same time, system supports the configuration of a large number of mini policies, so it can meet more policy storage requirements.

The maximum number of mini policies supported by different device platforms is different, please refer to the actual device limit (Capacity).

Notes:

- Mini policy does not support adjusting priority.
- The matching priority of the policy is: mini policy> policy rule> default action, that is, system traffic will first match the mini policy, and then match the policy rule. When it is not matched with any configured mini policy or policy rule, system will process the traffic according to the specified default action.

  For the configuration of the default action, see Configuring Default Action.

Configuring a Mini Policy

The configuration of mini policy includes:

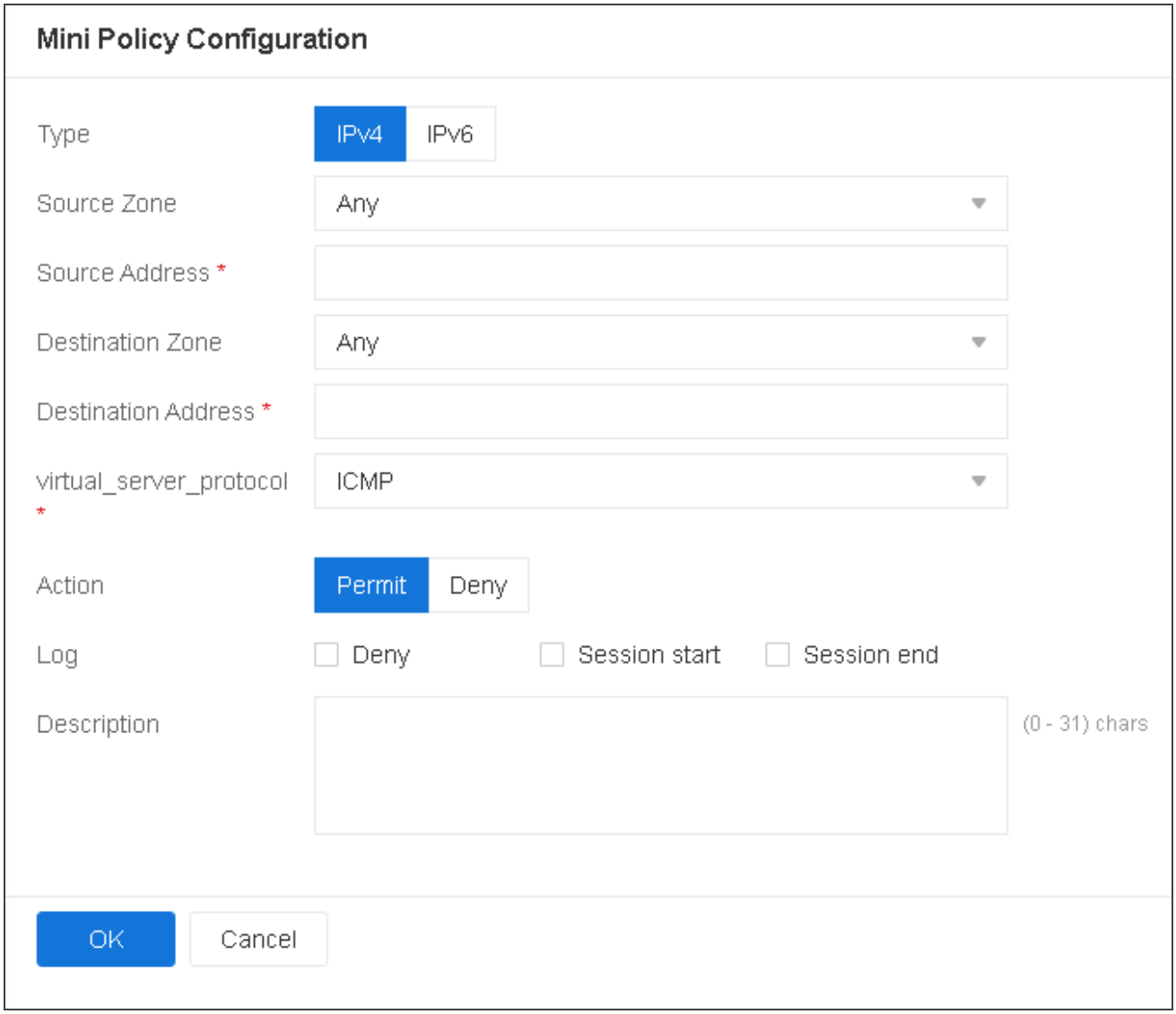
- Creating / Deleting a mini policy
- Editing a mini policy

- Viewing the mini policy information
- Viewing the mini policy hit information

Creating a Mini Policy

To create a mini policy, take the following steps:

1. Select **Policy > Security Policy > Mini Policy**.
2. Click **New** to open the **Mini Policy Configuration** page.



Configure the corresponding options.

Option	Description
Type	Specifies the IP address type, you can select **IPv4** or **IPv6**. This option can only be configured when the version supports IPv6; after selection, system only supports the configuration of IPv6 format IPv6/prefix length, IP address range or IP address entry.
Source Zone	Specifies the source zone of the mini policy. If not specified, the default value is any. Click the drop-down list, select the created zone, and click ⊕ to create a new zone. If not specified, the default is "Any".
Source Address (Required)	Specifies the source address of the mini policy. Enter the source address in the text box, which can be specified as an IPv4 address or an IPv6 address.
Destination Zone	Specifies the destination zone of the mini policy. If not specified, the default value is any. Click the drop-down list, select the created zone, and click ⊕ to create a new zone. If not specified, the default is "Any".
Destination Address (Required)	Specifies the destination address of the mini policy. Enter the source address in the text box, which can be specified as an IPv4 address or an IPv6 address.
Protocol Type (Required)	Select the protocol type from the drop-down list.

Option	Description
Destination Port	When the protocol type is specified as TCP or UDP, the destination port must be specified. The value range is 1-65535. For other protocol types, this option is not supported.
Action (Required)	Specifies the action of the mini policy, including: • Permit: Permits the traffic to pass through. • Deny: Denies the traffic.
Log	You can log policy rule matching in the system logs according to your needs, multiple options are available. • Deny: Record session rejection log information. • Session start: Record session establishment log information. • Session end: Record log information of session end.
Destination	Specifies the description of the mini policy. The length of *description* is 0 to 31 bytes.

3. Click **OK** to save your settings

Deleting a Mini Policy

To delete a mini policy, take the following steps:

1. Select **Policy > Security Policy > Mini Policy**.
2. Select the check box of the mini policy that you want to delete, and click **Delete**.

Editing a Mini Policy

To modify the configuration of mini policy, take the following steps:

1. Select **Policy > Security Policy > Mini Policy**.
2. Select the check box of the mini policy that you want to edit, and click **Edit**.
3. Modify the configuration of mini policy in the **Mini Policy Configuration** page


Notes: The type of mini policy cannot be modified.

Enabling/Disabling a Mini Policy

By default the configured mini policy will take effect immediately.

To enable/disable a mini policy group, take the following steps:

1. Select **Policy > Security Policy > Mini Policy** .
2. Select the check box of the mini policy that you want to enable or disable.
3. Click ⋮ icon , and then select **Enable** or **Disable** to enable or disable the rule.

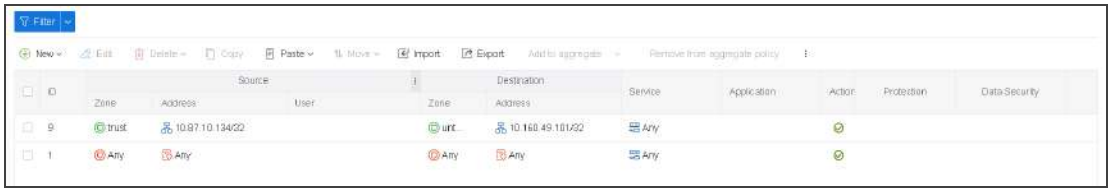
The disabled rule will not display in the list. Click ⋮ icon , and then select **Show Disabled Mini Policies** to show them.

Viewing and Searching Security Policy Rules/ Policy Groups/ Mini Policy

You can view and search the policy rules or policy groups in the policy/ policy group/ mini Policy list.

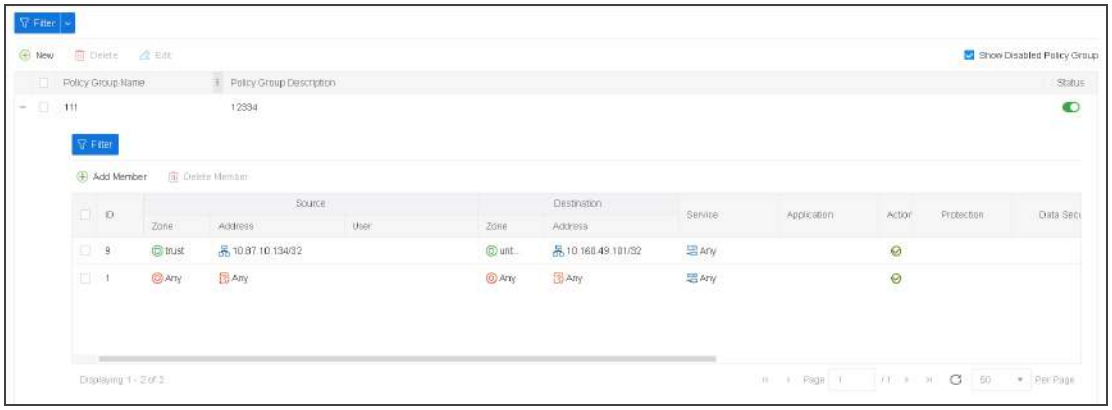
Viewing the Policy/ Policy Group/ Mini Policy

View the security policy rules in the policy rule list.



- Each column displays the corresponding configurations.
- Click icon under the Session Detail column in the Policy list to open then the **Session Detail** page. You can view the current session status of the selected policy. You can also click Filter button to add filtering conditions and search out the filtered sessions.
- Hover over your mouse on the configuration in a certain column. Then based on the configuration type, the WebUI displays either icon or the detailed configurations.
  - You can view the detailed configurations directly.
  - You can click icon. Based on the configuration type, the WebUI displays **Add Filter** or **Details**.
    - Click **Details** to see the detailed configurations. Then, in the **Details** section, click **View** next to **Entry Details** to view the details about the address or service.
    - Click **Add Filter**, the filter condition of the configuration you are hovering over with your mouse appears on the top of the list, and then you can filter the policy according to the filter condition. For detailed information of filtering policy rules, see Searching Security Policy Rules/ Policy Groups.

View the policy groups in the policy group list.



- Each column displays the corresponding configurations.
- You can view the current policy group status in **Status** column. The enabled state is displayed as  , and the disabled state is displayed as  .

View the mini policy rules in the policy group list.

- Each column displays the corresponding configurations.
- The **ID** column shows the ID automatically assigned by the system for the mini policy. The ID must be unique in the entire system. The starting ID of the mini policy is 1000001, and the ID range varies according to different device platforms.

Searching Security Policy Rules/ Policy Groups/ Mini Policy

Use the Filter to search for the policy rules that match the filter conditions.

1. Click **Policy > Security Policy > Policy**, **Policy > Security Policy > Policy Group** or **Policy > Security Policy > Mini Policy**.
2. At the top-right corner of the **Security Policy/ Security Policy Group** page, click **Filter**. Then a new row appears at the top.
3. Click **Filter** to add a new filter condition. Then select a filter condition from the drop-down menu and enter a value.
4. Press **Enter** to search for the policy rules that matches the filter conditions.
5. Repeat the above two steps to add more filter conditions. The relationship between each filter condition is **AND**.
6. To delete a filter condition, hover your mouse on that condition and then click ✕Remove All icon. To close the filter, click ✕ icon on the right side of the row.

Save the filter conditions.

1. After adding the filter conditions, click ⌄ in Filter ⌄, in the drop-down menu, click **Save Filters**.
2. Specifies the name of the filter condition to save, the maximum length of name is 32 characters, and the name supports only Chinese and English characters and underscores.
3. Click the **Save** button on the right side of the text box.
4. To use the saved filter condition, double click the name of the saved filter condition.
5. To delete the saved filter condition, click ✕ on the right side of the filter condition.

Notes:

- You can add up to 20 filter conditions as needed.
- After the device has been upgraded, the saved filter condition will be cleared.

Policy Optimization

If you want to clear up the rules which haven't been used for a long time, it is hard to determine which policy rules need to be deleted when there are a large number of policy rules on the device. The system supports to operate the Policy Hit Analysis, operate the Rule Redundancy Check, and configure the Policy Assistant.

Policy Hit Analysis

Policy Hit Analysis is a process to check the policy rule hit counts, that is, when traffic matches a certain policy rule, the hit count will increase by 1 automatically. With the statistics of the first hit time, the last hit time, and the days since last hit, you can identify the policy rule that need to be cleared. You can view the specified policy rules by setting up filters.

To check the hit counts, take the following steps:

1. Select **Policy > Security Policy > Policy Optimization**, and select the **Policy Hit Analysis** tab.
2. Select filter conditions from the **Filter** drop-down list, and configure filter conditions as needed.

   Configure the options as follows.

Option	Description
Days Since First Hit>	Specify the day after the first hit. Then the policy rules which were hit before the specified day will be displayed.

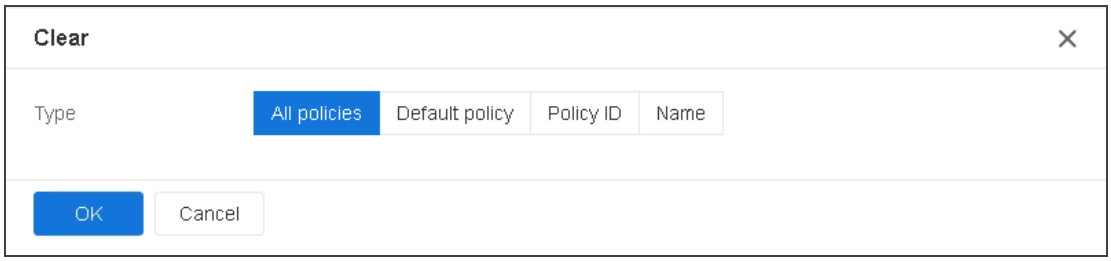
Option	Description
Days Since Last Hit>	Specify the day after the last hit. Then the policies rules before the specified day will be displayed.
Days Since Policy Created>	Specify the day after the policy is created. Then the policy rules before the specified day will be displayed.

3. Click the **Export** button, and the analysis of the filtered policy rules will be exported in the format of CSV.
4. Click **Enter** or any blank space on the page to view the latest result of Policy Optimization.
5. Click + icon in front of policy ID to view the details of the policy rule.
6. Click  icon on the right side of  to save the selected filters. Click **Save Filters**, type the name of the filters and click Save. After saved, the combined filters can be selected directly in the drop-down list.
7. To delete a filter condition, hover your mouse on that condition and then click × icon. To delete all filter conditions, click icon on the right side of the row.

To clear a policy hit count, take the following steps:

1. Select **Policy > Security Policy > Policy Optimization**, and select the **Policy Hit Analysis** tab.

2. Click **Clear** to open the **Clear** page.



Configure the following options.

Option	Description
All policies	Clears the hit counts of all policy rules.
Default policy	Clears the hit counts of the default action policy rules.
Policy ID	Clears the hit counts of a specified ID policy rule.
Name	Clears the hit counts of a specified name policy rule.

3. Click **OK**.

You can also perform other operations:

- Click icon to delete the policy rule.
- Click icon to disable the policy rule.

Rule Redundancy Check

In order to make the rules in the policy effective, system provides a method to check the conflicts among rules in a policy. With this method, administrators can check whether the rules overshadow each other.

To start a rule redundancy check, take the following steps:

1. Select **Policy > Security Policy > Policy Optimization**, and select the **Redundancy Check** tab.
2. Select **Redundancy Check**. After the check, system will list the policy rule which is over-shadowed.

> **Notes:** Status will be shown below the policy list when redundancy check is started. It is not recommended to edit a policy rule during the redundancy check. You can click ✖ to stop the check manually.

Configuring the Policy Assistant

The policy assistant can help users generate targeted policies more quickly and accurately. With the function, system can analyze the traffic of a specified policy ID, optimize the traffic via setting replacement conditions and aggregation conditions, generate address books and service books on the basis of the traffic, and then generate the target policies.

Click **Policy** > **Security Policy** > **Policy Optimization**, and select the **Policy Assistant** tab. In the **Policy Assistant** tab, generate target policies as the wizard:

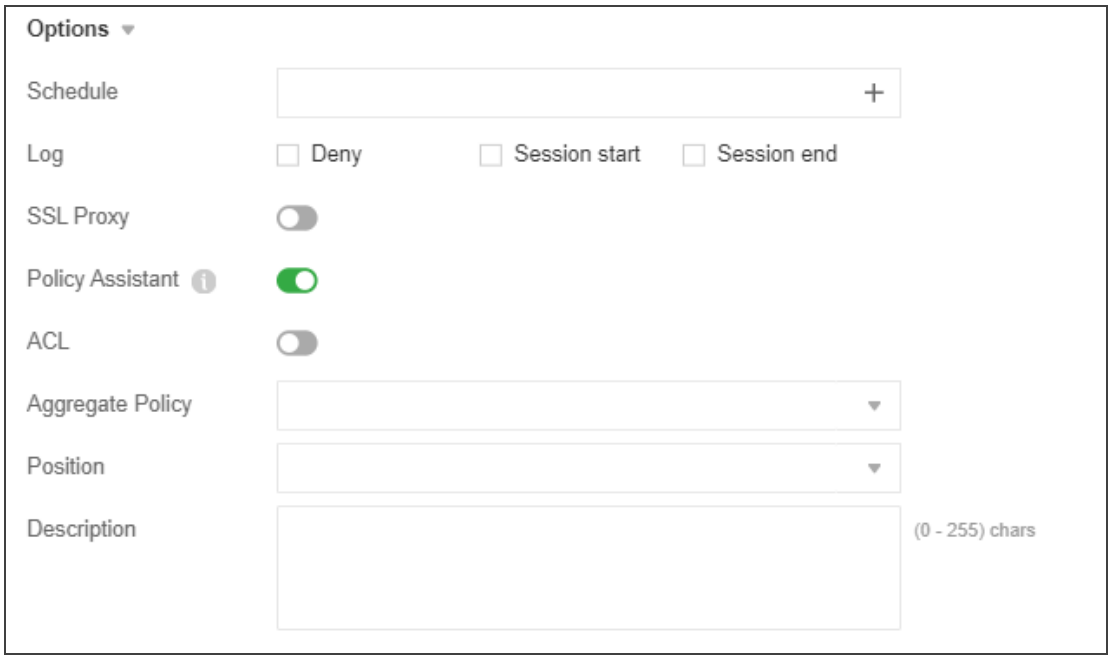
Display Traffic->Replace ->Aggregate -> Generate Address book ->Generate Service book ->Generate Policy

Enabling the Policy Assistant

Before configuring policy assistant related function, please enable the function first.

1. Select **Policy** > **Security Policy** > **Policy**.
2. Create a rule or select an existing rule which needs to enable the policy assistant function and click **Edit** to open the **Policy Configuration** page.

3. Expand **Options**, and click the **Policy Assistant** button to enable the function.



Notes: For the root VSYS, at most 4 policies are allowed to enable the policy assistant function, while for the non-root VSYS, only 1 policy can enable the function.

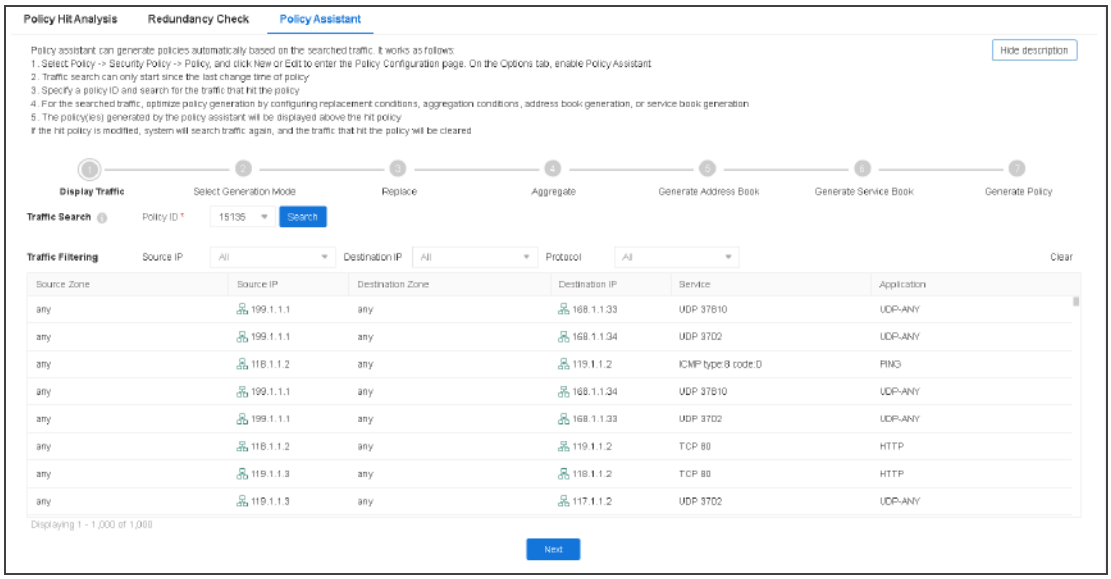
Displaying Traffic

On the Display Traffic page, the source zone, source IP, destination zone, destination IP and service of traffic hit the selected policy ID will be displayed.

To display the traffic data, take the following steps:

1. Click **Policy** > **Security Policy** > **Policy Optimization**, and select the **Policy Assistant** tab.

2. Click **Display Traffic** on the configuration wizard.



Configure the options as follows:

Option	Description
Traffic Search	Select the ID of policy which has enabled the policy assistant function from the **Policy ID** drop-down list, click **Search Traffic** and the traffic hit the policy will be displayed in the following list. **Note:** • At most 1,000 traffic data can be displayed in the list. If the traffic data exceeds 1,000, the oldest traffic data will be covered. • If the selected policy is edited, or the policy assistant function is disabled or the device is rebooted, the traffic data will be cleared.
Traffic Filtering	Edit filtering conditions, and the filtered traffic data

Option	Description
	will be displayed in the list.
Hide description/Show description	Click the **Hide description** or **Show description** button in the upper right corner to view/hide the step-by-step instructions of policy assistant.
Clear	Click the **Clear** button to delete the searched traffic data in the list. **Note**: Make sure the searched traffic has been analyzed before clearing.

3. Click **Next** to enter into the next configurations.

Replacing Policy

You can set the condition of source IP, destination IP or service. When the items of policies meet the condition, the items will be replaced with the condition.

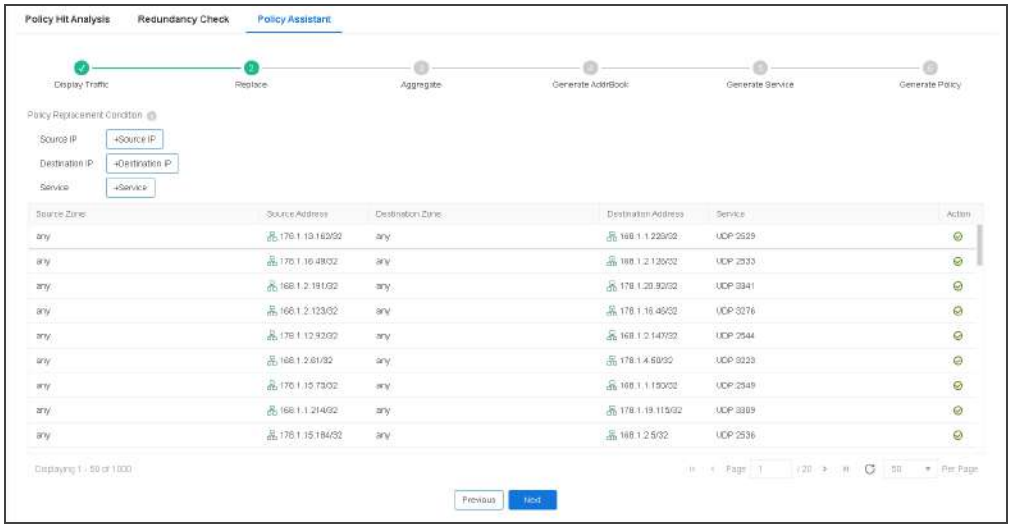
Application Scenario Example

For example, when the admin get some traffic data originating form 172.16.1.10. After the analysis of the traffic data, the source IP is judged as normal. What's more, all IP address of 172.16.1.0/24 is judged as normal too. To enlarge the source IP range to 172.16.1.0/24, the admin can set the 172.16.1.0/24 as the replacement condition on the Replace Policy page, then the source IP of the searched traffic which is within the IP range will be changed to 172.16.1.0/24.

Configuring Replacement Conditions

To configure replacement conditions for the policy items, take the following steps:

1. Click **Replace Policy** on the configuration wizard.



Configure the options as follows:

Option	Description
Source IP	Specify the replacement condition of source IP. At most 3 conditions can be set for the source IP. 1. Click the +Source IP button. 2. Select IP/Netmask or IP Range from the drop down list and set the replacement conditions as needed.
Destination IP	Specify the replacement condition of destination IP. At most 3 conditions can be set for the destination IP. 1. Click the +Destination IP button. 2. Select IP/Netmask or IP Range from the drop down list and set the replacement conditions as needed.

Option	Description
Service	Specify the replacement condition of service. At most 3 conditions can be set for the service. 1. Click the +Service button. 2. Specify the protocol from the drop-down list and set the port range as needed.

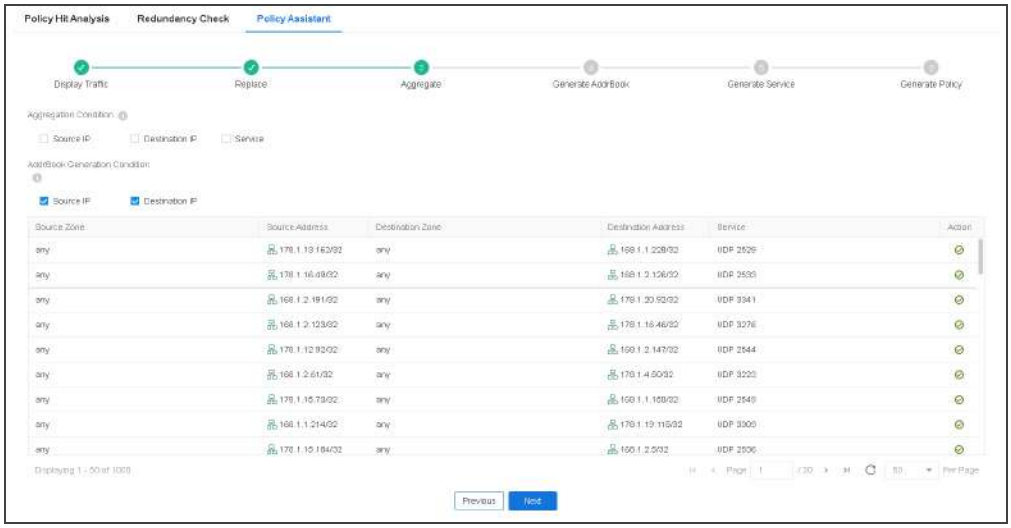
2. Click **Next** to enter into the next configurations.

Aggregating Policy

You can aggregate the policy items of the same source IP, destination IP and service, so as to reduce the redundant policies.

To aggregate policies, take the following steps:

1. Click **Aggregate Policy** on the configuration wizard.



2. Select the Aggregation conditions as Source IP, Destination IP , Service or Application, and the policy items in the list will be aggregated as the selected condition.

3. Select the Address Book Generation conditions as Source IP or Destination IP to enable the Address Book Generation function. In doing so, the corresponding address book entries will be listed in the "Generating Address book" procedure according to the generation conditions. By default, all the Address Book Generation conditions are selected. If no condition is selected, then the Address Book Generation function will be disabled, the "Generate Address Book" procedure will be removed from the configuration wizard, and the system generates policies based on IP address, not on address book.

4. Click **Next** to enter into the next configurations.

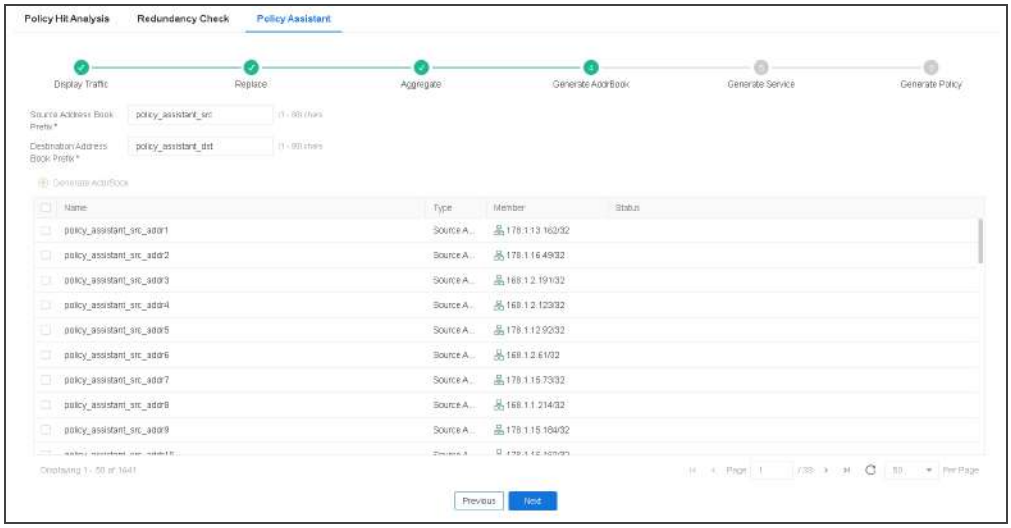
Generating Address book

The searched traffic data can display the Source IP and the Destination IP. After the procedures of replacing and aggregating, if the user select the Address Book Generation conditions in the **Aggregate** procedure and therefore generable address book entries are displayed in the **Generate Address book** page. According to your demands, you can select desirable entries to be generated as address books and then added into the system address books.

If you does not want to generate address books, then you can directly click **Next** to enter the next configurations.

To generate address book, take the following steps:

1. Click **Generate Address book** on the configuration wizard. The **Generate Address Book** page displays items of all address books, including the type, member and status.



2. Specify the prefix for the source address book in the list. The range is 1 -80 characters. The default prefix is "policy_assistant_src". When the prefix is specified, the name of address book in the list will be changed to "the specified prefix_addr+serial number".

3. Specify the prefix for the destination address book in the list. The range is 1 -80 characters. The default prefix is "policy_assistant_dst". When the prefix is specified, the name of address book in the list will be changed to "the specified prefix_addr+serial number".

4. Select the check box before the desirable address book entry and click **Generate Address book** button, the corresponding address book will be generated (which can be seen in **Object> Address book**). After successfully generating address books, the **Status** column will indicate **Generated**; if unsuccessfully, the Status column will indicate the failure reason.

5. Click **Next** to enter into the next configurations.

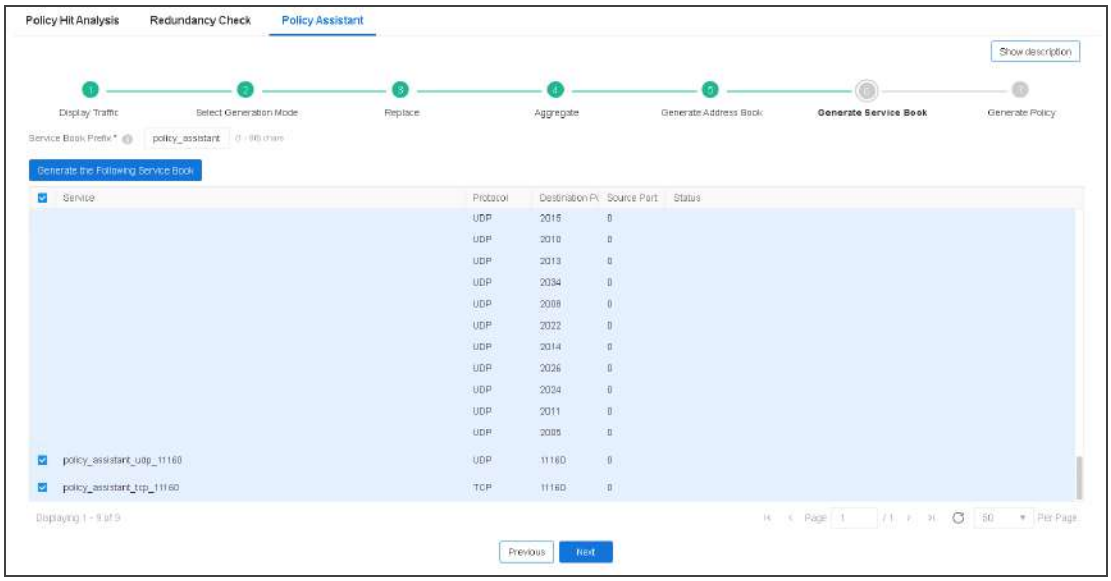
Generating Service Book

The searched traffic data can display the protocol and port, and you can generate corresponding service books based on the protocol and service. After replacing, aggregating, address book generation, generable service book entries are displayed in the **Generate Service book** page. According to your demands, you can select desirable entries to be generated as service books and then added into the system service books.

If you does not want to generate service books, then you can directly click **Next** to enter the next configurations.

To generate service, take the following steps:

1. Click **Generate Service Book** on the configuration wizard. The **Generate Service Book** page displays items of all service books, including the protocol, destination/source port and status.



2. Specify the prefix for the service book in the list. The range is 1 -95 characters. The default prefix is "policy_assistant". When the prefix is specified, the name of service book in the list will be changed to "the specified prefix + protocol configurations".

3. Select the check box before the desirable service book entry, click **Generate Service**, and the corresponding service book will be generated (which can be seen in **Object** > **Service Book** > **Service**). After successfully generating address books, the **Status** column will indicate **Generated**; if unsuccessfully, the Status column will indicate the failure reason.

4. Click **Next** to enter into the next configurations.

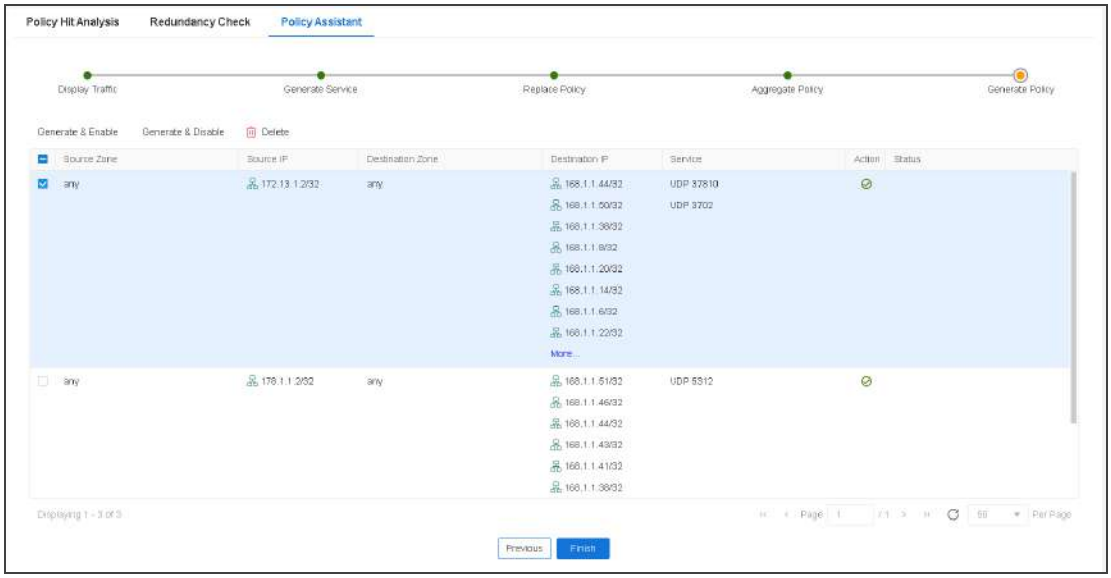
Generating Policy

The **Generate Policy** page displays all policy items after the configurations in **Replace**, **Aggregate**, **Generate Address Book** and **Generate Service Book** page. You can select policy items as needed to generate policy and the selected policy will be display on the **Security Policy** > **Policy** page.

Note: For the generated security policies, the source IP, destination IP, service and application are determined by the selected aggregation conditions, while the source zone, destination zone and action keep the same with the original policy items.

To generate policies, take the following steps:

1. Click **Generate Policy** on the configuration wizard.



Configure the options as follows:

Option	Description
Generate & Enable	Select the check box before the policy items as needed, click **Generate & Enable**, and the policies will take effect after generation. The generated policies will be displayed on the Policy page and on the above of the original

Option	Description
	policies.
Generate & Disable	Select the check box before the policy items as needed, click **Generate & Disable**, and the policies will not take effect after generation. The generated policies will be displayed on the Policy page and on the above of the original policies.
Delete	Select the check box before the policy items as needed, click **Delete**, and the policies will be deleted.

2. Click **Finish** to finish the configurations of policy assistant.

User Online Notification

The system provides the policy-based user online notification function. The user online notification function integrates WebAuth function and Web redirect function.

After configuring the user online notification function, system redirects your HTTP request to a new notification page when you visit the Internet for the first time. In the process, a prompt page (see the picture below) will be shown first, and after you click **continue** on this page, system will redirect your request to the specified notification page. If you want to visit your original URL, you need to type the URL address into the Web browser.

Before you enable the user online notification function, you must configure the WebAuth function. For more information about configuring WebAuth function, view "Web Authentication" on Page 451.

Configuring User Online Notification

To configure the user online notification function, take the following steps:

1. Select **Policy > Security Policy**.
2. Select the security policy rule with which you want to enable the user online notification function. Generally, it is recommended to select the security policy rule which is under the WebAuth policy rule and whose action is permit to transmit the HTTP traffic.
3. Click **Edit**.
4. In the Policy Configuration page, click the **Enable Web Redirect** button and type the notification URL into the **Notification page URL** box.
5. Click **OK** to save the settings.

Configuring the Parameters of User Online Notification

The parameters are:

- Idle time: The time that an online user stays online without traffic transmitting. If the idle time is exceeded, the HTTP request will be redirected to the user online notification page again.
- Background picture: You can change the background picture on the prompt page.

To configure the parameters, take the following steps:

1. Select **Policy > Security Policy**.
2. Select the security policy rule with the user online notification function enabled.
3. Click ⋮ and select **Web Redirect Configuration**.

4. Type the idle time value into the **Idle time** box. The default value is 30 minutes. The range is 0 to 1440 minutes.

5. Change the background picture of the prompt page. Click **Browse** to choose the picture you want, and then click **Upload**. The uploaded picture must be zipped and named as logo.jpg, with the suggested size of 120px*40px.

Viewing Online Users

After configuring the user online notification function, you can get the information of online users from the Online Notification Users dialog box.

1. Select **Policy > Security Policy**.

2. Click ⋮ and select **Web Redirect IP List**.

3. In the Web Redirect IP List page, view the following information.

Option	Description
IP address	The IP address of the online user.
Sessions	Session number of the online user.
Interface	The source interface of the online user.
Lifetime (s)	The period of time during which the user is staying online.
Expiration (s)	The idle time of the user.

iQoS

System provides iQoS (intelligent quality of service) which guarantees the customer's network performance, manages and optimizes the key bandwidth for critical business traffic, and helps the customer greatly in fully utilizing their bandwidth resources.

iQoS is used to provide different priorities to different traffic, in order to control the delay and flapping, and decrease the packet loss rate. iQoS can assure the normal transmission of critical business traffic when the network is overloaded or congested. iQoS is controlled by license. To use iQoS, apply and install the iQoS license.

Notes: If you have configured QoS in the previous QoS function before upgrading the system to verion 5.5, the previous QoS function will take effect. You still need to configure the previous QoS function in CLI. You cannot use the newest iQoS function in version 5.5 and the newest iQoS function will not display in the WebUI and will not take effect. If you have not configured the previous QoS function before upgrading the system to version 5.5, the system will enable the newest iQoS function in version 5.5. You can configure iQoS function in the WebUI and the previous QoS function will not take effect.

Implement Mechanism

The packets are classified and marked after entering system from the ingress interface. For the classified and marked traffic, system will smoothly forward the traffic through the shaping mechanism, or drop the traffic through the policing mechanism. If the shaping mechanism is selected to forward the traffic, the congestion management and congestion avoidance mechanisms will give different priorities to different types of packets so that the packets of higher priority can pass though the gateway earlier to avoid network congestion.

In general, implementing QoS includes:

- Classification and marking mechanism: Classification and marking is the process of identifying the priority of each packet. This is the first step of iQoS.

- Policing and shaping mechanisms: Policing and shaping mechanisms are used to identify traffic violation and make responses. The policing mechanism checks the traffic in real time and takes immediate actions according to the settings when it discovers a violation. The shaping mechanism works together with queuing mechanism. It makes sure that the traffic will never exceed the defined flow rate so that the traffic can go through that interface smoothly.
- Congestion management mechanism: Congestion management mechanism uses the queuing theory to solve problems in the congested interfaces. As the data rate can be different among different networks, congestion may happen to both wide area network (WAN) and local area network (LAN). Only when an interface is congested will the queuing theory begin to work.
- Congestion avoidance mechanism: Congestion avoidance mechanism is a supplement to the queuing algorithm, and it also relies on the queuing algorithm. The congestion avoidance mechanism is designed to process TCP-based traffic.

Pipes and Traffic Control Levels

System supports two-level traffic control: level-1 control and level-2 control. In each level, the traffic control is implemented by pipes.

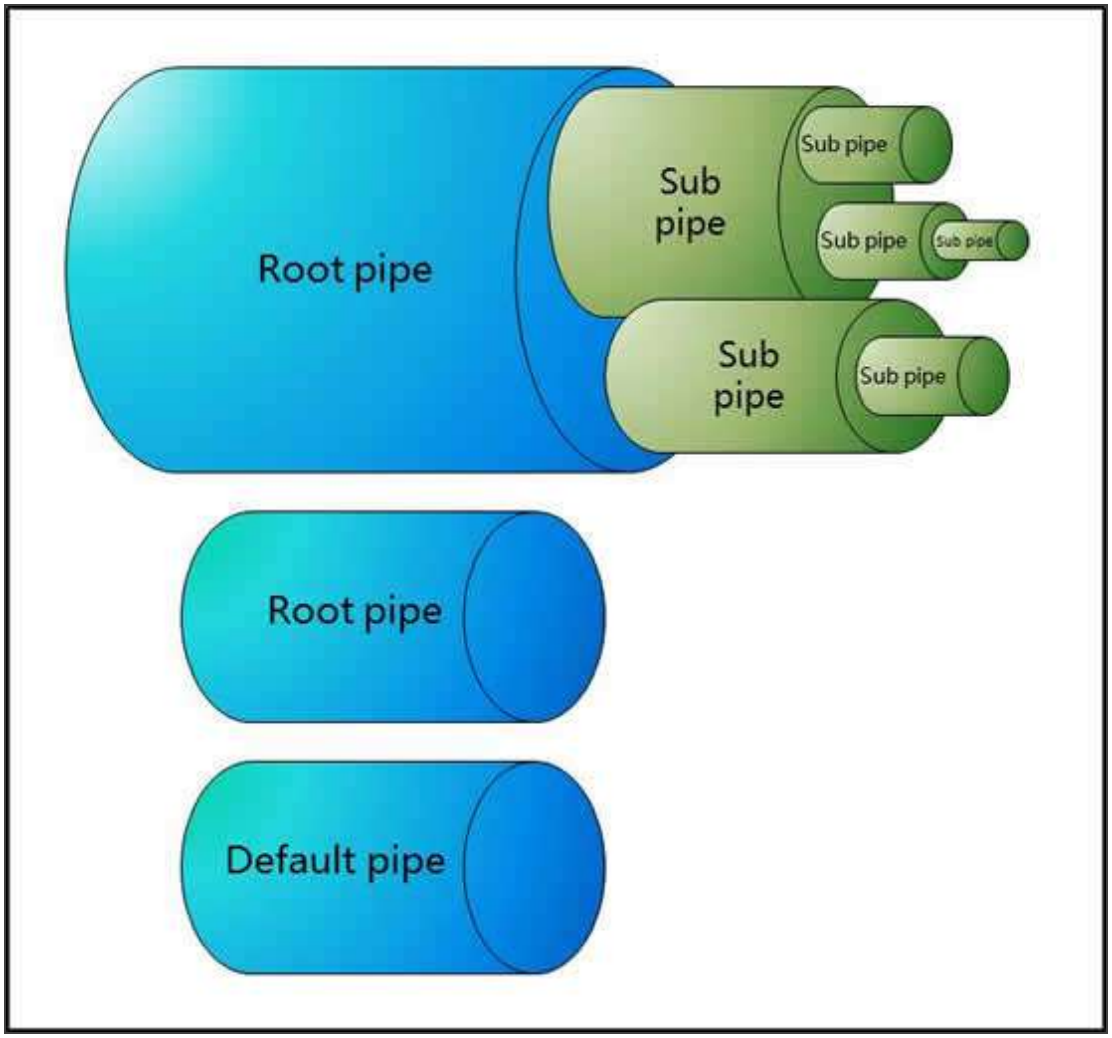
Pipes

By configuring pipes, the devices implement iQoS. Pipe, which is a virtual concept, represents the bandwidth of transmission path. System classifies the traffic by using the pipe as the unit, and controls the traffic crossing the pipes according to the actions defined for the pipes. For all traffic crossing the device, they will flow into virtual pipes according to the traffic matching conditions they match. If the traffic does not match any condition, they will flow into the default pipe pre-defined by the system.

Pipes, except the default pipe, include two parts of configurations: traffic matching conditions and traffic management actions:

- Traffic matching conditions: Defines the traffic matching conditions to classify the traffic crossing the device into matched pipes. System will limit the bandwidth to the traffic that matches the traffic matching conditions. You can define multiple traffic matching conditions to a pipe. The logical relation between each condition is OR. When the traffic matches a traffic matching condition of a pipe, it will enter this pipe. If the same conditions are configured in different root pipes, the traffic will first match the root pipe listed at the top of the Level-1 Control list in the Policy > iQoS page.
- Traffic management actions: Defines the actions adopted to the traffic that has been classified to a pipe. The data stream control includes the forward control and the backward control. Forward control controls the traffic that flows from the source to the destination; backward control controls the traffic flows from the destination to the source.

To provide flexible configurations, system supports the multiple-level pipes. Configuring multiple-level pipes can limit the bandwidth of different applications of different users. This can ensure the bandwidth for the key services and users. Pipes can be nested to at most four levels. Sub pipes cannot be nested to the default pipe. The logical relation between pipes is shown as below:



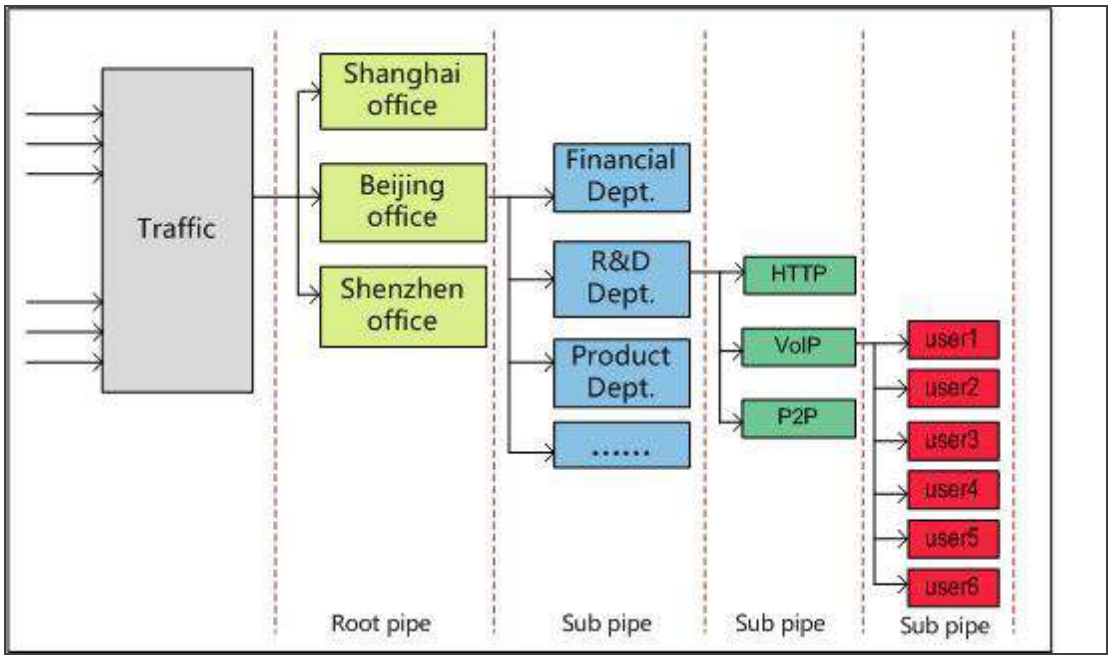
- You can create multiple root pipes that are independent. At most three levels of sub pipes can be nested to the root pipe.
- For the sub pipes at the same level, the total of their minimum bandwidth cannot exceed the minimum bandwidth of their upper-level parent pipe, and the total of their maximum bandwidth cannot exceed the maximum bandwidth of their upper-level parent pipe.
- If you have configured the forward or backward traffic management actions for the root pipe, all sub pipes that belong to this root pipe will inherit the configurations of the traffic direction

set on the root pipe.

- The root pipe that is only configured the backward traffic management actions cannot work.

The following chart illustrates the application of multiple-level pipes in a company. The administrator can create the following pipes to limit the traffic:

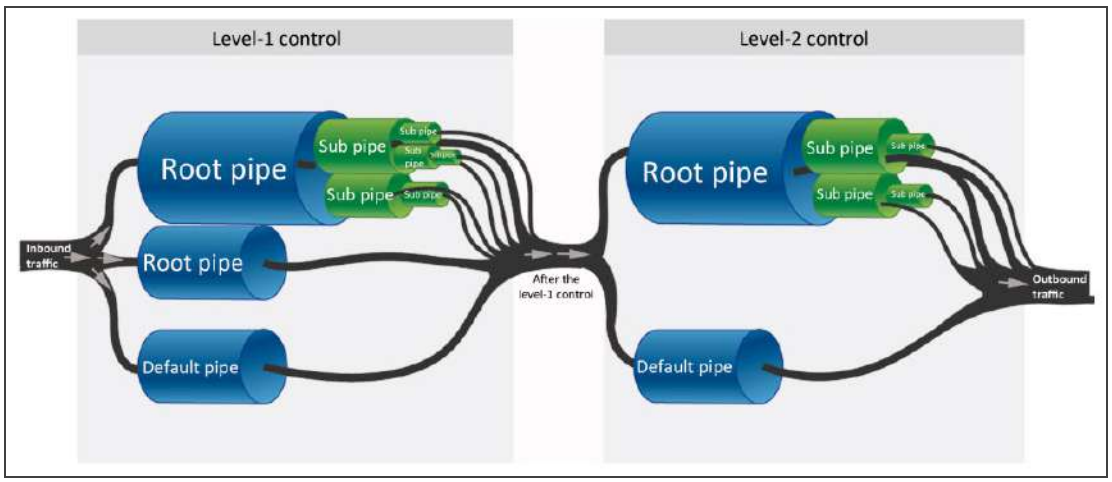
1. Create a root pipe to limit the traffic of the office located in Beijing.
2. Create a sub pipe to limit the traffic of its R&D department.
3. Create a sub pipe to limit the traffic of the specified applications so that each application has its own bandwidth.
4. Create a sub pipe to limit the traffic of the specified users so that each user owns the defined bandwidth when using the specified application.



Traffic Control Levels

System supports two-level traffic control: level-1 control and level-2 control. In each level, the traffic control is implemented by pipes. Traffic that is dealt with by level-1 control flows into the

level-2 control, and then system performs the further management and control according to the pipe configurations of level-2 control. After the traffic flowing into the device, the process of iQoS is shown as below:



According to the chart above, the process of traffic control is described below:

1. The traffic first flows into the level-1 control, and then system classifies the traffic into different pipes according to the traffic matching conditions of the pipe of level-1 control. The traffic that cannot match any pipe will be classified into the default pipe. If the same conditions are configured in different root pipes, the traffic will first match the root pipe listed at the top of the Level-1 Control list in the **Policy > iQoS** page. After the traffic flows into the root pipe, system classifies the traffic into different sub pipes according to the traffic matching conditions of each sub pipe.

2. According to the traffic management actions configured for the pipes, system manages and controls the traffic that matches the traffic matching conditions.

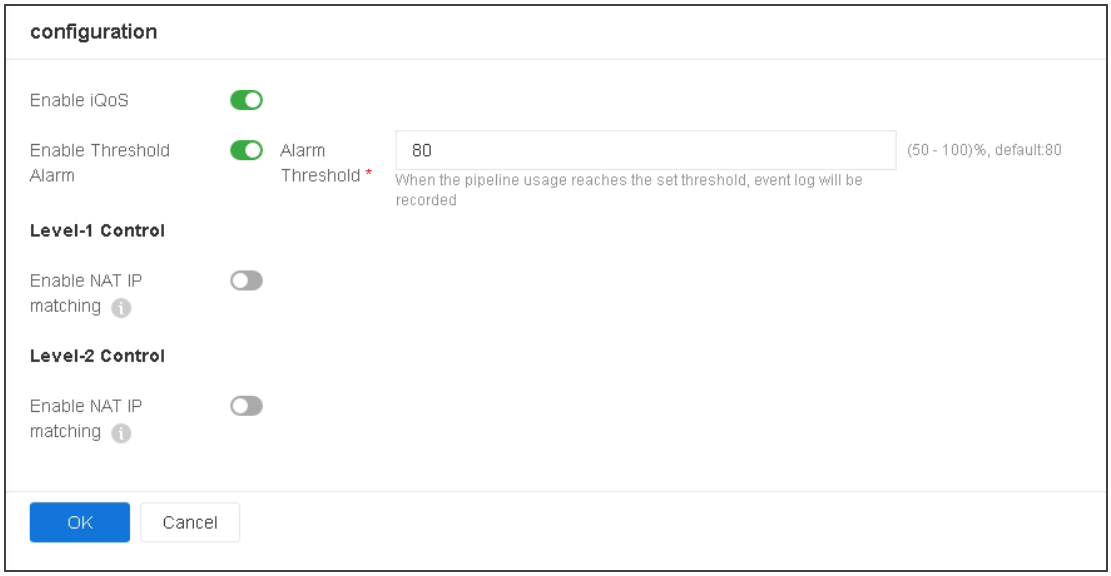
3. The traffic dealt with by level-1 control flows into the level-2 control. System manages and controls the traffic in level-2 control. The principles of traffic matching, management and control are the same as the one of the level-1 control.

4. Complete the process of iQoS.

Enabling iQoS

To enable iQoS, take the following steps:

1. Select **Policy > iQoS > Configuration**.
2. Click the **Enable iQoS** button.



3. Select the **Enable Threshold Alarm** checkbox, and specify the alarm threshold in the **Alarm Threshold** textbox. The range is from 50 to 100. The default value is 80. After the function is enabled and the alarm threshold is specified, when the pipeline usage reaches or exceeds the specified alarm threshold, the system will record a warning level event log. For the same pipeline, the system records the event log at an interval of 10 seconds.
4. If you click the **Enable NAT IP matching** button in **Level-1 Control** or **Level-2 Control**, system will use the IP addresses between the source NAT and the destination NAT as the matching items. If the matching is successful, system will limit the speed of these IP addresses.

Notes: Before enabling NAT IP matching, you must config the NAT rules. Otherwise, the configuration will not take effect.

5. Click **Apply** to save the configurations.

Pipes

By using pipes, devices implement iQoS. Pipes in different traffic control levels will take effect in different stages.

Configuring pipes includes the following sections:

1. Create the traffic matching conditions, which are used to capture the traffic that matches these conditions. If configuring multiple traffic matching conditions for a pipe, the logical relation between each condition is OR.
2. Create a white list according to your requirements. System will not control the traffic in the white list. Only root pipe and the default pipe support the white list.
3. Specify the traffic management actions, which are used to deal with the traffic that is classified into a pipe.
4. Specify the schedule. The pipe will take effect during the specified time period.

Basic Operations

Select **Policy > iQoS > Policy** to open the Policy page.

You can perform the following actions in this page:

- Disable the level-2 traffic control: Click **Disable second level control**. The pipes in the level-2 traffic control will not take effect. The Level-2 Control tab will not appears in this page.
- View pipe information: The pipe list displays the name, mode, action, schedule, and the description of the pipes.

- Click the icon to expand the root pipe and display its sub pipes.
- Click the icon of the root pipe or the sub pipe to view the condition settings.
- Click the icon of the root pipe to view the white list settings.
- represents the root pipe is usable, represents the root pipe is unusable, represents the sub pipe is usable, represents the sub pipe is unusable,

  Default Pipe the gray text represents the pipe is disabled.

- Create a root pipe: Select the Level-1 Control or Level-2 Control tab, then click **New** in the menu bar to create a new root pipe.
- Create a sub pipe: Click the icon of the root pipe or the sub pipe to create the corresponding sub pipe.
- Click **Enable** in the menu bar to enable the selected pipe. By default, the newly-created pipe will be enabled.
- Click **Disable** in the menu bar to disable the selected pipe. The disabled pipe will not take effect.
- Click **Delete** to delete the selected pipe. The default pipe cannot be deleted.

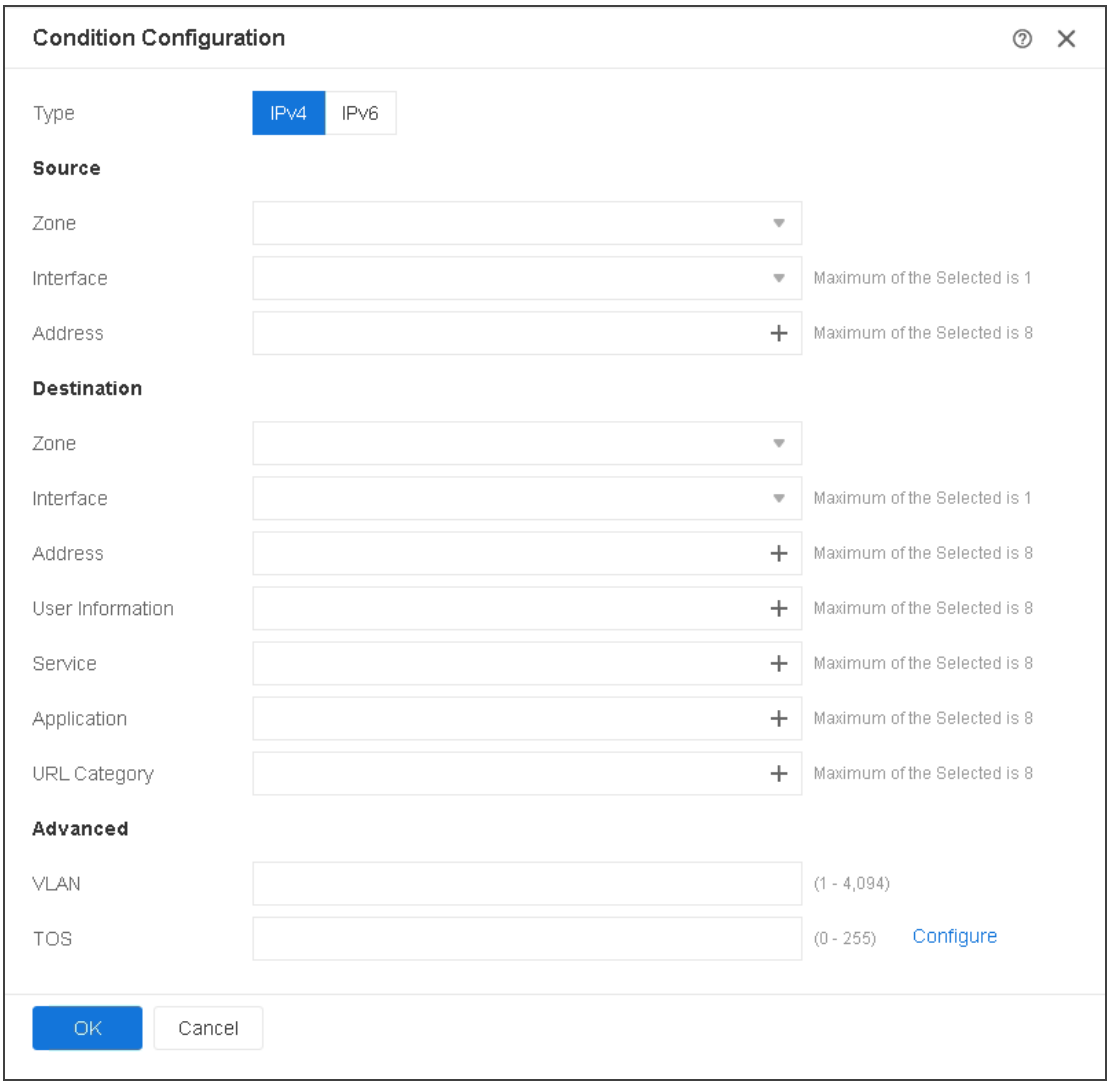
Configuring a Pipe

To configure a pipe, take the following steps:

1. According to the methods above, create a root pipe or sub pipe. The Pipe Configuration page appears.
2. In this page, specify the basic pipe information.

Option	Description
Parent Pipe/Control Level	Displays the control level or the parent pipe of the newly created pipe.
Pipe Name	Specify a name for the new pipe.
Description	Specify the description of this pipe.
Mode	Shape, Policy, or Monitor. • The Shape mode can limit the data transmission rate and smoothly forward the traffic. This mode supports the bandwidth borrowing and priority adjusting for the traffic within the root pipe. • The Policy mode will drop the traffic that exceeds the bandwidth limit. This mode does not support the bandwidth borrowing and priority adjusting, and cannot guarantee the minimum bandwidth. • The Monitor mode will monitor the matched traffic, generate the statistics, and will not control the traffic. • Bandwidth borrowing: All of the sub pipes in a root pipe can lend their idle bandwidth to the pipes that are lacking bandwidth. The prerequisite is that their bandwidth must be enough to forward the traffic in their pipes. • Priority adjusting: When there is traffic congestion, system will arrange the traffic to enter the waiting queue. You can set the traffic to have higher priority and system will deal with the traffic in order of precedence.

3. In Condition, click **New**.



In the Condition Configuration page, configure the corresponding options.

Option	Description
Type	Select the IP type, including IPv4 or IPv6. Only the IPv6 firmware supports to configure IPv6 type IP. If IPv6 is selected, all the IP/netmask, IP range, address entry configured should be in the IPv6 format.

Option	Description
Source Information	
Zone	Specify the source zone of the traffic. Select the zone name from the drop-down menu.
Interface	Specify the source interface of the traffic. Select the interface name from the drop-down menu.
Address	Specify the source address of the traffic. 1. Select an address type from the **Address** drop-down list. 2. Select or type the source addresses based on the selected type. 3. Click **Add** to add the addresses to the left pane. 4. After adding the desired addresses, click **Close** to complete the address configuration. You can also perform other operations: • When selecting the **Address Book** type, you can click ⊕ to create a new address entry. • You can click ▾ in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter

Option	Description
	"10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched. • The default address configuration is any. To restore the configuration to this default one, select the **any** check box.
Destination Information	
Zone	Specify the destination zone of the traffic. Select the zone name from the drop-down menu.
Interface	Specify the destination interface of the traffic. Select the interface name from the drop-down menu.
Address	Specify the destination address of the traffic. 1. Select an address type from the **Address** drop-down list.

Option	Description
	2. Select or type the source addresses based on the selected type. 3. Click **Add** to add the addresses to the right pane. 4. After adding the desired addresses, click **Close** to complete the address configuration. You can also perform other operations: • When selecting the **Address Book** type, you can click ⊕ to create a new address entry. • You can click ▾ in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may

Option	Description
	be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched. • The default address configuration is any. To restore the configuration to this default one, select the **any** check box.
User Inform-ation	Specify a user or user group that the traffic belongs to. 1. From the **User** drop-down menu, select the AAA server where the users and user groups reside. 2. Based on different types of AAA server, you can execute one or more actions: search a user/user group/role, expand the user/user group list, and enter the name of the user/user group. 3. After selecting users/user groups/roles, click them to add them to the left pane. 4. After adding the desired objects, click **Close** to complete the user information configuration.
Service	Specify a service or service group that the traffic belongs to. 1. From the **Service** drop-down menu, select a type: Service, Service Group. 2. You can search the desired service/service group,

Option	Description
	expand the service/service group list. 3. After selecting the desired services/service groups, click them to add them to the right pane. 4. After adding the desired objects, click **Close** to complete the service configuration. You can also perform other operations: • To add a new service or service group, select **User-defined** from the "Predefined" drop-down list, and click ⊕. • The default service configuration is any. To restore the configuration to this default one, select the **any** check box.
Application	Specify an application, application group, or application filters that the traffic belongs to. 1. From the **Application** drop-down menu, you can search the desired application/application group/application filter, expand the list of applications/application groups/application filters. 2. After selecting the desired applications/application groups/application filters, click them to add them to the left pane. 3. After adding the desired objects, click **Close** com-

Option	Description
	plete the application configuration. You can also perform other operations: • To add a new application group, click ⊕. • To add a new application filter, click ⊕.
URL Category	Specifies the URL category that the traffic belongs to. After the user specifies the URL category, the system matches the traffic according to the specified category. 1. In the "URL category" drop-down menu, the user can select one or more URL categories, up to 8 categories. 2. After selecting the desired filters, click the blank area in this page to complete the configuration. To add a new URL category, click ⊕ , the page will pop up "URL category" page. In this page, the user can configure the category name and URL.
Advanced	
VLAN	Specify the VLAN information of the traffic.
TOS	Specify the TOS fields of the traffic; or click **Configure** to specify the TOS fields of the IP header of the traffic in the TOS Configuration page. • Precedence: Specify the precedence.

Option	Description
	• Delay: Specify the minimum delay. • Throughput: Specify the maximum throughput. • Reliability: Specify the highest reliability. • Cost: Specify the minimum cost. • Reserved: Specify the normal service.
TrafficClass	Specify the TOS fields of the traffic.

4. If you are configuring root pipes, you can specify the white list settings based on the description of configuring conditions.

5. Configuring the trigger threshold for the maximum floating bandwidth.

Option	Description
Lower threshold of a root pipe's bandwidth utilization	Specifies the lower threshold of the bandwidth utilization for a root pipe. When the bandwidth utilization is lower than the lower threshold, the maximum floating bandwidth of sub pipes is triggered. The value range is 20%-75%. The default lower threshold is 40%.
Upper threshold of a root pipe's bandwidth utilization	Specifies the upper threshold of the bandwidth utilization for a root pipe. When the bandwidth utilization is higher than the upper threshold, the maximum floating bandwidth of sub pipes will not be triggered. The value range is 76%-90%. The default lower threshold is 80%.

6. In Action, configuring the corresponding actions.

Forward (From source to destination)	
The following configurations control the traffic that flows from the source to the destination. For the traffic that matches the conditions, system will perform the corresponding actions.	
Pipe Bandwidth	When configuring the root pipe, specify the pipe bandwidth. When configuring the sub pipe, specify the maximum bandwidth and the minimum bandwidth of the pipe: • Min Bandwidth: Specify the minimum bandwidth. If you want this minimum bandwidth to be reserved and cannot be used by other pipes, select **Enable Reserved Bandwidth**. • Max Bandwidth: Specify the maximum bandwidth.
Limit type	Specify the maximum bandwidth and minimum bandwidth of the pipe for each user/IP: • Type: Select the type of the bandwidth limitation: **No Limit**, **Limit Per IP**, or **Limit Per User**. • **No Limit** represents that system will not limit the bandwidth for each IP or each user. • **Limit Per IP** represents that system will limit the bandwidth for each IP. In the Limit by section, select **Source IP** to limit the bandwidth of the source IP in this pipe; or

	select **Destination IP** to limit the bandwidth of the destination IP in this pipe. • **Limit Per User** represents that system will limit the bandwidth for each user. In the Limit by section, specify the minimum/maximum bandwidth of the users. • When configuring the root pipe, you can select the **Enable Average Bandwidth** check box to make each source IP, destination IP, or user to share an average bandwidth.
Limit by	When the Limit type is **Limit Per IP** or **Limit Per User**, you need to specify the minimum bandwidth or the maximum bandwidth: • Min Bandwidth: Specify the minimum bandwidth. • Max Bandwidth: Specify the maximum bandwidth. • Maximum Floating Bandwidth: Specifies the maximum floating bandwidth. • Delay: Specify the delay time, whose value ranges from 1 second to 3600 seconds. The maximum bandwidth limit of each IP/ user is not effective within the delay time range.
Advanced	
Priority	Specify the priority for the pipes. Select a number,

	between 0 and 7, from the drop-down menu. The smaller the value is, the higher the priority is. When a pipe has higher priority, system will first deal with the traffic in it and borrow the extra bandwidth from other pipes for it. The priority of the default pipe is 7.
TOS	Specify the TOS fields of the traffic; or click **Configure** to specify the TOS fields of the IP header of the traffic in the appeared TOS Configuration page. • Precedence: Specify the precedence. • Delay: Specify the minimum delay. • Throughput: Specify the maximum throughput. • Reliability: Specify the highest reliability. • Cost: Specify the minimum monetary cost. • Reserved: Specify the normal service.
TrafficClass	Specifies the value of the TrafficClass field for IPv6 traffic, The TrafficClass field value of IPv6 traffic matching successfully will be set to the specified value.
Limit Opposite Bandwidth	Click the **Enable** button to configure the value of limit-strength.The smaller the value, the smaller the limit.
Backward (From condition's destination to source)	
The following configurations control the traffic that flows from the destination to the source. For the traffic that matches the conditions, sys-	

tem will perform the corresponding actions.	
Pipe Bandwidth	When configuring the root pipe, specify the pipe bandwidth. When configuring the sub pipe, specify the maximum bandwidth and the minimum bandwidth of the pipe: • Min Bandwidth: Specify the minimum bandwidth. If you want this minimum bandwidth to be reserved and cannot be used by other pipes, select **Enable Reserved Bandwidth**. • Max Bandwidth: Specify the maximum bandwidth.
Limit type	Specify the maximum bandwidth and minimum bandwidth of the pipe for each user/IP: • Type: Select the type of the bandwidth limitation: **No Limit**, **Limit Per IP**, or **Limit Per User**. • **No Limit** represents that system will not limit the bandwidth for each IP or each user. • **Limit Per IP** represents that system will limit the bandwidth for each IP. In the Limit by section, select **Source IP** to limit the bandwidth of the source IP in this pipe; or select **Destination IP** to limit the bandwidth of the destination IP in this pipe. • **Limit Per User** represents that system will

	limit the bandwidth for each user. In the Limit by section, specify the minimum/maximum bandwidth of the users. • When configuring the root pipe, you can click the **Enable Average Bandwidth** button to make each source IP, destination IP, or user to share an average bandwidth.
Limit by	When the Limit type is **Limit Per IP** or **Limit Per User**, you need to specify the minimum bandwidth or the maximum bandwidth: • Min Bandwidth: Specify the minimum bandwidth. • Max Bandwidth: Specify the maximum bandwidth. • Maximum Floating Bandwidth: Specifies the maximum floating bandwidth. • Delay： Specify the delay time, whose value ranges from 1 second to 3600 seconds. The maximum bandwidth limit of each IP/ user is not effective within the delay time range.
Advanced	
Priority	Specify the priority for the pipes. Select a number, between 0 and 7, from the drop-down menu. The smaller the value is, the higher the priority is. When a pipe has higher priority, system will first deal with the traffic in it

	and borrow the extra bandwidth from other pipes for it. The priority of the default pipe is 7.
TOS	Specify the TOS fields of the traffic; or click **Configure** to specify the TOS fields of the IP header of the traffic in the appeared TOS Configuration page. • Precedence: Specify the precedence. • Delay: Specify the minimum delay. • Throughput: Specify the maximum throughput. • Reliability: Specify the highest reliability. • Cost: Specify the minimum monetary cost. • Reserved: Specify the normal service.
Limit Opposite Bandwidth	Click the **Enable** button to configure the value of limit-strength.The smaller the value, the smaller the limit.

7. Click **OK** to save the settings.

Searching QoS Policy

Use the Filter to search for the QoS policy rules that match the filter conditions.

1. Click **Policy > iQoS> Policy**, and at the top-right corner of the page, click **Filter**. Then a new row appears at the top.
2. Click **Filter** to add a new filter condition. Then select a filter condition from the drop-down menu and enter a value.
3. Press **Enter** to search for the QoS policy rules that matches the filter conditions.

4. Repeat the above two steps to add more filter conditions. The relationship between each filter condition is **AND**.

5. To delete a filter condition, hover your mouse on that condition and then click ✕ icon. To close the filter, click ✕Remove All icon on the right side of the row.

Viewing Statistics of Pipe Monitor

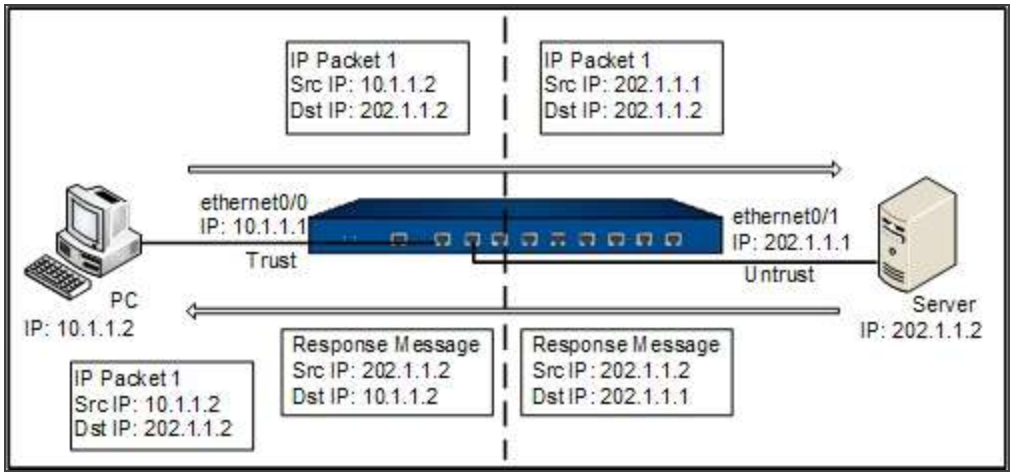
To view the statistics of pipe monitor, see "iQoS" on Page 1356.

NAT

NAT, Network Address Translation, translates the IP address within an IP packet header to another IP address. When the IP packets pass through the devices or routers, the devices or routers will translate the source IP address and/or the destination IP address in the IP packets. In practice, NAT is mostly used to allow the private network to access the public network, vice versa.

Basic Translation Process of NAT

When a device is implementing the NAT function, it lies between the public network and the private network. The following diagram illustrates the basic translation process of NAT.



As shown above, the device lies between the private network and the public network. When the internal PC at 10.1.1.2 sends an IP packet (IP packet 1) to the external server at 202.1.1.2 through the device, the device checks the packet header. Finding that the IP packet is destined to the public network, the device translates the source IP address 10.1.1.2 of packet 1 to the public IP address 202.1.1.1 which can get routed on the Internet, and then forwards the packet to the external server. At the same time, the device also records the mapping between the two addresses in its NAT table. When the response packet of IP packet 1 reaches the device, the device checks the packet header again and finds the mapping records in its NAT table, and replaces the destination address with the private address 10.1.1.2. In this process, the device is transparent to the PC and the Server. To the external server, it considers that the IP address of the internal PC is

202.1.1.1 and knows nothing about the private address 10.1.1.2. Therefore, NAT hides the private network of enterprises.

Implementing NAT

The devices translate the IP address and port number of the internal network host to the external network address and port number, and vice versa. This is the translation between the "private IP address + port number" and "public IP address + port number".

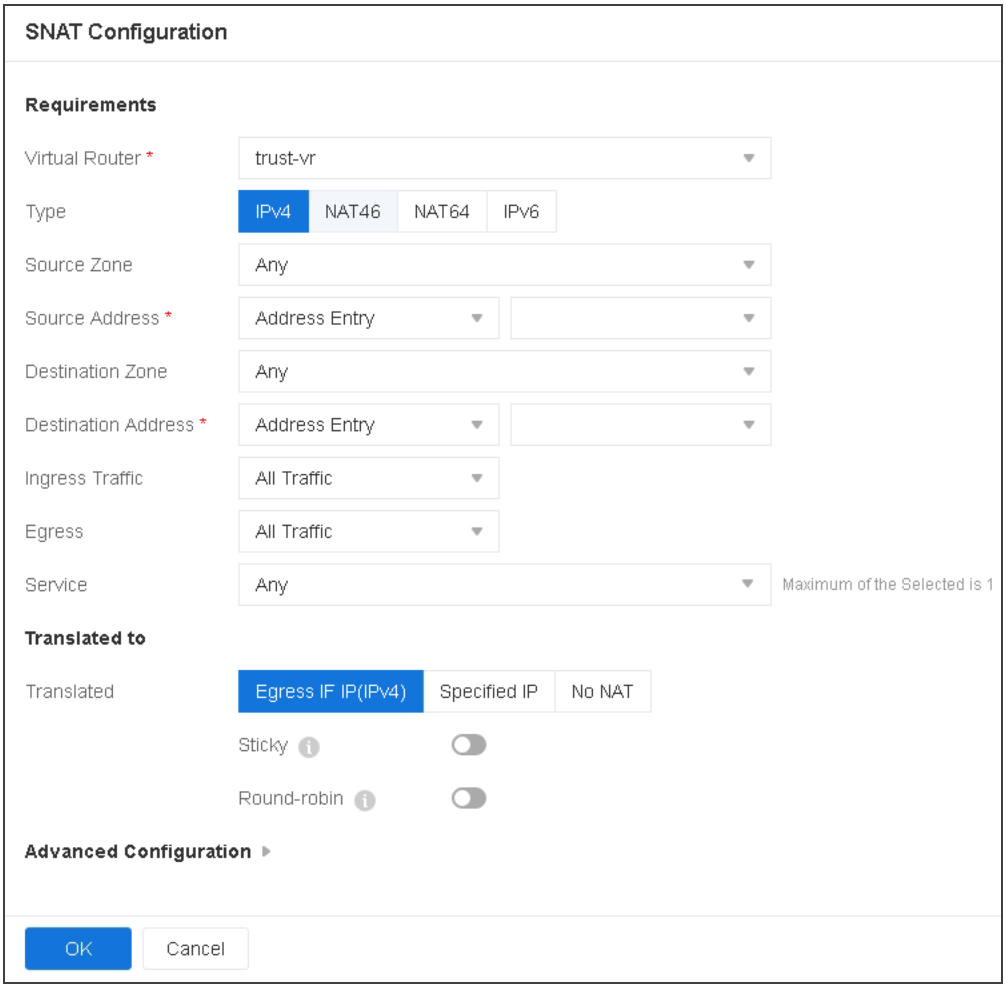
The devices achieve the NAT function through the creation and implementation of NAT rules. There are two types of NAT rules, which are source NAT rules (SNAT Rule) and destination NAT rules (DNAT Rule). SNAT translates source IP addresses, thereby hiding the internal IP addresses or sharing the limited IP addresses; DNAT translates destination IP addresses, and usually the IP addresses of internal servers (such as the WWW server or SMTP server) protected by the device is translated to public IP addresses.

Configuring SNAT

To create an SNAT rule, take the following steps:

1. Select **Policy > NAT > SNAT**.

2. Click **New** to open the SNAT Configuration page.



In this page, configure the following options.

Requirements	
Virtual Router	Specifies a VRouter for the SNAT rule. The SNAT rule will take effect when the traffic flows into this VRouter

Requirements	
	and matches the SNAT rule conditions.
Type	Specifies the type of the SNAT rule, including IPv4, NAT46, NAT64, and IPv6. The configuration options for different types of SNAT rules may vary in this page, please refer to the actual page.
Source Zone	Specifies the security zone to which the ingress interface of traffic that matches the SNAT rule is bound. By default, Any is selected. After the configuration is completed, only the traffic that flows through the ingress interface bound to this security zone can continue to match the SNAT rule. **Note:** The source zone needs to belong to the specified virtual router.
Source Address	Specifies the source IP address of the traffic, including: • Address Entry - Select an address entry from the drop-down list. • IP (IPv6) Address - Type an IP (IPv6) address into the box. Type an IPv4 address if the type of the SNAT rule is IPv4 or NAT46. Type an IPv6 address if the type of the SNAT rule is NAT64 or IPv6. • IP/Netmask - Type an IPv4 address and its netmask into the box. This configuration option is

Requirements	
	available if the type of the SNAT rule is IPv4 or NAT46. • IPv6/Prefix - Type an IPv6 address and its prefix length into the box. This configuration option is available if the type of the SNAT rule is NAT64 or IPv6.
Destination Address	Specifies the destination IP address of the traffic, including: • Address Entry - Select an address entry from the drop-down list. • IP (IPv6) Address - Type an IP (IPv6) address into the box. Type an IPv4 address if the type of the SNAT rule is IPv4 or NAT46. Type an IPv6 address if the type of the SNAT rule is NAT64 or IPv6. • IP/Netmask - Type an IPv4 address and its netmask into the box. This configuration option is available if the type of the SNAT rule is IPv4 or NAT46. • IPv6/Prefix - Type an IPv6 address and its prefix length into the box. This configuration option is available if the type of the SNAT rule is NAT64 or IPv6.

Requirements	
Ingress Traffic	Specifies the ingress traffic, the default value is all traffic. • All traffic - Specifies all traffic as the ingress traffic. Traffic from any ingress interfaces will continue to match this SNAT rule. • Ingress Interface - Specifies the ingress interface of traffic. Select an interface from the drop-down list. When the interface is specified, only the traffic from this interface will continue to match this SNAT rule, while traffic from other interfaces will not.
Egress	Specifies the egress traffic, the default value is all traffic. • All traffic - Specifies all traffic as the egress traffic. Traffic from all egress interfaces will continue to match this SNAT rule. • Egress Interface - Specifies the egress interface of traffic. Select an interface from the drop-down list. When the interface is specified, only the traffic from this interface will continue to match this SNAT rule, while traffic from other interfaces will not. • Next Virtual Router - Specifies the next virtual router of traffic. Select a virtual router from the drop-down list.

Requirements	
Service	Specifies the service type of the traffic from the drop-down list. To create a new service or service group, click **New Service** or **New Group**.
Translated to	
Translated	Specifies the translated NAT IP address, including: • Egress IF IP (IPv4)/Egress IF IP (IPv6) - Specifies the NAT IP address to be an egress interface IP address. • Specified IP - Specifies the NAT IP address to be a specified IP address. After selecting this option, continue to specify the available IP address in the **Address** drop-down list. • No NAT - Do not implement NAT. The translated action for different types of SNAT rules may vary in this page, please refer to the actual page.
Mode	Specifies the translation mode, including: • Static - Static mode means one-to-one translation. This mode requires the translated address entry to contain the same number of IP addresses as that of the source address entry. • Dynamic IP - Dynamic IP mode means multiple-to-one translation. This mode translates the source address to a specific IP address. Each source

Requirements	

	address will be mapped to a unique IP address, until all specified addresses are occupied.
	• Dynamic port - Called PAT. Multiple source addresses will be translated to one specified IP address in an address entry.
	  • If Sticky is enabled, all sessions from an IP address will be mapped to the same fixed IP address. Click the **Enable** button behind Sticky to enable Sticky.
	  • If Round-robin is enabled, all sessions from an IP address will be mapped to the same fixed IP address. Click the **Enable** button behind Round-robin to enable Round-robin.
	  • If Sticky and Round-robin are not enabled, the first address in the address entry will be used first; when the port resources of the first address are exhausted, the second address will be used.
	  • If Track is enabled, the system will track whether the translated public address is valid, i.e., use the translated address as the source address to track if the destination website or host is accessible. The configured track

Requirements	
	object can be a Ping track object, HTTP track object, TCP track object. For more details, see "Track Object" on Page 1169. This function only supports SNAT of IPv4 or NAT64 type, and the translated address should be an IP address or an address in address book, as well as the translation mode is dynamicport mode. The system will prioritize the translated address which is tracked successfully. When a translated address failed to visit a website or a host, it will be temporarily disabled until being tracked successfully again. When the tracking object fails, the system will disable the address and generate a log in the next tracking cycle, and no longer translate the private address to a public address until the address restores to reachable. If all the address in the public address book of SNAT rules are unreachable, the system will not disable any translated address and generate a log. Click the **Enable** button behind Track to enable the function, and select a track object from the drop-down list
	Note: The Sticky function and the Round-robin function are mutually exclusive and cannot be configured at the

Requirements	
	same time.

Expand Advanced Configuration, configure the corresponding options.

Option	Description
HA Group	Specifies the HA group that the SNAT rule belongs to. The default setting is 0.
Schedule	Specifies the schedule of the SNAT rule. Select a schedule from the drop-down list. In addition, fuzzy search is supported. To create a schedule, click ⊕.
NAT Log	Click the Enable button to enable the log function for this SNAT rule. The system will generate log information when there is traffic matching this NAT rule.
Position	Specifies the position of the rule. Each SNAT rule has a unique ID. When the traffic is flowing into the device, the device will search the SNAT rules in order, and then implement NAT on the source IP of the traffic according to the first matched rule. The sequence of the ID shown in the SNAT rule list is the order of the rule matching. Select one of the following items from the drop-down list: • Bottom - The rule is located at the bottom of all the rules in the SNAT rule list. By default, system will put the newly-created SNAT rule at the bottom of all SNAT rules. • Top - The rule is located at the top of all the rules in the SNAT rule list. • Before ID - Type the ID number into the text box. The rule will be located before the ID you

Option	Description
	specified. • After ID - Type the ID number into the text box. The rule will be located after the ID you specified.
ID	Specifies the method you get the rule ID. Each rule has its unique ID. It can be automatically assigned by system or manually assigned by yourself. If you select **Manually assign** , type an ID number into the box behind.
Description	Types the description.

3. Click **OK** to save the settings.

Notes:

- When configuring a static source NAT66 rule, the minimum subnet mask must be 48 bits.
- If the SNAT rule is configured with a source zone or destination zone that is not Any, the zone cannot be deleted.

Enabling/Disabling a SNAT rule

By default the configured SNAT rule will take effect immediately. You can terminate its control over the traffic by disabling the rule.

To enable/disable a SNAT rule:

1. Select **Policy > NAT > SNAT**.
2. Select the SNAT rule that you want to enable/disable.
3. Click **Enable** or **Disable** to enable or disable the rule.

Viewing and Searching SNAT Rules

You can view and search the SNAT rules on the SNAT rule list.

View the SNAT rules on the SNAT rule list.

- Each column displays the corresponding configurations. The **Schedule** column displays the name and status of SNAT rules. If **Disable** is displayed, it indicates that the SNAT rule does not take effect or has expired.
- Click icon in the Session Detail column on the SNAT rule list to go to the **Session Detail** page. You can view the current session status of the selected SNAT rule. You can also click Filter to add filtering conditions and search for the sessions that conform to the filtering conditions.

  You can filter **Session ID**, **Source Address**, **Source Port**, **Destination Address**, **Destination Port**, **Protocol**, **Application**, **Flow0 Interface**, **Flow1 Interface**. You can add multiple filter conditions at the same time. The relationship between filter conditions is **And**.
- Hover over your mouse over the configurations in different columns, then the WebUI displays either icon or the detailed information of this configuration based on the configuration type.

- You can view the detailed configurations directly.
- You can click ⋮ icon. Based on the configuration type, the WebUI displays **Filter**, **Add Filter**, or **Details**.
    - Click **Filter** or **Add Filter**, you can see the filter conditions of this configuration above the list, and then you can filter the SNAT rule according to the filter conditions.
    - Click **Details** to see the detailed configurations. Then, in the **Details** section, click **View** next to **Entry Details** to view the details about the address or service.

Adjusting Priority

Each SNAT rule has a unique ID. When the traffic flows into the device, the device will search the SNAT rules in order and then implement NAT on the source IP of the traffic according to the first matched rule. The sequence of the ID shown in the SNAT rule list is the order of the rule matching.

To adjust priority, take the following steps:

1. Select **Policy > NAT > SNAT**.
2. Select the rule you want to adjust its priority and click **Priority**.
3. In the Priority page, move the selected rule to:
    - Top: The rule is moved to the top of all of the rules in the SNAT rule list.
    - Bottom: The rule is moved to the bottom of all of the rules in the SNAT rule list. By default, system will put the newly-created SNAT rule at the bottom of all of the SNAT rules.

- Before ID: Specifies an ID number. The rule will be moved before the ID you specified.
- After ID: Specifies an ID number. The rule will be moved after the ID you specified.

4. Click **OK** to save the settings.

Copying/Pasting a SNAT rule

When there are a large number of NAT rules in system, to create a NAT rule which is similar to an configured NAT rule easily, you can copy the NAT rule and paste it to the specified location.

To copy/paste a SNAT rule, take the following steps:

1. Select **Policy > NAT > SNAT**.
2. Select the SNAT rule that you want to clone and click **Copy**.
3. Click **Paste**. In the pop-up, select the desired position. Then the rule will be cloned to the desired position.
   - Top: The rule is pasted to the top of all the rules in the SNAT rule list.
   - Bottom: The rule is pasted to the bottom of all the rules in the SNAT rule list.
   - Before the Rule Selected: The rule will be pasted before the Rule being selected.
   - After the Rule Selected: The rule will be pasted after the Rule being selected.

Importing SNAT rule

You can import the configuration file of the local SNAT rules into the device to avoid creating SNAT rules manually. Only the DAT format file is supported currently.

To import the configuration file of SNAT rules, take the following steps:

1. Click **Policy** > **NAT** > **SNAT** .

2. Click the **Import** button to open the **Import** page.

3. Click **Browse** and select the local configuration file of SNAT rule to upload.

4. Click **OK**, and the imported SNAT rule will be displayed in the list.

Notes:

- When importing the source NAT rule configuration file, please use the exported original file as far as possible and do not modify the contents of the file. Otherwise, it may cause formatting errors.
- If there's an error during import, system will stop importing immediately and roll back configurations automatically.
- If the ID of the imported source NAT already exists, the configuration of the original NAT rule will be overwritten.
- The imported SNAT rule will be displayed on the bottom of the SNAT rule list.

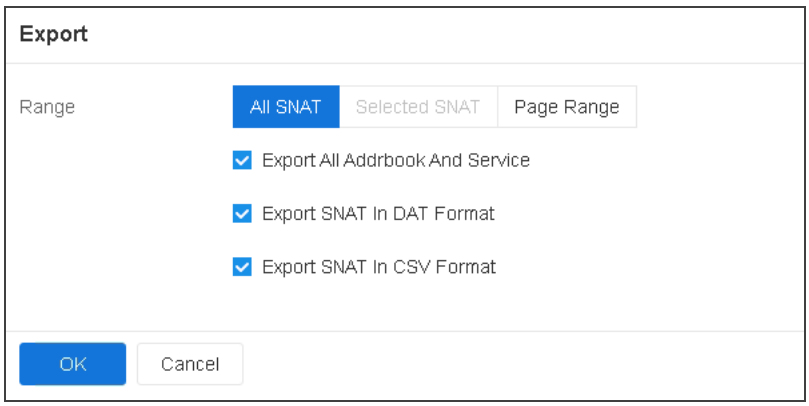
Exporting SNAT rule

You can export the SNAT rules existing on the device to the local in the format of HTML CSV or DAT formats. At the same time, all the custom objects of address book and service book (only

user defined)can be exported.

To export the SNAT rules, take the following steps:

1. Click **Policy** > **NAT** > **SNAT** .
2. Click **Export** to open the **Export** page.



Configure the options as follows:

Option	Description
Range	Specify the range of SNAT rules to be exported. • All SNAT: Select the radio button and export all SNAT rules on the device. • Selected SNAT: In the SNAT list, select the snat rule to be exported, and then click **Export** > **Selected SNAT**. • Page Range: Select the radio button, and enter the page number or page range of the SNAT list to be exported. **Note**: Separate the page number or range with semicolons, e.g. "3;5-8".
Export Address And Service	Select the check box to export all the custom objects including address book, and service book （only user defined） will be generated.

Option	Description
Export SNAT in DAT Format	Select the check box to export the SNAT configurations in the format of DAT.

3. Click **OK** to download the exported files. There're four kinds of files: natExport.html, " snat+exported time.zip", "snat+exported time.cvs" and the "vr_snat +exported time.dat "configurations in the DAT format.

4. Double-click the natExport.html, click **Import File** and import the " snat+exported time.zip" to view the table of exported policies.

Exporting NAT444 Static Mapping Entries

You can export the NAT444 static mapping entries to a file . The exported file contains the ID, source IP address, translated IP address, start port, end port, and the protocol information.

To export the NAT444 static mapping entries, take the following steps:

1. Select **Policy > NAT > SNAT**.

2. Click **Export NAT444 Static Mapping Entries.**

3. Select a location to store the file and click **Save**.

The exported file is CSV format. It is recommended to export the file through the management interface.

Configuring SNAT Optimization

If a large amount of NAT rules pile up in the device and you are not sure whether to delete them, this makes it more difficult to maintain these rules. The system supports the SNAT Optimization function, including hit analysis and redundancy check.

Hit Count

The system supports statistics on SNAT rule hit counts, i.e., statistics on the matching between traffic and SNAT rules. Each time the inbound traffic is matched to a certain SNAT rule, the hit count will increment by 1 automatically.

To view a SNAT rule hit count, click **Policy > NAT > SNAT**. In the SNAT rule list, view the statistics on SNAT rule hit count under the Hit Count column.

Clearing NAT Hit Count

To clear a SNAT rule hit count, take the following steps:

1. Select **Policy > NAT > SNAT Optimization**.
2. Click **Clear** to open the **Clearing NAT Hit Count** page.
    - All NAT: Clears the hit counts for all NAT rules.
    - NAT ID: Clears the hit counts for a specified NAT rule ID.
3. Click **OK**.

Hit Count Check

System supports to check SNAT rule hit counts.

To check hit count, take the following steps:

1. Select **Policy > NAT > SNAT Optimization**.
2. Click **Analyze**.

Redundancy Check

To ensure the validity of SNAT rules, the system can perform redundancy check on the SNAT rules. In other words, the system checks the coverage scope of SNAT rules to solve the problem that certain SNAT rules are overwritten and thus cannot be hit. After you complete the check, redundant SNAT rules are displayed in the redundancy check list.

To perform redundancy check on SNAT rules, take the following steps:

1. Select **Policy** > **NAT** > **SNAT Optimization**. On the **SNAT Optimization** page, click the **Redundancy Check** tab.

2. After you select a virtual router from the **Virtual Router** drop-down list and click **Redundancy Check**, the system starts to check all SNAT rules, which may take a long time. After the check is completed, redundant SNAT rules are displayed in the list.

   - The **ID** column displays the ID of SNAT rules that are overwritten and the **Rule ID to override this SNAT rule** column displays the ID of all rules that overwrite this SNAT rule.
   - Find an overwritten SNAT rule and click in the **Operation** column to delete this rule.
   - Find an overwritten SNAT rule and click in the **Operation** column to disable this rule. If you do not modify the status of this SNAT rule after the rule is disabled, the rule is excluded from redundancy check. To enable the SNAT rule, select **Policy** > **NAT** > **SNAT**. On the **SNAT** page, select the target SNAT rule and click **Enable**.
   - Click "+" to expand the details about the overwritten SNAT rule.

Notes: After redundancy check starts, a check progress bar is displayed in the lower-left corner of the SNAT rule list. During the redundancy check, we do not recommend that you create or modify an SNAT rule. You can click , and then click **OK** in the message that appears to stop the redundancy check.

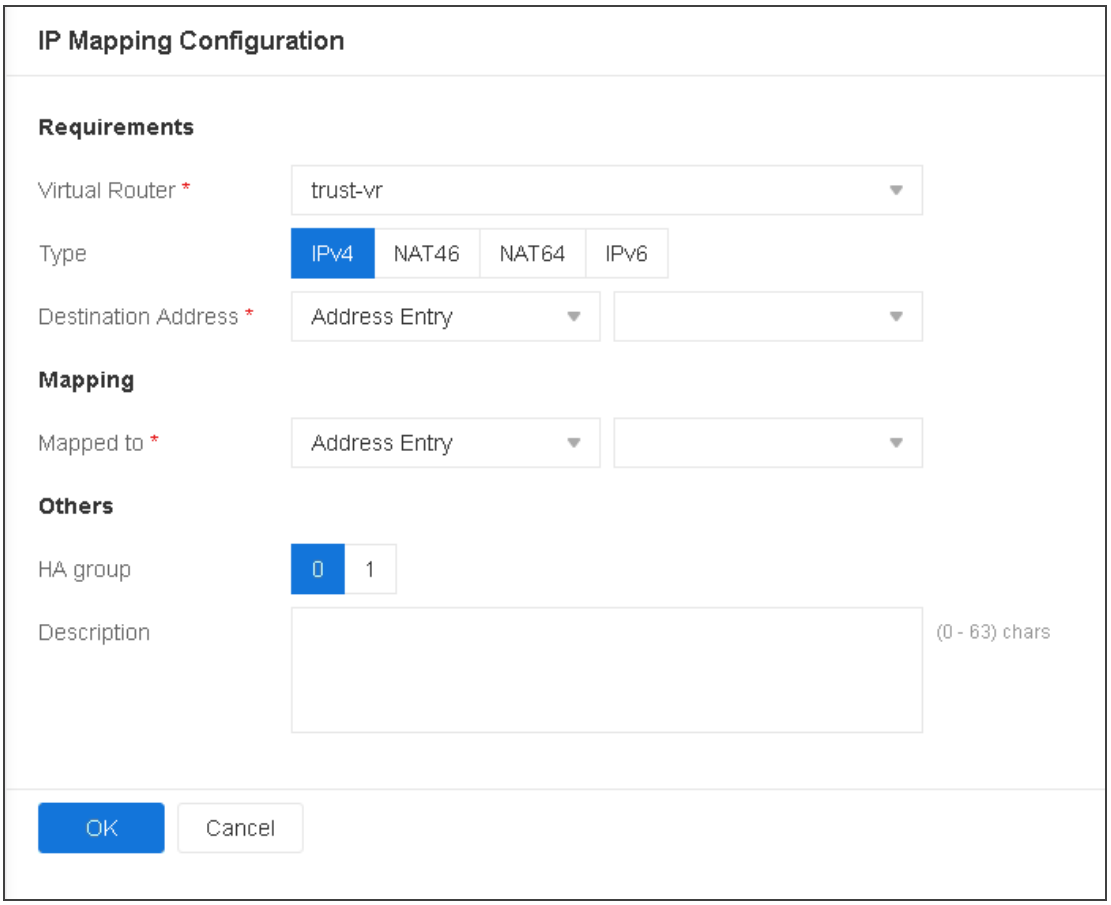
Configuring DNAT

DNAT translates destination IP addresses, usually the IP addresses of internal servers (such as the WWW server or SMTP server) protected by the device is translated to the public IP addresses.

Configuring an IP Mapping Rule

To configure an IP mapping rule, take the following steps:

1. Select **Policy > NAT > DNAT**.
2. Click **New** and select **IP Mapping**



In the IP Mapping Configuration page, configure the corresponding options.

Requirements	
Virtual Router	Specifies a VRouter for the DNAT rule. The DNAT rule will take effect when the traffic flows into this VRouter and matches the DNAT rule conditions.
Type	Specifies the type of the DNAT rule, including IPv4, NAT46, NAT64, and IPv6. The configuration options for different types of DNAT rules may vary in this page, please refer to the actual page.
Destination Address	Specifies the destination IP address or interface of the traffic, including: • Address Entry - Select an address entry from the drop-down list. • IP Address - Type an IP address into the box. Type an IPv4 address if the type of the DNAT rule is IPv4 or NAT46. Type an IPv6 address if the type of the DNAT rule is NAT64 or IPv6. • IP/Netmask - Type an IPv4 address and its net-mask into the box. This configuration option is available if the type of the DNAT rule is IPv4 or NAT46. • IPv6/Prefix - Type an IPv6 address and its prefix length into the box. This configuration option is available if the type of the DNAT rule is NAT64 or IPv6.

Requirements	
	• Dynamic IP (Physical Interface) - Select an interface which obtains IP via the DHCP and PPPoE protocols. This configuration option is available if the type of the DNAT rule is IPv4 or NAT46.
Mapping	
Mapped to	Specifies the translated NAT IP address, including **Address Entry**, **IP Address**, and **IP/Netmask** (or **IPv6/Prefix**). The number of the translated NAT IP addresses you specified must be the same as the number of the destination IP addresses of the traffic.
Others	
HA Group	Specifies the HA group that the DNAT rule belongs to. The default setting is 0.
Description	Types the description.

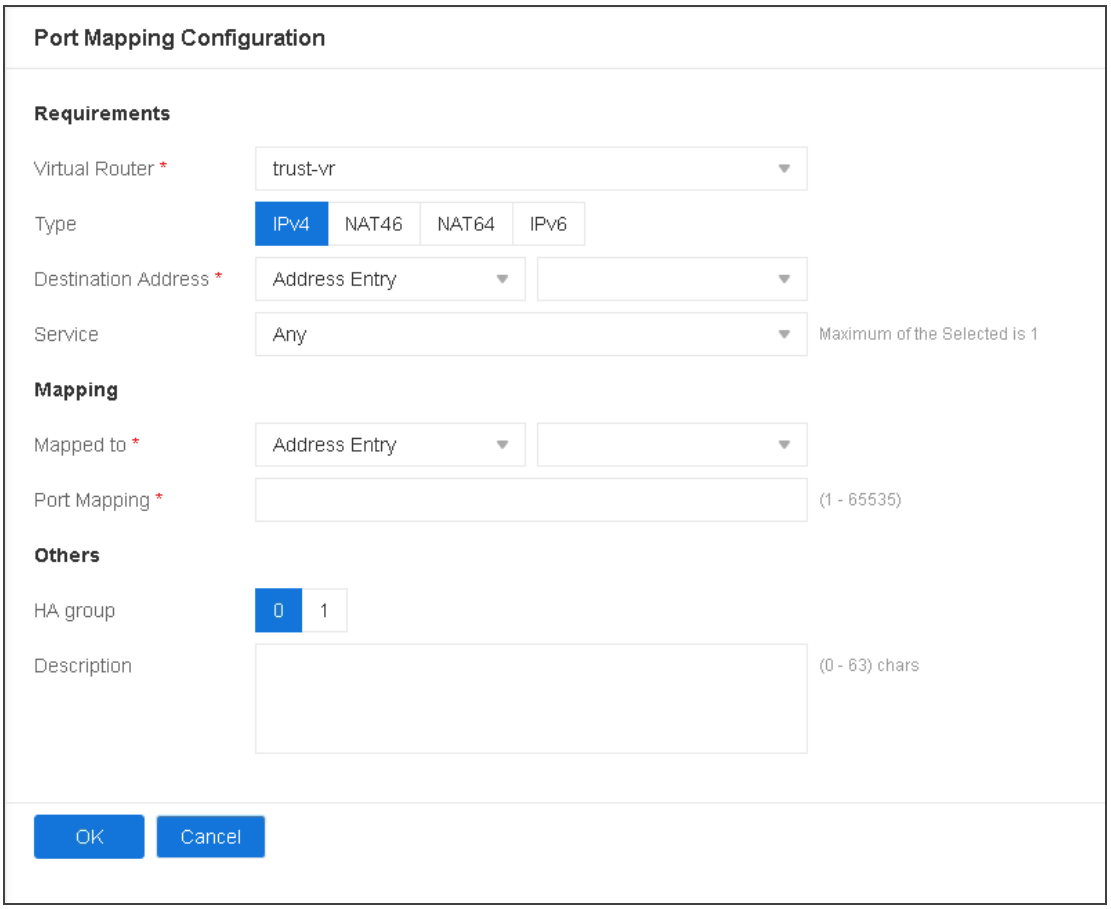
3. Click **OK** to save the settings.

Configuring a Port Mapping Rule

To configure a port mapping rule, take the following steps:

1. Select **Policy > NAT > DNAT**.

2. Click **New** and select **Port Mapping**.



In the Port Mapping Configuration page configure the corresponding options.

Requirements	
Virtual Router	Specifies a VRouter for the DNAT rule. The DNAT rule will take effect when the traffic flows into this VRouter and matches the DNAT rule conditions.
Type	Specifies the type of the DNAT rule, including IPv4, NAT46, NAT64, and IPv6. The configuration options for different types of DNAT rules may vary in this page, please refer to the actual page.

Requirements	
Destination Address	Specifies the destination IP address or interface of the traffic, including: • Address Entry - Select an address entry from the drop-down list. • IP Address - Type an IP address into the box. Type an IPv4 address if the type of the DNAT rule is IPv4 or NAT46. Type an IPv6 address if the type of the DNAT rule is NAT64 or IPv6. • IP/Netmask - Type an IPv4 address and its net-mask into the box. This configuration option is available if the type of the DNAT rule is IPv4 or NAT46. • IPv6/Prefix - Type an IPv6 address and its prefix length into the box. This configuration option is available if the type of the DNAT rule is NAT64 or IPv6. • Dynamic IP(Physical Interface) - Select an interface which obtains IP via the DHCP and PPPoE pro-tocols. This configuration option is available if the type of the DNAT rule is IPv4 or NAT46.
Service	Specifies the service type of the traffic from the drop-down list. To create a new service or service group, click **New Ser-**

Requirements	
	vice or **New Group**.
Mapping	
Mapped to	Specifies the translated NAT IP address, including **Address Entry**, **IP Address**, and **IP/Netmask** (or **IPv6/Prefix**). The number of the translated NAT IP addresses you specified must be the same as the number of the destination IP addresses of the traffic.
Port Mapping	Types the translated port number of the Intranet server. The available range is 1 to 65535.
Others	
HA Group	Specifies the HA group that the DNAT rule belongs to. The default setting is 0.
Description	Types the description.

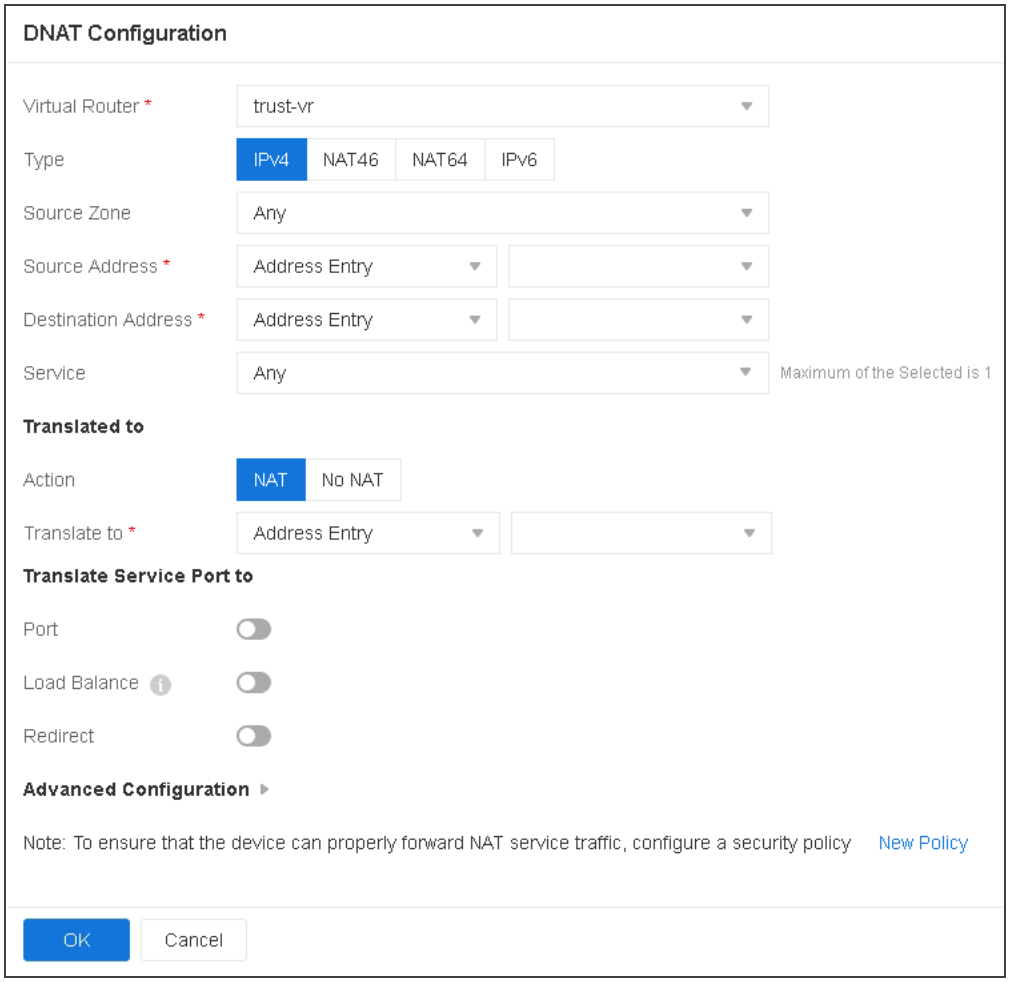
3. Click **OK** to save the settings.

Configuring an Advanced NAT Rule

You can create a DNAT rule and configure the advanced settings, or you can edit the advanced settings of an exiting DNAT rule.

To create a DNAT rule and configure the advanced settings, take the following steps:

1. Select **Policy > NAT > DNAT**.
2. Click **New** and select **Advanced Configuration**. To edit the advanced settings of an existing DNAT rule, select it and click **Edit**. The **DNAT configuration** page will appear.



In this page, configure the following options.

Requirements	
Virtual Router	Specifies a VRouter for the DNAT rule. The DNAT rule will take effect when the traffic flows into this VRouter and matches the DNAT rule conditions.
Type	Specifies the type of the DNAT rule, including IPv4, NAT46, NAT64, and IPv6. The configuration options for different types of DNAT rules may vary in this page, please refer to the actual page.

Requirements	
Source Zone	Specifies the security zone to which the ingress interface of traffic that matches the DNAT rule is bound. By default, Any is selected. After the configuration is completed, only the traffic that flows through the ingress interface bound to this security zone can continue to match the DNAT rule. **Note:** The source zone needs to belong to the specified virtual router.
Source Address	Specifies the source IP address of the traffic, including: • Address Entry - Select an address entry from the drop-down list. • IP Address - Type an IP address into the box. Type an IPv4 address if the type of the DNAT rule is IPv4 or NAT46. Type an IPv6 address if the type of the DNAT rule is NAT64 or IPv6. • IP/Netmask - Type an IPv4 address and its netmask into the box. This configuration option is available if the type of the DNAT rule is IPv4 or NAT46. • IPv6/Prefix - Type an IPv6 address and its prefix length into the box. This configuration option is available if the type of the DNAT rule is NAT64 or IPv6.

Requirements	
Destination Address	Specifies the destination IP address or interface of the traffic, including: • Address Entry - Select an address entry from the drop-down list. • IP Address - Type an IP address into the box. Type an IPv4 address if the type of the DNAT rule is IPv4 or NAT46. Type an IPv6 address if the type of the DNAT rule is NAT64 or IPv6. • IP/Netmask - Type an IPv4 address and its net-mask into the box. This configuration option is available if the type of the DNAT rule is IPv4 or NAT46. • IPv6/Prefix - Type an IPv6 address and its prefix length into the box. This configuration option is available if the type of the DNAT rule is NAT64 or IPv6. • Dynamic IP(Physical Interface): Select an interface which obtains IP via the DHCP and PPPoE pro-tocols. This configuration option is available if the type of the DNAT rule is IPv4 or NAT46.
Service	Specifies the service type of the traffic from the drop-down list. To create a new service or service group, click **Add**.

Requirements	
Translated to	
Action	Specifies the action for the traffic you specified, including: • NAT - Implements NAT for the eligible traffic. • No NAT - Do not implement NAT for the eligible traffic. • V4-MAPPED - Implements NAT for the eligible traffic, and extracts the destination IPv4 address from the destination IPv6 address of the packet directly. This configuration option is available if the type of the DNAT rule is NAT64. The **Translated to** action for different types of DNAT rules may vary in this page, please refer to the actual page.
Translate to	When selecting the **NAT** option, you need to specify the translated IP address. The options include **Address Entry**, **IP Address**, **IP/Netmask** (or **IPv6/Prefix**), and **SLB Server Pool**. The **SLB Server Pool** configure option is available if the type of the DNAT rule is IPv4 or NAT64. For more information about the SLB Server Pool, view "SLB Server Pool " on Page 1105.
Translate Service Port to	
Port	Click **Enable** to translate the port number of the service that matches the conditions above.

Requirements	
Load Balance	Click **Enable** to enable the function. Traffic will be balanced to different Intranet servers.
Redirect	Click **Enable** to enable the function. When the number of this **Translate to** is different from the **Destination Address** of the traffic or the **Destination Address** address is **any**, you must enable the redirect function for this DNAT rule.

Expand Advanced Configuration, configure the following options.

Track Server	
HA Group	Specifies the HA group that the DNAT rule belongs to. The default setting is 0.
Source translate	Enable the function for this DNAT rule to translate source addresses, that is, bidirectional NAT. After bidirectional NAT is enabled, the device will translate both the destination address and source address of packets passing through based on the DNAT rule.
Source translate to	After the source address translation function is enabled, set the type of address after translation. Options include **Address Entry**, **IP Address** and **IP/Netmask** (IPv6/Prefix Length).
Mode	Specifies the source address translation mode, including: • Dynamic port: With this option enabled, the same source IP address will be translated to the same

Track Server	
	NAT address. If translation fails, an arbitrary NAT address will be selected. • Static port: This mode means one-to-one translation. It requires the number of source IP addresses be the same as that of NAT addresses.
Schedule	Specifies the schedule of the DNAT rule. Select a schedule from the drop-down list. In addition, fuzzy search is supported. To create a schedule, click ⊕.
Track Ping Packets	After enabling this function, system will send Ping packets to check whether the Intranet servers are reachable.
Track TCP Packets	After enabling this function, System will send TCP packets to check whether the TCP ports of Intranet servers are reachable.
TCP Port	Specifies the TCP port number of the monitored Intranet server.
NAT Log	Enable the log function for this DNAT rule to generate the log information when traffic matches this NAT rule.
Position	Specifies the position of the rule. Each DNAT rule has a unique ID. When the traffic is flowing into the device, the device will search the DNAT rules by sequence, and then implement DNAT on the source IP of the traffic according to the first matched rule. The sequence of the ID shown in the DNAT rule list is the order of the rule

Track Server	
	matching. Select one of the following items from the drop-down list: • Bottom - The rule is located at the bottom of all of the rules in the DNAT rule list. By default, the system will put the newly-created DNAT rule at the bottom of all of the DNAT rules. • Top - The rule is located at the top of all of the rules in the DNAT rule list. • Before ID - Type the ID number into the text box. The rule will be located before the ID you specified. • After ID - Type the ID number into the text box. The rule will be located after the ID you specified.
ID	The ID number is used to distinguish between NAT rules. Specifies the method you get the rule ID. It can be automatically assigned by system or manually assigned by yourself.
Description	Types the description.

3. Click **OK** to save the settings.

Notes: If the DNAT rule is configured with a source zone that is not Any, the zone cannot be deleted.

Enabling/Disabling a DNAT Rule

By default the configured DNAT rule will take effect immediately. You can terminate its control over the traffic by disabling the rule.

To enable/disable a policy rule, take the following steps:

1. Select **Policy > NAT > DNAT**.
2. Select the DNAT rule that you want to enable/disable.
3. Click **Enable** or **Disable** to enable or disable the rule.

Viewing and Searching DNAT Rules

You can view and search the DNAT rules on the DNAT rule list.

View the DNAT rules on the DNAT rule list.

- Each column displays the corresponding configurations. The **Schedule** column displays the name and status of DNAT rules. If **Disable** is displayed, it indicates that the DNAT rule does not take effect or has expired.
- Click icon in the Session Detail column on the DNAT rule list to go to the **Session Detail** page. You can view the current session status of the selected DNAT rule. You can also click Filter to add filtering conditions and search for the sessions that conform to the filtering conditions.

  You can filter **Session ID**, **Source Address**, **Source Port**, **Destination Address**, **Destination**

Port, **Protocol**, **Application**, **Flow0 Interface**, **Flow1 Interface**. You can add multiple filter conditions at the same time. The relationship between filter conditions is **And**.

- Hover over your mouse over the configurations in different columns, then the WebUI displays either ⋮ icon or the detailed information of this configuration based on the configuration type.
  - You can view the detailed configurations directly.
  - You can click ⋮ icon. Based on the configuration type, the WebUI displays **Filter**, **Add Filter**, or **Details**.
    - Click **Filter** or **Add Filter**, you can see the filter conditions of this configuration above the list, and then you can filter the DNAT rule according to the filter condition.
    - Click **Details** to see the detailed configurations. Then, in the **Details** section, click **View** next to **Entry Details** to view the details about the address or service.

Copying/Pasting a DNAT Rule

When there are a large number of NAT rules in system, to create a NAT rule which is similar to an configured NAT rule easily, you can copy the NAT rule and paste it to the specified location.

To copy/paste a DNAT rule, take the following steps:

1. Select **Policy > NAT > DNAT**.
2. Select the DNAT rule that you want to clone and click **Copy**.
3. Click **Paste**. In the pop-up, select the desired position. Then the rule will be cloned to the desired position.

- Top: The rule is pasted to the top of all of the rules in the DNAT rule list.
- Bottom: The rule is pasted to the bottom of all of the rules in the DNAT rule list.
- Before the Rule Selected: The rule will be pasted before the Rule selected.
- After the Rule Selected: The rule will be pasted after the Rule selected.

Adjusting Priority

Each DNAT rule has a unique ID. When the traffic is flowing into the device, the device will search the DNAT rules in order, and then implement NAT of the source IP of the traffic according to the first matched rule. The sequence of the ID shown in the DNAT rule list is the order of the rule matching.

To adjust priority, take the following steps:

1. Select **Policy > NAT > DNAT**.
2. Select the rule you want to adjust its priority and click **Priority**.
3. In the Priority page, move the selected rule to:
    - Top: The rule is moved to the top of all of the rules in the DNAT rule list.
    - Bottom: The rule is moved to the bottom of all of the rules in the DNAT rule list. By default, system will put the newly-created DNAT rule at the bottom of all of the DNAT rules.
    - Before ID: Specifies an ID number. The rule will be moved before the ID you specified.
    - After ID: Specifies an ID number. The rule will be moved after the ID you specified.
4. Click **OK** to save the settings.

Importing DNAT rule

You can import the configuration file of the local DNAT rules into the device to avoid creating DNAT rules manually. Only the DAT format file is supported currently.

To import the configuration file of DNAT rules, take the following steps:

1. Click **Policy** > **NAT** > **DNAT** .
2. Click the **Import** button to open the **Import** page.

3. Click **Browse** and select the local configuration file of DNAT rule to upload.
4. Click **OK**, and the imported DNAT rule will be displayed in the list.

Notes:

- When importing the source NAT rule configuration file, please use the exported original file as far as possible and do not modify the contents of the file. Otherwise, it may cause formatting errors.
- If there's an error during import, system will stop importing immediately and roll back configurations automatically.
- If the ID of the imported source NAT already exists, the configuration of the original NAT rule will be overwritten.

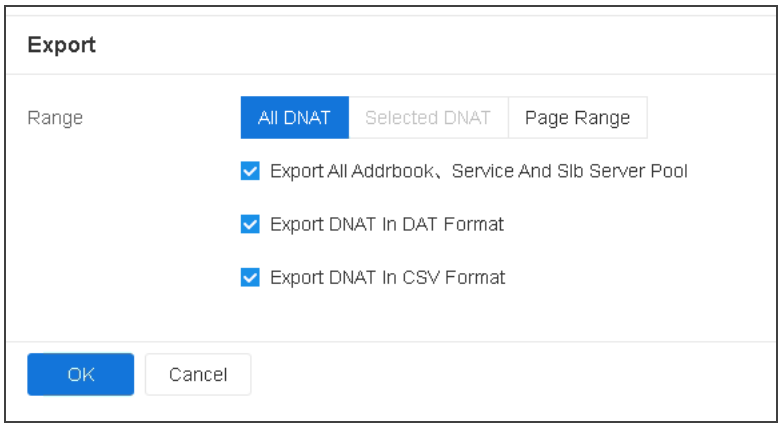
- The imported DNAT rule will be displayed on the bottom of the DNAT rule list.

Exporting DNAT rule

You can export the DNAT rules existing on the device to the local in the format of HTML CSV or DAT formats. At the same time, all the custom objects of address book , service book (only user defined) and slb server (only user defined) can be exported.

To export the DNAT rules, take the following steps:

1. Click **Policy** > **NAT** > **DNAT** .
2. Click **Export** to open the **Export** page.



Configure the options as follows:

Option	Description
Range	Specify the range of DNAT rules to be exported. • All DNAT: Select the radio button and export all DNAT rules on the device. • Selected DNAT: In the DNAT list, select the DNAT rule to be

Option	Description
	exported, and then click **Export** > **Selected DNAT**. • Page Range: Select the radio button, and enter the page number or page range of the DNAT list to be exported. **Note**: Separate the page number or range with semicolons, e.g. "3;5-8".
Export Address, Service And Slb Server Pool	Select the check box to export all the custom objects including address book, service book （only user defined） and slb server (only user defined) will be generated.
Export DNAT in DAT Format	Select the check box to export the DNAT configurations in the format of DAT.

3. Click **OK** to download the exported files. There're four kinds of files: natExport.html, " dnat+exported time.zip", "dnat+exported time.cvs" and the "vr_dnat +exported time.dat "configurations in the DAT format.
4. Double-click the natExport.html, click **Import File** and import the " dnat+exported time.zip" to view the table of exported policies.

Configuring DNAT Optimization

If a large amount of NAT rules pile up in the device and you are not sure whether to delete them, this makes it more difficult to maintain these rules. The system supports the DNAT Optimization function, including hit analysis and redundancy check.

Hit Count

The system supports statistics on DNAT rule hit counts, i.e., statistics on the matching between traffic and DNAT rules. Each time the inbound traffic is matched to a certain DNAT rule, the hit count will increment by 1 automatically.

To view a DNAT rule hit count, click **Policy > NAT > DNAT**. In the DNAT rule list, view the statistics on DNAT rule hit count under the Hit Count column.

Clearing NAT Hit Count

To clear a DNAT rule hit count, take the following steps:

1. Select **Policy > NAT > DNAT Optimization**.
2. Click **Clear** to open the **Clearing NAT Hit Count** page.
    - All NAT: Clears the hit counts for all NAT rules.
    - NAT ID: Clears the hit counts for a specified NAT rule ID.
3. Click **OK**.

Hit Count Check

System supports to check policy rule hit counts.

To check hit count, take the following steps:

1. Select **Policy > NAT > DNAT Optimization**.
2. Click **Analyze**.

Redundancy Check

To ensure the validity of DNAT rules, the system can perform redundancy check on the DNAT rules. In other words, the system checks the coverage scope of DNAT rules to solve the problem that certain DNAT rules are overwritten and thus cannot be hit. After you complete the check, redundant DNAT rules are displayed in the redundancy check list.

To perform redundancy check on DNAT rules, take the following steps:

1. Select **Policy** > **NAT** > **DNAT Optimization**. On the **DNAT Optimization** page, click the **Redundancy Check** tab.

2. After you select a virtual router from the **Virtual Router** drop-down list and click **Redundancy Check**, the system starts to check all DNAT rules, which may take a long time. After the check is completed, redundant DNAT rules are displayed in the list.

- The **ID** column displays the ID of DNAT rules that are overwritten and the **Rule ID to override this DNAT rule** column displays the ID of all rules that overwrite this DNAT rule.
- Find an overwritten DNAT rule and click in the **Operation** column to delete this rule.
- Find an overwritten DNAT rule and click in the **Operation** column to disable this rule. If you do not modify the status of this DNAT rule after the rule is disabled, the rule is excluded from redundancy check. To enable the DNAT rule, select **Policy** > **NAT** > **DNAT**. On the **DNAT** page, select the target DNAT rule and click **Enable**.
- Click "+" to expand the details about the overwritten DNAT rule.

Notes: After redundancy check starts, a check progress bar is displayed in the lower-left corner of the DNAT rule list. During the redundancy check, we do not recommend that you create or modify a DNAT rule. You can click , and then click **OK** in the message that appears to stop the redundancy check.

Configuring DNS Rewrite

When the client sends a DNS resolution request to the public DNS server through the firewall, the system can rewrite the IP address in the response message returned by the DNS server to a

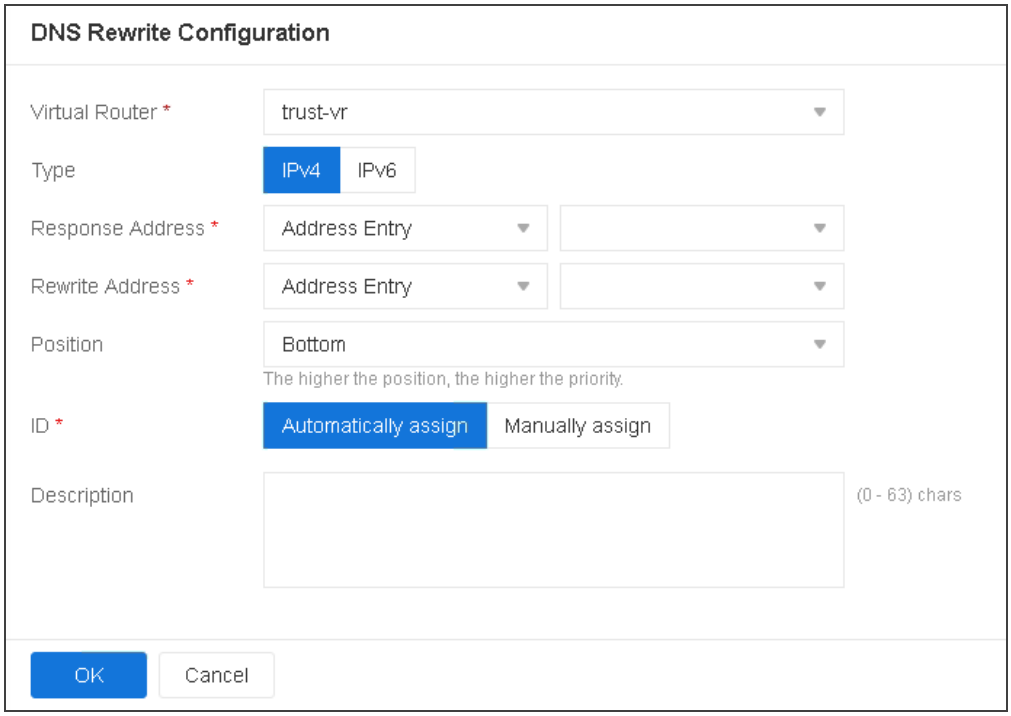
private IP address based on DNS rewrite rules. This protects and hides networking environment configuration.

You can set multiple DNS rewrite rules, which are matched in descending order. The system uses the first rule that the response message matches to rewrite the IP address. You can view the order of DNS rewrite rules on the **Policy** > **NAT** > **DNS Rewrite** page.

Configuring a DNS Rewrite Rule

To configure a DNS rewrite rule, take the following steps:

1. Select **Policy** > **NAT** > **DNS Rewrite**.
2. Click **New**.



3.

Option	Description
Virtual Router	Specifies the virtual router to which the DNS rewrite rule belongs.
Type	Specifies the IP protocol of the DNS rewrite rule. Valid values: IPv4 and IPv6.
Response Address	Specifies the address to be rewritten, which can be an address entry, IP address, IP/netmask, or host book. For Address Entry or Host Book, you can select a configured address entry or host book, or create one.
Rewrite Address	Specifies the address after the rewrite operation, which can be an address entry, IP address, or IP/netmask. For Address Entry, you

Option	Description
	can select a configured address entry or create one.
Position	Specifies the position of the DNS rewrite rule, which can be placed before or after a specified ID, or can be placed at the first or last position. By default, a newly created rule is placed at the end of all rules.
ID	Specifies the ID of the DNS rewrite rule. Each rule has a unique ID. The ID can be automatically assigned by the system or you can manually assign one. Valid values: 1 to 16.
Description	Enter a description for the DNS rewrite rule. It can be up to 63 characters in length.

4. Click **OK**.

Managing DNS Rewrite Rules

To view configured DNS rewrite rules, select **Policy** > **NAT** > **DNS Rewrite**.

- To modify a DNS rewrite rule, select this rule from the list and click **Edit**.
- To delete one or more DNS rewrite rules, select these rules from the list and click **Delete**.
- To adjust the order of a DNS rewrite rule, select this rule from the list and click **Priority**.
- To filter DNS rewrite rules, click **Filter**, select a filter type from the drop-down list, and then enter a filter condition.

Viewing Dynamic Mapping Table of DNS Rewrite

The dynamic mapping table of DNS rewrite stores the mappings between the response address and the rewrite address. After a DNS response is received, the system obtains the domain name and IP address from the response and searches for dynamic mapping entries in the table.

- If a dynamic mapping entry is matched, the DNS response is directly rewritten and the TTL of the dynamic mapping entry is updated.
- If no dynamic mapping entry is matched, DNS rewrite rules are matched in descending order of priority. If a DNS rewrite rule is matched, the system generates a dynamic mapping entry and rewrites the DNS response. If no DNS rewrite rule is matched, the system directly forwards the DNS response.

After a business access request is received from the client, the system searches for a matched entry in the dynamic mapping table and performs NAT based on the matched entry.

Select **Policy** > **NAT** > **DNS Rewrite Dynamic Mapping** to view the dynamic mapping table of DNS rewrite stored in the system. You can click **Filter** to specify filter conditions based on your needs.

SLB Server

View SLB server status: After you enabling the track function (PING track, TCP track, or UDP track), system will list the status and information of the intranet servers that are tracked.

View SLB server pool status: After you enabling the server load balancing function, system will monitor the intranet servers and list the corresponding status and information.

Viewing SLB Server Status

To view the SLB server status, take the following steps:

1. Select **Policy > NAT > SLB Server Status**.
2. You can set the filtering conditions according to the virtual router, SLB server pool, and server address and then view the information.

Option	Description
Server	Shows the IP address of the server.
Type	Shows the type of the server, include IPv4 or IPv6.
Port	Shows the port number of the server.
Status	Shows the status of the server.
Current Sessions	Shows the number of current sessions.
DNAT	Shows the DNAT rules that uses the server.
HA Group	Shows the HA group that the server belongs to.

Viewing SLB Server Pool Status

To view the SLB server pool status, take the following steps:

1. Select **Policy > NAT > SLB Server Pool Status**.
2. You can set the filtering conditions according to the virtual router, algorithm, and server pool name and then view the information.

Option	Description
Name	Shows the name of the server pool name.
Type	Shows the type of the server pool, include IPv4 or IPv6.
Algorithm	Shows the algorithm used by the server pool.
DNAT	Shows the DNAT rules that use the server.
Abnormal Server/All Servers	Shows the number of abnormal servers and the total number of the servers.
Current Sessions	Shows the number of current sessions.

Session Limit

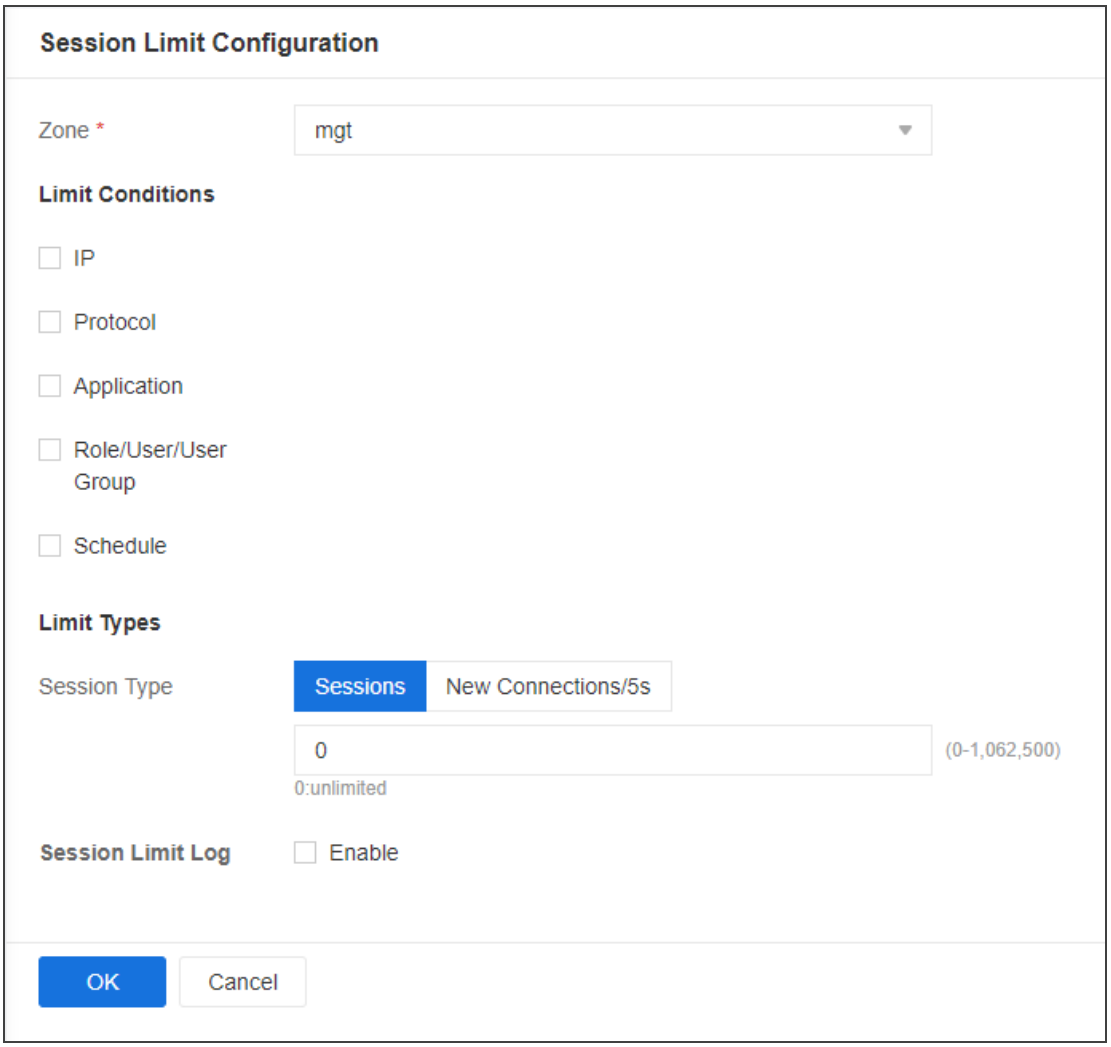
The devices support zone-based session limit function. You can limit the number of sessions and control the session rate to the source IP address, destination IP address, specified IP address, applications or role/user/user group, thereby protecting from DoS attacks and controlling the bandwidth of applications, such as IM or P2P.

Configuring a Session Limit Rule

To configure a session limit rule, take the following steps:

1. Select **Policy > Session Limit**.

2. Click **New**. The Session Limit Configuration page will appear.



3. Select the zone where the session limit rule is located.

4. Configure the limit conditions.

IP	
Select the **IP** check box to configure the IP limit conditions.	
IP	Select the **IP** radio button and then select an IP address entry.

IP	
	• Select **All IPs** to limit the total number of sessions to all IP addresses. • Select **Per IP** to limit the number of sessions to each IP address.
Source IP	Select the **Source IP** radio button and specify the source IP address entry and destination IP address entry. When the session's source IP and destination IP are both within the specified range, system will limit the number of session as follows: • When you select **Per Source IP**, system will limit the number of sessions to each source IP address. • When you select **Per Destination IP**, system will limit the number of sessions to each destination IP address.
Protocol	
Protocol	Limits the number of sessions to the protocol which has been set in the text box.
Application	
Application	Limits the number of sessions to the selected application.
Role/User/User Group	
Select the **Role/User/User Group** check box to configure the corresponding limit conditions.	

IP	
Role	Select the **Role** radio button and a role from the **Role** drop-down list to limit the number of sessions of the selected role.
User	Select the **User** radio button and a user from the **User** drop-down list to limit the number of sessions of the selected user.
User Group	Select the **User Group** radio button and a user group from the **User Group** drop-down list to limit the number of sessions of the selected user group. • Next to the **User Group** radio button, select **All Users** to limit the total number of sessions to all of the users in the user group. • Next to the **User Group** radio button, select **Per User** to limit the number of sessions to each user.
Schedule	
Schedule	Select the **Schedule** check box and choose a schedule you need from the drop-down list to make the session limit rule take effect within the time period specified by the schedule.

5. Configure the limit types.

Session Type	
Session Number	Specify the maximum number of sessions. The value range is 0 to 1048576. The value of 0 indicates no lim-

Session Type	
	itation.
New Connections/5s	Specify the maximum number of sessions created per 5 seconds. The value range is 1 to 1048576.

6. Select the **Enable** after **Session Limit Log** to record the session limit log.
7. Click **OK** to save your settings.
8. Click **Switch Mode** to select a matching mode. If you select **Use the Minimum Value** and an IP address matches multiple session limit rules, the maximum number of sessions of this IP address is limited to the minimum number of sessions of all matched session limit rules; if you select **Use the Maximum Value** and an IP address matches multiple session limit rules, the maximum number of sessions of this IP address is the maximum number of sessions of all matched session limit rlules.

Clearing Statistic Information

After configuring a session limit rule, the sessions which exceed the maximum number of sessions will be dropped. You can clear the statistical information of the dropped sessions of specified session limit rule according to your need.

To clear statistic information, take the following steps:

1. Select **Policy > Session Limit**.
2. Select the rule whose session's statistical information you want to clear.
3. Click **Clear**.

Traffic Quota

System supports the traffic quota function, which can limit and control the allowable flow quota of users/user groups per day or per month. When the user traffic reaches the daily or monthly quota defined by the traffic quota profile, the system will block the user traffic.

Related Topics:

- "Configuring the Traffic Quota Rule" on Page 1435
- "Configuring the Traffic Quota Profile" on Page 1437
- "Configuring the Traffic Quota Zone" on Page 1438
- "User Quota Monitor" on Page 1642

Configuring the Traffic Quota Rule

The traffic quota rule configuration including configuring user/ user group traffic quota rule and adjusting the traffic quota rule position.

Configuring the User/ User Group Traffic Quota Rule

To configure the user/ user group traffic quota rule, take the following steps:

1. Select **Policy > Traffic Quota > Rule**.
2. In the **User Quota Rule** or **User Group Quota Rule** tab, click **New**.

In the <User Traffic Quota Rule Configuration> or <User Group Traffic Quota Rule Configuration> page, configure the corresponding options.

Option	Description
Name	Specifies the name of user/ user group traffic quota rule.
Quota Profile	Select the created quota profile from the drop-down list, or click ⊕ to create a new traffic quota profile. For traffic quota profile configuration, see "Configuring the Traffic Quota Profile" on Page 1437.

Option	Description
User/ User Group	Specifies the user/ user group of traffic quota rule. 1. From the **User** or **User Group** drop-down list, select the AAA server where the users and user groups reside. 2. Based on the type of AAA server, you can execute one or more actions: search a user/user group, expand the user/user group list, enter the name of the user/user group. 3. After selecting users/user groups/roles, click them to add the them to the left pane. 4. After adding the desired objects, click **Close** to complete the user configuration.

3. Click **OK** to save your settings.

Adjusting Traffic Quota Rule Priority

To adjust the rule priority, take the following steps:

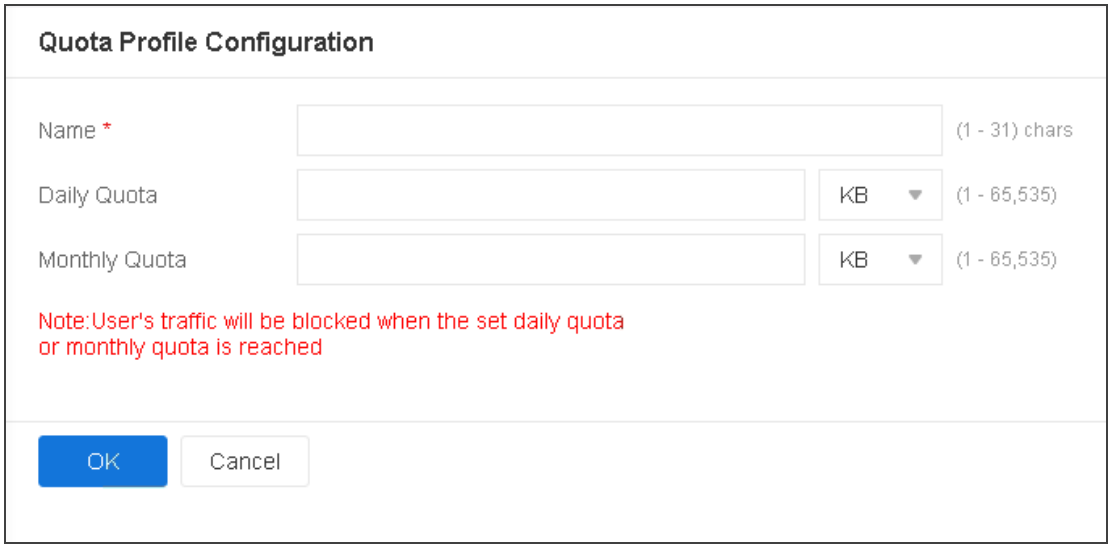
1. Select **Policy > Traffic Quota > Rule**.
2. Select the check box of the traffic quota rule whose priority will be adjusted, and click **Priority** .
3. In the **Change User Quota Rule Priority**or **Change User Group Quota Rule Priority** page, click **First List** , **Last List** , **Before This Name** or **After This Name**. Then the rule will be moved before or after the specified name.

Configuring the Traffic Quota Profile

To configure the traffic quota profile, use the following steps:

1. Select **Policy > Traffic Quota > Profile**.

2. Click **New**to open the Quota Profile Configuration page.



In the <Quota Profile Configuration> page, configure the corresponding options.

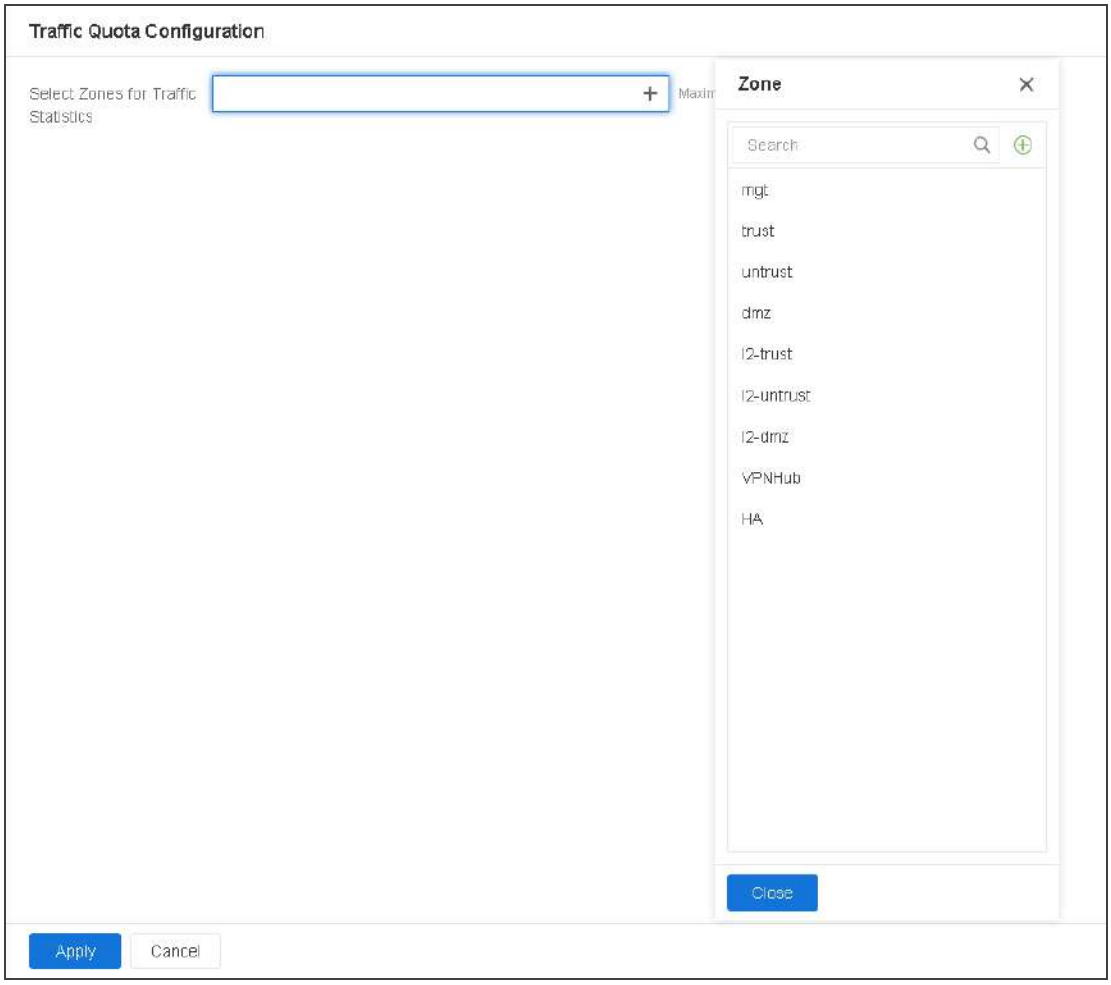
Option	Description
Name	Specifies the quota profile name.
Daily Quota	Type the daily quota in the text box and select the quota unit in the drop-down list, including KB, MB, GB, TB.
Monthly Quota	Type the monthly quota in the text box and select the quota unit in the drop-down list, including KB, MB, GB, TB.

3. Click **OK** to save your settings.

Configuring the Traffic Quota Zone

To configure the zone that you want to enable the traffic quota function, take the following steps:

1. Select **Policy > Traffic Quota > Configuration**.
2. Click **Select Zones for Traffic Statistics**.



3. Click ⊕ to add a new zone entry to the **Selected** list.
4. In the **Selected** list, select the zone entry and click ✕ for the zone entry not be counted.
5. Click **Apply** to save your settings.

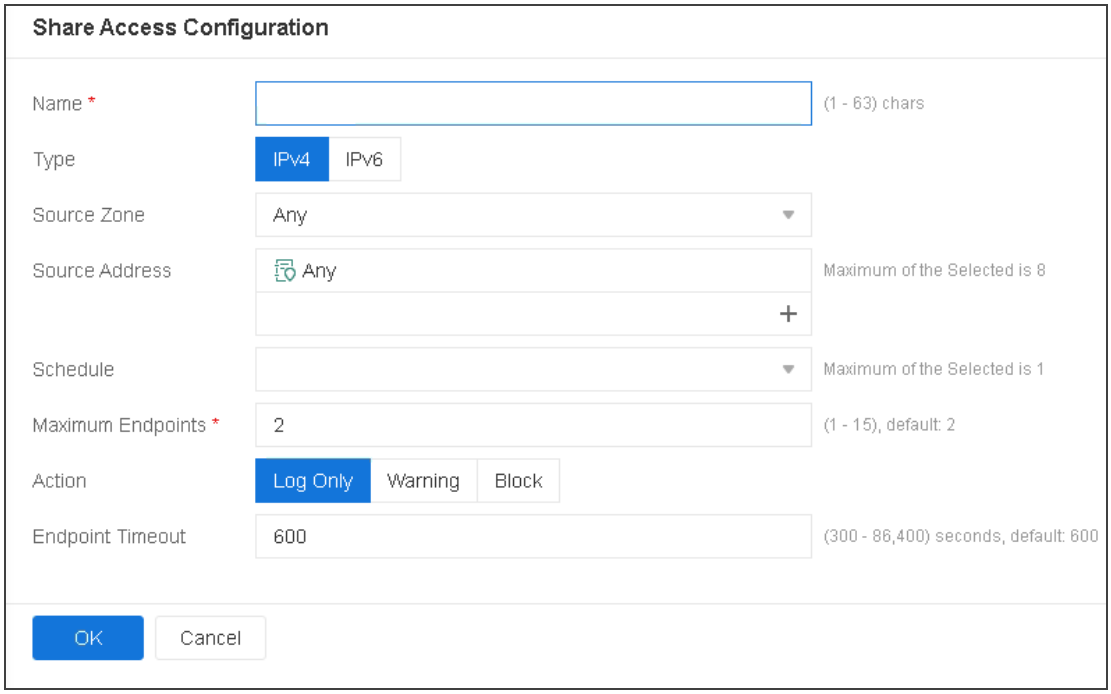
Share Access

Share access means multiple endpoints access network with the same IP. The function of share access can block access from unknown device and allocate bandwidth for users, so as to prevent possible risks and ensure good online experience.

Configuring Share Access Rules

To configure a share access rule, take the following steps:

1. Select **Policy > Share Access**.
2. Click **New**. The Share Access Configuration page will appear.



Option	Description
Name	Specifies the name of share access rule.
Source Zone	Specify the source zone of share access.
Source	Specify the source IP address segment of share access.

Option	Description
Address	1. Click + to open the **Address** page. 2. Select the address type in the **Address** page. 3. According to different address types, select or enter the required address. 4. Click **Add** to add the addresses to the left pane. 5. After adding the desired addresses, click **Close** to complete the source address configuration. You can also perform other operations: • When selecting the **Address Book** type, you can click + icon to create a new address entry. • You can click ▼ in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation. In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member

Option	Description
	whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched. • The default address configuration is any. To restore the configuration to this default one, select the **any** or **IPv6-any** check box.
Schedule	Specify the schedule of share access. The share access rule takes effect in the period specified by the schedule. If the schedule is not configured, the share access rule will always be effective.
Maximum Endpoints	Specify the maximum number of share access endpoints. The range is 1-15. The default value is 2.
Action	When the number of endpoints with the same IP address exceeds the maximum allowed to be shared by system, the IP address of the endpoints will be processed according to the specified action. • Log Only: When the number of shared access end-points exceeds the maximum, system will only record logs of the IP address out of limit, without affecting the normal connection of the access end-points.

Option	Description

	• Warning: When the number of shared access endpoints exceeds the maximum, system will send warnings to endpoints out of limit and record logs during the specified control duration.
	  • Control Duration: Specify the control duration of warning. The range is 30-3600s. The default value is 60s. After the duration is over, the system will re-detect whether the number of access endpoints exceeds the maximum.
	  • Warning Message: Specify the user-defined warning message, the range is 0-255 characters.
	• Block: When the number of shared access endpoints exceeds the maximum, system will block the IP address of the endpoints out of the limit and record logs during the specified control duration.
	  • Control Duration: Specify the control duration of block. The range is 30-3600s. The default value is 60s. After the duration is over, the system will re-detect whether the number of access endpoints exceeds the maximum.

Endpoint	Specify the timeout time of endpoint. After the timeout

Option	Description
Timeout	time, when the endpoint no longer accesses network with the IP, system will clear the endpoint information. The range is 300-86400s. The default value is 600s.

ARP Defense

StoneOS provides a series of ARP defense functions to protect your network against various ARP attacks, including:

- ARP Learning: Devices can obtain IP-MAC bindings in an Intranet from ARP learning, and add them to the ARP list. By default this function is enabled. The devices will always keep ARP learning on, and add the learned IP-MAC bindings to the ARP list. If any IP or MAC address changes during the learning process, the devices will add the updated IP-MAC binding to the ARP list. If this function is disabled, only IP addresses in the ARP list can access the Internet.
- MAC Learning: Devices can obtain MAC-Port bindings in an Intranet from MAC learning, and add them to the MAC list. By default this function is enabled. The devices will always keep MAC learning on, and add the learned MAC-Port bindings to the MAC list. If any MAC address or port changes during the learning process, the devices will add the updated MAC-Port binding to the MAC list.
- IP-MAC-Port Binding: If IP-MAC, MAC-Port or IP-MAC-Port binding is enabled, packets that are not matched to the binding will be dropped to protect against ARP spoofing or MAC address list attacks. The combination of ARP and MAC learning can achieve the effect of "real-time scan + static binding", and make the defense configuration more simple and effective.
- Authenticated ARP: Authenticated ARP is implemented on the ARP client Hillstone Secure Defender. When a PC with Hillstone Secure Defender installed accesses the Internet via the interface that enables Authenticated ARP, it will perform an ARP authentication with the device, for the purpose that the MAC address of the device being connected to the PC is trusted.

- ARP Inspection: Devices support ARP Inspection for interfaces. With this function enabled, StoneOS will inspect all ARP packets passing through the specified interfaces, and compare the IP addresses of the ARP packets with the static IP-MAC bindings in the ARP list and IP-MAC bindings in the DHCP Snooping list.
- DHCP Snooping: With this function enabled, system can create a binding relationship between the MAC address of the DHCP client and the allocated IP address by analyzing the packets between the DHCP client and server.
- Host Defense: With this function enabled, the system can send gratuitous ARP packets for different hosts to protect them against ARP attacks.

Configuring ARP Defense

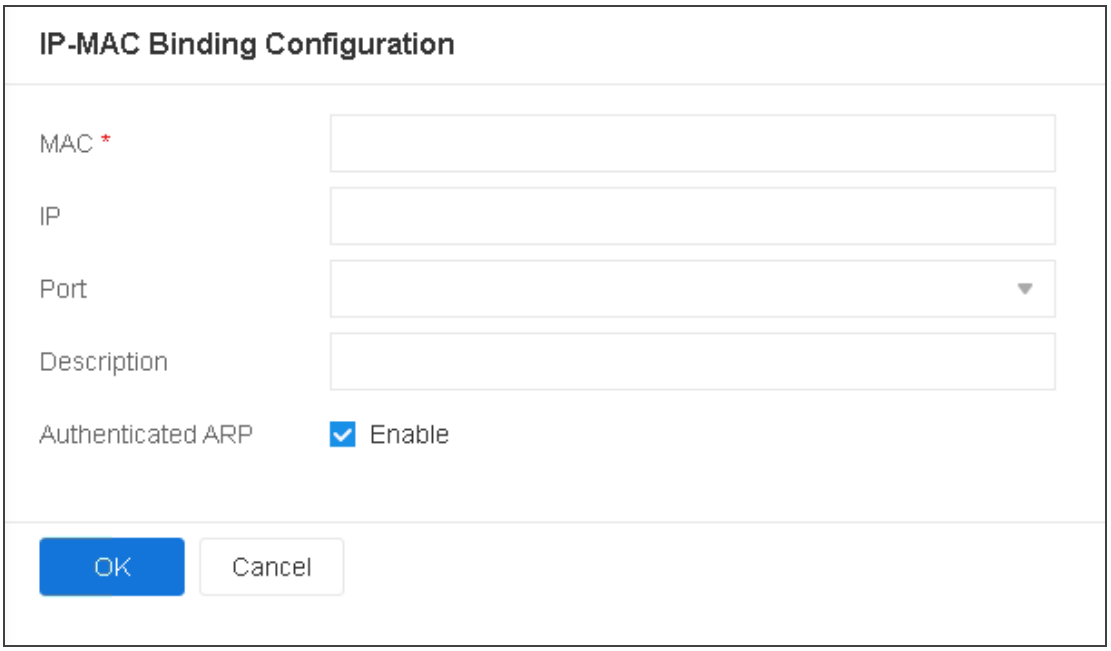
Configuring Binding Settings

Devices support IP-MAC binding, MAC-Port binding and IP-MAC-Port binding to reinforce network security control. The bindings obtained from ARP/MAC learning and ARP scan are known as dynamic bindings, and those manually configured are known as static bindings.

Adding a Static IP-MAC-Port Binding

To add a static IP-MAC-Port binding, take the following steps:

1. Select **Policy > ARP Defense > IP-MAC Binding**.
2. Click **New**.



In the IP-MAC Binding Configuration page, configure the corresponding settings.

Option	Description
MAC	Specify a MAC address.
IP	Specify an IP address.
Port	Select a port from the drop-down list behind.
VLAN ID	If the port belongs to a VLAN, select the VLAN ID from the **VLAN ID** drop-down list.
Virtual Router	Select the virtual router that the binding item belongs to. By default, the binding item belongs to trust-vr.
Description	Specify the description for this item.
Authenticated ARP	Click the **Enable** button the authenticated ARP function.

3. Click **OK** to save the settings.

Obtaining a Dynamic IP-MAC-Port Bindings

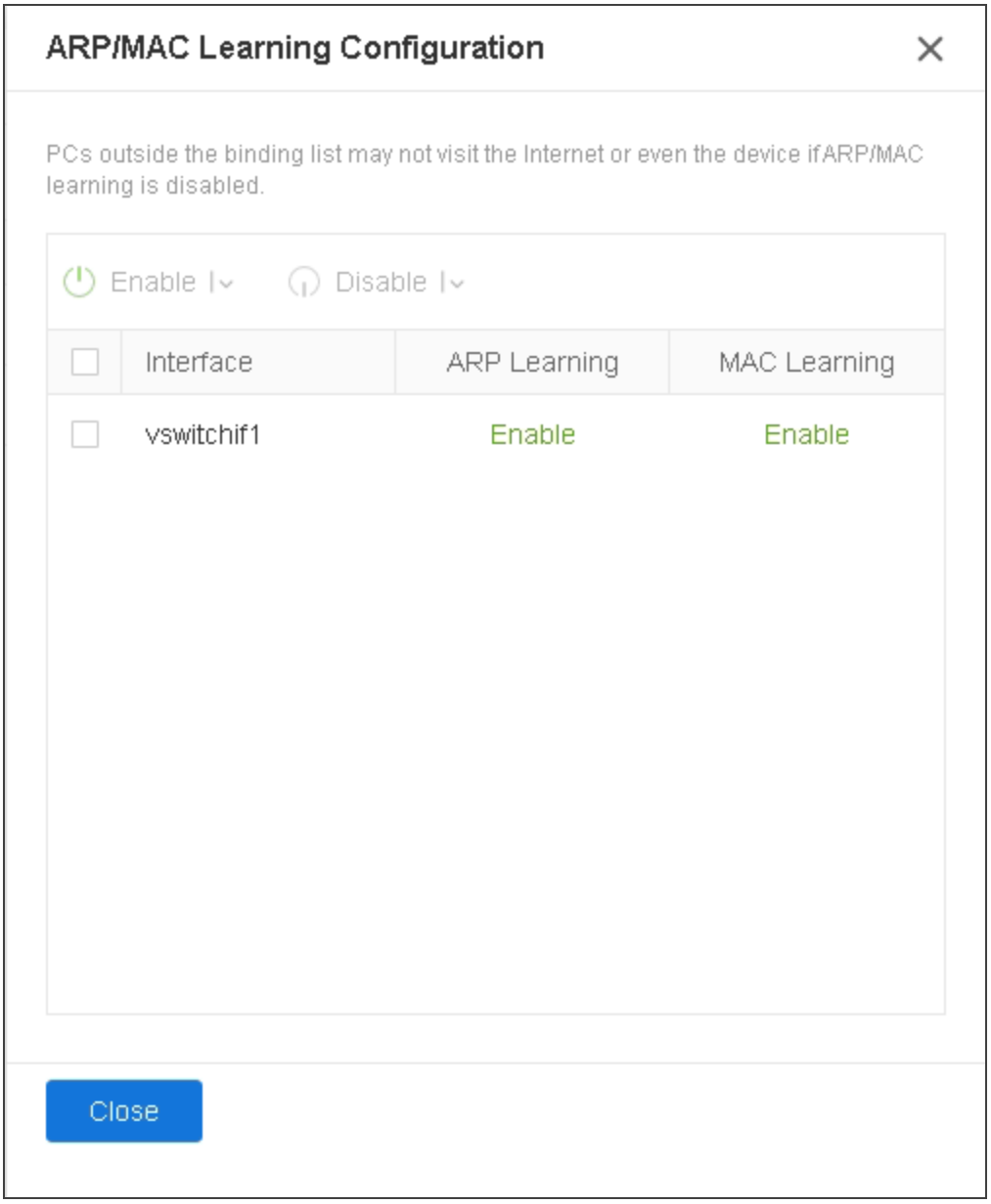
Devices can obtain dynamic IP-MAC-Port binding information from:

- ARP/MAC learning
- IP-MAC scan

To configure the ARP/MAC learning, take the following steps:

1. Select **Policy > ARP Defense > IP-MAC Binding**.

2. Click ⋮ and click **ARP/MAC Learning** from the pop-up menu.



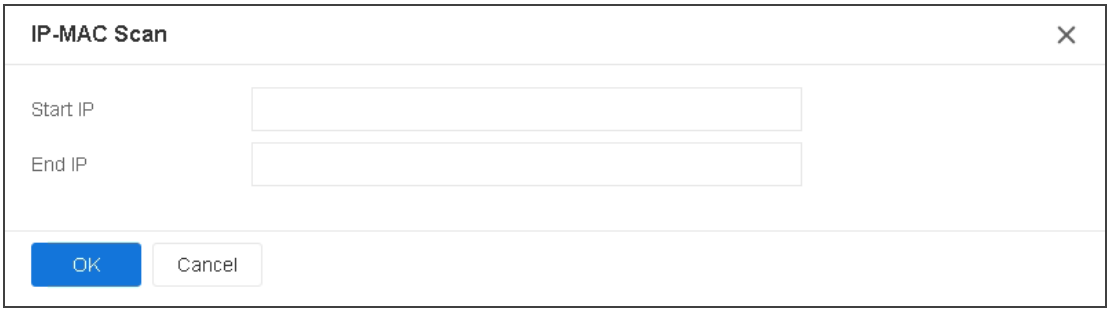
3. In the ARP/MAC Learning Configuration page, select the interface that you want to enable the ARP/MAC learning function.

4. Click **Enable** and then select **ARP Learning** or **MAC Learning** in the pop-up menu. The system will enable the selected function on the interface you select.

5. Close the page and return to the IP-MAC Binding page.

To configure the ARP scan, take the following steps:

1. Select **Policy > ARP Defense > IP-MAC Binding**.
2. Select **Binding Configuration** and then click **IP-MAC Scan** from the pop-up menu.



3. In the IP-MAC Scan page, enter the start IP and the end IP.
4. Click **OK** to start scanning the specified IP addresses. The result will display in the table in the IP-MAC binding page.

Bind the IP-MAC-Port Binding Item

To bind the IP-MAC-Port binding item, take the following steps:

1. Select **Policy > ARP Defense > IP-MAC Binding**.
2. Select **Binding Configuration** and then click **Bind All** from the pop-up menu.
3. In the **Bind All** page, select the binding type.
4. Click **OK** to complete the configurations.

To unbind an IP-MAC-Port binding item:

1. Select **Policy > ARP Defense > IP-MAC Binding**.
2. Select **Binding Configuration** and then click **Unbind All** from the pop-up menu.

3. In the **Unbind All** page select the unbinding type.

4. Click **OK** to complete the configurations.

Importing/Exporting Binding Information

To import the binding information, take the following steps:

1. Select **Policy > ARP Defense > IP-MAC Binding**.

2. Select ⋮ and then click **Import** from the pop-up menu.

3. In the Import page, click **Browse** to select the file that contains the binding information. Only the UTF-8 encoding file is supported.

To export the binding information, take the following steps:

1. Select **Policy > ARP Defense > IP-MAC Binding**.

2. Select ⋮ and then click **Export** from the pop-up menu.

3. Choose the binding information type.

4. Click **OK** to export the binding information to a file.

Configuring Authenticated ARP

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

The devices provide Authenticated ARP to protect the clients against ARP spoofing attacks. Authenticated ARP is implemented on the ARP client Hillstone Secure Defender. When a PC with Hillstone Secure Defender installed accesses the Internet via the interface that enables Authenticated ARP, it will perform an ARP authentication with the device to assure the MAC address of the device being connected to the PC is trusted. Besides. The ARP client is also designed with powerful anti-spoofing and anti-replay mechanisms to defend against various ARP attacks.

Notes: The Loopback interface and PPPoE sub-interface are not designed with ARP learning, so these two interfaces do not support Authenticated ARP.

To use the Authenticated ARP function, you need to enable the Authenticated ARP function in the device and install the Hillstone Secure Defender in the PCs.

To enable the Authenticated ARP in the device, take the following steps:

1. Select **Policy > ARP Defense > Authenticated ARP**.
2. Select the interfaces on which you want to enable the Authenticated ARP function.

3. Click **Enable** and select **Force Authenticated ARP** to enable the authenticated ARP function.
4. Enable or disable **Force Install** as needed. If the **Force Install** option is selected, PCs cannot access the Internet via the corresponding interface unless the ARP client has been installed; if the **Force Install** option is not selected, only PCs with the ARP client installed are controlled by Authenticated ARP.

To install Hillstone Secure Defender in the PCs, take the following steps:

1. Enable Authenticated ARP for an interface, and also select the **Force Install** option for the interface.
2. When a PC accesses the Internet via this interface, the Hillstone Secure Defneder's download page will pop up. Download HillstoneSecureDefender.exe as prompted.

3. After downloading, double-click **HillstoneSecureDefender.exe** and install the client as prompted by the installation wizard.

Configuring ARP Inspection

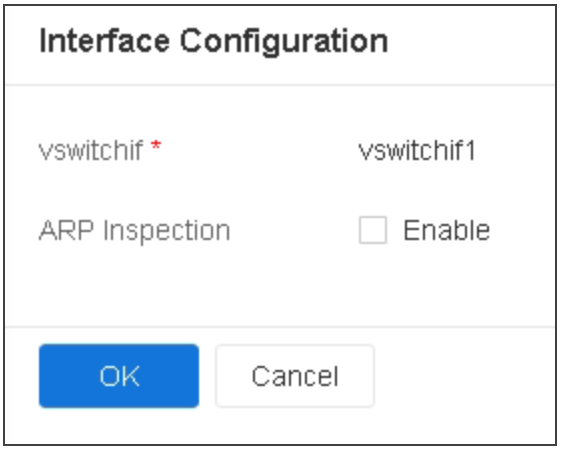
Devices support ARP Inspection for interfaces. With this function enabled, system will inspect all the ARP packets passing through the specified interfaces, and compare the IP addresses of the ARP packets with the static IP-MAC bindings in the ARP list and IP-MAC bindings in the DHCP Snooping list:

- If the IP address is in the ARP list and the MAC address matches, the ARP packet will be forwarded;
- If the IP address is in the ARP list but the MAC address does not match, the ARP packet will be dropped;
- If the IP address is not in the ARP list, continue to check if the IP address is in the DHCP Snooping list;
- If the IP address is in the DHCP Snooping list and the MAC address also matches, the ARP packet will be forwarded;
- If the IP address is in the DHCP Snooping list but the MAC address does not match, the ARP packet will be dropped;
- If the IP address is not in the DHCP Snooping, the ARP packet will be dropped or forwarded according to the specific configuration.

Both the VSwitch and VLAN interface of the system support ARP Inspection. This function is disabled by default.

To configure ARP Inspection of the VSwitch interface, take the following steps:

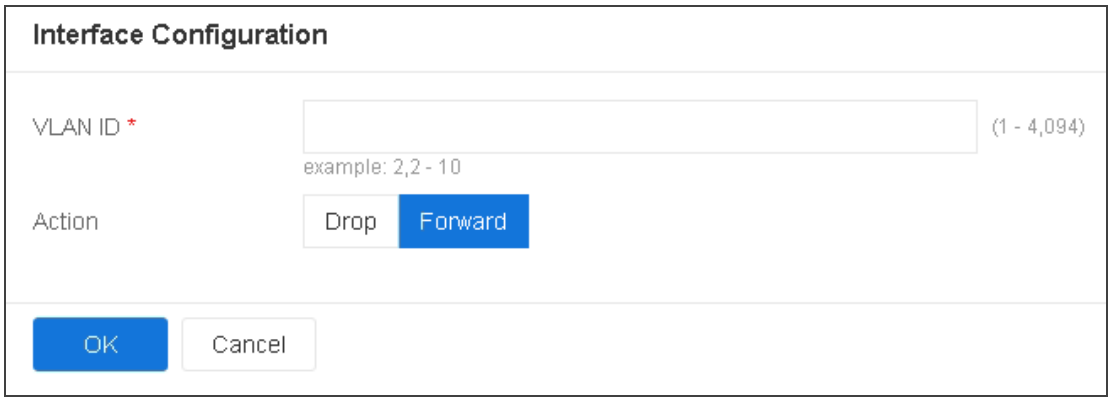
1. Select **Policy > ARP Defense > ARP Inspection**.
2. System already lists the existing VSwitch interfaces.
3. Double-click the item of a VSwitch interface.



4. In the Interface Configuration page, click the **Enable** button.
5. To drop the traffic whose sender's IP address is not in the ARP table, select **Drop**. To forward the traffic whose sender's IP address is not in the ARP table, select **Forward**.
6. Click **OK** to save the settings and close the page.
7. For the interfaces belonging to the VSwitch interface, you can set the following options:
    - If you do not need the ARP inspection in the interface, in the Advanced Options section, double-click the interface and select **Do Not Inspect** option in the pop-up page.
    - Configure the number of ARP packets received per second. When the ARP packet rate exceeds the specified value, the excessive ARP packets will be dropped. The value range is 0 to 10000. The default value is 0, i.e., no rate limit.
8. Click **OK** to save the settings.

To configure the ARP inspection of the VLAN interface, take the following steps:

1. Select **Policy > ARP Defense > ARP Inspection**.
2. Click **New**.



3. In the Interface Configuration page, specify the VLAN ID.
4. To drop the traffic whose sender's IP address is not in the ARP table, select **Drop**. To forward the traffic whose sender's IP address is not in the ARP table, select **Forward**.
5. For the interfaces belongs to the VLAN, you can set the following options:
   - If you do not need the ARP inspection in the interface, in the Advanced Options section, double-click the interface and select **Do Not Inspect** option in the pop-up page.
   - Configure the number of ARP packets received per second. When the ARP packet rate exceeds the specified value, the excessive ARP packets will be dropped. The value range is 0 to 10000. The default value is 0, i.e., no rate limit.
6. Click **OK** to save the settings.

Configuring DHCP Snooping

DHCP, Dynamic Host Configuration Protocol, is designed to allocate appropriate IP addresses and related network parameters for sub networks automatically. DHCP Snooping can create a binding relationship between the MAC address of the DHCP client and the allocated IP address by analyzing the packets between the DHCP client and the server. When ARP Inspection is also

enabled, the system will check if an ARP packet passing through can be matched to any binding on the list. If not, the ARP packet will be dropped. In the network that allocates addresses via DHCP, you can prevent against ARP spoofing attacks by enabling ARP inspection and DHCP Snooping.

DHCP clients look for the server by broadcasting, and only accept the network configuration parameters provided by the first reachable server. Therefore, an unauthorized DHCP server in the network might lead to DHCP server spoofing attacks. The devices can prevent DHCP server spoofing attacks by dropping DHCP response packets on related ports.

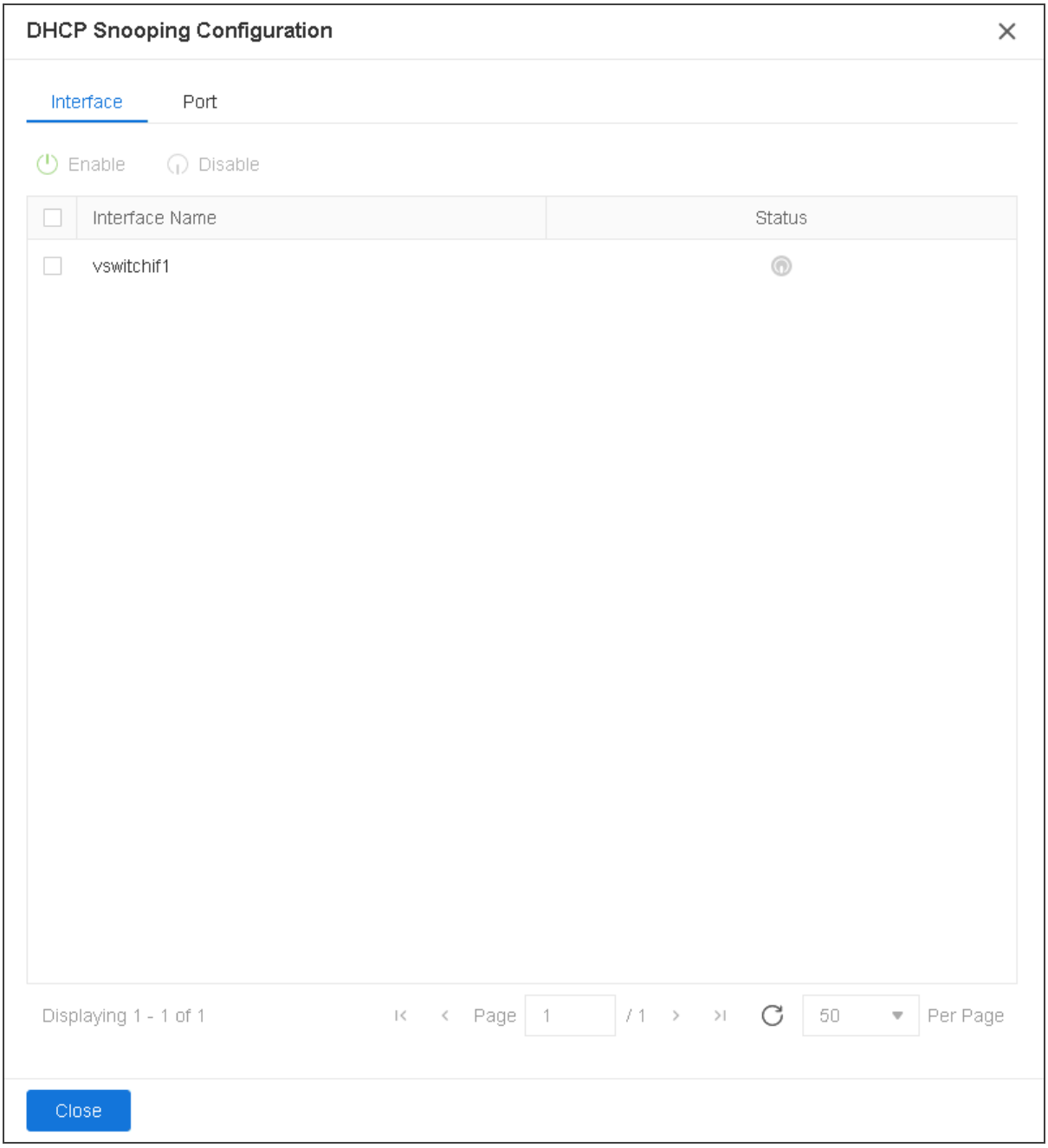
Besides, some malicious attackers send DHCP requests to a DHCP server in succession by forging different MAC addresses, and eventually lead to IP address unavailability to legal users by exhausting all the IP address resources. This kind of attacks is commonly known as DHCP Starvation. The devices can prevent against such attacks by dropping request packets on related ports, setting rate limit or enabling validity check.

The VSwitch interface of the system supports DHCP snooping. This function is disabled by default.

To configure DHCP snooping, take the following steps:

1. Select **Policy > ARP Defense > DHCP Snooping**.

2. Click **DHCP Snooping Configuration**.



3. In the Interface tab, select the interfaces that need the DHCP snooping function.

4. Click **Enable** to enable the DHCP snooping function.

5. In the Port tab, configure the DHCP snooping settings:

    - Validity check: Check if the client's MAC address of the DHCP packet is the same as the source MAC address of the Ethernet packet. If not, the packet will be dropped. Select the interfaces that need the validity check and then click **Enable** to enable this function.

    - Rate limit: Specify the number of DHCP packets received per second on the interface. If the number exceeds the specified value, system will drop the excessive DHCP packets. The value range is 0 to 10000. The default value is 0, i.e., no rate limit. To configure the rate limit, double-click the interface and then specify the value in the **Rate** text box in the pop-up Port Configuration page.

    - Drop: In the Port Configuration page, if the **DHCP Request** check box is selected, the system will drop all of the request packets sent by the client to the server; if the **DHCP Response** check box is selected, system will drop all the response packets returned by the server to the client.

6. Click **OK** to save the settings.

Viewing DHCP Snooping List

With DHCP Snooping enabled, system will inspect all of the DHCP packets passing through the interface, and create and maintain a DHCP Snooping list that contains IP-MAC binding information during the process of inspection. Besides, if the VSwitch, VLAN interface or any other Layer 3 physical interface is configured as a DHCP server, the system will create IP-MAC binding information automatically and add it to the DHCP Snooping list even if DHCP Snooping is not enabled. The bindings in the list contain information like legal users' MAC addresses, IPs, interfaces, ports, lease time, etc.

To view the DHCP snooping list, take the following steps:

1. Select **Policy > ARP Defense > DHCP Snooping**.

2. In the current page, you can view the DHCP snooping list.

Configuring Host Defense

Host Defense is designed to send gratuitous ARP packets for different hosts to protect them against ARP attacks.

To configure host defense, take the following steps:

1. Select **Policy > ARP Defense > Host Defense**.

2. Click **New**.

In the Host Defense page, configure the corresponding options.

Sending Settings	
Interface	Specify an interface that sends gratuitous ARP packets.

Sending Settings	
Excluded Port	Specify an excluded port, i.e., the port that does not send gratuitous ARP packets. Typically it is the port that is connected to the proxied host.
Host	
IP	Specify the IP address of the host that uses the device as a proxy.
MAC	Specify the MAC address of the host that uses the device as a proxy.
Sending Rate	Specify a gratuitous ARP packet that sends rate. The value range is 1 to 10/sec. The default value is 1.

3. Click **OK** to save your settings and return to the Host Defense page.
4. Repeat Step 2 and Step 3 to configure gratuitous ARP packets for more hosts. You can configure the device to send gratuitous ARP packets for up to 16 hosts.

Perimeter Traffic Filtering

Perimeter Traffic Filtering can filter the perimeter traffic based on known risk IP, MAC or Service list, and take logging/block action on the malicious traffic that hits the risk IP, MAC or Service list.

The risk IP list includes the following three types:

- IP Blacklist: The system supports Static IP Blacklist, Blacklist Library, Dynamic IP Blacklist, Real IP Blacklist, and Hit Statistics.
- Service Blacklist: After adding the services to the service blacklist, system will perform the block action to the service until the block duration ends.
- MAC Blacklist: After adding the MAC of the host to the blacklist to prevent users from accessing the network during the specified period.
- IP Reputation list: Retrieve the risk IP (such as Botnet, Spam, Tor nodes, Compromised, Brute-forcer, and so on.) list from the Perimeter Traffic Filtering signature database.
- IP Whitelist: After adding the IP to the IP Whitelist, the system will not block the IP address.
- Global Search: Show the static IP blacklist, blacklist library, dynamic IP blacklist, exception whitelist, service blacklist and IP reputation list entriesof specified IP address .
- Configuration: Blacklist global configuration, including Blacklist Log , Session Rematch and IP Blacklist TCP Reset.

Notes:

- You need to update the IP reputation database before enabling the IP Reputation function for the first time. By default, system will update the database at the certain time everyday, and you can modify the updating settings

according to your own requirements, see "Upgrading System" on Page 1869.

- To upgrade the IP reputation database, install the IP reputation license and reboot. The IP reputation database upgrade function is available only after the device is reboot.

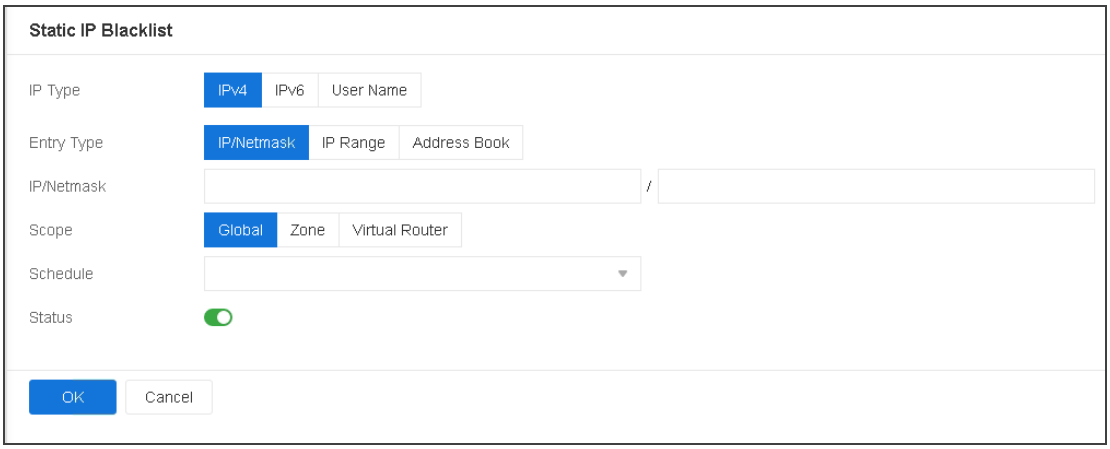
Configuring IP Blacklist

Static IP Blacklist

The static IP blacklist will block specified IP address or prevent hosts from accessing the network during the specified period.

To configure the static IP blacklist, take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > IP Blacklist**.
2. Click **New** in the Static IP Blacklist page.



Configure the corresponding options.

Option	Description
IP Type	Select the address type, including IPv4, IPv6 or User

Option	Description
	Name. When specified as **User Name**, it means to filter, block or control the malicious traffic of the specified user.
Entry Type	Select the address entry type and then type the address.
User Name	When the IP type is specified as "User Name", click the drop-down list to specify the user type and name in the expanded page: • User: Click **AAA Server/Role**, select the AAA server to which the user belongs, and then click the **Select User** drop-down list and select the configured user name or input a user. • User Group: Click **AAA Server/Role**, select the AAA server to which the user group belongs, and then click the **Select User** drop-down list and select the configured user group name or input a user group. • Click **AAA Server/Role**, select the role and search or select the configured role name. **Notes:** Before configuration, please complete the following configuration: create users/user groups and bind IP addresses, create roles and map to users, specify role mapping rules in the AAA server.

Option	Description
Scope	Specify the blacklist applied to global, zone or Virtual Router. When selecting zone or Virtual Router, select the desired entry in the corresponding drop-down list.
Schedule	Specifies a schedule when the blacklist will take effect. Select a desired **schedule** from the Schedule drop-down list.
Status	Specify the status of the static IP blacklist.

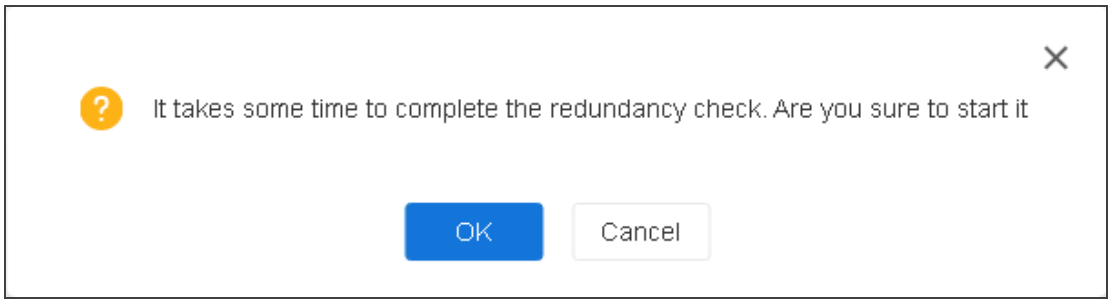
3. Click **OK** to save the settings.

Redundancy Check

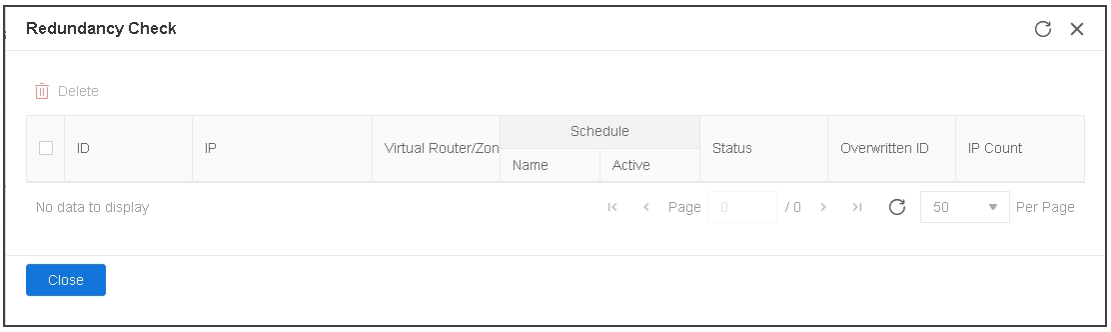
The system supports to check the conflicts among blacklists. You can check whether the black-lists overshadow each other.

To configure the redundancy check, take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > IP Blacklist**.
2. Click **Redundancy Check** in the Static IP Blacklist page. Click **OK** in the following prompt dialog.



3. After the check, system will highlight the policy rule which is overshadowed.



4. To delete an blacklist, select the blacklist you want to delete from the list and click **Delete**.

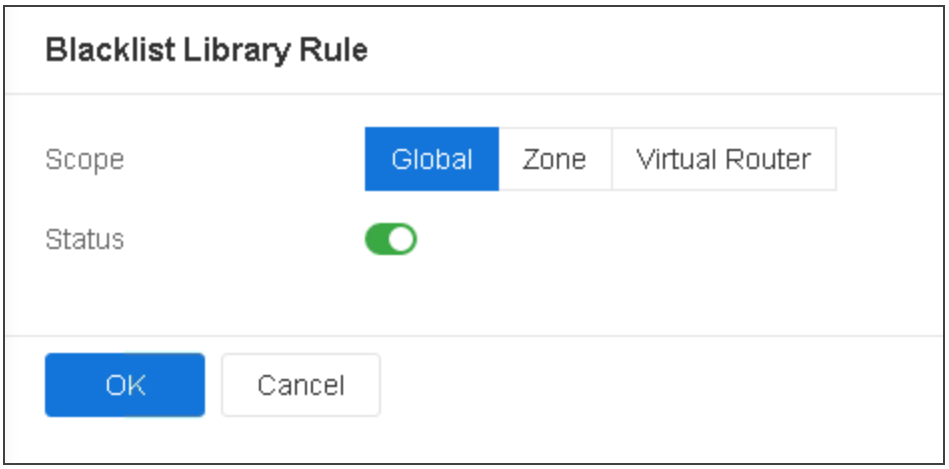
Blacklist Library Rule

The system support to import/export the blacklist library file or update the blacklist from the specified server, and specify the rule of the blacklist library.

To configure the blacklist library rule, take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > IP Blacklist**.

2. Click **New** in the Blacklist Library Rule page.



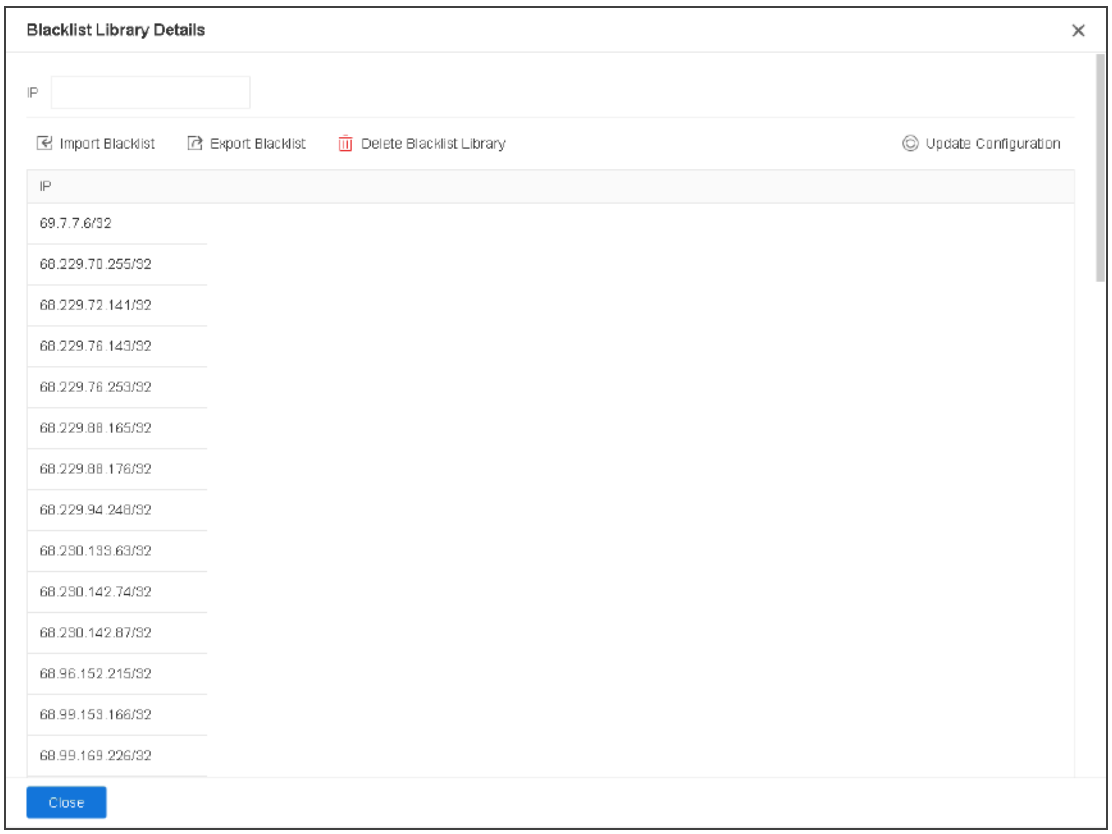
Configure the corresponding options.

Option	Description
Scope	Specify the blacklist applied to global, zone or Virtual Router. When selecting zone or Virtual Router, select the desired entry in the corresponding drop-down list.
Status	Specify the status of the blacklist library rule.

3. Click **OK** to save the settings.

Blacklist Library Details

Click **Blacklist Library Details** to open the Blacklist Library Details page.



To import blacklist library file, take the following steps:

1. Click **Import Blacklist** in the Blacklist Library Details page.
2. Select the import mode, including incremental import and overwrite import.
    - Incremental Import: Import the blacklist library file on the basis of the original file.
    - Overwrite import: Overwrite the original blacklist library file.
3. Click the **Browse** to select the local file to be imported in the File Name area.
4. Click **OK** to save the settings.

To configure auto update, take the following steps:

1. Click **Update Configuration** in the Blacklist Library Details page.
2. Click **Auto Update** to automatically update the blacklist library file from the specified server.

    Configure the corresponding options.

Option	Description
Type	Specifies the time interval for auto update, update at the specified time of every day or the specified time of a specified day during a week.
Server Type	Specifies the server type, including FTP, TFTP, HTTP, and HTTPS.
IP address	If you set the server type to FTP or TFTP, enter the IP address of the server.
URL (Required)	If you set the server type to HTTP or HTTPS, enter the URL of the server in the field. The URL needs to be 1 to 255 characters in length.

Option	Description
	Note: The URL of the HTTP server needs to start with "http://" and the URL of the HTTPS server needs to start with "https://".
Virtual Router (Required)	Specifies the virtual router of the server.
User Name	If you set the server type to FTP, enter the username used to log on to the FTP server.
Password	If you set the server type to FTP, enter the password of the FTP username.
Import Mode	Select the import mode, including incremental import and overwrite import.
File Name (Required)	If you set the server type to FTP or TFTP, enter the name of the file to be imported.

3. Click **OK** to save the settings.
4. You can also click **OK And Update Now** to save the settings and update the blacklist library immediately.

Notes:

- The blacklist library file to be imported or automatically updated needs to be in the TXT or CSV format. (This limit applies only to the FTP or TFTP server).

- The size of the blacklist file to be imported or automatically updated cannot be larger than 20 MB.
- The blacklist library files to be imported or automatically updated will be checked for redundancy in the order of import. If the imported entries are completely covered by the first imported entries, the import will be failed.

You can also perform the following operations:

- Export Blacklist: Click **Export Blacklist** to export blacklist file to local PC.
- Delete Blacklist Library: Click **Delete Blacklist Library** to delete the blacklist file.

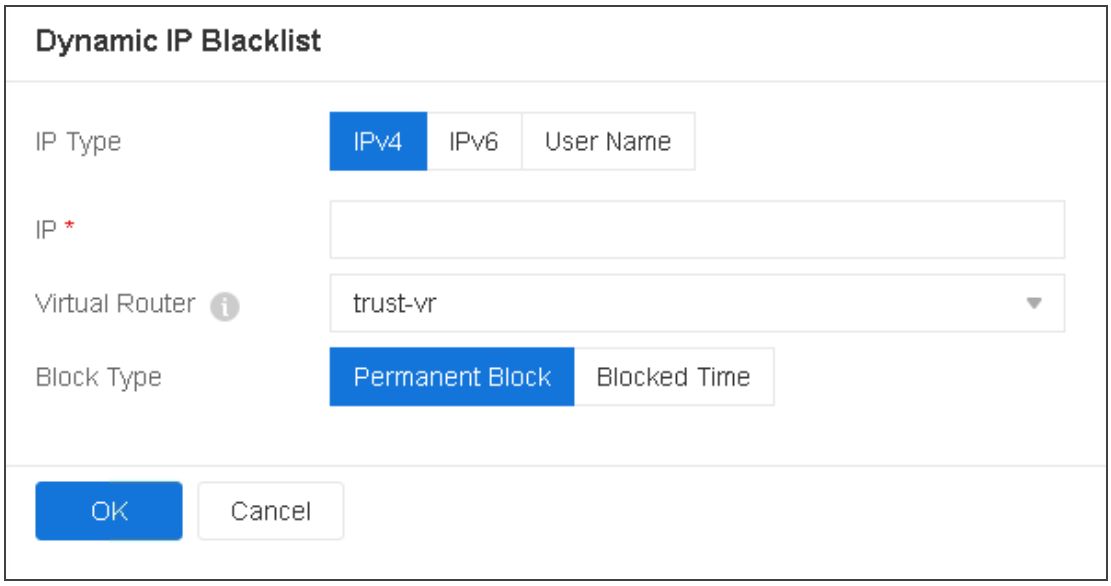
Dynamic IP Blacklist

After adding the IP addresses to the global blacklist, the system will perform the block action to the IP address and service until the block duration ends.

To configure the dynamic IP blacklist , take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > IP Blacklist**.

2. Click **New** in the Dynamic IP Blacklist tab.



Configure the corresponding options.

Option	Description
IP Type	Select the address type, including IPv4, IPv6 or User Name. When specified as **User Name**, it means to filter, block or control the malicious traffic of the specified user.
IP	Type the IP address that you want to block. This IP address can be not only the source IP address, but also the destination IP address.
User Name	When the IP type is specified as "User Name", click the drop-down list to specify the user type and name in the expanded page: • User: Click **AAA Server/Role**, select the AAA server to which the user belongs, and then click the

Option	Description
	Select User drop-down list and select the configured user name or input a user. • User Group: Click **AAA Server/Role**, select the AAA server to which the user group belongs, and then click the **Select User** drop-down list and select the configured user group name or input a user group. • Click **AAA Server/Role**, select the role and search or select the configured role name.  **Notes:** Before configuration, please complete the following configuration: create users/user groups and bind IP addresses, create roles and map to users, specify role mapping rules in the AAA server.
Virtual Router	Select the virtual router where the blocked IP belongs from the drop-down list.
Block Type	Select the block type, including **Permanent Block** and **Blocked Time**. When **Blocked Time** is selected, type the duration during which the IP address will be blocked. The unit is second. The value ranges from 60 to 1,296,000 seconds.

3. Click **OK**.

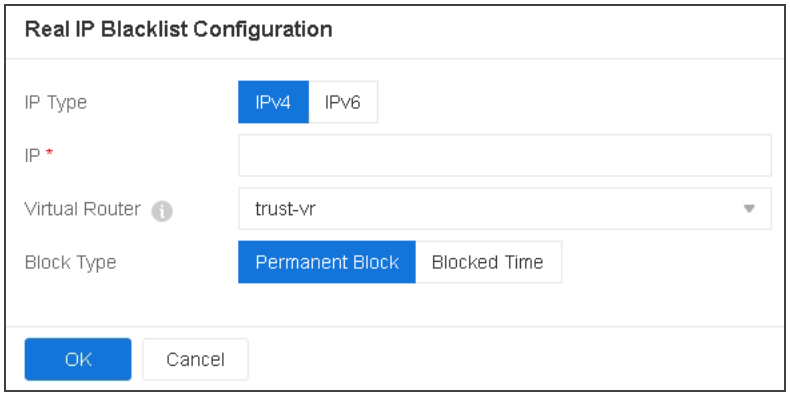
Real IP Blacklist

Generally, you can determine the IP address of the client by checking the HTTP packet. However, if the proxy is configured on the client, the source IP contained in the HTTP packet will be the IP address of the proxy server, rather than the real client IP address. In this case, when an attack is detected, the system blocks the IP address of the proxy server, making all services unavailable. To solve this problem, you can determine the real IP address of the client by parsing the X-Forwarded-For and X-Real-IP fields in the HTTP packet. The X-Forwarded-For field is used to record the real IP address of the client and the IP addresses of the proxy servers of different levels. The X-Real-IP field is only used to record the real IP address of the client.

After adding the real IP address of the client to the Real IP Blacklist, the system will perform the block action to that IP address until the block duration ends.

To configure the Real IP Blacklist, take the following steps:

1. Select **Policy** > **Perimeter Traffic Filtering** > **IP Blacklist**
2. Click **New** in the **Real IP Blacklist** tab.



On the Real IP Blacklist Configuration page, configure the following options.

Option	Description
IP Type	Select the IP type, including IPv4 and IPv6.
IP	Type the IP address to be blocked in the text box. This IP address is the real IP address of the client which is

Option	Description
	parsed by the X-Forwarded-For and X-Real-IP fields in the HTTP packet.
Virtual Router	Select the virtual router where the blocked IP belongs from the drop-down list.
Block Type	Specifies the block type, including **Permanent Block** and **Blocked Time**. **Permanent Block** is the default block type. If **Blocked Time** is selected, type the duration during which the IP address will be blocked. The unit is second. The value ranges from 60 to 1,296,000 seconds.

3. Click **OK**.

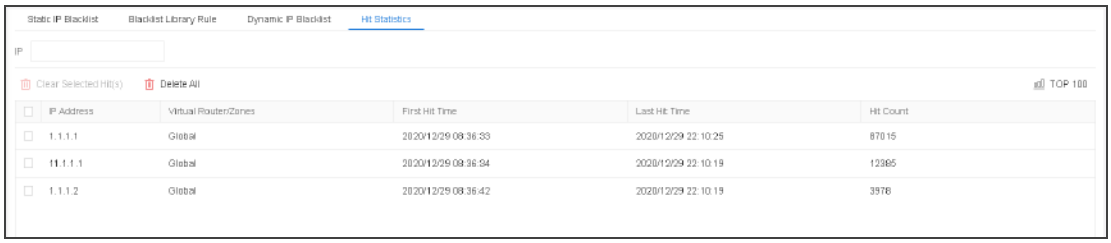
Hit Statics

System supports statistics on blacklist hit counts, you can view all hit entries and TOP100 blacklist entries on the hit statistics page when there is a large number of blacklist entries.

To view a blacklist hit count take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > IP Blacklist**.

2. View all hit entries in the Hit Statics page.



3. Click **TOP 100** to view the TOP 100 hit entries in the Hit Statistics Ranking page.

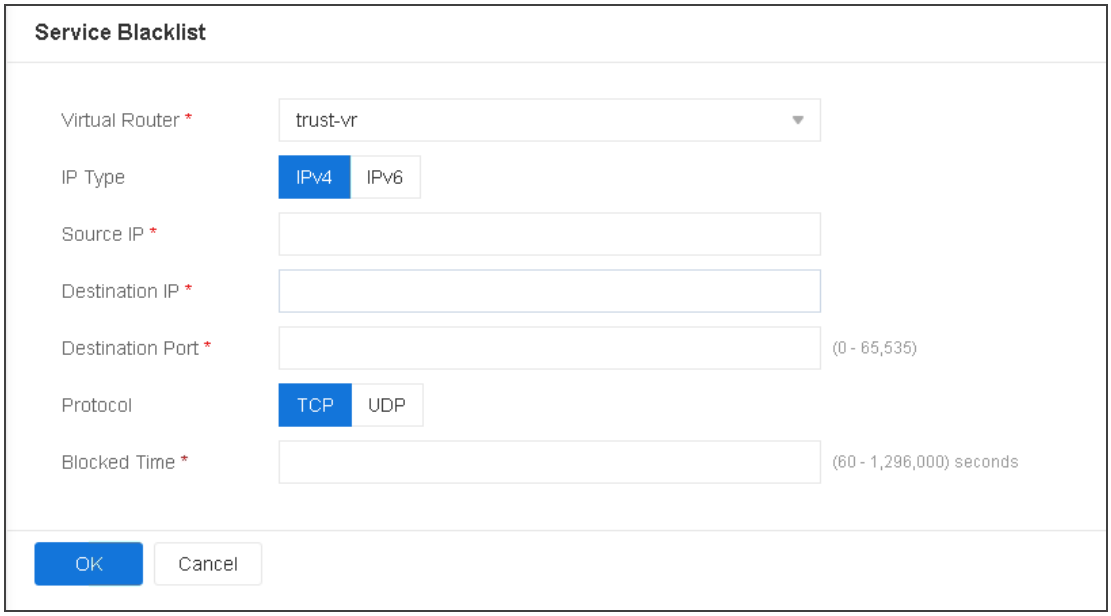
4. Select the items that need to be cleared, click **Clear Selected Hit(s)** to clear the hit statistics of the specified IP. Click **Delete All** to clear all hit statistics.

Notes: After deleting the IP blacklist entry, the corresponding hit statistics will also be cleared.

Service Blacklist

To configure the service blacklist, take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > Service Blacklist**.
2. Click **New**.



Configure the corresponding options.

Option	Description
Virtual Router	Select the virtual router that the IP address belongs to.
IP Type	Select the address type, including IPv4 and IPv6.
Source IP	Type the source IP address of the blocked service. The service block function will block the service from the source IP address to the destination IP address.
Destination IP	Type the destination IP address of the blocked service.
Destination Port	Type the port number of the blocked service.
Protocol	Select the protocol of the blocked service.
Blocked Time	Type the duration that the IP address will be blocked. The unit is second. The value ranges from 60 to 1296000.

3. Click **OK** to save the settings.

MAC Blacklist

To configure the MAC blacklist, take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > MAC Blacklist**.

2. Click **New**.

Configure the corresponding options.

Option	Description
MAC address	Type the MAC address of the host that will be added to the blacklist.
Schedule	Specifies a schedule when the blacklist will take effect. Select a desired **schedule** from the Schedule drop-down list.
Status	Specify the status of the MAC blacklist.

3. Click **OK** to save the settings.

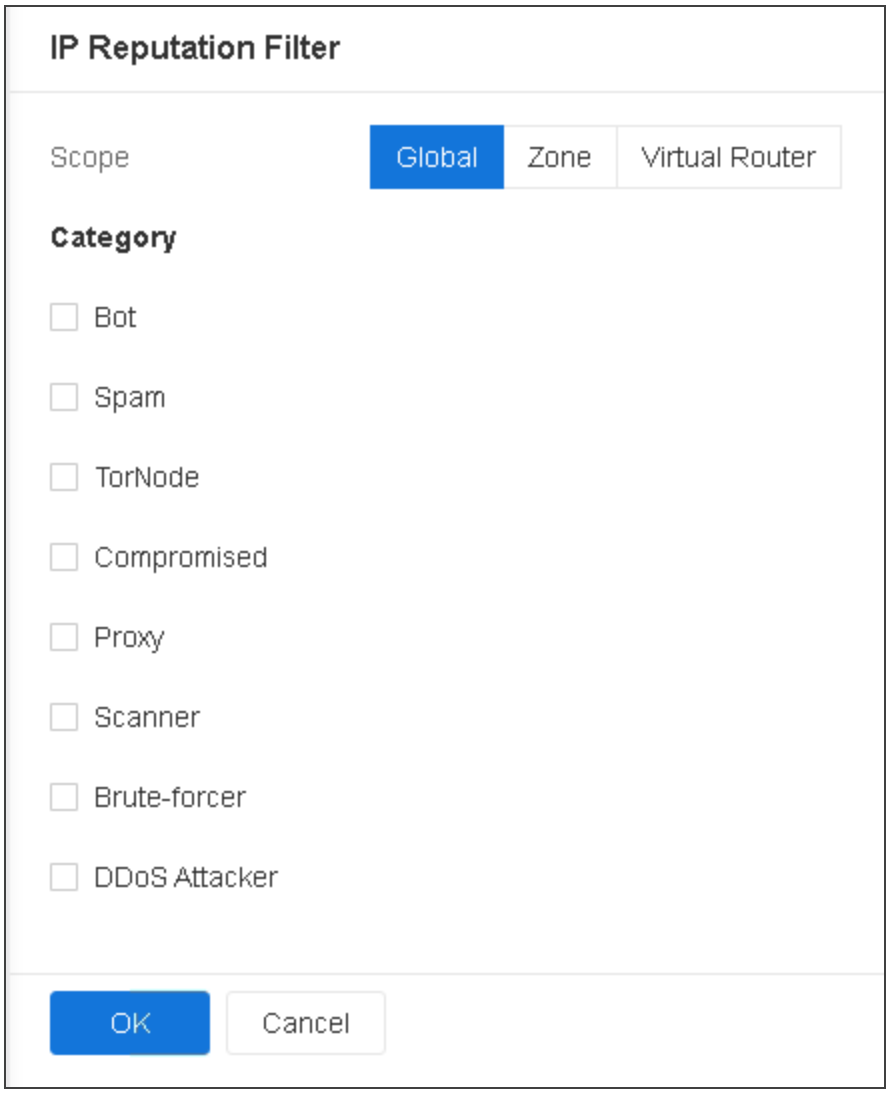
Notes: The configuration of multicast MAC addresses is not supported.

IP Reputation Filtering

To configure the IP Reputation Filtering function, take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > IP Reputation Filtering**.

2. Click **New**.



Configure the corresponding options.

Option	Description
Scope	Specify the blacklist applied to global, zone or Virtual Router. When selecting zone or Virtual Router, select the desired entry in the corresponding drop-down list.

Option	Description
Category	Select the types of risky IPs and block the corresponding IP.

3. Click **OK** to save the settings.

Configuring IP Whitelist

The system supports Global Whitelist and Perimeter Traffic Filtering Whitelist. The Global Whitelist applies to the whole firewall. For the IP addresses on the Global Whitelist, the system bypasses them without performing security checks. The Perimeter Traffic Filtering Whitelist applies to the perimeter traffic filtering function. For the IP addresses on the Perimeter Traffic Filtering Whitelist, the system does not perform perimeter traffic filtering detection. Therefore, it does not block these IPs.

Notes:

- NAT and Traffic Quota functions are not affected by the Global Whitelist.
- After the NAT function is configured, the system performs perimeter traffic filtering detection before and after the NAT translation. if the IP addresses before and after NAT translation are not all added to the Global Whitelist, the traffic may be blocked by the blacklist.
- Some Attack-Defense types of X-Series devices are not affected by the Global Whitelist. These types are: Teardrop、IP Option、IP Fragment、WinNuke、Ping-of-Death、Huge ICMP Packet、UDP Flood，DNS Flood

To configure IP Whitelist, take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > IP WhiteList**.
2. Click **New**.

   Configure the corresponding options.

Option	Description
IP Type	Select the address type, including IPv4 and IPv6.
IP/Netmask	Type the IP address and netmask for the user-defined white list.
Global Whitelist	After this function is enabled, the whitelist takes effect globally.
Perimeter Traffic Filtering Whitelist	Specify that the whitelist applys to All Zones, specified Zones or specified Virtual Routers. When "All Zones" is selected, the whitelist takes effect in all security zones or Virtual Routers (that is, in the perimeter traffic filtering module). When selecting "Zone" or "Virtual Router", you must select a security zone or Virtual Router from the drop-down list. Once specified, the whitelist takes effect in the specified security zone or Virtual Router.

3. Click **OK** to save the settings.

Global Search

To view black/white list entry of specified IP address, take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > Global Search**.

2. Type the IP address, click **Search** to jump to the corresponding blacklist tab to view the corresponding entry.

Configuration

To configure the blacklist global configuration, take the following steps:

1. Select **Policy > Perimeter Traffic Filtering > Configuration**.
2. Click **Enable** button of Blacklist Log to enable the log of blacklist.
3. Click **Enable** button of Session Rematch. When you add, modify or delete the blacklist, the session will match the optimal blacklist again.
4. Click **Enable** button of IP BlackList TCP Reset. After the IP BlackList TCP Reset is enabled, the system will send a TCP-RST packet to the IP address of TCP traffic that hits the blacklist, thus blocking the IP address.

Chapter 12 Threat Prevention

Threat prevention means that the device that can detect and block network threats. By configuring the threat prevention function, Hillstone devices can defend network attacks and reduce losses of the internal network.

Threat protections include:

- Anti Virus: It can detect the common file types and protocol types which are most likely to carry the virus and protect the network from them. Hillstone devices can detect protocol types of HTTP, FTP, HTTPS, SMTP, POP3 IMAP4 and SMB, and the file types of archives (including GZIP, BZIP2, TAR, ZIP and RAR-compressed archives), PE、HTML、MAIL、RIFF、ELF、PDF、MS OFFICE、Raw Data and Others. **Others** means scans the other file, including GIF, BMP, PNG, JPEG, FWS, CWS, RTF, MPEG, Ogg, MP3, wma, WMV, ASF, RM, etc. If SMB protocol type is used, the system supports the filtering and blocking of virus files in break-point resumption scenarios.
- Intrusion Prevention: It can detect and protect mainstream application layer protocols (DNS, FTP, POP3, SMTP, TELNET, MYSQL, MSSQL, ORACLE, NETBIOS), against web-based attacks and common Trojan attacks.
- Attack Defense: It can detect various types of network attacks, and take appropriate actions to protect the Intranet against malicious attacks, thus assuring the normal operation of the Intranet and systems.
- Sandbox protection: It can executes suspicious files in the virtual environment, collect dynamic behaviors of suspicious files, analyze these dynamic behaviors, and determine the validity of files based on the analysis results
- Botnet Prevention: It can detect botnet host in the internal network timely, as well as locate and take other actions according to the configuration, so as to avoid further threat attacks.

The threat protection configurations are based on security zones and policies.

- If a security zone is configured with the threat protection function, system will perform detection on the traffic that is matched to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the threat protection function, system will perform detection on the traffic that is matched to the policy rule you specified, and then respond.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the threat protection configurations in a destination zone is superior to that in a source zone if specified at the same time.

Notes:

- Threat protection is controlled by a license. To use Threat protection, apply and install the Threat Protection（TP） license, 、Anti Virus（AV）license orIntrusion Prevention System（IPS）license.

Threat Protection Signature Database

The threat protection signature database includes a variety of virus signatures, Intrusion prevention signatures, Perimeter traffic filtering signatures, . By default system updates the threat protection signature database everyday automatically. You can change the update configuration as needed. Hillstone devices provide two default update servers: https://update1.hillstonenet.com and https://update2.hillstonenet.com. Hillstone devices support auto updates and local updates. Non-root VSYS does not support updating signature database.

According to the severity, signatures can be divided into three security levels: critical, warning and informational. Each level is described as follows:

- Critical: Critical attacking events, such as buffer overflows.
- Warning: Aggressive events, such as over-long URLs.
- Informational: General events, such as login failures.

Anti-Virus

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

The system is designed with an Anti-Virus that is controlled by licenses to provide an AV solution featuring high speed, high performance and low delay. With this function configured in StoneOS, Hillstone devices can detect various threats including worms, Trojans, malware, malicious websites, etc., and proceed with the configured actions.

Anti-Virus function can detect the common file types and protocol types which are most likely to carry the virus and protect the network from them. Hillstone devices can detect protocol types of HTTP, FTP, HTTPS, SMTP, POP3 IMAP4 and SMB, and the file types of archives (including GZIP, BZIP2, TAR, ZIP and RAR-compressed archives), PE、HTML、MAIL、RIFF、ELF、PDF、MS OFFICE、Raw Data and Others. **Others** means scans the other file, including GIF, BMP, PNG, JPEG, FWS, CWS, RTF, MPEG, Ogg, MP3, wma, WMV, ASF, RM, etc. If SMB protocol type is used, the system supports the filtering and blocking of virus files in break-point resumption scenarios.

If IPv6 is enabled, Anti-Virus function will detect files and protocols based on IPv6. How to enable IPv6, see StoneOS_CLI_User_Guide_IPv6.

The virus signature database contains over 10 million signatures. By default, this database supports both daily auto update and real-time local update. See "Security Policy" on Page 1286.

Notes: Anti-Virus is controlled by license. To use Anti-Virus , apply and install the Anti-Virus （AV）license.

Configuring Anti-Virus

This chapter includes the following sections:

- Preparation for configuring Anti-Virus function
- Configuring Anti-Virus function
- Configuring Anti-Virus global parameters

Preparing

Before enabling Anti-Virus, make the following preparations:

1. Make sure your system version supports Anti-Virus.
2. Import an Anti-Virus license and reboot. The Anti-Virus will be enabled after the rebooting.

Notes:

- You need to update the Anti-Virus signature database before enabling the function for the first time. To assure a proper connection to the default update server, you need to configure a DNS server for StoneOS before updating.
- After Anti-Virus is enabled, system's max concurrent sessions might decrease. For more information about the maximum concurrent sessions, see "The Maximum Concurrent Sessions" on Page 1924.

Configuring Anti-Virus Function

The Anti-Virus configurations are based on security zones or policies.

- If a security zone is configured with the Anti-Virus function, system will perform detection on the traffic that is matched to the binding zone specified in the rule, and then do according to what you specified.
- If a policy rule is configured with the threat protection function, system will perform detection on the traffic that is matched to the policy rule you specified, and then respond.
- The threat protection configurations in a policy rule is superior to that in a zone rule if specified at the same time, and the threat protection configurations in a destination zone is superior to that in a source zone if specified at the same time.
- To perform the Anti-Virus function on the HTTPS traffic, see the policy-based Anti-Virus.

The system also supports binding the anti-virus profile to a ZTNA policy to perform virus detection and processing on the traffic matching the ZTNA policy. For configuration information, refer to Configuring ZTNA Policy.

To realize the zone-based Anti-Virus, take the following steps:

1. Create a zone. For more information, refer to "Security Zone" on Page 169.
2. In the Zone Configuration page, expand Threat Protection.
3. Enable the threat protection you need and select an Anti-Virus rule from the profile drop-down list below; or you can click ⊕ from the profile drop-down list. To create an Anti-Virus rule, see Configuring_Anti-Virus_Rule.
4. Click **OK** to save the settings.

To realize the zone-based Anti-Virus, take the following steps:

1. Create a security policy rule. For more information, refer to "Security Policy" on Page 1286.
2. In the Policy Configuration page, expand the Protection tab.

3. Click the **Enable** button of **Anti-virus**. Then select an Anti-Virus rule from the Profile drop-down list, or you can click ⊕ from the Profile drop-down list to create an Anti-Virus rule.

   For more information, see Configuring_Anti-Virus_Rule.

4. To perform the Anti-Virus function on the HTTPS traffic, you need to enable the SSL proxy function for the above specified security policy rule. System will decrypt the HTTPS traffic according to the SSL proxy profile and then perform the Anti-Virus function on the decrypted traffic.

   According to the various configurations of the security policy rule, system will perform the following actions:

Policy Rule Configurations	Actions
SSL proxy enabled Anti-Virus disabled	System decrypts the HTTPS traffic according to the SSL proxy profile but it does not perform the Anti-Virus function on the decrypted traffic.
SSL proxy enabled Anti-Virus enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the Anti-Virus function on the decrypted traffic.
SSL proxy disabled Anti-Virus enabled	System performs the Anti-Virus function on the HTTP traffic according to the Anti-Virus profile. The HTTPS traffic will not be decrypted and the system will transfer it.

   If the destination zone or the source zone specified in the security policy rule are configured with Anti-Virus as well, system will perform the following actions:

Policy Rule Configurations	Zone Configurations	Actions
SSL proxy enabled Anti-Virus disabled	Anti-Virus enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the Anti-Virus function on the decrypted traffic according to the Anti-Virus rule of the zone.
SSL proxy enabled Anti-Virus enabled	Anti-Virus enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the Anti-Virus function on the decrypted traffic according to the Anti-Virus rule of the policy rule.
SSL proxy disabled Anti-Virus enabled	Anti-Virus enabled	System performs the Anti-Virus function on the HTTP traffic according to the Anti-Virus rule of the policy rule. The HTTPS traffic will not be decrypted and system will transfer it.

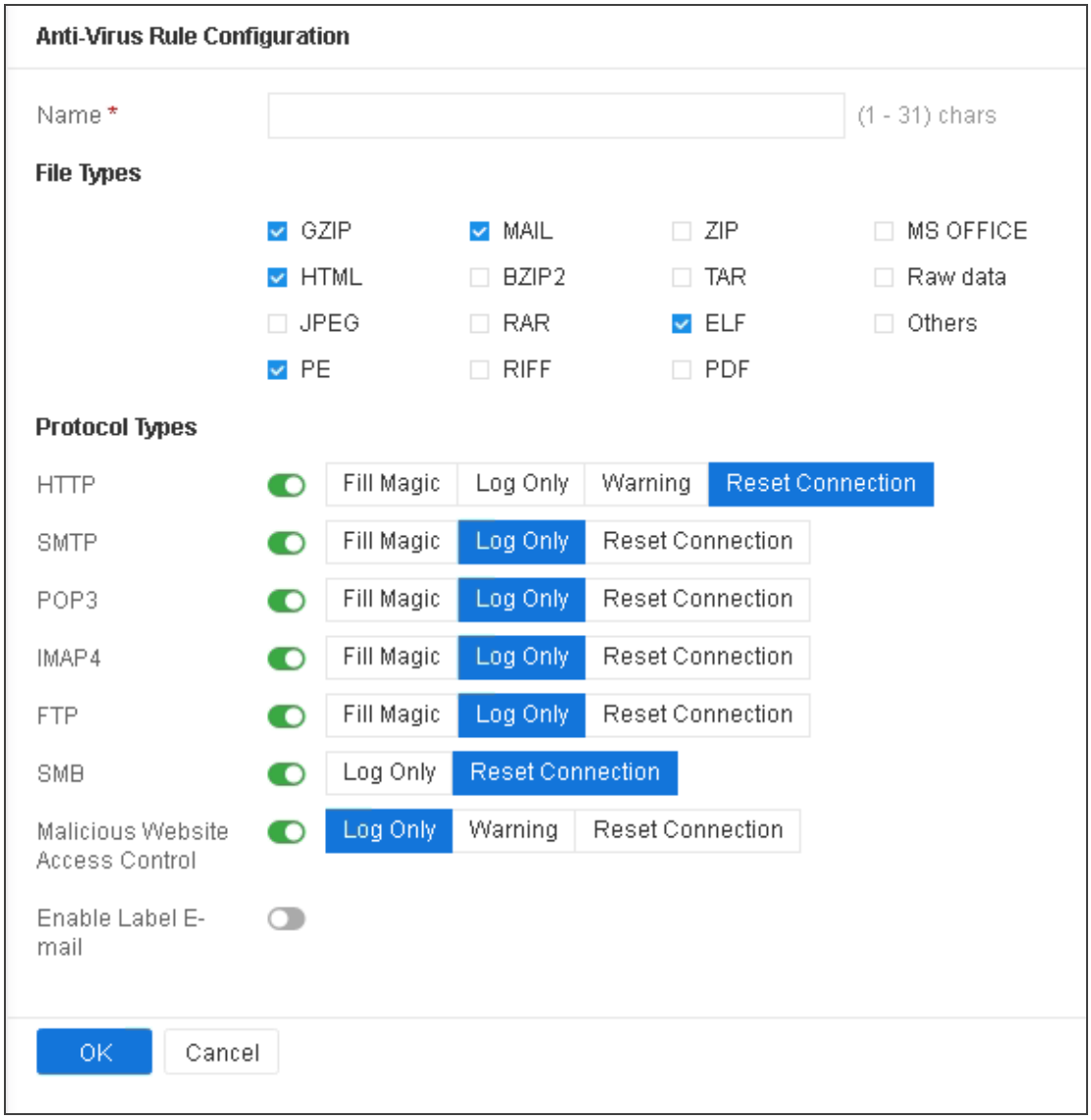
5. Click **OK** to save the settings.

Configuring an Anti-Virus Rule

To configure an Anti-Virus rule, take the following steps:

1. Select **Object > Anti-Virus > Profile**.

2. Click **New**.



In the Anti-Virus Rules Configuration page, enter the Anti-Virus rule configurations.

Option	Description
Name	Specifies the rule name.
File Types	Specifies the file types you want to scan. It can be GZIP,

Option	Description
	JPEG, MAIL, RAR, HTML .etc. **Other** means scans the other file, including GIF, BMP, PNG, JPEG, FWS, CWS, RTF, MPEG, Ogg, MP3, wma, WMV, ASF, RM, etc.
Protocol Types	Specifies the protocol types (HTTP, SMTP, POP3, IMAP4, FTP,SMB) you want to scan and specifies the action the system will take after the virus is found. • Fill Magic - Processes the virus file by filling magic words, i.e., fills the file with the magic words (Virus is found, cleaned) from the beginning to the ending part of the infected section. • Log Only - Only generates log. • Warning - Pops up a warning page to prompt that a virus has been detected. This option is only effective to the messages transferred over HTTP. • Reset Connection - If virus has been detected, system will reset connections to the files.
Malicious Website Access Control	Click the button behind Malicious Website Access Control to enable the function.
Action	Specifies the action the system will take after the malicious website is found. • Log Only - Only generates log.

Option	Description
	• Reset Connection - If a malicious website has been detected, system will reset connections to the files. • Warning - Pops up a warning page to prompt that a malicious website has been detected. This option is only effective to the messages transferred over HTTP.
Enable Label E-mail	If an email transferred over SMTP is scanned, you can enable label email to scan the email and its attachment(s). The scanning results will be included in the mail body, and sent with the email. If no virus has been detected, the message of "No virus found" will be labeled; otherwise information related to the virus will be displayed in the email, including the filename, result and action. Type the end message content into the box. The range is 1 to 128.

3. Click **OK**.

Notes: By default, according to virus filtering protection level, system comes with three default virus filtering rules: predef_low, predef_middle, predef_high. The default rule is not allowed to edit or delete.

Cloning an Anti-Virus Rule

System supports the rapid clone of an Anti-Virus rule. You can clone and generate a new Anti-Virus rule by modifying some parameters of the one current Anti-Virus rule.

To clone an Anti-Virus rule, take the following steps:

1. Select **Object > Anti-Virus > Profile**.
2. Select an Anti-Virus rule in the list.
3. Click the **Clone** button above the list, and the **Name** configuration box will appear below the button. Then enter the name of the new Anti-Virus rule.
4. The cloned Anti-Virus rule will be generated in the list.

Configuring Anti-Virus Global Parameters

The Anti-Virus global parameters configuration includes:

- Enabling / Disabling the Anti-Virus function
- Configuring the decompression control function

Enabling / Disabling the Anti-Virus function

To enable / disable the Anti-Virus function, take the following steps:

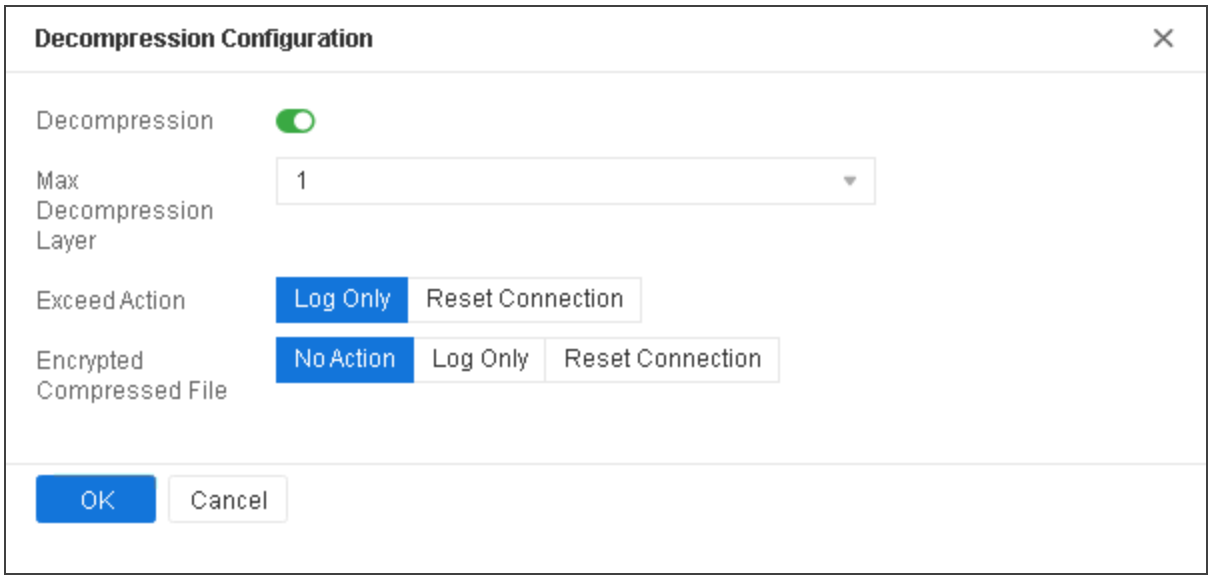
1. Select **Object > Anti-Virus > Configuration**.
2. Click / clear the **Enable** button to enable / disable the Anti-Virus function.
3. In the **Log Aggregate Type**section, select the aggregation type for the anti-virus logs.
    - **Do Not Merge**: The system stores each anti-virus log in the database and does not merge any logs.
    - **Source IP, Destination IP**: Select **Source IP, Destination IP** and specify the **Aggregate Time**. The system merges anti-virus logs of the same source and destination IP based on the specified time granularity, and then stores the merged logs in the database once rather than repeatedly. The number of merged logs is displayed in Attacks Number.
4. Click **OK**.

Notes: The configuration to enable/disable the anti-virus function takes effect only after the system is restarted. The configuration of log aggregation takes effect without restarting the system.

Configuring the Decompression Control Function

After configuring the decompression control function, StoneOS can decompress the transmitted compressed files, and can handle the files that exceed the max decompression layer as well as the encrypted compressed files in accordance with the specified actions. This function supports to decompress the files in type of RAR, ZIP, TAR, GZIP, and BZIP2. To configure the decompression control function, take the following steps:

1. Select **Object > Anti-Virus > Configuration**.
2. Click / clear the **Enable** button to enable / disable the Anti-Virus function.
3. Click **Configuration**.



In the Decompression Configuration page, configure the following options.

Option	Description
Decompression	Click / clear the **Enable** button to enable / disable the decompression function.
Max Decompression Layer	By default, StoneOS can check the files of up to 5 decompression layers. To specify a decompression layer, select a value from the drop-down list. The value range is 1 to 5.
Exceed Action	Specifies an action for the compressed files that exceed the max decompression layer. Select an action from the drop-down list: • Log Only - Only generates logs but will not scan the files. This action is enabled by default. • Reset Connection - Resets connections for the files.
Encrypted Compressed File	Specifies an action for encrypted compressed files: • No Action - Will not take any actions against the files, but might further scan the files according to the Anti-Virus rule. • Log Only - Only generates logs but will not scan the files. • Reset Connection - Resets connections for the files.

4. Click **OK**.

Notes: For compressed files containing docx, pptx, xlsx, jar, and apk formats, when **Exceed Action** is specified as **Reset Connection**, the maximum compression layers should be added one more layer to prevent download failure.

Intrusion Prevention System

IPS, Intrusion Prevention System, is designed to monitor various network attacks in real time and take appropriate actions (like block) against the attacks according to your configuration.

The IPS can implement a complete state-based detection which significantly reduces the false positive rate. Even if the device is enabled with multiple application layer detections, enabling IPS will not cause any noticeable performance degradation. Besides, StoneOS will automatically update the signature database every day by default to assure its integrity and accuracy.

- IPS will support IPv6 address if the IPv6 function is enabled.
- By integrating with the SSL proxy function, IPS can monitor the HTTPS traffic.

The protocol detection procedure of IPS consists of two stages: signature matching and protocol parse.

- Signature matching: IPS abstracts the interested protocol elements of the traffic for signature matching. If the elements are matched to the items in the signature database, system will process the traffic according to the action configuration. This part of detection is configured in the **Select Signature** section.
- Protocol parse: IPS analyzes the protocol part of the traffic. If the analysis results show the protocol part containing abnormal contents, system will process the traffic according to the action configuration. This part of detection is configured in the **Protocol Configuration** section.

Notes: Intrusion Prevention System is controlled by a license. To use Threat protection, apply and install the Intrusion Prevention System (IPS) license.

Signatures

The IPS signatures are categorized by protocols, and identified by a unique signature ID. The signature ID consists of two parts: protocol ID (1st bit or 1st and 2nd bit) and attacking signature

ID (the last 5 bits). For example, in ID 605001, "6" identifies a Telnet protocol, and "00120" is the attacking signature ID. The 1st bit in the signature ID identifies protocol anomaly signatures, while the others identify attacking signatures. The mappings between IDs and protocols are shown in the table below:

ID	Protocol	ID	Protocol	ID	Protocol	ID	Protocol
1	DNS	7	Other-TCP	13	TFTP	19	NetBIOS
2	FTP	8	Other-UDP	14	SNMP	20	DHCP
3	HTTP	9	IMAP	15	MySQL	21	LDAP
4	POP3	10	Finger	16	MSSQL	22	VoIP
5	SMTP	11	SUNRPC	17	Oracle	-	-
6	Telnet	12	NNTP	18	MSRPC	-	-

In the above table, Other-TCP identifies all the TCP protocols other than the standard TCP protocols listed in the table, and Other-UDP identifies all the UDP protocols other than the standard UDP protocols listed in the table.

Configuring IPS

This chapter includes the following sections:

- Preparation for configuring IPS function
- Configuring IPS function

Preparation

Before enabling IPS, make the following preparations:

1. Make sure your system version supports IPS.
2. Import an Intrusion Prevention System (IPS) license and reboot. The IPS will be enabled after the rebooting.

Notes: After IPS is enabled, system's max concurrent sessions might decrease. For more information about the maximum concurrent sessions, see "The Maximum Concurrent Sessions" on Page 1924.

Configuring IPS Function

The IPS configurations are based on security zones or policies.

- To perform the IPS function on the HTTPS traffic, see the policy-based IPS.

The system also supports binding the IPS profile to a ZTNA policy to perform IPS detection and processing on the traffic matching the ZTNA policy. For configuration information, refer to Configuring ZTNA Policy.

To realize the zone-based IPS, take the following steps:

1. Create a zone. For more information, refer to "Security Zone" on Page 169.
2. In the Zone Configuration page, expand Threat Protection.

3. Enable the IPS you need and select an IPS rules from the profile drop-down list below, or you can click ⊕ from the profile drop-down list below. To create an IPS rule, see Configuring_an_IPS_Rule.

4. Click a direction (Inbound, Outbound, Bi-direction). The IPS rule will be applied to the traffic that is matched with the specified security zone and direction.

To realize the policy-based IPS, take the following steps:

1. Create a policy rule. For more inform action, refer to "Security Policy" on Page 1286.

2. In the Policy Configuration page, expand Protection.

3. Click the **Enable** button of **IPS**. Then select an IPS rule from the Profile drop-down list, or you can click ⊕ from the Profile drop-down list to create an IPS rule. For more information, see Configuring_an_IPS_Rule.

4. To perform the IPS function on the HTTPS traffic, you need to enable the SSL proxy function for the above specified security policy rule. System will decrypt the HTTPS traffic according to the SSL proxy profile and then perform the IPS function on the decrypted traffic.

   According to the various configurations of the security policy rule, system will perform the following actions:

Policy Rule Configurations	Actions
SSL proxy enabled IPS disabled	System decrypts the HTTPS traffic according to the SSL proxy profile but it does not perform the IPS function on the decrypted traffic.
SSL proxy	System decrypts the HTTPS traffic according to the SSL

Policy Rule Configurations	Actions
enabledIPS enabled	proxy profile and performs the IPS function on the decrypted traffic.
SSL proxy disabled IPS enabled	System performs the IPS function on the HTTP traffic according to the IPS profile. The HTTPS traffic will not be decrypted and system will transfer it.

If the destination zone or the source zone specified in the security policy rule is configured with IPS as well, system will perform the following actions:

Policy Rule Configurations	Zone Configurations	Actions
SSL proxy enabled IPS disabled	IPS enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the IPS function on the decrypted traffic according to the IPS rule of the zone.
SSL proxy enabled IPS enabled	IPS enabled	System decrypts the HTTPS traffic according to the SSL proxy profile and performs the IPS function on the decrypted traffic according to the IPS rule of the policy rule.
SSL proxy disabled IPS enabled	IPS enabled	System performs the IPS function on the HTTP traffic according to the IPS rule of the policy rule. The HTTPS traffic will not be decrypted and system will

Policy Rule Configurations	Zone Configurations	Actions
		transfer it.

5. Click **OK** to save the settings.

Configuring an IPS Rule

System has three default IPS rules: **predef_default** , **predef_loose** and **predef_critical**.

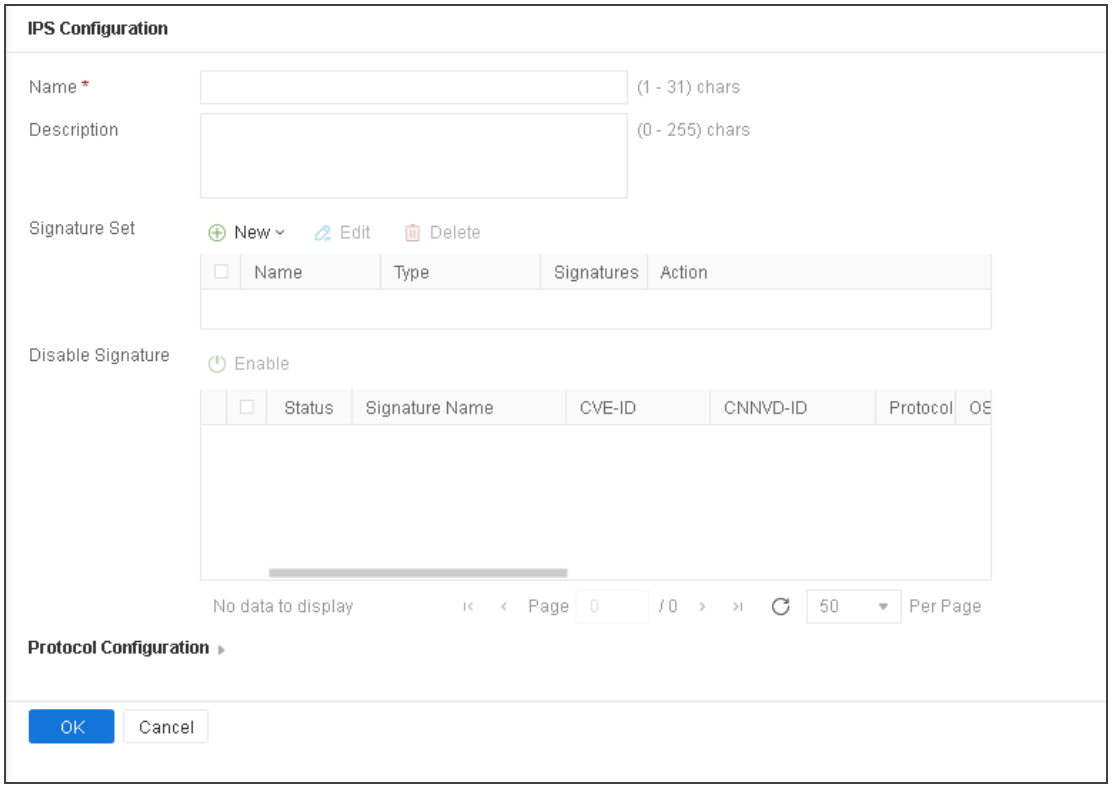
- The **predef_default** rule is configured with IPS signatures of medium and high confidence levels, this rule can be used to detect threats and perform the default rule action.
- The **predef_loose** rule is configured with all the IPS signatures and its default action is log only.
- The **predef_critical** rule is configured with IPS signatures of the latest high-risk attacks and its default action is reset.

The system supports up to 64 user-defined IPS rules and each non-root VSYS supports up to 4 user-defined IPS rules.

To configure an IPS rule, take the following steps:

1. Select **Object > Intrusion Prevention System > Profile**.

2. Click **New** to create a new IPS rule. To edit an existing one, select the check box of this rule and then click **Edit**. To view it, click the name of this rule.



3. Type the name into the Rule name box.

4. Type the description information into the **Description** text box.

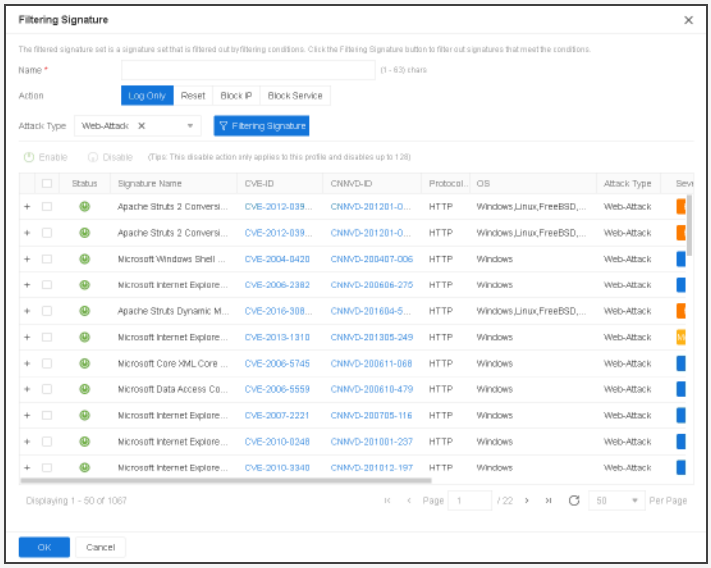
5. In the **Signature Set** area, the existing signature sets and their settings will be displayed in the table. Select the desired signature sets. You can also manage the signature sets, including **New**, **Edit**, and **Delete**. When creating a new signature set rule, you can select **Filtering Signature** or **Selection Signature** as needed to filter and retrieve the signature database to select the desired signature sets.

    - Filtering Signature: Filter signature sets by certain filter conditions. Click the **Filter Signature** button to search for the signatures you want. In this way, you can quickly select the signatures that have been classified by system.

- Selection Signature: Select a particular signature set from the signature database. In this way, you can quickly select a particular signature.

6. Click New to create a new signature set rule.

Option	Description
There are two methods: **Filtering Feature** and **Selection Feature**. Creating a new signature set contains: • Name: Specify the name of signature. • Action: Specify the action performed on the abnormal traffic that match the signature set.	
Methods	
Filter	System categorizes the signatures according to the following aspects (aka main categories): affected OS, attack type, protocol, severity, confidence, released year, affected application, and bulletin board. A signature can be in several subcategories of one main category. For example, the signature of ID 105001 is in the Linux subcategory, the FreeBSD subcategory, and Other Linux subcategory at the same time. With Filter selected, system displays the main categories and subcategories above. You can select the subcategories to choose the signatures in this subcategory. As shown below, after selecting the Web Attack subcategory in the Attack Type main category, system will choose the signatures related to this subcategory. To view the detailed

Option	Description
	information of these chosen signatures, you can click the ID in the table. Click **Disable** or **Enable** button to disable or re-enable the signature. The enabled/disabled state here is only for the current profile, but the global state is not affected.  When selecting main category and subcategory, note the following matters: • You can select multiple subcategories of one main category. The logic relation between them is OR. • The logic relation between each main category is AND. • For example, you have selected Windows and Linux in OS and select HIGH in Severity. The chosen signatures are those whose severity is high

Option	Description
	and meanwhile whose affected operating system is either Windows or Linux.
Action	
Log Only	Record a log.
Reset	Reset connections (TCP) or sends destination unreachable packets (UDP) and also generate logs.
Block IP	Block the IP address of the attacker. Specify a block duration. The value range is 60 to 3600 seconds, and the default value is 60.
Block Service	Block the service of the attacker. Specify a block duration. The value range is 60 to 3600 seconds, and the default value is 60.
Note: You create several signature sets and some of them contain a particular signature. If the actions of these signature sets are different and the attack matches this particular signature , system will adopt the following rules: • Always perform the stricter action on the attack. The signature set with stricter action will be matched. The strict level is: Block IP > Block Service > Rest > Log Only. If one signature set is Block IP with 15s and the other is Block Service with 30s, the final action will be Block IP with 30s. • The action of the signature set created by Search Condition has higher priority than the action of the signature set created by Fil-	

Option	Description
ter.	

7. Click **OK** to complete signature set configurations.
8. In the Disabled Signature area, the signatures that are Disabled in the template will be shown. Select one or more signatures, and then click the **Enable** button to re-enable the signature.
9. In the Password Protect section, enable the Weak Password Detection function by clicking the **Enable** button. Then, the system checks the strength of the plaintext password which is set under the FTP/Telnet/POP3/IMAP/SMTP protocols in this profile. The password is detected as weak if it meets the conditions configured in the Weak Password Detection section. In this case, the system issues an alarm log to prevent potential security risks caused by a weak password. Click **Configure** to configure the detection parameters of the weak password.

Configure the detection parameters of the weak password

Option	Description
Password Length	Specify the length criterion of the password. If a password is shorter than the length criterion, it will be detected as a weak password. The default length criterion is 6 characters. You can specify the password length criterion from 6 characters to 50 characters.
Password Character Type	Specify how many character types should be covered in the password. There are four types of characters: digits, uppercase letters, lowercase letters, and symbols. If the character types covered in a password are less than the specified number, the password will be detected as a

Option	Description
	weak password. By default, the system will detect the password containing less than 2 character types as a weak password and you can specify up to 4 character types for the detection of the password character type.
Other situations:	In the following situations, the password will be detected as a weak password: User Name Equals Password, Continuous Character Detection, FTP Anonymous Login Detection. • **User Name Equals Password**: The password that equals the user name will be detected as a weak password after the detection function is enabled. • **Continuous Character Detection**: After this detection is enabled, a password that has less than 10 characters, among which at least 8 characters are the same or in consecutive sequence, will be detected as a weak password, such as 1aaaaaaaa, 1abcdefgh, a87654321. • **FTP Anonymous Login Detection**: When you log in anonymously through FTP, the system identifies your password as a weak password.
Specify Weak Password	You can specify the weak passwords. If a password matches the specified weak password, the system will consider the password as a weak one. You can specify up to 100 weak passwords.

10. In the Password Protect section, you can configure to block the brute force attacks under the FTP/MSRPC/POP3/SMTP/SUNRPC/Telnet/IMAP/SSH/LDAP/SMB/ VNC/RDP protocol.

To configure the protocol ， click the Enable button behind the protocol.

Option	Description
FTP/MSRPC/ POP3/SMTP/ SUNRPC/Tel-net/ IMAP/SSH/ LDAP/SMB/ VNC/RDP	**Action for Brute-force**: If the login attempts per 5 minutes fail for the times specified by the threshold, system will identify the attempts as an intrusion and take an action according to the configuration. Click the **Enable** button to enable brute-force. • Login Threshold per 5 Mins: Specifies a permitted authentication/login failure count per 5 minutes. • Action: Block the IP address of the attacker • Block Time: Specifies the block duration. Default value: 60. Valid values: 60 to 3600. Unit: Second. • Time Unit: If you want to specify a longer blocking duration, you can select a greater duration unit ("hour" or "day") , or you can select "permanent" to permanently block the IP address or the service of the attacker.

11. In the Rebound Shell Detection area, click ‣ and configure the rebound shell detection function.

Option	Description
Rebound Shell Detection	Click the enable button to enable Rebound Shell Detection. With this function enabled, the system detects and

Option	Description
	defends against rebound shell attacks. If a rebound shell attack is detected, the system will defend it based on user-defined actions.
Action	Specifies the defend action against the rebound shell attacks. • Log Only - The system only generate logs when it detects the rebound shell attacks. • Reset - When a rebound shell attack is detected, the system resets connection (TCP) or sends destination unreachable packets (UDP), and then generates logs. • Block IP - Block the IP address of the rebound shell attacker and configure the block time. • Block Time: The default value is 60 seconds. The value range is from 60 to 3600 seconds. If longer block duration is needed, you can select bigger time unit, such as Hour or Day. You can also block the attacker IP permanently.
Mode	Specifies the detect and defend mode for the rebound shell attacks. • Low Misreport: When the system scans to detect keywords of the rebound shell attack, logs are

Option	Description
	reported only when the keywords are hit more than four time. This mode can be used in scenarios where high system performance is required. • High Detection: When the system scans to detect keywords of the rebound shell attack, logs are reported when the keywords are hit more than twice. This mode can be used in scenarios with high requirements for attack detection.

12. In the Protocol Configuration area, click ▸. The protocol configurations specify the requirements that the protocol part of the traffic must meet. If the protocol part contains abnormal contents, system will process the traffic according to the action configuration. System supports the configurations of HTTP, DNS, FTP, MSRPC, POP3, SMTP, SUNRPC, and Telnet.

In the HTTP tab, configure the following settings:

Option	Description
HTTP	**Max Scan Length**: Specify the maximum length of scanning when scanning the HTTP packets. **Banner Detection**: Click the **Enable** button to enable protection against HTTP server banners. • Banner information - Type the new information into the box that will replace the original server banner information. **Protocol Anomaly Detection**: Click **Enable** to analyze the

Option	Description
	HTTP packets. If abnormal contents exist, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max URI Length**: Specify a max URI length for the HTTP protocol. If the URI length exceeds the limitation, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Allowed Methods**: Specify the allowed HTTP methods.

To protect the Web server, configure Web Server in the HTTP tab.

Protecting the Web server means system can detect the following attacks: SQL injection, XSS injection, external link check, ACL, and HTTP request flood and take actions when detecting them. A pre-defined Web server protection rule named **default** is built in. By default, this protection rule is enabled and cannot be disabled or deleted.

Configure the following settings to protect the Web server:

Option	Description
Name	Specify the name of the Web server protection rule.
Configure Domain	Specify domains protected by this rule. Click the link and the Configure Domain page will appear. Enter the domain names in the **Domain** text box. At most 5 domains can be configured. The traffic to these domains will be checked by the protection rule. The domain name of the Web server follows the longest match rule from the back to the front. The traffic that does not match any rules will match the default Web server. For example, you have configured two protection rules: **rule1 and rule2**. The domain name in rule1 is abc.com. The domain name in rule2 is email.abc.com. The traffic that visits news.abc.com will match rule1, the traffic that visits www.e-mail.abc.com will match rule2, and the traffic that visits www.abc.com.cn will match the default protection rule.
Sensitive File Scan	Select Enable to enable the Sensitive File Scan function for Web servers. In Sensitive File Scan attacks, an attacker traverses the sites in the Web server by using a file scanning tool. This way, the attacker can obtain sensitive information of the Web server, such as the directory structure, back-

Option	Description
	ground files, and backup files. If an attacker attempts to scan sensitive files on the Web server, the Web server returns a large number of response packets with the status code "404". In this case, the system counts the number of 404 responses returned by the Web server per minute. ① If the number is greater than 10, the system parses the URLs in all HTTP requests and matches them with the built-in sensitive file dictionary. If the number of times that the parsed URL matches the sensitive file dictionary exceeds the specified threshold, the system performs the user-specified protection actions. The specified actions can be Log Only, Reset, Block IP, or Block Service. ②If the number is equal to or greater than 100, the system determines the behavior as a sensitive file scanning attack and performs the specified protection action. • Threshold: Specifies the threshold for the system to defend against sensitive file scanning attacks. If the number of times that URL paths match sensitive file dictionaries per minute exceeds the threshold, the system performs the user-specified protection actions. Default value: 10. Valid values: 10 to 100. Unit: times/min.

Option	Description

	• Action: Specifies the protection action for the system to defend against sensitive file scanning attacks: Log Only, Block IP, or Block Service.
	  • Log Only: record a log.
	  • Reset: Reset connections (TCP) or sends destination unreachable packets (UDP) and also generate logs.
	  • Block IP: Block the IP address of the attacker and specify a block duration. Default value: 60. Valid values: 60 to 3600. Unit: Second. If you want to specify a longer blocking duration, you can select a greater duration unit ("hour" or "day") , or you can select "permanent" to permanently block the attacker's IP address of the attacker.
	  • Block Service: Block the service of the attacker and specify a block duration. Default value: 60. Valid values: 60 to 3600. Unit: Second. If you want to specify a longer blocking duration, you can select a greater duration unit ("hour" or "day") , or you can select "permanent" to

Option	Description
	permanently block the service of the attacker.
High Frequency Access Control	Click the Enable button to enable the High Frequency Access Control feature. When this function is enabled, system will block the traffic of this IP address, whose access frequency exceeds the threshold. ◦ Threshold: Specifies the maximum number of times a single source IP accesses the URL path per minute. When the frequency of a source IP address exceeds this threshold, system will block the flow of the IP. The value ranges from 1 to 65535 times per minute. ◦ URL Path: Click the link and the URL Page Configuration page appears. Click **New** and enter the URL path in the **Path** text box. After the configuration, all paths that contain the name of the path are also counted. System accesses the frequency statistics for HTTP requests that access these paths. If the access frequency of the HTTP request exceeds the threshold, the source IP of the request is blocked, and the IP will not be able to access the Web server. For example: configure'/home/ab', system will perform a fre-

Option	Description
	quency check on the 'access/home/ab/login' and '/home/BC/login' HTTP requests. URL path does not support the path format which contains the host name or domain name, for example: you can not configure www.baidu.-com/home/login.html, you should configure '/ home / login.html', and 'www.baidu.com' should be configured in the corresponding Web server domain name settings. You can configure up to 32 URL paths. The length of each path is in the range of 1-255 characters.
SQL Injection Protection	Click the Enable button to enable SQL injection check. • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. • Sensitivity: Specifies the sensitivity for the SQL injection protection function. The higher the sensitivity is, the lower the false negative rate is.

Option	Description
	• Check point: Specifies the check point for the SQL injection check. It can be Cookie, Cookie2, Post, Referer or URI.
XSS Injection Protection	Click the Enable button box to enable XSS injection check for the HTTP protocol. • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. • Sensitivity: Specifies the sensitivity for the XSS injection protection function. The higher the sensitivity is, the lower the false negative rate is. • Check point: Specifies the check point for the XSS injection check. It can be Cookie, Cookie2, Post, Referer or URI.
External Link Check	Click the Enable button to enable external link check for the Web server. This function controls the resource reference from the external sites. • External link exception: Click this link, and the

Option	Description
	External Link Exception Configuration page will appear. All the URLs configured on this page can be linked by the Web sever. At most 32 URLs can be specified for one Web server. • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends destination unreachable packets (UDP) and also generate logs.
Hotlinking Check	Click the Enable button to enable Hotlinking Check. System checks the headers of the HTTP packets and obtains the source site of the HTTP request. If the source site is in the Hotlinking Exception list, system will release it; otherwise, log or reset the connection. Thus controlling the Web site from other sites and to prevent chain of CSRF (Cross Site Request Forgery cross-site request spoofing) attacks occur. • Hotlinking Exception: Click the 'Hotlinking Exception ' to open the <Hotlinking Exception Configuration> page, where the configured URL can refer to the other Web site. Each Web server can be configured with up to 32 URLs. • Action: Specify the action for the HTTP request for the chaining behavior, either "Log only" or "Reset". “

Option	Description
Iframe check	Click the Enable button to enable iframe checking. System will identify if there are hidden iframe HTML pages by this function, then log it or reset its link. After iframe checking is enabled, system checks the iframe in the HTML page based on the specified iframe height and width, and when any height and width is less than or equal to the qualified value, system will identify as a hidden iframe attack, record, or reset connection that occurred. • Height: Specifies the height value for the iframe, range from 0 to 4096. • Width: Specifies the width value of the iframe, range from 0 to 4096. • Action: Specify the action for the HTTP request that hides iframe behavior, which is 'Only logged' or 'Reset'. Log Only - Record a log. Reset - Reset connections (TCP) or sends destination unreachable packets (UDP) and also generate logs.
ACL	Click the Enable button to enable access control for the Web server. The access control function checks the upload paths of the websites to prevent the mali-

Option	Description
	cious code uploading from attackers. • ACL: Click this link, the ACL Configuration page appears. Specify websites and the properties on this page. "Static" means the URI can be accessed statically only as the static resource (images and text), otherwise, the access will handle as the action specified (log only/reset); "Block" means the resource of the website is not allowed to access. • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends destination unreachable packets (UDP) and also generate logs.
HTTP Request Flood Protection	Select the Enable check box to enable the HTTP request flood protection. Both IPv4 and IPv6 address are supported. • Request threshold: Specifies the request threshold. For the protected domain name, when the number of HTTP connecting request per second reaches the threshold and this lasts 20 seconds, system will treat it as a HTTP request flood attack, and will enable the HTTP request flood protection. • When the number of HTTP connecting request

Option	Description
	per second by the object reaches the threshold and this lasts 20 seconds, system will treat it as a HTTP request flood attack by this object, and will enable the HTTP request flood protection. • x-forwarded-for: Select None, system will not use the value in x-forwarded-for as the statistic object. Select First, system will use the first value of the x-forwarded-for field as the statistic object. Select Last, system will use the last value of the x-forwarded-for field as the statistic object. Select All, system will use all values in x-forwarded-for as the statistic object. • x-real-ip: Select whether to use the value in the x-real-ip field as the statistic field. When the HTTP request flood attack is discovered, you can make the system take the following actions: • Authentication: Specifies the authentication method. System judges the legality of the HTTP request on the source IP through the authentication. If a source IP fails on the authentication, the current request from the source IP will be blocked. The available authentication

Option	Description
	methods are: • No Authentication: The system does not authenticate the source IP of the HTTP request. • Auto (JS Cookie): The Web browser will finish the authentication process automatically. • Auto (Redirect): The Web browser will finish the authentication process automatically. • Manual (Access Configuration): The initiator of the HTTP request must confirm by clicking OK on the returned page to finish the authentication process. • Manual (CAPTCHA): The initiator of the HTTP request must be confirmed by entering the authentication code on the returned page to finish the authentication process. • Crawler-friendly: If this button is clicked, system will not authenticate to the crawler. • Request limit: Specifies the request limit for the

Option	Description
	HTTP request flood protection. After configuring the request limit, system will limit the request rate of each source IP. If the request rate is higher than the limitation specified here and the HTTP request flood protection is enabled, system will handle the exceeded requests according to the action specified (Block IP/Reset). To record a log, click the Record log enable button. • Proxy limit: Specifies the proxy limit for the HTTP request flood protection. After configuring the proxy limit, system will check whether each source belongs to the each source IP proxy server. If belongs to, according to configuration to limit the request rate. If the request rate is higher than the limitation specified here and the HTTP request flood protection is enabled, system will handle the exceeded requests according to the action specified (Block IP/Reset). To record a log, click the Record log enbale button. • White List: Specifies the white list for the HTTP request flood protection. The source IP added to the white list will not check the HTTP request flood protection.

In the DNS tab, configure the following settings:

Option	Description
DNS	**Max Scan Length**: Specify the maximum length of scanning when scanning the DNS packets. **Protocol Anomaly Detection**: Select **Enable** to analyze the DNS packets. If abnormal contents exist, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or send the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration.

In the FTP tab, configure the following settings:

Option	Description
FTP	**Max Scan Length**: Specify the maximum length of scanning when scanning the FTP packets. **Banner Detection**: Click the Enable button to enable protection against FTP server banners. • Banner Information: Type the new information into the box that will replace the original server banner information **Protocol Anomaly Detection**: Select **Enable** to analyze the FTP packets. If abnormal contents exist, you can: • Action: Log Only - Record a log. Rest - Reset con-

Option	Description
	nections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max Command Line Length**: Specifies a max length (including carriage return) for the FTP command line. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration **Max Response Line Length**: Specifies a max length for the FTP response line.If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block dur-

Option	Description
	ation.

In the MSRPC tab, configure the following settings:

Option	Description
MSRPC	**Max Scan Length**: Specify the maximum length of scanning when scanning the MSRPC packets. **Protocol Anomaly Detection**: Select **Enable** to analyze the MSRPC packets. If abnormal contents exist, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max bind length**: Specifies a max length for MSRPC's binding packets. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max request length**: Specifies a max length for MSRPC's request packets. If the length exceeds the limits, you can:

Option	Description
	• Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration.

In the POP3 tab, configure the following settings:

Option	Description
POP3	**Max Scan Length**: Specify the maximum length of scanning when scanning the POP3 packets. **Protocol Anomaly Detection**: Click the Enable button to analyze the POP3 packets. If abnormal contents exist, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Banner Detection**: click the **Enable** button to enable protection against POP3 server banners. • Banner information - Type the new information into the box that will replace the original server ban-

Option	Description
	ner information. **Max Command Line Length**: Specifies a max length (including carriage return) for the POP3 command line. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max Parameter Length**: Specifies a max length for the POP3 client command parameter. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends destination unreachable packets (UDP) and also generates logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max failure time**: Specifies a max failure time (within one single POP3 session) for the POP3 server. If the failure time exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreach-

Option	Description
	able packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration.

In the SMTP tab, configure the following settings:

Option	Description
SMTP	**Max Scan Length**: Specify the maximum length of scanning when scanning the SMTP packets.**Protocol Anomaly Detection**: Click **Enable** to analyze the SMTP packets. If abnormal contents exist, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Banner Detection**: Click the **Enable** button to enable protection against SMTP server banners. • Banner information - Type the new information into the box that will replace the original server banner information. **Max Command Line Length**: Specifies a max length (including carriage return) for the SMTP command line. If

Option	Description
	the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max Path Length**: Specifies a max length for the reverse-path and forward-path field in the SMTP client command. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max Reply Line Length**: Specifies a max length reply length for the SMTP server. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the ser-

Option	Description
	vice of the attacker and specify a block duration. **Max Text Line Length**: Specifies a max length for the E-mail text of the SMTP client. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max Content Type Length**: Specifies a max length for the content-type of the SMTP protocol. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max Content Filename Length**: Specifies a max length for the filename of E-mail attachment. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset con-

Option	Description
	nections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Max Failure Time**: Specifies a max failure time (within one single SMTP session) for the SMTP server. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration.

In the SUNRPC tab, configure the following settings:

Option	Description
SUNRPC	**Max Scan Length**: Specify the maximum length of scanning when scanning the SUNRPC packets. **Protocol Anomaly Detection**: Click **Enable** to analyze the SUNRPC packets. If abnormal contents exist, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block

Option	Description
	IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration.

In the Telnet tab, configure the following settings:

Option	Description
Telnet	**Max Scan Length**: Specify the maximum length of scanning when scanning the Telnet packets. **Protocol Anomaly Detection**: Click **Enable** to analyze the Telnet packets. If abnormal contents exist, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends the destination unreachable packets (UDP) and also generate logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service of the attacker and specify a block duration. **Username/Password Max Length**: Specifies a max length for the username and password used in Telnet. If the length exceeds the limits, you can: • Action: Log Only - Record a log. Rest - Reset connections (TCP) or sends destination unreachable packets (UDP) and also generates logs. Block IP - Block the IP address of the attacker and specify a block duration. Block Service - Block the service

Option	Description
	of the attacker and specify a block duration.

13. Click **Save** to complete the protocol configurations.

14. Click **OK** to complete the IPS rule configurations.

Notes: The Capture Packets function is supported for A-series, K series (except K9180), X series (except X8180/X2080X) and CloudEdge.

Cloning an IPS Rule

System supports the rapid cloning of an IPS rule. The user can generate a new IPS rule by modifying some parameters of the cloned IPS rule.

To clone an IPS rule, take the following steps:

1. Select **Object > Intrusion Prevention System > Profile**.

2. Select an IPS rule in the list.

3. Click **Clone** above the list, the **Name** configuration box will appear below the button, enter the name of the cloned IPS rule.

4. A cloned IPS rule will be generated in the list.

IPS Global Configuration

Configuring the IPS global settings includes:

- Enable the IPS function
- Specify how to merge logs
- Specify the work mode

Click **Object > Intrusion Prevention System > Configuration** to configure the IPS global settings.

Option	Description
IPS	Click/clear the **Enable** button to enable/disable the IPS function.
Log Aggregate Type	System can merge IPS logs which have the same protocol ID, the same VSYS ID, the same Signature ID, the same log ID, and the same merging type. Thus it can help reduce the number of logs and avoid receiving redundant logs. The function is disabled by default. Select the merging types in the drop-down list: • Do Not Merge - Do not merge any logs. • Source IP - Merge the logs with the same Source IP. • Destination IP - Merge the logs with the same Destination IP. • Source IP, Destination IP - Merge the logs with the same Source IP and the same Destination IP.
Aggregate Time	Specifies the time granularity for IPS threat log of the same merging type (specified above) to be stored in the database. At the same time granularity, the same type of log is only stored once. It ranges from 10 to 600 seconds.
Mode	Specifies a working mode for IPS: • IPS - If attacks have been detected, StoneOS will generate logs, and will also reset connections or block attackers. This is the default mode.

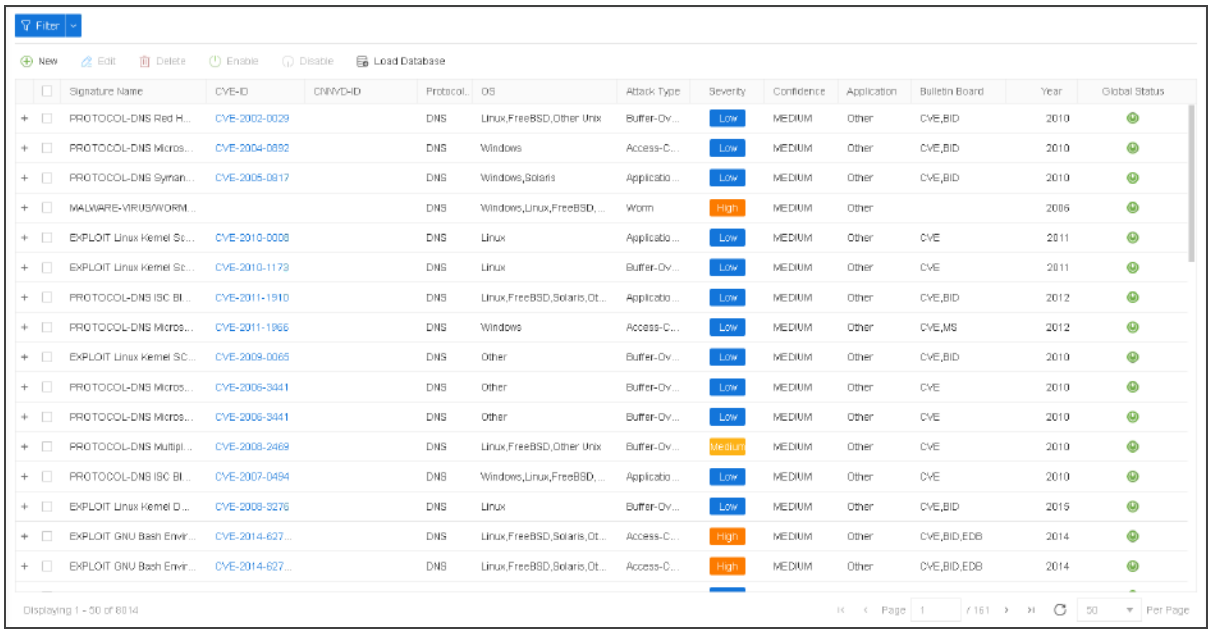
Option	Description
	• Log only - If attacks have been detected, StoneOS will only generate logs, but will not reset connections or block attackers.

After the configurations, click **OK** to save the settings.

Notes: Non-root VSYS does not support IPS global configuration.

Signature List

Select **Object > Intrusion Prevention System > Signature List**. You can see the signature list.



The upper section is for searching signatures. The lower section is for managing signatures.

Searching Signatures

In the upper section, click **Filter** to set the search conditions to search the signatures that match the condition.

To clear all search conditions, click **Remove All**. To save the search conditions, click  and then click **Save Filters** to name this set of search conditions and save it.

Managing Signatures

You can view signatures, create a new signature, load the database, delete a signature, edit a signature, enable a signature, and disable a signature.

- View signatures: In the signature list, click the "+" button before the ID of a signature to view the details.
- Create a new signature: click **New**.

  On the User-defined Signature page, configure the following settings:

Option	Description
Name	Specifies the signature name.
Description	Specifies the signature descriptions.
Protocol	Specifies the affected protocol.
Matching Direction	Specifies the matching direction of the signature. • To_Server means the package of attack is from the server to the client. • To_Client means the package of attack is from the client to the server. • Any includes To_Server and To_Client.
Attack Direction	Specifies how the system determines the direction of the attack traffic. Typically, this option works with Matching Direction. By default, the system determines the source IP

Option	Description
	address of the attack traffic as the attacker. For example, in the case where **Matching Direction** is set to **To Server**, and **Attack Direction** is set to **Source To Destination**, the system determines that the attack source comes from the client when an attack occurs. However, if **Matching Direction** is set to **To Server**, and **Attack Direction** is set to **Destination To Source**, the system determines that the attack source comes from the server.
Source Port	Specifies the source port of the signature. • Any - Any source port. • Included - The source port you specified should be included. It can be one port, several ports, or a range. Specifies the port number in the text box, and use "," to separate. • Excluded - The source port you specified should be excluded. It can be one port, several ports, or a range. Specifies the port number in the text box, and use "," to separate.
Destination Port	Specifies the destination port of the signature. • Any - Any destination port. • Included - The destination port you specified should be included. It can be one port, several ports, or a range. Specifies the port number in the

Option	Description
	text box, and use "," to separate. • Excluded - The destination port you specified should be excluded. It can be one port, several ports, or a range. Specifies the port number in the text box, and use "," to separate.
Dsize	Specifies the payload message size. Select "----",">", "<" or "=" from the drop-down list and specifies the value in the text box. "----" means no setting of the parameters.
Severity	Specifies the severity of the attack.
Attack Type	Select the attack type from the drop-down list.
Application	Select the affected applications. "----" means all applications.
Operating System	Select the affected operating system from the drop-down list. "----" means all the operating systems.
Bulletin Board	Select a bulletin board of the attack.
Year	Specifies the released year of attack.
Action	Specifies the default action for the signature - Log Only or Reset. If **Log Only** is selected, the system only generate logs when it detects an attack. If **Reset** is selected, the system resets connections (TCP) or sends destination unreachable packets (UDP), and generates logs when it detects an attack.

Option	Description
Detection Filter	Specifies the frequency of the signature rule. • Track - Select the track type from the drop-down list. It can be **by_source** or **by_destination**. System will use the statistic of the source IP or the destination IP to check whether the attack matches this rule. • Count - Specifies the maximum times the rule occurs in the specified time. If the attacks exceed the Count value, system will trigger rules and act as specified. • Seconds - Specifies the interval value of the rule occurs.

Configure Content, click New to specify the content of the signature:

Option	Description
Content	Specifies the signature content. Select the following check box if needed: • HEX - Means the content is hexadecimal. • Case Insensitive - Means the content is not case sensitive. • URI - Means the content needs to match URI field of HTTP request.
Relative	Specifies the signature content location.

Option	Description

	• If **Beginning** is selected, system will search from the header of the application layer packet.
	  • Offset: System will start searching after the offset from the header of the application layer packet. The unit is byte.
	  • Depth: Specifies the scanning length after the offset. The unit is byte.
	• If **Last Content** is selected, system will search from the content end position.
	  • Distance: System will start searching after the distance from the former content end position. The unit is byte.
	  • Within: Specifies the scanning length after the distance. The unit is byte.

- Load the database: After you create a new signature, click **Load Database** to make the newly created signature take effect.
- Edit a signature: Select a signature and then click **Edit**. You can only edit the user-defined signature. After editing the signature, click **Load Database** to make the modifications take effect.
- Delete a signature: Select a signature and then click **Delete**. You can only delete the user-defined signature. After deleting the signature, click **Load Database** to make the deletion take effect.
- Enable/Disable signatures: After selecting signatures, click **Enable** or **Disable**.

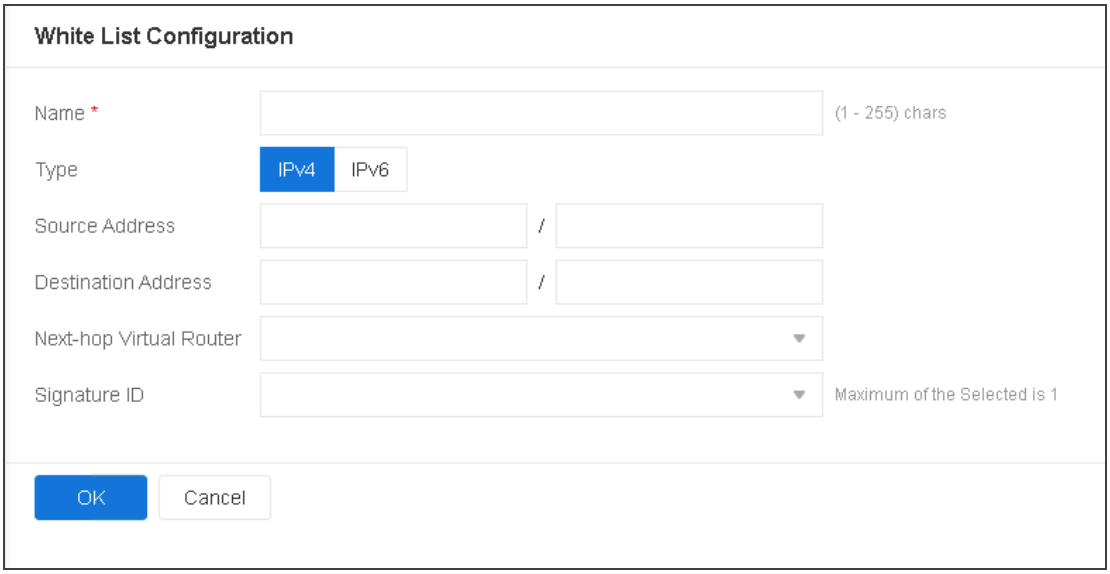
Notes: Non-root VSYS does not support signature list.

Configuring IPS White list

The device detects the traffic in the network in real time. When a threat is detected, the device generates alarms or blocks threats. With the complexity of the network environment, the threat of the device will generate more and more warning, too much threat to the user can not start making the alarm, and many of them are false positives. By providing IPS whitelist, the system no longer reports alarms or blocks to the whitelist, thus reducing the false alarm rate of threats. The IPS whitelist consists of source address, destination address, and threat ID, and the user selects at least one item for configuration.

To configure an IPS white list :

1. Select **Object> Intrusion Prevention System >Whitelist**
2. Click **New**.



In the WhiteList Configuration page, enter the White List configurations.

Option	Description
Name	Specifies the white-list name.
Type	Select the address type, including IPv4 or IPv6.
Source Address	Specifies the source address of the traffic to be matched by IPS.
Destination Address	Specifies the destination address of the traffic to be matched by IPS.
Next-hop Virtual Router	Select the Next-hop VRouter from the drop-down list.
Signature ID	Select the signature ID from the drop-down list. A whitelist can be configured with a maximum of one threat ID. When the threat ID is not set, the traffic can be filtered based on the source and destination IP address. When user have configured threat ID, the source address, destination address and threat ID must be all matched successfully before the packets can be released.

3. Click **OK**.

Sandbox

A sandbox executes a suspicious file in a virtual environment, collects the actions of this file, analyzes the collected data, and verifies the legality of the file.

The Sandbox function of the system uses the cloud sandbox and the local sandbox technology. The suspicious file will be uploaded to the cloud sandbox or the local sandbox. The cloud sandbox or the local sandbox will collect the actions of this file, analyze the collected data, verify the

legality of the file, give the analysis result to the system and deal with the malicious file with the actions set by system.

The Sandbox function contains the following parts:

- Collect and upload the suspicious file: The Sandbox function parses the traffic, and extracts the suspicious file from the traffic.
    - If there are no analyze result about this file in the local database, system will upload this file to the local sandbox or to the Hillstone cloud service platform, and the local sandbox will analyze the file or the cloud service platform will upload the suspicious file to the cloud sandbox for analysis. For how to connect to the Hillstone cloud service platform, refer to "Connecting to Hillstone Cloud Service Platform" on Page 1847.
    - If this file has been identified as an illegal file in the local database of the Sandbox function, system will generate corresponding threat logs and cloud sandbox logs.

  Additionally, you can specify the criteria of the suspicious files by configuring a sandbox profile.
- Check the analysis result and take actions: The Sandbox function checks the analysis results of the suspicious file returned from the cloud sandbox or the local sandbox, verifies the legality of the file, saves the result to the local database. If this suspicious file is identified as an illegal file, you need to deal with the file according to the actions (reset the connection or report logs) set by system. If it's the first time to find malicious file by the cloud sandbox or the local sandbox, system will record threat logs and cloud sandbox logs and cannot stop the malicious link. When malicious file accesses the cached threat information in the local device, the threat will be effective only by resetting connection.
- Maintain the local database of the Sandbox function: Record the information of the uploaded files, including uploaded time and analysis result. This part is completed by the Sandbox function automatically.

Notes: The cloud sandbox function is controlled by license. To use the cloud sandbox function, install the cloud sandbox license.

Related Topics: Configuring Sandbox

Configuring Sandbox

This chapter includes the following sections:

- Preparation for configuring the Sandbox function
- Configuring the Sandbox rules
- Sandbox global configurations

Preparation

Before enabling the Sandbox function, make the following preparations:

Make sure your system version supports the Sandbox function.

The current device is registered to the Hillstone cloud service platform. For how to connect to the Hillstone cloud service platform, refer to "Connecting to Hillstone Cloud Service Platform" on Page 1847.

Import the cloud sandbox license and reboot. The cloud sandbox function will be enabled after rebooting.

Notes: After the Sandbox function is enabled, system's max concurrent sessions might decrease. For more information about the maximum concurrent sessions, see "The Maximum Concurrent Sessions" on Page 1924.

Configuring Sandbox

The System supports the zone-based and policy-based Sandbox:

- If a security zone is configured with the Sandbox function, system will perform sandbox detection on the traffic that is sourced from or destined to the binding zone specified in the rule.
- If a policy rule is configured with the Sandbox filtering function, system will perform sandbox detection on the traffic that is destined to the policy rule you specified.
- The sandbox configurations in a policy rule are superior to that in a zone rule if they are specified at the same time, and the sandbox configurations in a destination zone are superior to that in a source zone if they are specified at the same time.

The system also supports binding the sandbox profile to a ZTNA policy to perform sandbox detection and processing on the traffic matching the ZTNA policy. For configuration information, refer to Configuring ZTNA Policy.

To create the zone-based Sandbox, take the following steps:

1. Create a zone. For more information , refer to Security Zone.
2. In the Zone Configuration page, expand Threat Protection.
3. Click the **Enable** button after the **Sandbox**. Select a existing Sandbox rule from the profile drop-down list or click the "+" button to create a sandbox rule you need.
4. Click **OK**.

To create the policy-based Sandbox, take the following steps:

1. Click **Object > Sandbox > Configuration**. Click the **Enable** button after the Cloud Sandbox or the Local Sandbox to enable the Sandbox function. If you do not have a cloud sandbox license, you can enable the Free Cloud Sandbox function. The Free Cloud Sandbox function only supports to detect PE files.

2. Click **Object > Sandbox > Profile** to create a sandbox rule you need.

3. Bind the sandbox rule to a policy. Click **Policy > Security Policy**.Select the policy rule you want to bind or click **New** to create a new policy. In the Policy Configuration page, expand **Protection** and then click the **Enable** button of Sandbox. Select a existing Sandbox rule from the drop-down list or click the "+" button to create a sandbox rule you need.

Configuring a Sandbox Rule

A sandbox rule contains the files types that device has detected, the protocols types that the device has detected, the white list settings, and the file filter settings.

- File Type: Support to detect PE, APK, JAR, MS-Office, PDF, SWF, RAR, ELF, ZIP, Script, and Others file. "Others" indicates all other types, except the ones that you can select on the page.
- Protocol Type: Support to detect HTTP, FTP, POP3, SMTP, IMAP4 and SMB protocol. If SMB protocol type is used, the system supports the filtering and blocking of files in break-point resumption scenarios.
- White list: A white list includes domain names that are safe. When a file extracted from the traffic is from a domain name in the white list, this file will not be marked as a suspicious file and it will not be upload to the cloud sandbox or the local sandbox.
- File filter: Mark the file as a suspicious file if it satisfies the criteria configured in the file filter settings. The analysis result from the cloud sandbox tor he local sandbox determines whether this suspicious file is legal or not.
- Actions: When the suspicious file accesses the threat items in the sandbox, system will deal with the malicious file with the set actions.

There are five built-in sandbox rules with the files and protocols type configured, white list enabled and file filter configured. The four default sandbox rules includes predef_low, predef_ middle, predef_high, predef_pe and no_sandbox.

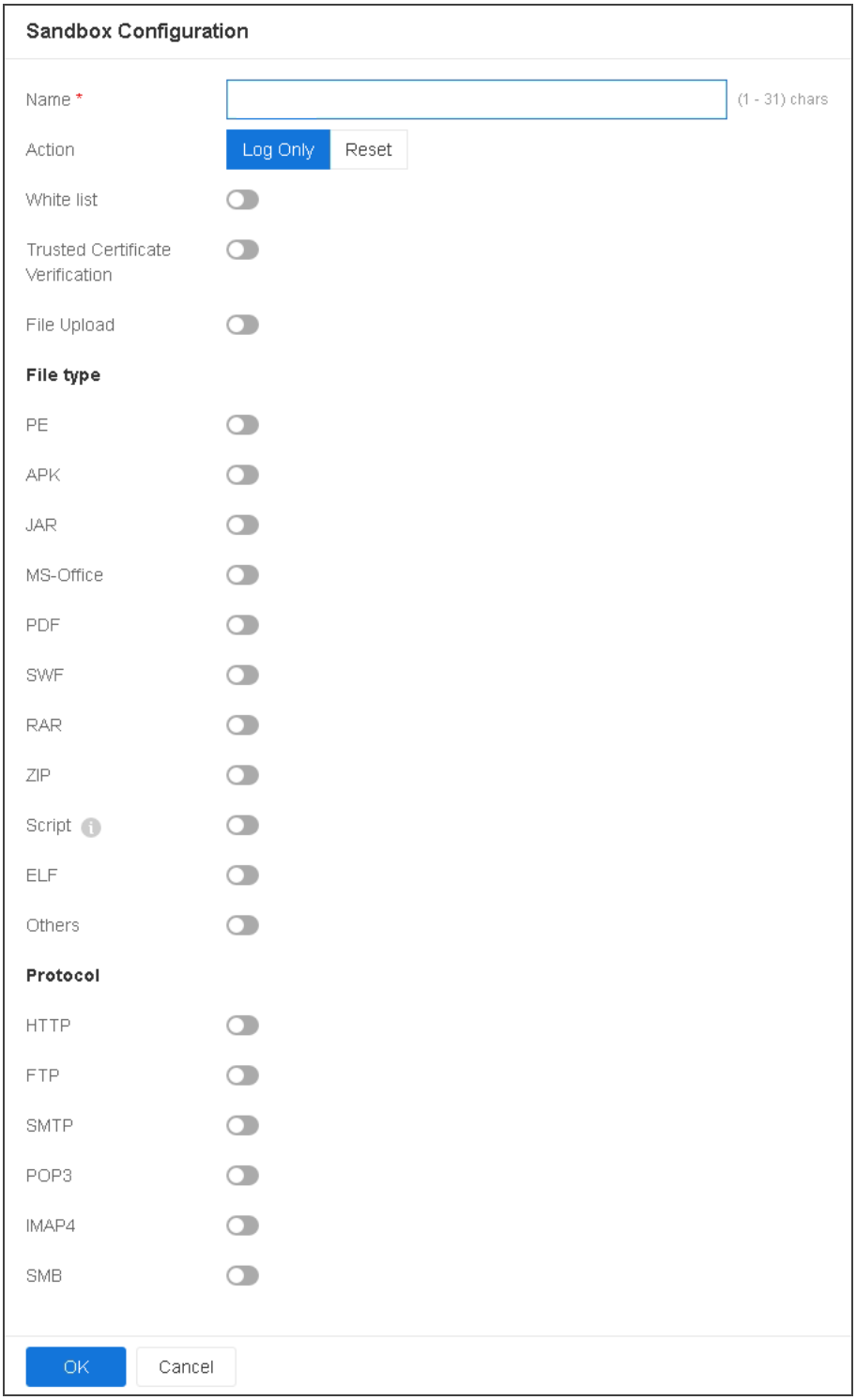
- **predef_low**: A loose sandbox detection rule, whose file type is PE and protocol types are HTTP/FTP/POP3/SMTP/IMAP4/SMB, with white list and file filter enabled.
- **predef_middle**: A middle-level sandbox detection rule, whose file types are PE/APK/JAR/MS-Office/PDF and protocol types are HTTP/FTP/POP3/SMTP/IMAP4/SMB, with white list and file filter enabled.
- **predef_high**: A strict sandbox detection rule, whose file types are PE/APK/JAR/MS-Office/PDF/SWF/RAR/ZIP/ELF/Script and protocol types are HTTP/FTP/POP3/SMTP/IMAP4/SMB, , with white list and file filter enabled.
- **predef_pe**: A sandbox detection rule, whose file type is only PE and protocol types are HTTP/FTP/POP3/SMTP/IMAP4, with white list and file filter enabled.
- **no_sandbox**:With this detection rule, the system does not perform any sandbox detection.

Notes: When the SSL proxy function is enabled, the system will support sandbox detection of HTTPS/POP3S/SMTPS/IMAPS traffic.

To create a new sandbox rule, take the following steps:

1. Select **Object > Sandbox > Profile**.

2. Click **New** to create a new sandbox rule. To edit an existing one, select the check box of this rule and then click **Edit**.



In the Sandbox Configuration page, configure the following settings.

Option	Description
Name	Enter the name of the sandbox rule.
Action	When the suspicious file accesses the threat items in the local sandbox, system will deal with the malicious file with the set actions. Actions: • Log Only - When detecting malicious files, system will pass traffic and record logs only (threat log and cloud sandbox log). • Reset - When detecting malicious files, system will reset connection of malicious link and record threat logs and cloud sandbox logs only.
White List	Click **Enable** to enable the white list function. A white list includes domain names that are safe. When a file extracted from the traffic is from a domain name in the white list, this file will not be marked as a suspicious file and it will not be upload to the cloud sandbox. You can update the white list in **System > Upgrade Management > Signature Database Update > Sandbox Whitelist Database Update**.
Trusted Certificate Verification	Click **Enable** to enable the verification for the trusted certification. After enabling, system will not detect the PE file whose certification is trusted.
File Upload	By default, the file will be uploaded to the cloud sandbox when it marks it is classified as suspicious. You can disable the function of suspicious file uploading, which will

Option	Description
	prevent the suspicious file from being uploaded to the cloud sandbox. Click the **Disable** to disable the function of suspicious file uploading.
File Filter: Mark the file as a suspicious file if it satisfies the criteria configured in the file filter settings. The analysis result from the cloud sandbox determines whether this suspicious file is legal or not. The logical relation is AND.	
File Type	Mark the file of the specified file type as a suspicious file. Click the **Enable** button of the file type, select **Cloud Sandbox Detection** to specify that suspicious files will be uploaded to the cloud sandbox for detection, or select **Local Sandbox Detection** to specify that suspicious files will be uploaded to the local sandbox for detection. The system can mark the PE(.exe), APK, JAR, MS-Office, PDF, SWF, ELF, RAR, ZIP, Script and Others (all types other than the preceding types) file as a suspicious file now. Files of the Others type can only be uploaded to the local sandbox but not the cloud sandbox for detection. If no file type is specified, the Sandbox function will mark no file as a suspicious one.
Protocol	Specifies the protocol to scan. System can scan the HTTP, FTP, POP3, SMTP, IMAP4 and SMB traffic now. If no protocol is specified, the Sandbox function will not scan the network traffic. After specifying the protocol type, you have to specify the direction of the detection:

Option	Description
	• **Upload** - The direction is from client to server. • **Download** - The direction is from server to client. • **Bi-directional** - The direction includes uploading and downloading directions.

3. Click **OK** to save the settings.

Threat List

The threat list means the list of threat items in the Hillstone device. There are three sources of the threat items:

- The Hillstone device finds suspicious file and upload this file to the local sandbox or to the cloud sandbox. After verifying the file is malicious, the cloud sandbox or the local sandbox will send the analysis results and MD5 to the device, and the threat item will be listed in the threat list.
- The Hillstone device finds suspicious file and successfully queries MD5 of the threat in the cloud sandbox or the local sandbox, the threat item will be listed in the threat list.
- The Hillstone device receives the synchronous threat MD5 from the Hillstone cloud service platform and matches the threat, the threat item will be listed in the threat list.

You can filter and check threat items through specifying MD5 or the name of virus on the threat list page, as well as add the selected threat item to trust list. Take the following steps:

1. Click **Object > Sandbox > Threat List**.
2. Select the threat item that needs to be added to the trust list and click **Add to Trust** button. When threat item is added, once it's matched, the corresponding traffic will be released.

Trust List

You can view all the sandbox threat information which can be detected on the device and add them to the trust list. Once the item in trust list is matched, the corresponding traffic will be released and not controlled by the actions of sandbox rule.

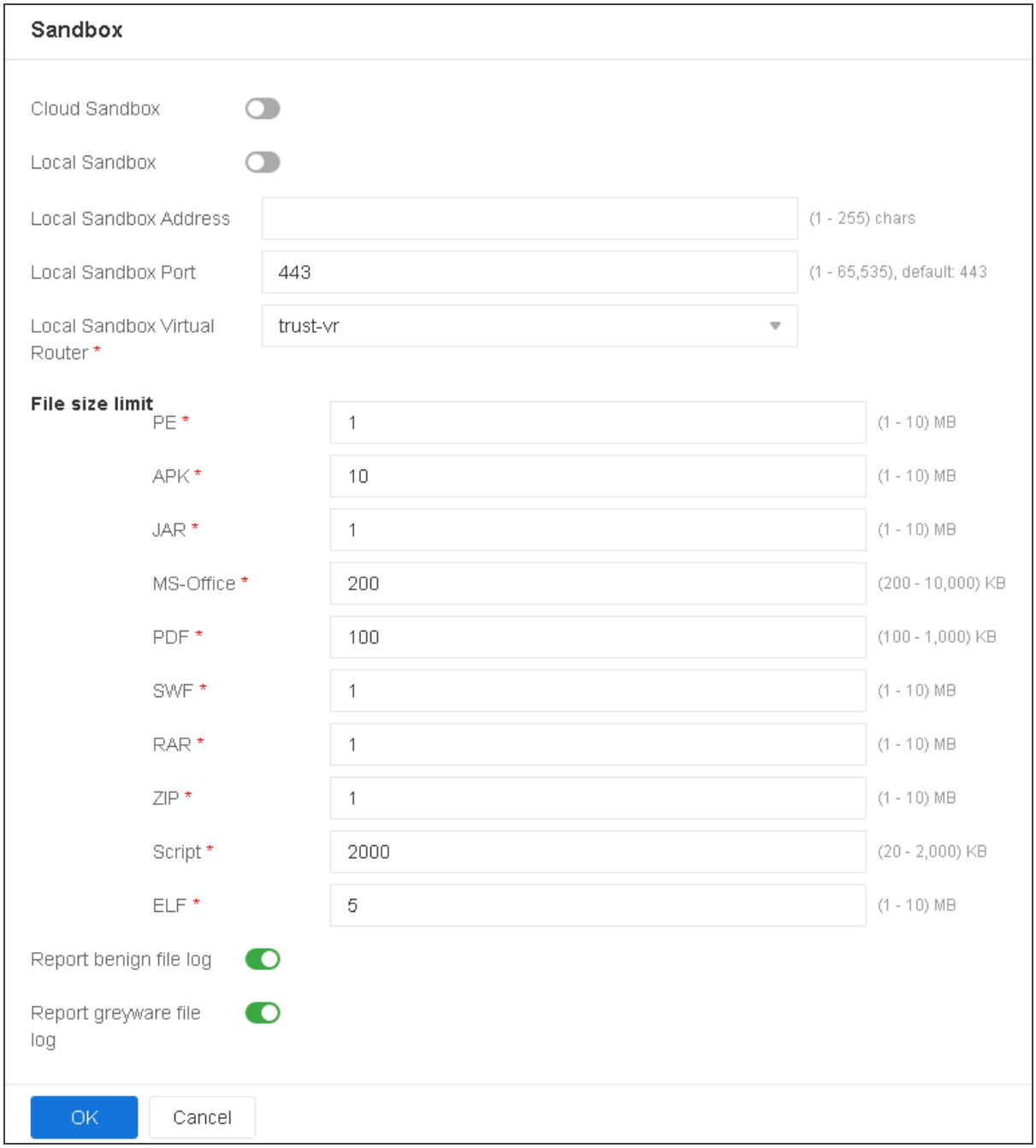
To remove threat items in the trust list, take the following steps:

1. Click **Object > Sandbox > Trust List**.
2. Select the threat item that needs to be removed in the trust list and click **Remove from Trust** button. The threat item will be removed from the trust list.

Sandbox Global Configurations

To configure the sandbox global configurations, take the following steps:

1. Select **Object > Sandbox > Configuration**.



2. Click the **Enable** button of Cloud Sandbox to enable the cloud sandbox function. If you do not have a cloud sandbox license, you can enable the Free Cloud Sandbox function. The Free Cloud Sandbox function only supports to detect PE files.

3. Click the **Enable** button of Local Sandbox to enable the local sandbox function., and then specifies the IP address and the VRouter for the local sandbox.Specify the file size for the files you need. The file that is smaller than the specified file size will be marked as a suspicious file.

4. Specify the file size for the files you need. The file that is smaller than the specified file size will be marked as a suspicious file.

5. If you click the **Report benign file log** button, system will record cloud sandbox logs of the file when it marks it as a benign file. By default, system will not record logs for the benign files.

6. If you click the **Report greyware file log** button, system will record cloud sandbox logs of the file when it marks it as a greyware file. A greyware file is the one system cannot judge it is a benign file or a malicious file. By default, system will not record logs for the greyware files.

7. Click **OK** to save the settings.

Attack-Defense

There are various inevitable attacks in networks, such as compromise or sabotage of servers, sensitive data theft, service intervention, or even direct network device sabotage that causes service anomaly or interruption. Security gates, belonging to a category of network security devices, must be designed with attack defense functions to detect various types of network attacks, and take appropriate actions to protect the Intranet against malicious attacks, thus assuring the normal operation of the Intranet and systems.

Devices provide attack defense functions based on security zones, and can take appropriate actions against network attacks to assure the security of your network systems.

ICMP Flood and UDP Flood

An ICMP Flood/UDP Flood attack sends huge amounts of ICMP messages (such as ping)/UDP packets to a target within a short period and requests for a response. Due to the heavy load, the attacked target cannot complete its normal transmission task.

ARP Spoofing

LAN transmits network traffic based on MAC addresses. ARP spoofing attacks occur by filling in the wrong MAC address and IP address to make a wrong corresponding relationship of the target host's ARP cache table. This will lead to the wrong destination host IP packets, and the packet network's target resources will be stolen.

SYN Flood

Due to resource limitations, a server will only permit a certain number of TCP connections. SYN Flood just makes use of this weakness. During the attack an attacker will craft a SYN packet, set its source address to a forged or non-existing address, and initiate a connection to a server. Typically the server should reply the SYN packet with SYN-ACK, while for such a carefully crafted SYN packet, the client will not send any ACK for the SYN-ACK packet, leading to a half-open connection. The attacker can send large amount of such packets to the attacked host and establish are equally large number of half-open connections until timeout. As a result, resources will be

exhausted and normal accesses will be blocked. In the environment of unlimited connections, SYN Flood will exhaust all the available memory and other resources of the system.

WinNuke Attack

A WinNuke attack sends OOB (out-of-band) packets to the NetBIOS port (139) of a Windows system, leading to NetBIOS fragment overlap and host crash. Another attacking vector is ICMP fragment. Generally an ICMP packet will not be fragmented; so many systems cannot properly process ICMP fragments. If your system receives any ICMP fragment, it's almost certain that the system is under attack.

IP Address Spoofing

IP address spoofing is a technology used to gain unauthorized access to computers. An attacker sends packets with a forged IP address to a computer, and the packets are disguised as if they were from a real host. For applications that implement validation based on IP addresses, such an attack allows unauthorized users to gain access to the attacked system. The attacked system might be compromised even if the response packets cannot reach the attacker.

ICMP Redirect Attack

An ICMP redirect message is an out-of-band message that is designed to inform a host of a more optimal route through a network, but possibly used maliciously for attacks that redirect traffic to a specific system. In this type of an attack, the hacker, posing as a router, sends an ICMP redirect message to a host, which indicates that all future traffic must be directed to a specific system as the more optimal route for the destination.

IP Address Sweep and Port Scan

This kind of attack makes a reconnaissance of the destination address and port via scanners, and determines the existence from the response. By IP address sweeping or port scanning, an attacker can determine which systems are alive and connected to the target network, and which ports are used by the hosts to provide services.

Ping of Death Attack

Ping of Death is designed to attack systems by some over-sized ICMP packets. The field length of an IP packet is 16 bits, which means the max length of an IP packet is 65535 bytes. For an ICMP response packet, if the data length is larger than 65507 bytes, the total length of ICMP data, IP header (20 bytes) and ICMP header (8 bytes) will be larger than 65535 bytes. Some routers or systems cannot properly process such a packet, and might result in crash, system down or reboot.

Teardrop Attack

Teardrop attack is a denial of service attack. It is a attack method based on morbid fragmented UDP packets, which works by sending multiple fragmented IP packets to the attacker (IP fragmented packets include the fragmented packets of which packet, the packet location, and other information). Some operating systems contain overlapping offset that will crash, reboot, and so on when receiving fragmented packets.

Smurf Attack

Smurf attacks consist of two types: basic attack and advanced attack. A basic Smurf attack is used to attack a network by setting the destination address of ICMP ECHO packets to the broadcast address of the attacked network. In such a condition all the hosts within the network will send their own response to the ICMP request, leading to network congestion. An advanced Smurf attack is mainly used to attack a target host by setting the source address of ICMP ECHO packets to the address of the attacked host, eventually leading to host crash. Theoretically, the more hosts in a network, the better the attacking effect will be.

Fraggle Attack

A fraggle attack is basically the same with a smurf attack. The only difference is the attacking vector of fraggle is UDP packets.

Land Attack

During a Land attack, an attacker will carefully craft a packet and set its source and destination address to the address of the server that will be attacked. In such a condition the attacked server will send a message to its own address, and this address will also return a response and establish a Null connection. Each of such connections will be maintained until timeout. Many servers will crash under Land attacks.

IP Fragment Attack

An attacker sends the victim an IP datagram with an offset smaller than 5 but greater than 0, which causes the victim to malfunction or crash.

IP Option Attack

An attacker sends IP datagrams in which the IP options are abnormal. This attack intends to probe the network topology. The target system will break down if it is incapable of processing error packets.

Huge ICMP Packet Attack

An attacker sends large ICMP packets to crash the victim. Large ICMP packets can cause memory allocation error and crash the protocol stack.

TCP Flag Attack

An attacker sends packets with defective TCP flags to probe the operating system of the target host. Different operating systems process unconventional TCP flags differently. The target system will break down if it processes this type of packets incorrectly.

DNS Query Flood Attack

The DNS server processes and replies to all DNS queries that it receives. A DNS flood attacker sends a large number of forged DNS queries. This attack consumes the bandwidth and resources of the DNS server, which prevents the server from processing and replying legal DNS queries.

DNS Reply Flood Attack

When the DNS server receives the reply message, it will process the message regardless whether it is valid. DNS reply flood is that the attacker sends a large number of DNS reply message to the DNS cache server, causing the cache server to run out of resources by processing these reply messages.

TCP Split Handshake Attack

When a client establishes TCP connection with a malicious TCP server, the TCP server will respond to a fake SYN packet and use this fake one to initialize the TCP connection with the client. After establishing the TCP connection, the malicious TCP server switches its role and becomes the client side of the TCP connection. Thus, the malicious traffic might enter into the intranet.

SIP Flood

SIP (Session Initiation Protocol) is an application-layer signaling control protocol. It is used to initiate, modify and terminate interactive multimedia sessions, such as multimedia meetings and Internet telephone. The attacker of the SIP flood attack sends a large number of INVITE messages to the target SIP server in a short time. Therefore, the target SIP server exhausts its resources and fails to respond to the call requests from valid users.

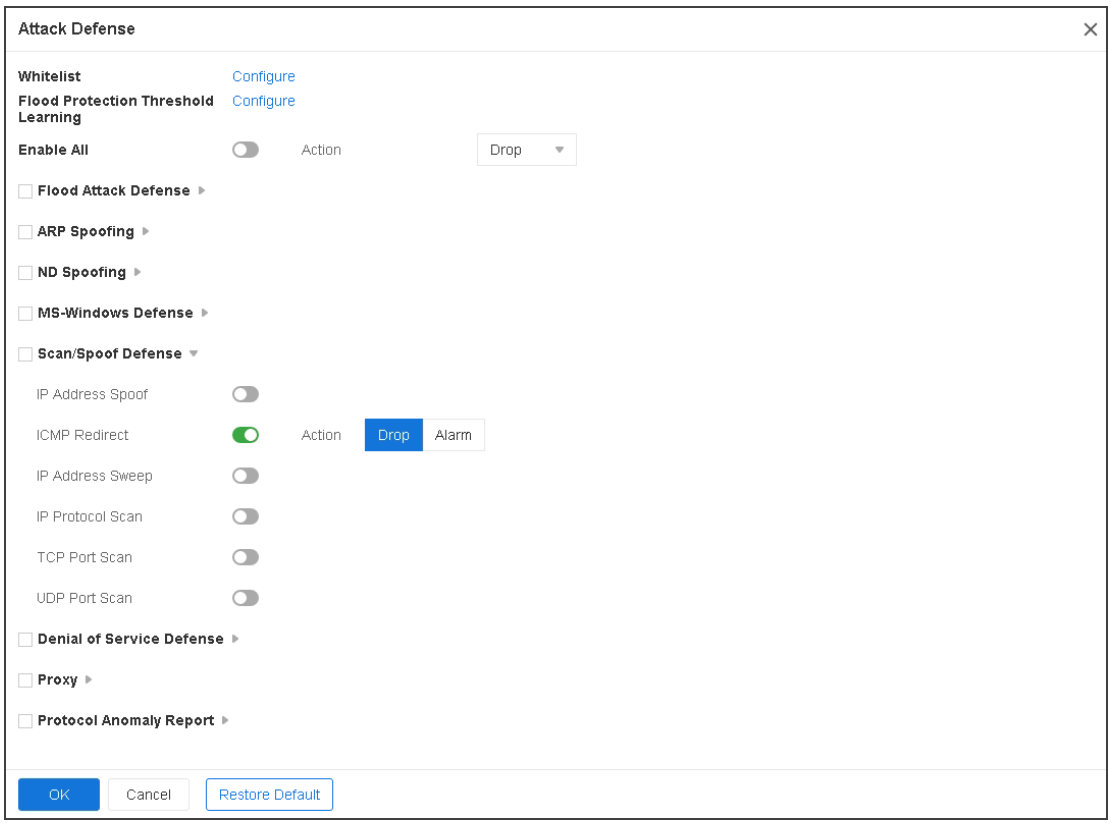
Configuring Attack Defense

To configure the Attack Defense based on security zones, take the following steps:

1. Create a zone. For more information, refer to "Security Zone" on Page 169.

2. On the Zone Configuration page, expand Threat Protection.

3. To enable the Attack Defense functions, click the **Enable** button, and click **Configure**.



In the Attack Defense panel, enter the Attack Defense configurations.

Option	Description
Whitelist	IP address or IP range in the whitelist is exempt from attack defense check. Click **Configure**,and in the White Configuration tab, click **New** to

Option	Description
	create a whitelist. Select the type for the whitelist, including source whitelist and destination whitelist. And then select the IP type, including: • IP/Netmask - Specifies the IPv4 address and netmask. • IPv6/Prefix - Specifies the IPv6 address and prefix, range 120 to 128. • Address entry - Specifies the address entry.
Flood Protection Threshold Learning	An appropriate attack detection threshold is crucial for configuring attack defense. Flood protection threshold learning collects statistics on the maximum rate of traffic that passes through a normal network environment. Then, this function provides a proper reference value for the attack detection threshold. The Flood Protection Threshold Learning function is supported for SYN flood attacks, DNS Query flood attacks, DNS Recursive Query flood attacks, DNS Reply flood attacks, UDP flood attacks, ICMP flood attacks, and SIP flood attacks. For more information, see Configuring Flood Protection Threshold Learning.
Enable All	**Enable all**: Click this button to enable all the Attack Defense functions for the security zone. **Action**: Specifies an action for all the Attack Defense functions, i.e., the defense measure system will be taken if any attack has been detected. • Drop - Drops packets. This is the default action. • Alarm - Gives an alarm but still permits packets to pass

Option	Description
	through. • Do not specify global actions.
Flood Attack Defense	Click the ▶ button to expand the information of all flood attack defenses. Select the **Flood Attack Defense** check box to enable all flood attack defenses.
	ICMP Flood: Click this button to enable ICMP flood defense for the security zone. • Threshold - Specifies a threshold for inbound ICMP packets. If the number of inbound ICMP packets matched to one single IP address per second exceeds the threshold, system will identify the traffic as an ICMP flood and take the specified action. The value range is 1 to 50000. The default value is 1500. • Action - Specifies an action for ICMP flood attacks. If the default action Drop is selected, system will only permit the specified number (threshold) of IMCP packets to pass through during the current and the next second, and also give an alarm. All the excessive packets of the same type will be dropped during this period.
	UDP Flood: Click this button to enable UDP flood defense for the security zone. • Src threshold - Specifies a threshold for outbound UDP packets. If the number of outbound UDP packets ori-

Option	Description
	ginating from one single source IP address per second exceeds the threshold, system will identify the traffic as a UDP flood and take the specified action. The value range is 1 to 50000. The default value is 1500. • Dst threshold - Specifies a threshold for inbound UDP packets. If the number of inbound UDP packets destined to one single port of one single destination IP address per second exceeds the threshold, system will identify the traffic as a UDP flood and take the specified action. The value range is 1 to 50000. The default value is 1500. • Action - Specifies an action for UDP flood attacks. If the default action Drop is selected, system will only permit the specified number (threshold) of UDP packets to pass through during the current and the next second, and also give an alarm. All the excessive packets of the same type will be dropped during this period. • Session State Check - Select this check box to enable the function of session state check. After the function is enabled, system will not check whether there is UDP Flood attack in the backward traffic of UDP packet of the identified sessions.
	DNS Query Flood: Click this button to enable DNS query flood defense for the security zone.

Option	Description
	• Src threshold - Specifies a threshold for outbound DNS query packets. If the number of outbound DNS query packets originating from one single IP address per second exceeds the threshold, StoneOS will identify the traffic as a DNS query flood and take the specified action. • Dst threshold - Specifies a threshold for inbound DNS query packets. If the number of inbound DNS query packets matched to one single IP address per second exceeds the threshold, StoneOS will identify the traffic as a DNS query flood and take the specified action. • Action - Specifies an action for DNS query flood attacks. If the default action Drop is selected, StoneOS will only permit the specified number (threshold) of DNS query packets to pass through during the current and next second, and also give an alarm. All the excessive packets of the same type will be dropped during this period; if Alarm is selected, StoneOS will give an alarm but still permit the DNS query packets to pass through.
	Recursive DNS Query Flood: Click this button to enable recursive DNS query flood defense for the security zone. • Src threshold - Specifies a threshold for outbound recursive DNS query packets packets. If the number of outbound DNS query packets originating from one single IP address per second exceeds the threshold, StoneOS will

Option	Description
	identify the traffic as a DNS query flood and take the specified action. • Dst threshold - Specifies a threshold for inbound recursive DNS query packets packets. If the number of inbound DNS query packets destined to one single IP address per second exceeds the threshold, StoneOS will identify the traffic as a DNS query flood and take the specified action. • Action - Specifies an action for recursive DNS query flood attacks. If the default action Drop is selected, StoneOS will only permit the specified number (threshold) of recursive DNS query packets to pass through during the current and next second, and also give an alarm. All the excessive packets of the same type will be dropped during this period; if Alarm is selected, StoneOS will give an alarm but still permit the recursive DNS query packets to pass through.
	SYN Flood: Select this check box to enable SYN flood defense for the security zone. • Src threshold - Specifies a threshold for outbound SYN packets (ignoring the destination IP address and port number). If the number of outbound SYN packets originating from one single source IP address per second exceeds the threshold, StoneOS will identify the traffic as a SYN flood. The value range is 0 to 50000. The default value is 1500.

Option	Description

	The value of 0 indicates the Src threshold is void.
	• Dst threshold - Specifies a threshold for inbound SYN packets destined to one single destination IP address per second.
	  • IP-based - Click IP-based and then type a threshold value into the box behind. If the number of inbound SYN packets matched to one single destination IP address per second exceeds the threshold, StoneOS will identify the traffic as a SYN flood. The value range is 0 to 50000. The default value is 1500. The value of 0 indicates the Dst threshold is void.
	  • Port-based - Click Port-based and then type a threshold value into the box behind. If the number of inbound SYN packets matched to one single destination port of the destination IP address per second exceeds the threshold, StoneOS will identify the traffic as a SYN flood. The value range is 0 to 50000. The default value is 1500. The value of 0 indicates the Dst threshold is void. After clicking Port-based, you also need to type an address into or select an IP Address or Address entry from the Dst address combo box to enable port-based SYN flood defense for the specified segment. The SYN flood attack defense for other segments will be IP based. The

Option	Description
	value range for the mask of the Dst address is 24 to 32. • Action - Specifies an action for SYN flood attacks. If the default action Drop is selected, StoneOS will only permit the specified number (threshold) of SYN packets to pass through during the current and the next second, and also give an alarm. All the excessive packets of the same type will be dropped during this period. Besides if Src threshold and Dst threshold are also configured, StoneOS will first detect if the traffic is a destination SYN flood attack: if so, StoneOS will drop the packets and give an alarm, if not, StoneOS will continue to detect if the traffic is a source SYN attack.
	DNS Reply Flood: Click this button to enable DNS reply flood defense for the security zone. • Src threshold - Specifies a threshold for outbound DNS reply packets. If the number of outbound DNS reply packets originating from one single IP address per second exceeds the threshold, StoneOS will identify the traffic as a DNS query flood and take the specified action. • Dst threshold - Specifies a threshold for inbound DNS reply packets. If the number of inbound DNS reply packets matched to one single IP address per second exceeds the threshold, StoneOS will identify the traffic as a DNS

Option	Description
	reply flood and take the specified action. • Action - Specifies an action for DNS reply flood attacks. If the default action Drop is selected, StoneOS will only permit the specified number (threshold) of DNS reply packets to pass through during the current and next second, and also give an alarm. All the excessive packets of the same type will be dropped during this period; if Alarm is selected, StoneOS will give an alarm but still permit the DNS reply packets to pass through.
	SIP Flood: Click this button to enable SIP flood defense for the security zone. • Dst threshold - Specifies the threshold of the number of the SIP INVITE messages with the same destination IP to be received by the device. That is to say, the device determines that it is attacked by the SIP flood attack when it receives more SIP INVITE messages with the same destination IP than the configured threshold. In this scenario, the device takes further measures to deal with this attack. • Action - Specifies the action of the system when it is attacked by the SIP flood attack. When the system detects the attack, it inspects whether there is a real SIP client behind the subsequent source IP address. If yes, the system bypasses the subsequent SIP INVITE messages sent by this source IP. Otherwise, the system will perform the

Option	Description
	configured action for the SIP INVITE messages sent by this source IP in three seconds. There are two system actions: Drop or Alarm. The action of Drop is the default action and it means dropping the INVITE messages. The action of Alarm means that the system sends an alarm but still bypasses the INVITE messages.
ARP Spoofing	Click the ▶ button to expand the information of the ARP spoofing. Select the **ARP Spoofing** check box to enable all ARP spoofing defenses.
	Max IP number per MAC: Click this button to check the max IP number per MAC. Specifies whether system will check the IP number per MAC in the ARP table. If the parameter is set to 0, system will not check the IP number; if it is set to a value other than 0, system will check the IP number, and if the IP number per MAC is larger than the parameter value, system will take the specified action. The value range is 0 to 1024.
	ARP Send Rate: Click this button to check the ARP send rate. Specifies if StoneOS will send gratuitous ARP packet(s). If the parameter is set to 0 (the default value), StoneOS will not send any gratuitous ARP packet; if it is set to a value other than 0, StoneOS will send gratuitous ARP packet(s), and the number sent per second is the specified parameter value. The value range is 0 to 10.

Option	Description
	Reverse Query: Click this button to enable Reverse query. Select this check box to enable Reverse query. When StoneOS receives an ARP request, it will log the IP address and reply with another ARP request; and then StoneOS will check if any packet with a different MAC address will be returned, or if the MAC address of the returned packet is the same as that of the ARP request packet.
ND Spoofing	**Max IP number per MAC**: Click this button to check the max IP number per MAC. Specifies whether system will check the IP number per MAC in the ND table. System will check the IP number, and if the IP number per MAC is larger than the parameter value, system will take the specified action. The value range is 1 to 1024. **ND Send Rate**: Click this button to check the ND send rate. Specifies if StoneOS will send gratuitous ND packet(s). StoneOS will send gratuitous ND packet(s), and the number sent per second is the specified parameter value. The value range is 1 to 10. **Reverse Query**: Click this button to enable Reverse query. Select this check box to enable Reverse query. When StoneOS receives a NS/NA packet, it will log the IP address and reply with another NS/NA packet; and then StoneOS will check if any packet with a different MAC address will be returned, or if the MAC address of the returned packet is the same as that of the ND packet.

Option	Description
MS-Windows Defense	Click the button to expand the information of MS-Windows defense. Select the **MS-Windows Defense** check box to enable MS-Windows defense.
	Win Nuke Attack: Click this button to enable WinNuke attack defense for the security zone. If any WinNuke attack has been detected, system will drop the packets and give an alarm.
Scan/Spoof Defense	Click the button to expand the information of Scan/Spoof Defense. Select the **Scan/Spoof Defense** check box to enable all scan/spoof defenses.
	IP Address Spoof: Click this button to enable IP address spoof defense for the security zone. If any IP address spoof attack has been detected, StoneOS will drop the packets and give an alarm.
	ICMP Redirect: Click this button to enable ICMP redirect attack defense. • Action - Specifies an action for ICMP redirect attacks. If the default action Drop is selected, StoneOS will send an alarm and drop ICMP redirect messages. If the action Alarm is selected, StoneOS will send an alarm but still allow ICMP redirect messages to pass through.
	IP Address Sweep: Click this button to enable IP address sweep defense for the security zone.

Option	Description
	• Threshold - Specifies a time threshold for IP address sweep. If over 10 ICMP/TCP packets from the same source IP address are sent to different hosts within the specified time threshold, StoneOS will identify them as an IP address sweep attack. The value range is 1 to 1,800,000 milliseconds. The default value is 2. • Action - Specifies an action for IP address sweep attacks. If the default action **Drop** is selected, StoneOS will only permit 10 IMCP/TCP packets originating from one single source IP address while matched to different hosts to pass through during the specified period (threshold), and also give an alarm. All the excessive packets of the same type will be dropped during this period.
	IP Protocol Scan: Click this button to enable IP protocol Scan defense for the security zone. • Threshold - Specifies a time threshold for IP protocol scan. If packets of over 10 different IP protocols from the same source IP address are sent to the same host within the specified time threshold, StoneOS will identify them as an IP protocol scan attack. The value range is 1 to 1,800,000 milliseconds. The default value is 10. • Action - Specifies an action for IP protocol scan attacks. If the default action **Drop** is selected, during the specified period (threshold), StoneOS will only permit packets of 10

Option	Description
	different IP protocols destined to the same host to pass through and drop other IP protocol packets, and also generates an alarm.
	TCP Port Scan: Click this button to enable port scan defense for the security zone. • Threshold - Specifies a time threshold for port scan. If over 10 TCP SYN packets are sent to different ports within the period specified by the threshold, StoneOS will identify them as a TCP port scan attack. The value range is 1 to 1,800,000 milliseconds. The default value is 5. • Action - Specifies an action for TCP port scan attacks. If the default action **Drop** is selected, during the specified period (threshold), StoneOS will only permit 10 TCP SYN packets destined to different ports to pass through and drops the other packets of the same type, and also generates an alarm.
	UDP Port Scan: Click this button to enable UDP Port Scan defense for the security zone. • Threshold - Specifies a time threshold for UDP port scan. If over 10 UDP packets from the same source IP address are sent to different ports within the specified time threshold, StoneOS will identify them as a UDP port scan attack. The value range is 1 to 1,800,000 milliseconds. The

Option	Description
	default value is 5. • Action - Specifies an action for UDP port scan attacks. If the default action **Drop** is selected, during the specified period (threshold), StoneOS will only permit 10 UDP packets destined to different ports to pass through and drops the other packets of the same type, and also generates an alarm.
Denial of Service Defense	Click the ▶ button to expand the information of denial of service defense. Select the **Denial of Service Defense** check box to enable all denial of service defenses.
	Ping of Death Attack:Click this button to enable Ping of Death attack defense for the security zone. If any Ping of Death attack has been attacked, StoneOS will drop the attacking packets, and also give an alarm.
	Teardrop Attack: Click this button to enable Teardrop attack defense for the security zone. If any Teardrop attack has been attacked, StoneOS will drop the attacking packets, and also give an alarm.
	IP Fragment: Click this button to enable IP fragment defense for the security zone. • Action - Specifies an action for IP fragment attacks. The default action is Drop.
	IP Option: Click this button to enable IP option attack defense

Option	Description
	for the security zone. StoneOS will defend against the following types of IP options: Security, Loose Source Route, Record Route, Stream ID, Strict Source Route and Timestamp. • Action - Specifies an action for IP option attacks. The default action is Drop.
	Smurf or Fragile Attack: Click this button to enable Smurf or fragile attack defense for the security zone. • Action - Specifies an action for Smurf or fragile attacks. The default action is Drop.
	Land Attack: Click this button to enable Land attack defense for the security zone. • Action - Specifies an action for Land attacks. The default action is Drop.
	Large ICMP Packet: Click this button to enable large ICMP packet defense for the security zone. • Threshold - Specifies a size threshold for ICMP packets. If the size of any inbound ICMP packet is larger than the threshold, StoneOS will identify it as a large ICMP packet and take the specified action. The value range is 1 to 50000 bytes. The default value is 1024. • Action - Specifies an action for large ICMP packet attacks. The default action is Drop.

Option	Description
Proxy	Click the ▶ button to expand the information of proxy defense. Select the **Proxy** check box to enable all proxy defenses.
	SYN Proxy: Click this button to enable SYN proxy for the security zone. SYN proxy is designed to defend against SYN flood attacks in combination with SYN flood defense. When both SYN flood defense and SYN proxy are enabled, SYN proxy will act on the packets that have already passed detections for SYN flood attacks. • Proxy trigger rate - Specifies a min number for SYN packets that will trigger SYN proxy or SYN-Cookie (if the Cookie check box is selected). If the number of inbound SYN packets matched to one single port of one single destination IP address per second exceeds the specified value, StoneOS will trigger SYN proxy or SYN-Cookie. The value range is 1 to 50000. The default value is 1000. • Cookie - Select this check box to enable SYN-Cookie. SYN-Cookie is a stateless SYN proxy mechanism that enables StoneOS to enhance its capacity of processing multiple SYN packets. Therefore, you are advised to expand the range between "Proxy trigger rate" and "Max SYN packet rate" appropriately. • Max SYN packet rate - Specifies a max number for SYN packets that are permitted to pass through per second by

Option	Description
	SYN proxy or SYN-Cookie (if the Cookie check box is selected). If the number of inbound SYN packets destined to one single port of one single destination IP address per second exceeds the specified value, StoneOS will only permit the specified number of SYN packets to pass through during the current and the next second. All the excessive packets of the same type will be dropped during this period. The value range is 1 to 1500000. The default value is 3000. • Timeout - Specifies a timeout for half-open connections. The half-open connections will be dropped after timeout. The value range is 1 to 180 seconds. The default value is 30.
Protocol Anomaly Report	Click the ▶ button to expand the information of protocol anomaly report. Select the **Protocol Anomaly Report** check box to enable the function of all protocol anomaly reports.
	TCP Anomalies: Click this button to enable TCP option anomaly defense for the security zone. • Action - Specifies an action for TCP option anomaly attacks. The default action is Drop. **TCP Split Handshake**: Click this button to enable TCP split handshake defense for the security zone. • Action - Specifies an action for TCP split handshake

Option	Description
	attacks. The default action is Drop.

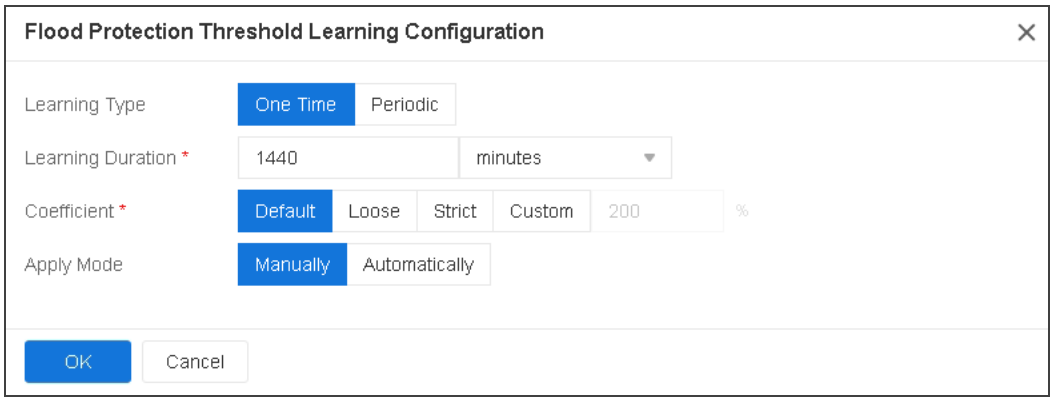
4. To restore the system default settings, click **Restore Default**.
5. Click **OK**.

Configuring Flood Protection Threshold Learning

Configuring Flood Protection Threshold Learning Parameters

To configure flood protection threshold learning parameters, take the following steps:

1. Create a zone. For more information, refer to "Security Zone" on Page 169.
2. On the **Zone Configuration** page, expand **Threat Protection**.
3. Click the **Enable** button next to **Attack Defense** and then **Configure**.
4. In the **Attack Defense** panel, click **Configure** next to **Flood Protection Threshold Learning**.



In the Flood Protection Threshold Learning Configuration panel, configure the following options:

Option	Description

Learning Type	Specifies the type of flood protection threshold learning. Valid values: One Time and Periodic. Default value: One Time.
	One Time: Runs the learning task only once, which will be automatically stopped after completion.
	Periodic: Runs the learning task periodically based on the interval. You need to manually stop the learning task. If you set the type to this value, you also need to specify the periodic interval.
	• Periodic Interval: This value specifies the interval between the last time when the learning task ends and the next time when the learning task starts. To specify an interval, enter a time period in the field and select a time unit from the drop-down list. Valid units: minutes, hours, and days.
	  • If the time unit is set to days, valid values of the interval are 1 to 365 days and the default value is 7 days.
	  • If the time unit is set to hours, valid values of the interval are 1 to 8760 hours and the default value is 1 hour.
	  • If the time unit is set to minutes, valid values of the interval are 10 to 525600 minutes and the default value is 1440 minutes.

Option	Description
Learning Duration	Specifies the duration of flood protection threshold learning. To do this, enter a time period in the field and select a time unit from the drop-down list. Valid units: minutes, hours, and days. • If the time unit is set to days, valid values of the duration are 1 to 365 days and the default value is 1 day. • If the time unit is set to hours, valid values of the duration are 1 to 8760 hours and the default value is 1 hour. • If the time unit is set to minutes, valid values of the duration are 10 to 525600 minutes and the default value is 1440 minutes.
Coefficient	Final threshold learning result=Maximum traffic rate within learning duration * Coefficient. Specifies the coefficient of flood protection threshold learning. Unit: %. You can select Default, Loose, Strict, or customize a coefficient. • Default: The coefficient is 200. • Loose: The coefficient is 4000. • Strict: The coefficient is 100. • Custom: The coefficient range is from 100 to 4000.
Apply Mode	Specifies the mode of applying the flood protection threshold learning result. Valid values: Manually and

Option	Description
	Automatically. Default value: Manually. • Manually: Applies the threshold learning result to the threshold configuration of a flood attack defense item based on your requirements. For more information, see Viewing and Applying Flood Protection Threshold Learning Result. • Automatically: The threshold configuration of all enabled flood attack defense items will be automatically configured with the threshold learning result and these threshold configurations will be automatically applied.

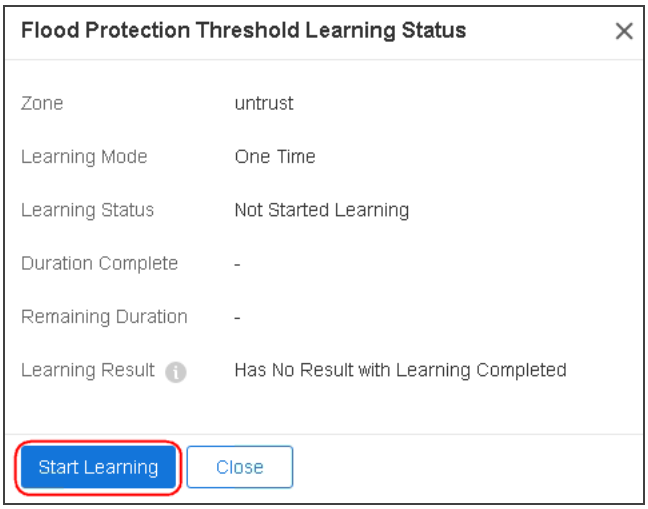
5. Click **OK**.

Enabling Flood Protection Threshold Learning

After you configure flood protection threshold learning parameters, you can start flood protection threshold learning. To do this, take the following steps:

1. Select **Network** > **Zone**.
2. In the list of zones whose Attack Defense function is enabled, click **Status** in the **AD Intelligent Learning** column. In the **Flood Protection Threshold Learning Status** panel, click

Start Learning.



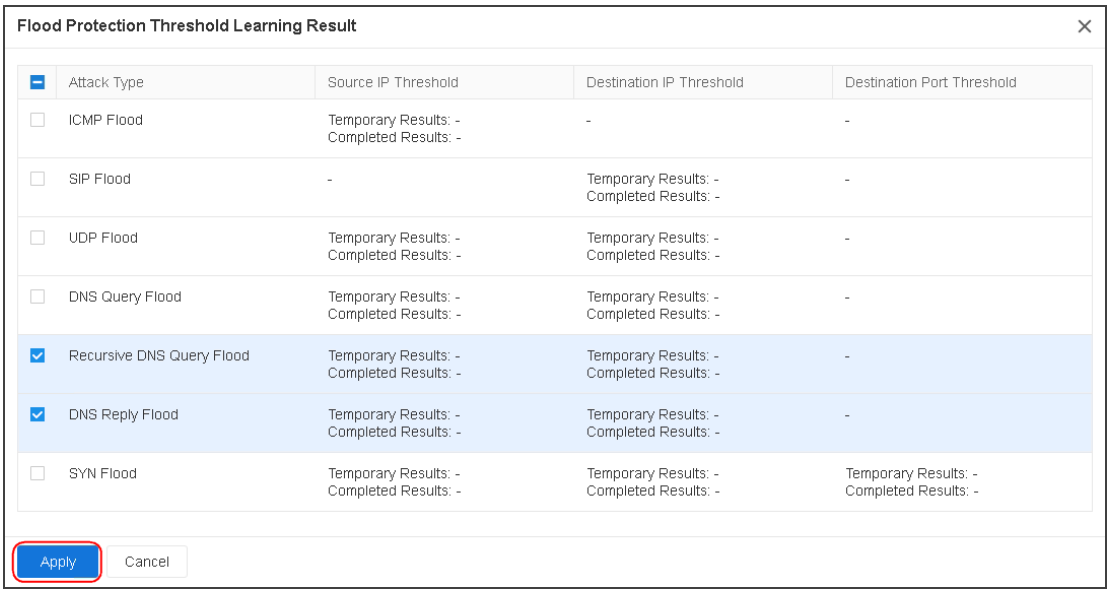
3. After flood protection threshold learning is started, you can view details such as the duration completed, remaining duration, and learning result. You can also click Stop Learning to stop flood protection threshold learning.

Viewing and Applying Flood Protection Threshold Learning Result

After flood protection threshold learning is completed, you can view and apply the learning result. To do this, take the following steps:

1. Create a zone. For more information, refer to "Security Zone" on Page 169.
2. On the **Zone Configuration** page, expand **Threat Protection**.
3. Click the **Enable** button next to **Attack Defense** and then **Configure**.
4. Click **View Result** next to **Flood Protection Threshold Learning**. In the **Flood Protection Threshold Learning Result** panel, view threshold learning result of each flood attack type, including completed results and temporary results. To use a temporary result, you need to record this result and manually replace the threshold of the corresponding flood attack

defense item with this result.



5. Select the flood attack type whose threshold learning result you want to apply and click **Apply**.

Notes:

- The Flood Protection Threshold Learning function takes effect only if the Attack Defense function and corresponding flood attack defense items are enabled.
- Flood protection threshold learning parameters cannot be edited when flood protection threshold learning is in progress.
- The minimum value of actual flood protection threshold learning result is 1500 and the maximum value is consistent with that of the flood attack defense item you can configure.

- In HA state, only the master device can perform flood protection threshold learning. After the master device starts learning, the learning result is not synchronized to the backup device. The threshold configuration is synchronized to the backup device only after the learning result is applied to the master device. If a switchover occurs, threshold learning automatically stops.
- If the device is restarted, you need to start flood protection threshold learning again.

Botnet Prevention

Botnet refers to a kind of network that uses one or more means of communication to infect a large number of hosts with bots, forming a one-to-many controlled network between the controller and the infected host, which will cause a great threat to network and data security.

The botnet prevention function can detect botnet host in the internal network timely, as well as locate and take other actions according to the configuration, so as to avoid further threat attacks.

The botnet prevention configurations are based on security zones or policies. If the botnet prevention profile is bound to a security zone, the system will detect the traffic destined to the specified security zone based on the profile configuration. If the botnet prevention profile is bound to a policy rule, the system will detect the traffic matched to the specified policy rule based on the profile configuration.

Notes: The botnet prevention function is controlled by license. Therefore, botnet prevention can be used only after the Botnet Prevention license is installed in StoneOS.

Related Topics:

- "Configuring Botnet Prevention" on Page 1587
- "Address Liberary" on Page 1590
- "Botnet Prevention Global Configuration" on Page 1594

Configuring Botnet Prevention

This chapter includes the following sections:

- Preparation for configuring Botnet Prevention function
- Configuring Botnet Prevention function

Preparing

Before enabling botnet prevention, make the following preparations:

1. Make sure your system version supports botnet prevention.
2. Import a botnet prevention license and reboot. The botnet prevention will be enabled after the rebooting.

Notes:

- You need to update the botnet prevention signature database before enabling the function for the first time. To assure a proper connection to the default update server, you need to configure a DNS server for system before updating.

Configuring Botnet Prevention Function

The Botnet Prevention configurations are based on security zones or policies.

To realize the zone-based Botnet Prevention, take the following steps:

1. Create a zone. For more information, refer to "Security Zone" on Page 169.
2. In the Zone Configuration page, expand Threat Protection.

3. Enable the threat protection you need and select a Botnet Prevention rule from the profile drop-down list below; or you can click ⊕ from the profile drop-down list. To create a Botnet Prevention rule, see Configuring a Botnet Prevention Rule.

4. Click **OK** to save the settings.

To realize the zone-based Botnet Prevention, take the following steps:

1. Create a security policy rule. For more information, refer to "Security Policy" on Page 1286.

2. In the Policy Configuration page, expand the Protection.

3. Click the **Enable** button of **Botnet Prevention**. Then select an Anti-Spam rule from the Profile drop-down list, or you can click ⊕ from the Profile drop-down list to create a Botnet Prevention rule. For more information, see Configuring a Botnet Prevention Rule.

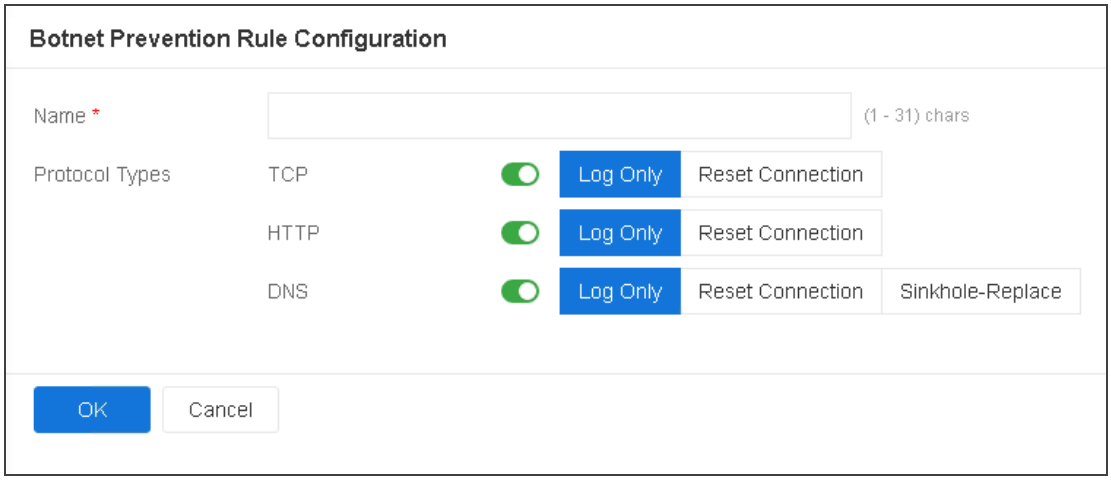
4. Click **OK** to save the settings.

Configuring a Botnet Prevention Rule

To configure a Botnet Prevention rule, take the following steps:

1. Click **Object** > **Botnet Prevention**> **Profile**.

2. Click **New**.



In the Botnet Prevention Rule Configuration page, enter the Botnet Prevention rule configurations.

Option	Description
Name	Specifies the rule name.
Protocol Types	Specifies the protocol types (TCP, HTTP, DNS) you want to scan and specifies the action the system will take after the botnet is found. • Log Only - Only generates log. • Reset Connection - If botnets has been detected, system will reset connections to the files. • Sinkhole-Replace - When the protocol type is DNS, you can specify the processing action as "Sinkhole Address Replacement". After the threat is discovered, the system will replace the IP address in the DNS response packet with the Sinkhole IP address.

3. Click **OK**.

Address Liberary

The address library includes a predefined address library and a custom address library, each of which contains a block list and an exclude list, which are described as follows:

- Predefined exclude list: It contains domains automatically obtained through the botnet prevention signature database. When the traffic matches to the domain name in the list, system will not control the traffic with botnet prevention function.
- Custom exclude list: It contains IPs, domains and URLs manually added by the user. When the traffic matches to the IP address, domain name or URL in the list, system will not control the traffic with botnet prevention function.
- Predefined block list: It contains IPs, domains and URLs automatically obtained through the botnet prevention signature database. When the traffic matches to the IP address, domain name or URL in the list, system will control the traffic with botnet prevention function.
- Custom block list: It contains IPs, domains and URLs manually added by the user. When the traffic matches to the IP address, domain name or URL in the list, system will control the traffic with botnet prevention function.

The traffic matching sequence will be: Custom exclude list > Custom block list > Predefined exclude list > Predefined block list.

Configuring the Exclude List

Creating a Custom Exclude List

To create a custom exclude list entry, take the following steps:

1. Click **Object > Botnet Prevention > Address Library**.
2. In the Exclude List tab, click **New** to open the **Exclude Entry Configuration** page.

3. Click **IP**, **Domain** or **URL** to specify the entry type.
    - IP: Enter the IP address and Port in the text box. If not specified the port,it will be any port.
    - Domain: Enter the domain name in the text box. You can click the **enable** button of "Including subdomains" to specify the domain as a wildcard domain.
    - URL: Select HTTP or HTTPS from the URL drop-down list and enter the URL address in the text box.
4. Click **OK**.

Deleting a Custom Exclude List

To delete a custom exclude list entry, take the following steps:

1. Click **Object > Botnet Prevention > Address Library**.
2. In the Exclude List tab, select the entry you want to delete from the exclude list.
3. Click **Delete**.

Filtering a Entry in the Exclude List

Users can filter and view an exclude list entry in the predefined address library and the custom address library. To filter an exclude list entry, take the following steps:

1. Click **Object > Botnet Prevention > Address Library**.
2. In the Exclude List tab, click the **Filter** button to add filtering conditions and search out the filtered entry.

Configuring the Block List

Creating a Custom Block List

To create a custom block list entry, take the following steps:

1. Click **Object > Botnet Prevention > Address Library**.
2. In the Block List tab, click **New** to open the **Blocklist Entry Configuration** page.
3. Click **IP**, **Domain** or **URL** to specify the entry type.
    - IP: Enter the IP address and Port in the text box. If not specified the port,it will be any port.
    - Domain: Enter the domain name in the text box. You can click the enable button of "Including subdomains" to specify the domain as a wildcard domain.
4. Click **OK**.

Deleting a Custom Block List

To delete a custom block list entry, take the following steps:

1. Click **Object > Botnet Prevention > Address Library**.
2. In the Blick List tab, select the entry you want to delete from the block list.
3. Click **Delete**.

Filtering a Entry in the Block List

Users can filter and view a block list entry in the predefined address library and the custom address library. To filter a block list entry, take the following steps:

1. Click **Object > Botnet Prevention > Address Library**.
2. In the Block List tab, click the **Filter** button to add filtering conditions and search out the filtered entry.

Adding to Exclude List

To add a block list entry to the exclude list, take the following steps:

1. Click **Object > Botnet Prevention > Address Library**.
2. In the Block List tab, click **Add to exclude list** under the Operation column in the block list to add the entry to the exclude list.

Botnet Prevention Global Configuration

To configure the Botnet Prevention global settings, take the following steps:

1. Click **Object** > **Botnet Prevention** > **Configuration**.

2. Click/clear the **Enable** button to enable/disable the Botnet Prevention function.

3. In the **Log Aggregate Type**section, select the aggregation type for the anti-virus logs. If **Do Not Merge** is not selected, the system will merge botnet prevention logs based on specified log aggregation type and time granularity. This way, logs are reduced to prevent the log server from receiving redundant logs.

   Option descriptions:

Option	Description
Do Not Merge	The system stores each botnet prevention log in the database and does not merge any logs.
Source IP	The system merges botnet prevention logs of the same source IP according to the specified time granularity.
Destination IP	The system merges botnet prevention logs of the same destination IP according to the specified time granularity.
Source IP, Destination	The system merges botnet prevention logs of the same source and destination IP according to the specified time

Option	Description
IP	granularity.
Source IP, IOC	The system merges botnet prevention logs of the same source IP and IOC according to the specified time granularity. IOC indicates threat intelligence, that is to say, the malicious domain name, IP address, or URL detected by the botnet prevention function.
Destination IP, IOC	The system merges botnet prevention logs of the same destination IP and IOC according to the specified time granularity. IOC indicates threat intelligence, that is to say, the malicious domain name, IP address, or URL detected by the botnet prevention function.
Souce IP, Destination IP, IOC	The system merges botnet prevention logs of the same source IP, destination IP, and IOC according to the specified time granularity. IOC indicates threat intelligence, that is to say, the malicious domain name, IP address, or URL detected by the botnet prevention function.

4. In the **Aggregate Time** section, specifies the time granularity for merging botnet prevention logs. With this parameter specified, at the same time granularity, the system stores botnet prevention logs of the same merging type (specified above) in the database only once. Value ranges from 10 to 600 seconds. The default value is 10 seconds.

5. Specify the Sinkhole IP address that replaces the IP address in the DNS response message. You can select the system's predefined Sinkhole IP address or specify a user-defined Sinkhole IP address. After selecting **User-defined Sinkhole**, specify a custom IPv4 address and an IPv6 address. If only the IPv4 address is configured, the system will automatically map

the configured IPv4 address to the corresponding IPv6 address when the DNS server communicates by using the IPv6 protocol.

6. Click **Apply** to apply the settings.

Encrypted Traffic Detection

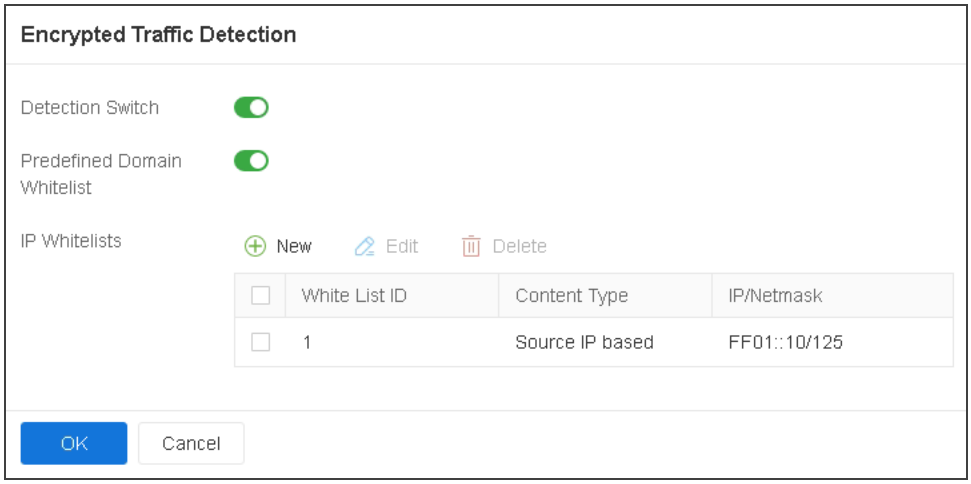
Traffic processed by using encryption technology is called encrypted traffic. Malicious traffic is typically hidden by using SSL/TLS encryption protocols, which is difficult to detect and can pose great threats to network security. After you configure the Encrypted Traffic Detection function, the system extracts feature data from encrypted traffic and detects the data based on the detection model in the encrypted traffic detection database. If abnormal encrypted traffic is detected, the system records threat logs.

The system supports daily automatic update of the encrypted traffic detection database or you can manually update the database in real time. For more information, see the Updating Signature Database section of the "Upgrading System" on Page 1869 topic.

Configuring the Encrypted Traffic Detection Function

To configure the Encrypted Traffic Detection function, take the following steps:

1. Select **Object** > **Encrypted Traffic Detection**.



On the Encrypted Traffic Detection page, configure the following options:

Option	Description
Detection Switch	Click the button to enable or disable the Encrypted Traffic Detection function. By default, this function is disabled.
Predefined Domain Whitelist	Click the button to enable or disable the predefined domain whitelist. By default, the whitelist is enabled. The predefined domain whitelist contains 10,000 common domain names. If traffic comes from a domain in the predefined domain whitelist, the traffic is considered as normal traffic and will not be detected by the Encrypted Traffic Detection function. You can update the predefined domain whitelist by updating the encrypted traffic detection database.
IP Whitelists	Traffic from the IP address or CIDR block in the whitelist is not detected by the Encrypted Traffic Detection function. To configure an IP whitelist, take the following steps: 1. Click **New**. The **Whitelist Configuration** panel appears. 2. In the White List ID field, enter the whitelist ID. Valid values: 1 to 64, which indicates that you can create up to 64 entries in the whitelist. 3. In the Type field, specify the IP address type. Valid values: IPv4 and IPv6. 4. In the Content Type field, specify the content type of the IP whitelist. Valid values: Source IP

Option	Description
	based and Destination IP based. 5. In the Member field, add an address member to the IP whitelist. • If the Type parameter is set to IPv4, you need to specify the IPv4 address and subnet mask to be added to the whitelist. • If the Type parameter is set to IPv6, you need to specify the IPv6 address and prefix length to be added to the whitelist. Valid values of the prefix length: 120 to 128. 6. Click **OK**. You can view added IP whitelist entries in the IP whitelist list. To edit or delete an entry, select this entry and click **Edit** or **Delete**.

2. Click **OK**.

Notes: The Encrypted Traffic Detection function is supported for A-series (except A200/A6800/A7600) devices, K 2380, and K2680.

Chapter 13 Monitor

The monitor section includes the following functions:

- **Monitor**: The Monitor function statistically analyzes the devices and displays the statistics in a bar chart, line chart, tables, and so on, which helps the users have information about the devices.
- **Report**: Through gathering and analyzing the device traffic data, traffic management data, threat data, monitor data and device resource utilization data, the function provides the all-around and multi-demensional staticstcs.
- **Log**: Records various system logs, including system logs, threat logs, session logs, NAT logs, NBC logs and configuration logs.

Monitor

System can monitor the following objects.

- **User Monitor**: Displays the application statistics within the specified period (Realtime, latest 1 hour, latest 1 day, latest 1 month) The statistics include the application traffic and applications' concurrent sessions.
- **Application Monitor**: Displays the statistics of applications, application categories, application subcategories, application risk levels, application technologies, application characteristics within the specified period (Realtime, latest 1 hour, latest 1 day, latest 1 month). The statistics include the application traffic and applications' concurrent sessions.
- **Cloud Application Monitor**: Displays statistics of cloud based applications, including their traffic, new sessions and concurrent sessions.
- **Share Access Monitor**: Displays the access terminal statistics of specified filter condition(Virtual router, IP, host number), including operation system , online time, login time and last online time of users.
- **End Point Detect**:Displays the endpoint data information list synchronized with the endpoint security control center.
- **User Quota Detect**:Displays the user traffic quota statistics list.
- **Device Monitor**: Displays the device statistics within the specified period (Realtime, latest 1 hour, latest 1 day, latest 1 month), including the total traffic, interface traffic, zone traffic, CPU/memory status, sessions, Online IP and hardware status.
- **URL Hit**: If system is configured with " URL Filtering" on Page 1176, the predefined stat-set of URL Hit can gather statistics on user/IPs, URLs and URL categories.

- **Link Status Monitor**:Displays the traffic statistics of the interfaces that have been bound within the specified period .
- **Application Block**: If system is configured with "Security Policy" on Page 1286 the application block can gather statistics on the applications and user/IPs.
- **Keyword Block**: If system is configured with "File Content Filter" on Page 897, "Web Content" on Page 1227, "Email Filter" on Page 1239, "Web Posting" on Page 1233, the predefined stat-set of Keyword Block can gather statistics on the file content keyword, Web keyword, Web keywords, email keywords, posting keywords and users/IPs.
- **Authenticated User**: If system is configured with"Web Authentication" on Page 451, "Single Sign-On" on Page 465, "SSL VPN" on Page 586 , "L2TP VPN" on Page 682 the auth user can gather statistics on the authenticated users.
- **Monitor Configuration**: Enable or disable some monitor items as needed.
- **User Defined Monitor**: Provides a more flexible approach to view the statistics.

Notes: If IPv6 is enabled, system will count the total traffic/sessions/AD/URLs/applications of IPv4 and IPv6 address. Only User Monitor/Application Monitor/Cloud Application Monitor/Device Monitor/URL Hit/Application Block/User-defined Monitor support IPv6 address.

User Monitor

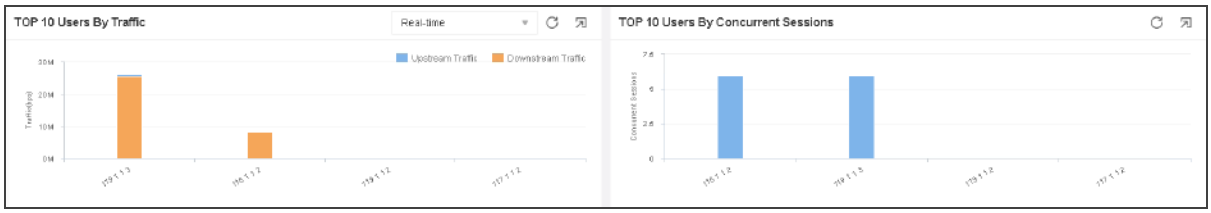
User monitor displays the application statistics within the specified period (Realtime, latest 1 hour, latest 1 day, latest 1 month) . The statistics include the application traffic and applications' concurrent sessions.

If IPv6 is enabled, system will support to monitor both IPv4 and IPv6 address.

Notes: Non-root VSYS also supports user monitor, but does not support address book statistics.

Summary

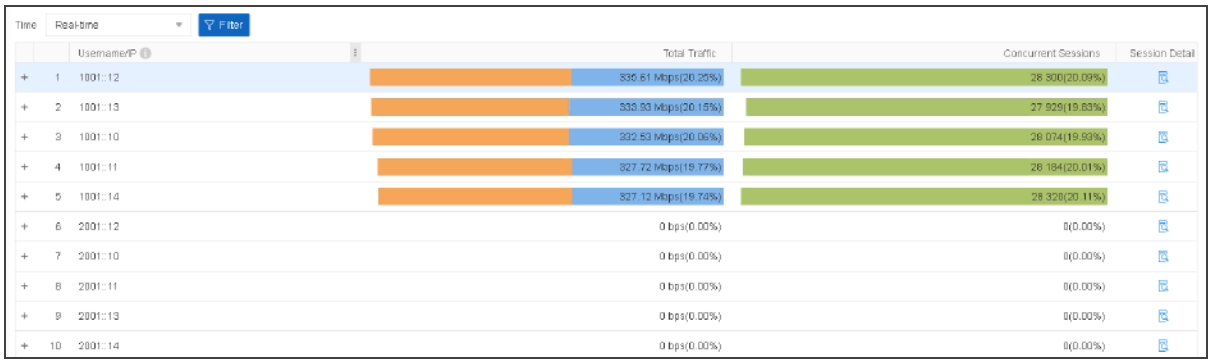
Summary displays the user traffic/concurrent sessions ranking during a specified period or of specified interfaces/zones. Click **Monitor > User Monitor > Summary**.



- Select a different Statistical_Period to view the statistical information in that period of time.
- Click " " to refresh the monitoring data in this page.
- Click "" to close the current frame.
- Hover your mouse over a bar to view the user's average upstream traffic, downstream traffic, total trafficor concurrent sessions .
- When displaying the user traffic statistics, the Upstream and Downstream legends are used to select the statistical objects in the bar chart.

User Details

Click **Monitor > User Monitor> User Details**.

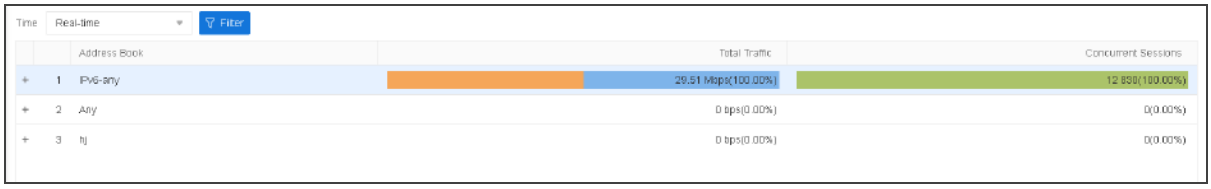


- Click Filter to select the condition in the drop-down list to search the desired users.
- To view the detailed information of a certain user , select the user entry in the list, and click "+".
    - Application (real-time): Select the Application(real-time)tab and display the detailed information of the category, subcategory, risk level, technology, upstream traffic, down-stream traffic, total traffic. Click **Details** in the list to view the line chart.
    - Cloud Application (real-time): Select the Cloud Application tab to display the cloud application information of selected user.
    - URL (real-time): Select the URL tab to display the URL hit count of selected user.
    - URL Category (real-time) : Select the URL Category tab to display the URL category hit count of selected user.
    - Traffic: Select the Traffic tab to display the traffic trends of selected user .
    - Concurrent Sessions: Select the Concurrent Sessions tab to display the concurrent sessions trends of selected user .

- Within the user entry list, hover your cursor over a user entry, and there is a ⋮ button to its right. Click this button and select **Add to Black List**.
- Select an user item in the user list, and click the button in the Session Detail column to open the <Session Detail> page and check all the session details of the selected user.
    - Click Filter to select the condition in the drop-down list to search the desired sessions.

Address Book Details

Click **Monitor>User Monitor>Address Book Details**.



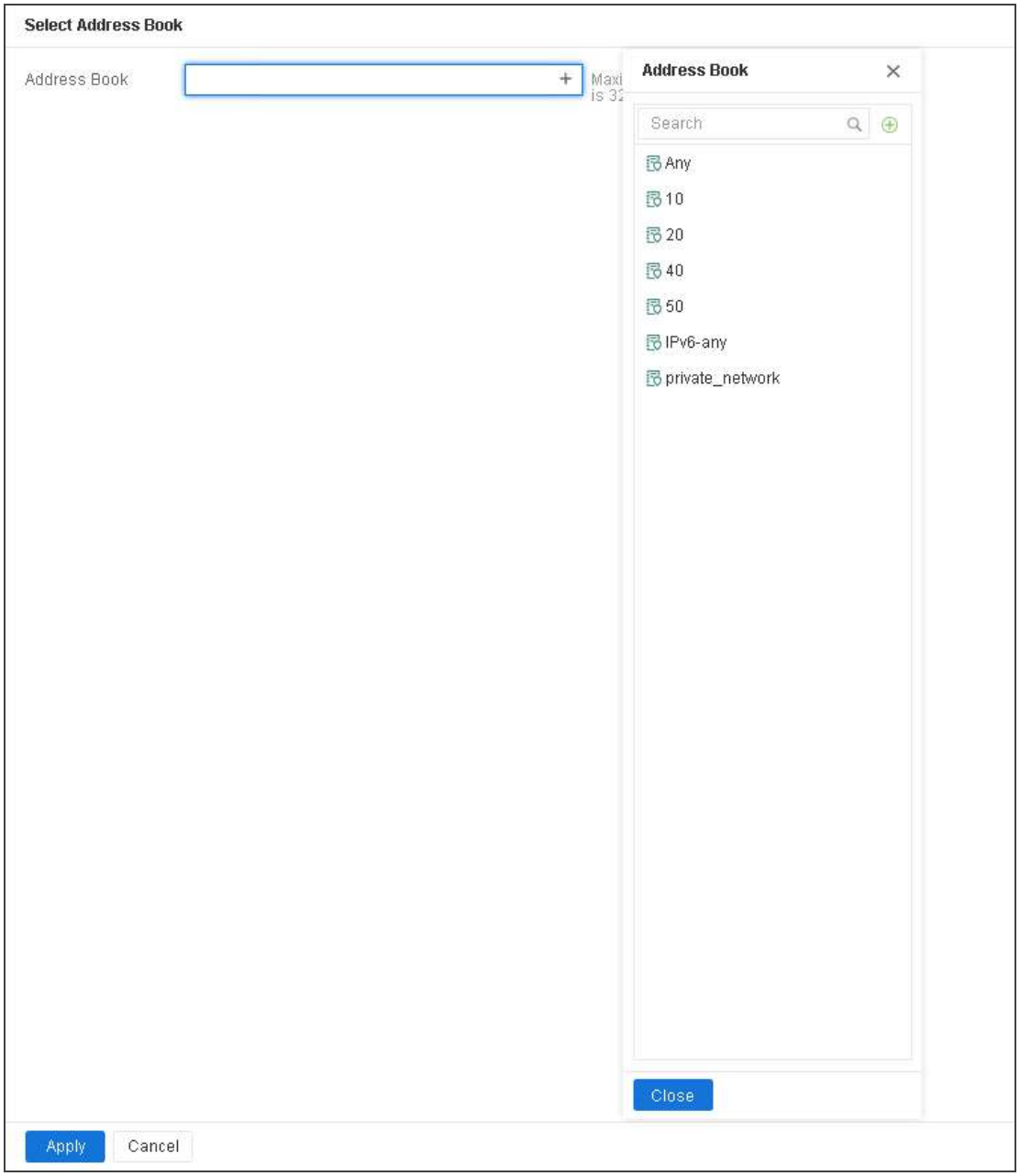
- Click Filter to select the condition in the drop-down list to search the desired address entry.
- To view the detailed information of a address entry, select the address entry in the list, and click "+".
    - Application (real-time): Select the Application (real-time) tab to displays the detailed information of the upstream traffic, downstream traffic, and total traffic. Click **Details**in the list to view the line chart.
    - Cloud Application(real-time) : Select the Cloud Application tab to display the cloud application information of selected address book.
    - User (real-time) : Select the User tab to display the total traffic of selected address book.

- Traffic: Select the Traffic tab to display the traffic trends of selected address entry.
- Concurrent Sessions: Select the Concurrent Sessions tab to display the concurrent sessions trends of selected address entry.

Monitor Address Book

The monitor address is a database that stores the user 's address which is used for statistics.

Click **Monitor > User Monitor> Select Address Book**.



In this page, you can perform the following actions:

- Click the desired address entry check box to add a new address entry to the left list. You can click ▼ in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation.
- In the left list, click an address entry to remove it from the list.

Notes: In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched.

Statistical Period

System supports the predefined time cycle and the custom time cycle. Click the time button on the top right corner of each tab to set the time cycle.

- Real-time: Displays the current statistical information.
- Last Hour: Displays the statistical information within the latest 1 hour.
- Last Day: Displays the statistical information within the latest 1 day.
- Last Month: Displays the statistical information within the latest 1 month.

Application Monitor

Application monitor displays the statistics of applications, application categories, application sub-categories, application risk levels, application technologies, and application characteristics within the specified period (Realtime, latest 1 hour, latest 1 day, latest 1 month) .The statistics include the application traffic and applications' concurrent sessions.

If IPv6 is enabled, system will support to monitor both IPv4 and IPv6 address.

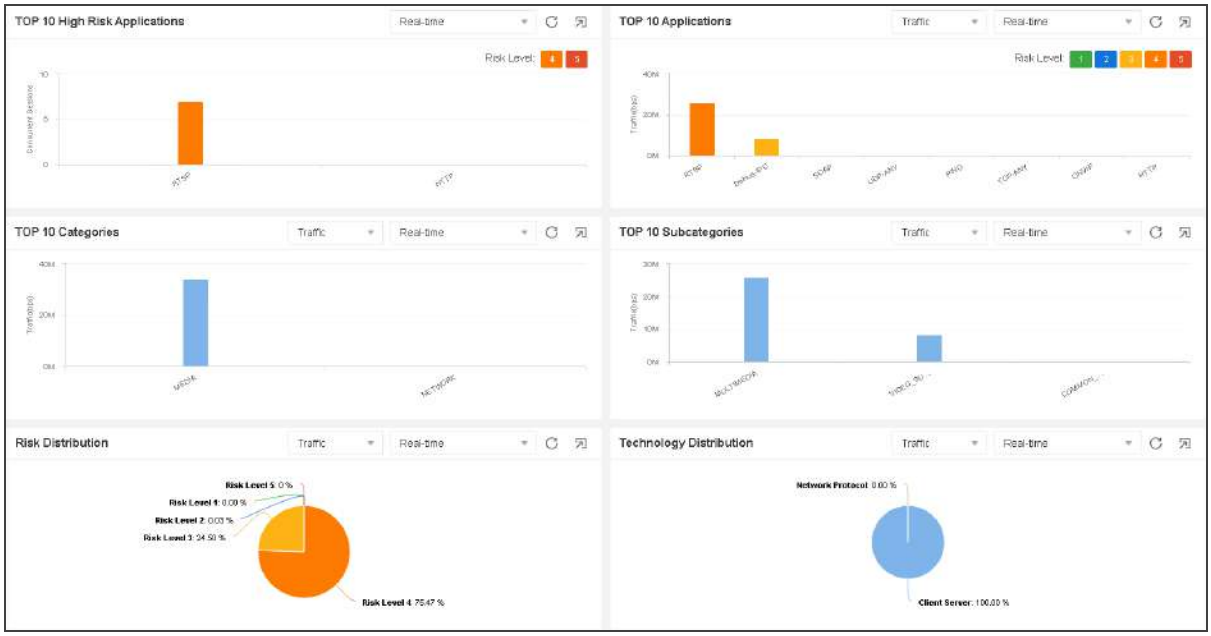
Notes: Non-root VSYS also supports application monitor, but does not support to monitor application group.

Summary

The summary displays the following contents during a specified period:

- The concurrent sessions of top 10 hot and high-risk applications.
- The traffic/concurrent sessions of top 10 applications.
- The traffic/concurrent sessions of top 10 application categories.
- The traffic/concurrent sessions of top 10 application subcategories.
- The traffic/concurrent sessions organized by application risk levels.
- The traffic/concurrent sessions organized by application technologies.
- The traffic/concurrent sessions organized by application characteristics.

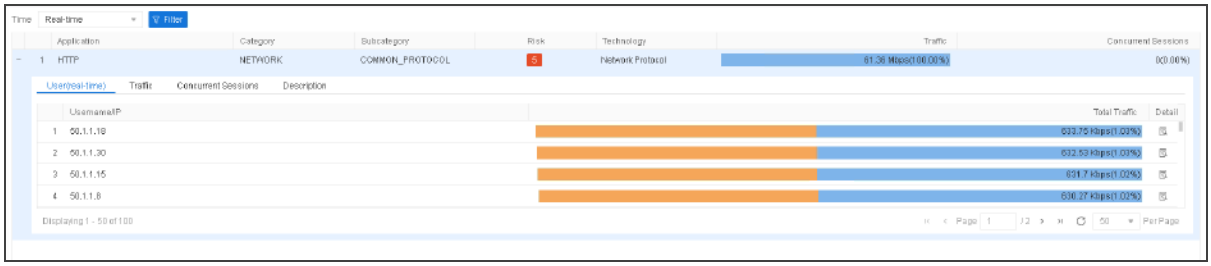
Click **Monitor>Application Monitor>Summary**.



- Select different Statistical_Period to view the statistical information in different periods of time.
- From the drop-down menu, specify the type of statistics: Traffic or Concurrent Sessions.
- Click " " to refresh the monitoring data in this page.
- Click "" to close the current frame.
- Hover your mouse over a bar or a pie graph to view the concrete statistical values of total traffic or concurrent sessions.

Application Details

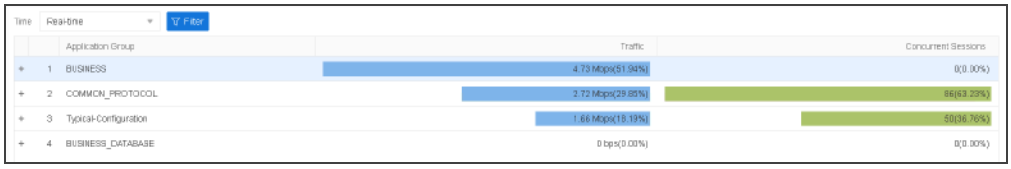
Click **Monitor > Application Monitor > Application Details**.



- Click the **Time** drop-down menu to select different Statistical_Period to view the statistical information in that periods of time.
- Click Filter button and select **Application** in the drop-down menu. You can search the desired application by entering the keyword of the application's name in the text field.
- To view the detailed information of a certain application, select the application entry in the list, and click "+".
  - Users(real-time): Select the Users (real-time) tab to displays the detailed information of users who are using the selected application. Click in details column to see the trends of upstream traffic, downstream traffic, total traffic.
  - Traffic: Select the Traffic tab to display the traffic trends of selected application.
  - Concurrent Sessions: Select the Concurrent Sessions tab to display the concurrent sessions trends of the selected application.
  - Description: Select the Description tab to displays the detailed information of the selected application.

Group Details

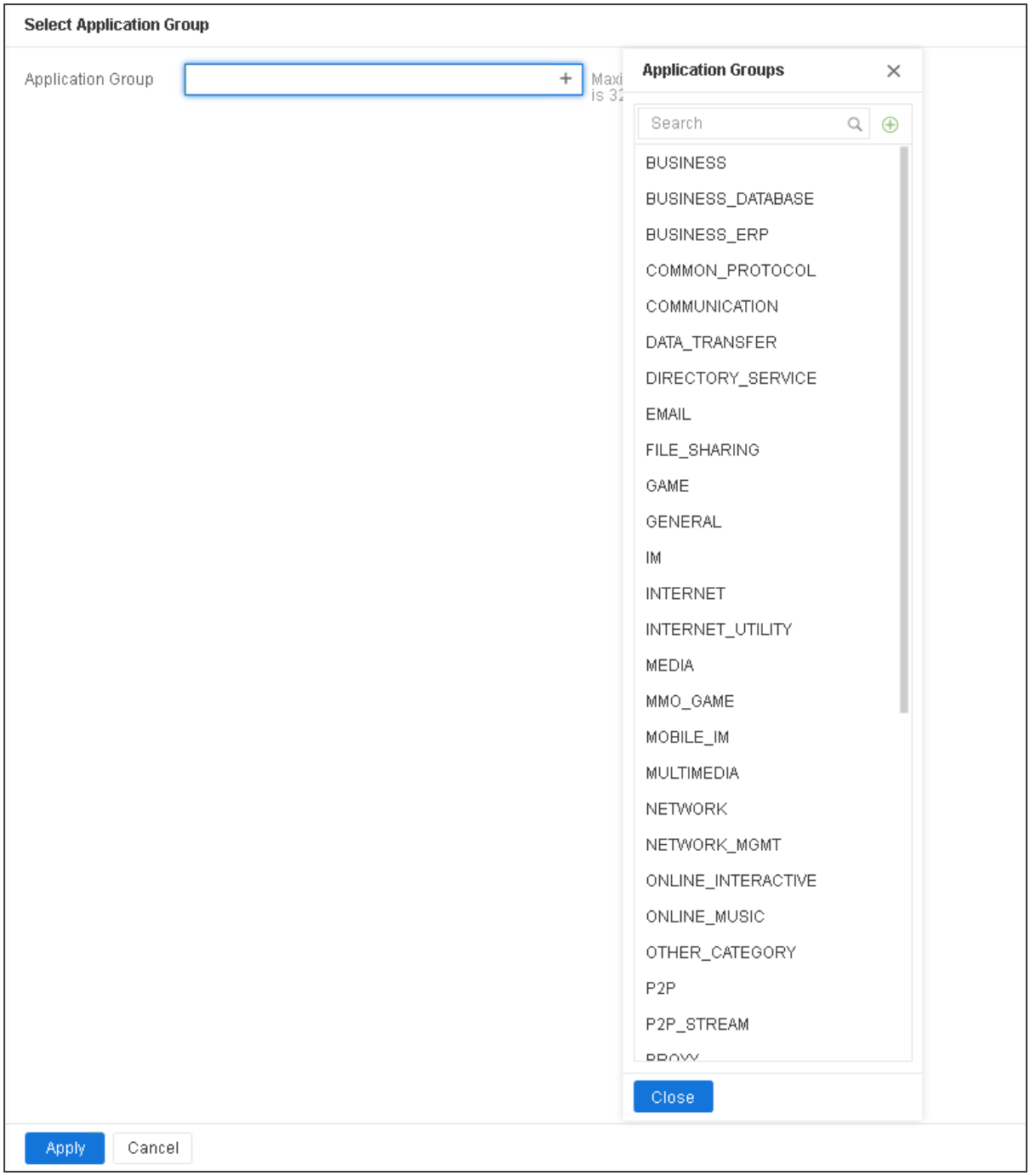
Click **Monitor>Application Monitor>Group Details**.



- Click **Time** drop-down menu to select a different Statistical_Period to view the statistical information in that periods of time.
- Click Filter button and select **Application Group** in the drop-down menu. You can search the desired application group by entering the keyword of the application group name in the text field.
- To view the detailed information of a certain application group, select the application group entry in the list, and click "+".
  - User (real-time): Select the Users (real-time)tab to display the detailed information of users who are using the selected application group. Click in details column, you can see the trends of the upstream traffic, downstream traffic, total traffic .
  - Traffic: Select the Traffic tab to display the traffic trends of selected application group.
  - Concurrent Sessions: Select the Concurrent Sessions tab to display the concurrent sessions trends of the selected application group.

Select Application Group

Click **Monitor>Application Monitor>Select Application Group**. There are global application groups in the right column.



In this page, you can perform the following actions:

- Click the desired address entry check box to add a new address entry to the left list.
- In the left list, click an address entry to remove it from the list.

Statistical Period

System supports the predefined time cycle and the custom time cycle. Click **Real-time** on the top right corner of each tab to set the time cycle.

- Real-time: Displays the current statistical information.
- Last 60 Minutes: Displays the statistical information within the latest 1 hour.
- Last 24 Hours: Displays the statistical information within the latest 1 day.
- Last 30 Days: Displays the statistical information within the latest 1 month.

Cloud Application Monitor

This feature may vary slightly on different platforms and not be available in VSYS on a part of platforms. If there is a conflict between this guide and the actual page, the latter shall prevail.

A cloud application is an application program that functions in the cloud. It resides entirely on a remote server and is delivered to users through the Internet.

Cloud application monitor page displays the statistics of cloud applications and users within a specified period (realtime, latest 1 hour, latest 1 day, latest 1 month), including application traffic, user number, and usage trend.

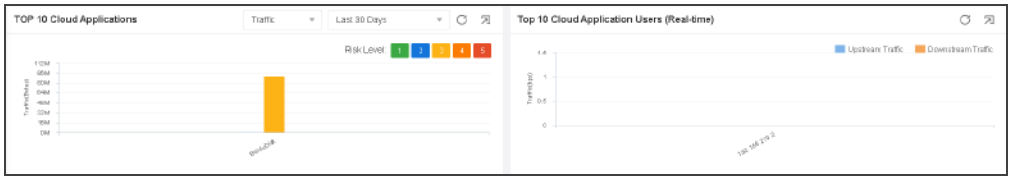
If IPv6 is enabled, system will support to monitor both IPv4 and IPv6 address.

Summary

The summary displays the following contents during a specified period:

- Top 10 cloud application rank by traffic/concurrent session number with in a specified period (realtime, latest 1 hour, latest 1 day, latest 1 month).
- Top 10 cloud application user rank by application number/traffic/concurrent session/new session.

Click **Monitor > Cloud Application Monitor> Summary**.



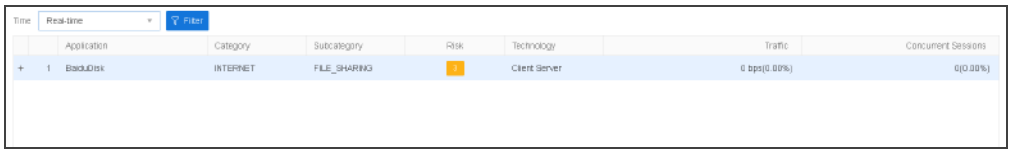
- By selecting different filters, you can view the statistics of different time period.
- By selecting the drop-down menu of trafficor concurrent sessions, you can view your intended statistics.

- Click the update icon to update the displayed data.

    - Hover your cursor over bar or pie chart to view exact data. Click the **Details** link on hover box, and you will jump to the **Cloud Application Details** page.

Cloud Application Details

Click **Monitor > Cloud Application Monitor>Cloud Application Details**.



- Click the Time drop-down menu to select different time period to view the statistics in that period.
- Click the **Filter** button, and select **Application**. In the new text box, enter the name of your intended application.
- To view the detailed information of a certain application group, select the application group entry in the list and click + before it.

    - User(real-time): Select the Users(real-time) tab to display the detailed information of users who are using the selected application group. Click in details column to see the trends of the upstream traffic, downstream traffic, total traffic .
    - Traffic: Select the Traffic tab to display the traffic trends of selected application.
    - Concurrent Sessions: Select the Concurrent Sessions tab to display the concurrent sessions trends of the selected application.

- Description: Select the Description tab to display the detailed description of the selected application.

Statistical Period

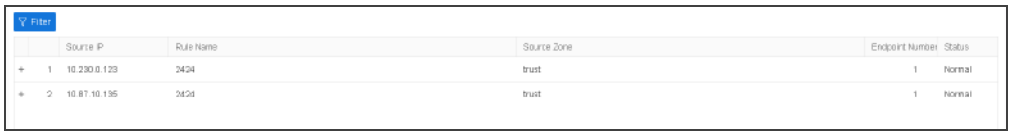
System supports the predefined time cycle and the custom time cycle. Click **Real-time** on the top right corner of each tab to set the time cycle.

- Real-time: Displays the current statistical information.
- Last 60 Minutes: Displays the statistical information within the latest 1 hour.
- Last 24 Hours: Displays the statistical information within the latest 1 day.
- Last 30 Days: Displays the statistical information within the latest 1 month.

Share Access Monitor

To detect the users' private behavior of shared access to the Internet, system supports to analyze the User-agent filed of HTTP packet, a share access detect method which is based on the application characteristic. The share access detect page can display the share access information with specified filter condition.

Click **Monitor> Share Access**.



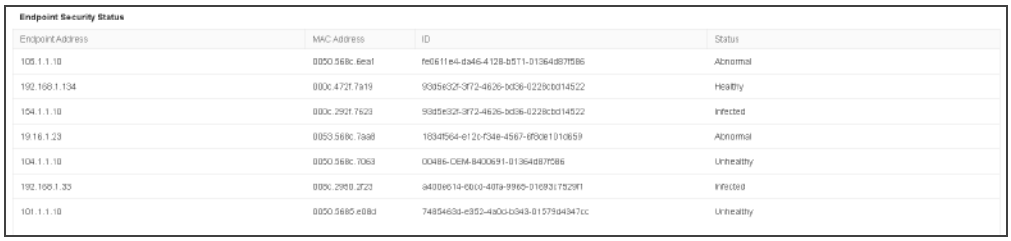
- Click Filter to select the condition in the drop-down list to search for the share access.
- Source IP: Displays the endpoints statistics of the specified source IP (IPv4 or IPv6).
- Rule Name: Displays the endpoints statistics of the specified share access rule.
- Source Zone: Displays the endpoints statistics of the specified source zone.
- Endpoint Number: Displays the endpoints statistics of the specified endpoint number.
- Status: Displays the endpoints statistics of the specified status, including the normal status, logging status, warning status, and blocking status.

Move the mouse to **Endpoint Number** list, click + button, you will view the list of **Endpoint info** and **First Detection Time**.

End Point Monitor

If system is configured with "Configuring End Point Security Control Center Parameters" on Page 1269, the endpoint detect page displays the endpoint data information list synchronized with the endpoint security control center.

Click **Monitor** > **End Point Monitor**.



Endpoint Security Status

Endpoint Address	MAC Address	ID	Status
105.1.1.10	0050.568c.6ea1	fe0611e4-da46-4128-b5T1-01364d87f586	Abnormal
192.168.1.134	000c.472f.7a19	9305e92f-3f72-4626-bd36-0228cbd14522	Healthy
104.1.1.10	000c.292f.7623	9305e92f-3f72-4626-bd36-0228cbd14522	Infected
19.16.1.23	0053.568c.7a98	18941564-e120-f34e-4567-6f90e1010659	Abnormal
104.1.1.10	0050.568c.7063	00486-OEM-8400691-01364d87f586	Unhealthy
192.168.1.33	0050.2960.2f23	a400e614-60c0-40fa-9965-016831752911	Infected
101.1.1.10	0050.5685.e08d	7485463d-e352-4a0c-b943-01579d4347cc	Unhealthy

iQoS Monitor

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

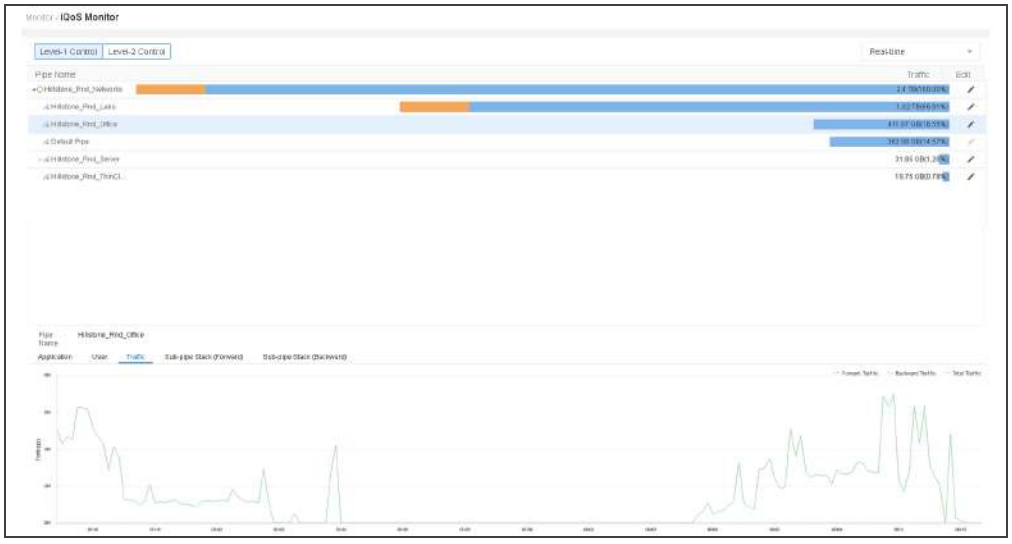
When the iQoS policy is configured and the function of iQoS is enabled, you can view the real-time traffic details or traffic trends of pipes and sub-pipes in Level-1 Control or Level-2 Control.

Notes: The iQoS monitor function is controlled by license, To use the function, install the iQoS license.For more information on license, please refer to the License .

- Click the "Edit" button to edit the selected pipe.
- Mouse over the bar of the Traffic columns to see the forward and backward traffic of the pipe.

iQoS Details

Click **Monitor >iQoS Monitor** and enter the iQOS page. The pipe name and total traffic will be displayed in the list.



- Select the Level-1 Control or Level-2 Control button to display the pipe traffic of the selected level.
- In the Real-time drop-down list, select **Last 60 Minutes**, **Last 24 Hours, Last 7 Days** or **Last 30 Days** to display the pipe traffic of the selected period. The maximum period is 30 days.
- Click ◢ to expand sub-pipes.
- Click Edit to edit the selected pipe.
- Hover your mouse over the colorful lines of Traffic to view the forward traffic and backward traffic.

The traffic details of the selected pipe will be displayed at the bottom of the page, including traffic, sub-pipe stack (forward) and sub-pipe stack (backward).

- Traffic: Displays the trends of forward traffic, backward traffic and total traffic of pipes. Hover you mouse over the lines to view the forward traffic, backward traffic and total traffic in real time. When you click Forward Traffic, Backward Traffic or Total Traffic in the top right corner of trend chart, it will turn grey and the corresponded line will be hidden; when you click it again, it will turn black and the line will appear.
- Sub-pipe Stack (Forward): Displays the trends of forward traffic of sub-pipes. Hover you mouse over the lines to view the top 5 traffic and other forward traffic of sub-pipes in real time. When you click the name of the specified sub-pipe in the top right corner of trend chart, it will turn grey and the corresponded line will be hidden; when you click it again, it will turn black and the line will appear.
- Sub-pipe Stack (Backward): Displays the trends of backward traffic of sub-pipes. Hover you mouse over the lines to view the top 5 backward traffic and other backward traffic of sub-pipes in real time. When you click the name of the specified sub-pipe in the top right corner

of trend chart, it will turn grey and the corresponded line will be hidden; when you click it again, it will turn black and the line will appear.

Device Monitor

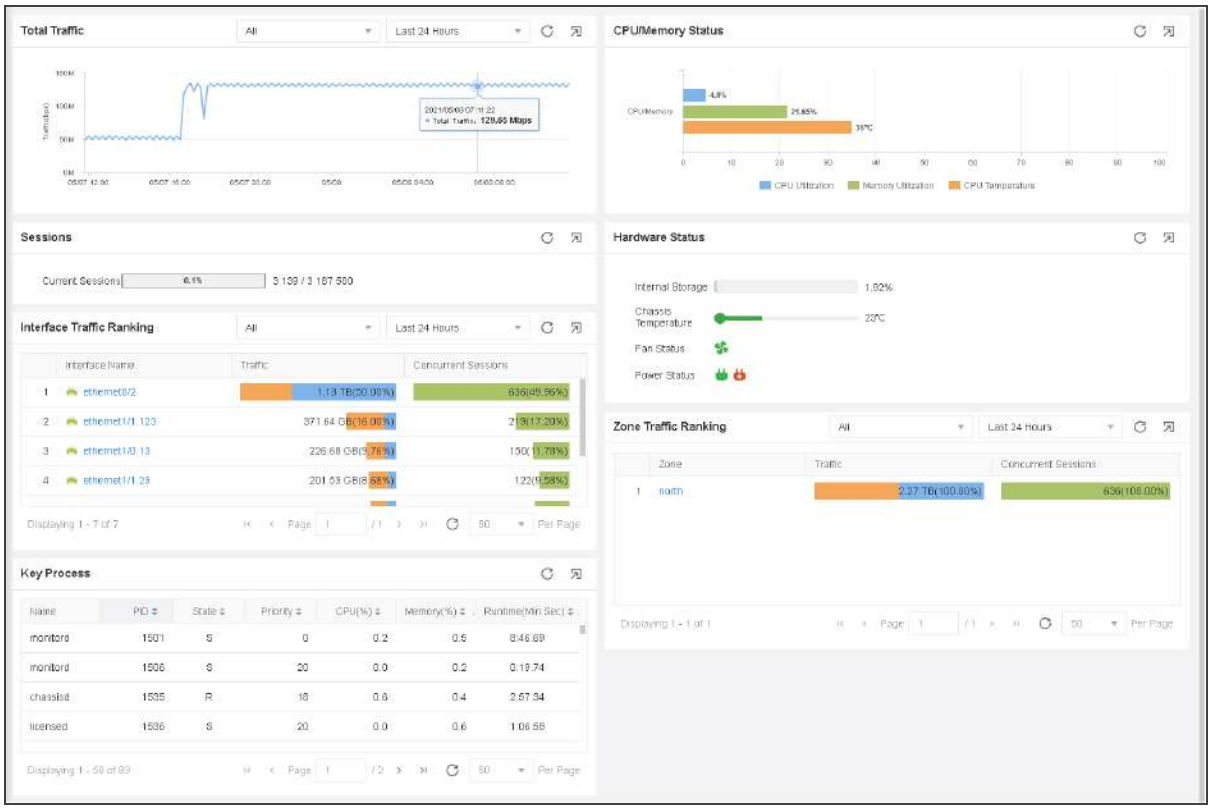
This feature may vary slightly on different platforms. If there is a conflict between this guide and the actual page, the latter shall prevail.

The Device page displays the device statistics within the specified period, including the total traffic, interface traffic, zone traffic, CPU/memory status, sessions, hardware status and online IP.

If IPv6 is enabled, system will support to monitor both IPv4 and IPv6 address.

Summary

The summary displays the device statistics within last 24 hours. Click **Monitor>Device Monitor>Summary**.



- Total traffic: Displays the total traffic within the specified statistical period.
  - Hover your mouse over the chart to view the total traffic statistics at a specific point in time.
  - Select a different Statistical Period to view the statistical information in that period of time.
  - Select the address type from the drop-down list 

to view the IPv4 traffic, IPv6 traffic or total traffic of IPv4 and IPv6.
- Interface traffic: Displays the upstream traffic, downstream traffic, total traffic and concurrent sessions of interface within the specified statistical period by rank.
  - Click **Traffic In**, **Traffic Out**, **Traffic**, or **Concurrent Sessions**. System displays the interface traffic according to the value(from large to small) of the specified object. By default, the interface traffic is displayed according to the total traffic value of interface.
  - Select the address type from the drop-down list 

to view the IPv4 traffic, IPv6 traffic or total traffic of IPv4 and IPv6.
  - Select a different Statistical Period to view the statistical information in that period of time.
  - Click the interface name to view the Detailed Information.
  - If IPv6 is enabled, the interface traffic will show the traffic of IPv4 and IPv6.
- Zone traffic: Displays the upstream traffic, downstream traffic, total traffic and concurrent sessions of zone within the specified statistical period by rank.

- Click **Traffic In**, **Traffic Out**, **Traffic**, or **Concurrent Sessions**. System displays the zone traffic according to the value(from large to small) of the specified object. By default, the zone traffic is displayed according to the total traffic value of zone.
- Select the address type from the drop-down list 

to view the IPv4 traffic, IPv6 traffic or total traffic of IPv4 and IPv6.
- Select a different Statistical Period to view the statistical information in that period of time.
- Click the zone name to view the Detailed Information.

- Hardware status: Displays the real-time hardware status, including storage, chassis temperature and fan status.
  - Internal Storage: Displays the percentage of hard disk utilization. Only E6368, E6168, E5568, E5268, E5168, E3968, E3668 and E2868 support this function.
    - Hover your mouse over the utilization to view the current utilization, the used storage size and the total storage size.
  - Chassis temperature: Displays the current CPU/chassis temperature.
    - Click **Chassis Temperature** for system to display the CPU/chassis temperature trend.
    - Hover your mouse over the chart to view the CPU/chassis temperature statistics at a specific point in time.
    - Select a different Statistical Period to view the statistical information in that period of time.

- Fan status: Displays the operation status of the fan. Green indicates normal, and red indicates error or a power supply module is not used.
- Power Status： Displays the power status of the device. Green indicates that the power module is normal. Red indicates that the power module is faulty or not in use.

- Sessions: Displays the current sessions utilization.
- CPU/memory status: Displays current CPU utilization, memory utilization and CPU temperature statistics.
  - Click legends of **CPU Utilization**, **Memory Utilization** or **CPU Temperature** to specify the histogram statistical objects. By default, it displays statistics of all objects.
- Key Process: Displays information about key processes on the device, including process name, PID, state, priority, and CPU percentage .

Statistical Period

System supports the predefined time cycle. The statistical period may vary slightly on different monitored objects. If there is conflict between this guide and the actual page, the latter shall prevail. Select statistical period from the drop-down menu 

at the top right corner of some statistics page to set the time cycle.

- Last 5 Minutes: Displays the statistical information within the latest 5 Minutes.
- Last 15 Minutes: Displays the statistical information within the latest 15 Minutes.
- Custom: Displays the statistical information within the custom period. Click **Custom** to configure the start time and end time.
- Real-time: Displays the current statistical information.
- Last 60 Minutes: Displays the statistical information within the latest 1 hour.

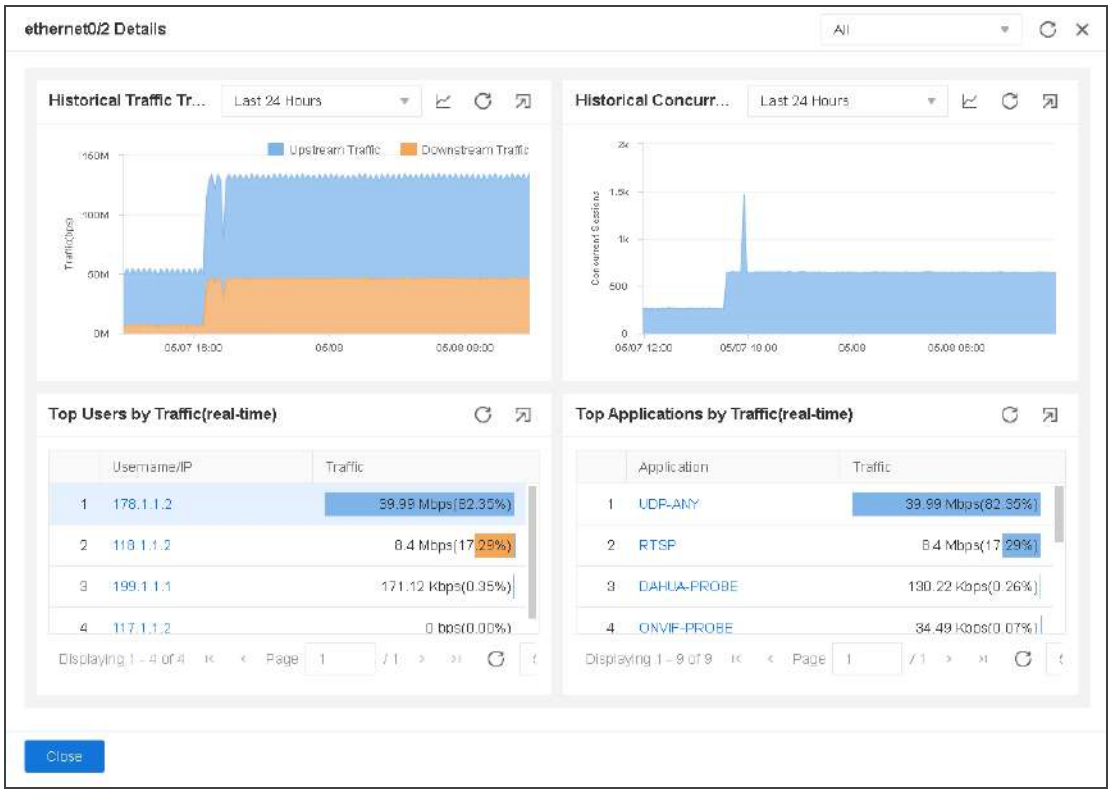
- Last 24 Hours: Displays the statistical information within the latest 1 day.
- Last 30 Days: Displays the statistical information within the latest 1 month.

In the top-right corner, you can set the refresh interval of the displayed data.

Detailed Information

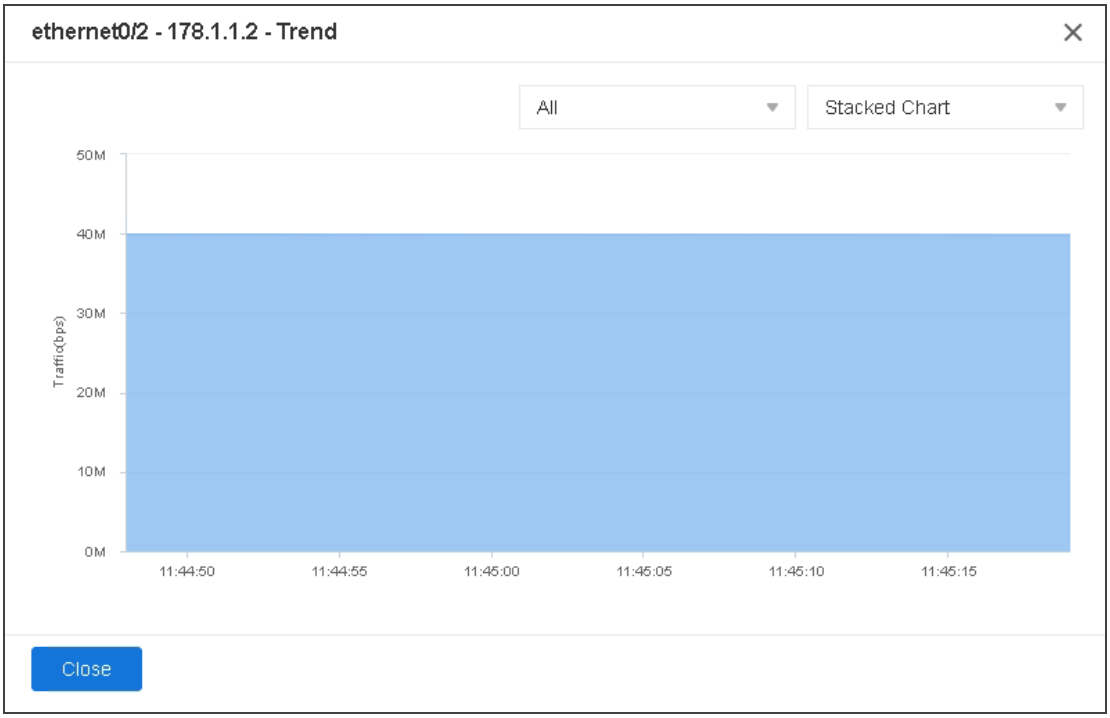
The detailed information page displays detailed statistics of certain monitored objects. In addition, in the detailed information page, hover your mouse over the chart that represents a certain object to view the statistics of history trend and other information.

For example, click **ethernet0/2** in the Interface Traffic , and the detailed information of ethernet0/2 appears.



- The drop-down list 

is used to specify the statistical type of interface traffic, including all, IPv4 and IPv6.
- Icon and are used to switch the line chart and stacked chart, which display the history trend of sessions and concurrent sessions.
- In traffic trend section, click legends of **Traffic In** or **Traffic Out** to specify the statistical objects. By default, it displays all statistical objects.
- In the User or Application section, click **Username/IP** or **Application** to display the real-time trend of the specified user or application. For example, the user traffic trend is shown as below.



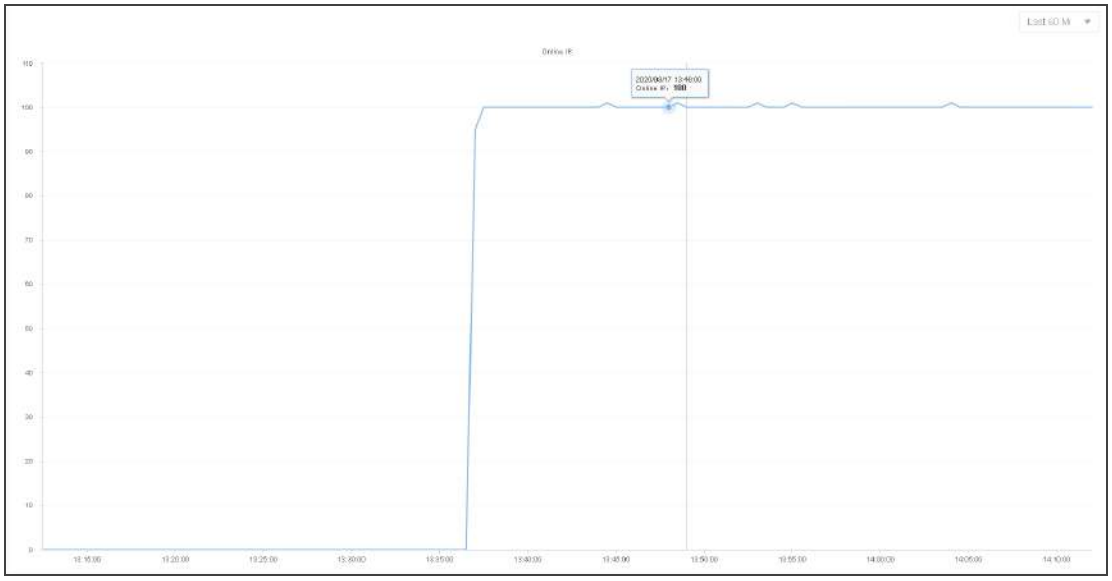
  - Select line chart or stacked chart from the pop-up menu 

at the top right corner .

- Hover your mouse over the chart to view the session statistics at a specific point in time.

Online IP

Click **Monitor>Device>Online IP** to view the historical trend of the number of online users. You can select the statistical period as last 60 minutes, last 24 hours or last 30 days.



- Hover your mouse over the line to view online users information.

URL Hit

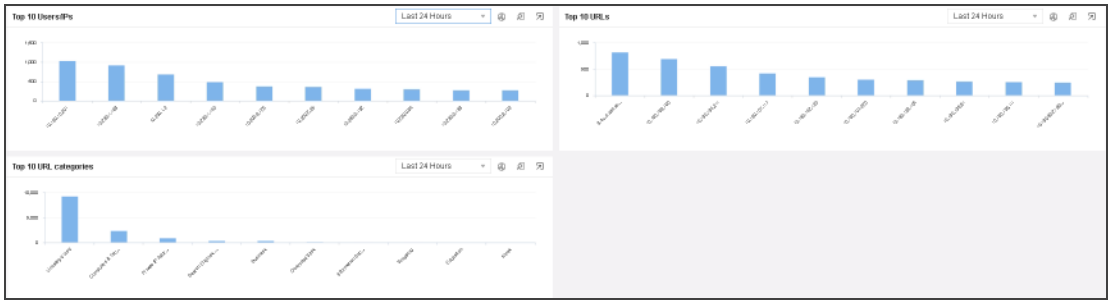
This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

If the " URL Filtering" on Page 1176 function is enabled in the security policy rule, the pre-defined stat-set of URL filter can gather statistics on user/IPs, URLs and URL categories.

If IPv6 is enabled, system will support to monitor both IPv4 and IPv6 address.

Summary

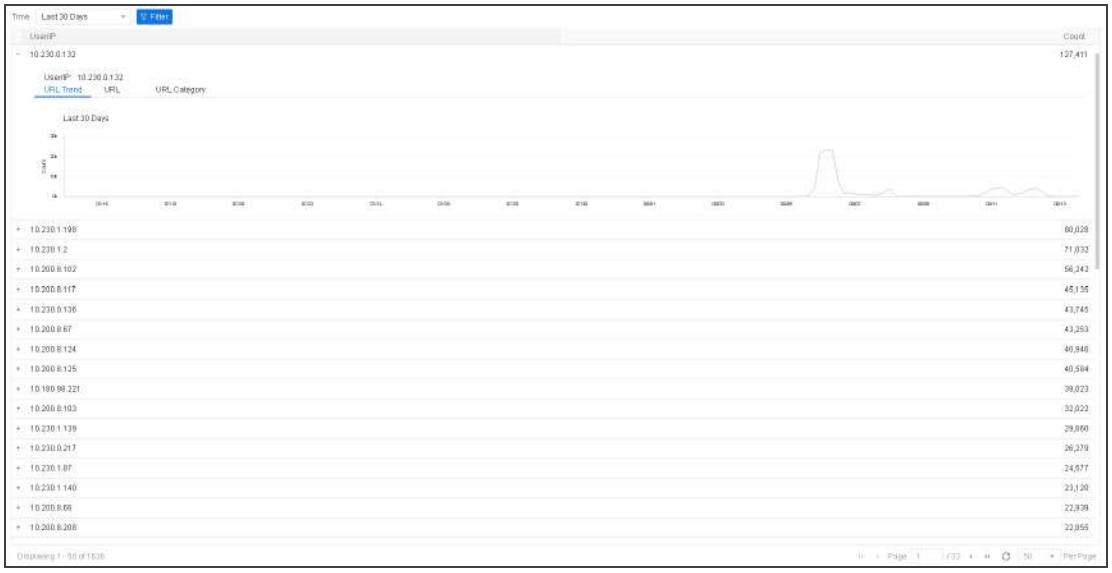
Click **Monitor> URL Hit>Summary**.



- Select a different Statistical_Period to view the statistical information in that period of time.
- Hover your mouse over a bar, to view the hit count of User/IP, URL or URL Category .
- Click at top-right corner of every table and enter the corresponding details.
- Click and to switch between the bar chart and the pie chart.

User/IP

Click **Monitor> URL Hit>User/IP**.



- The User/IPs and detailed hit count are displayed in the list below.
- Click a User/IP in the list to display the corresponding URL hit statistics in the curve chart below.
    - Statistics: Displays the hit statistics of the selected User/IP, including the real-time statistics and statistics for the latest 1 hour, 24 hours 30 days .
    - URL(real-time): Displays the URLs' real-time hit count of selected User/IP. Click URL link ,you can view the corresponding URLs detailed statistics page. Click **Detail** link, you can view the URL hit trend of the selected User/IP in the **URL Filter Details**dialog .
    - URL category(real-time): Displays the URL categories' read-time hit count of selected User/IP. Click URL category link , you can view the corresponding URL categories' detailed statistics page. Click **Detail** link, you can view the URL category hit trend of the selected User/IP in the pop-up dialog .
- Click the **Filter** button at top-left corner. Select **User/IP** and you can search the User/IP hit count information by entering the keyword of the username or IP.

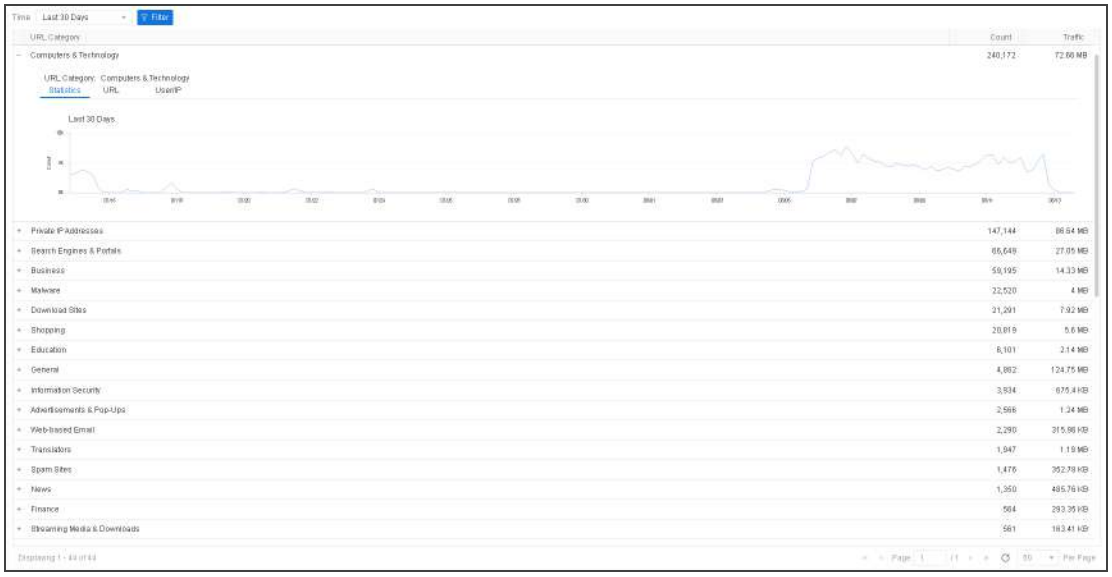
URL

Click **Monitor > URL Hit > URL**.

- The URL, URL category and detailed hit count are displayed in the list below.
- Click a URL in the list to view its detailed statistics.
    - Statistics: Displays the hit statistics of the selected URL, including the real-time statistics and statistics for the latest 1 hour, 24 hours 30 days .
    - User/IP(real-time): Displays the User/IP's real-time hit count of selected URL. Click the User/IP link and you can view the corresponding user/IPs detailed statistics page. Click the **Detail** link and you can view the URL hit trend of the selected user/IP in the **URL Filter Details** page.
- Click the **Filter** button at the top-left corner. Select **URL**and you can search the URL hit count information by entering the keyword of the URL.
- Click to refresh the real-time data in the list.

URL Category

Click **Monitor> URL Hit > URL Category**.



- The URL category, count, traffic are displayed in the list.
- Click a URL category in the list to view its detailed statistics displayed in the Statistics, URL (real-time), User/IP(real-tiime) tabs.
  - Statistics: Displays the trend of the URL category visits, including the real-time trend and the trend in the last 60 minutes, 24 hours , 30 days.
  - URL(real-time): Displays the visit information of the URLs, contained in the URL category, that are being visited.
  - User/IP(real-time): Displays the visit information of the users or IPs that are visiting the URL category.
- Click  to refresh the real-time data in the list.

Statistical Period

System supports the predefined time cycle and the custom time cycle. Click the time button on the top right corner of each tab to set the time cycle.

- Real-time: Displays the current statistical information.
- Last 60 Minutes: Displays the statistical information within the latest 1 hour.
- Last 24 Hours: Displays the statistical information within the latest 1 day.
- Last 30 Days: Displays the statistical information within the latest 1 month.

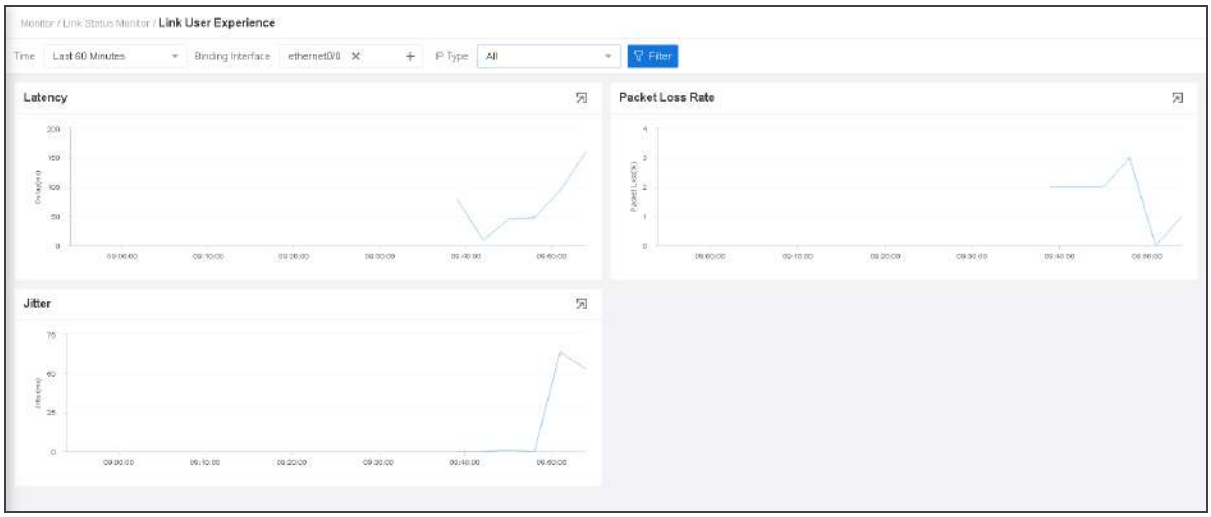
Link Status Monitor

Link status monitoring can calculate the sampling traffic information of the specific interface in the link, including latency, packet loss rate, and jitter, to monitor and display the overall status of the link. System also supports for link detection to calculate the traffic information of the specific destination IP address in the link, including latency, and jitter.

Link User Experience

The link user experience page displays the traffic statistics of the interfaces that have been bound within a specified period (Realtime, latest 1 hour, latest 1 day, latest 1 month)

Click **Monitor > Link Status Monitor.** For more information about configuration of binding interfaces, refer to Link Configuration.



- Select a different Statistical_Period to view the statistical information in that periods of time.
- Select the binding interface **Binding Interface** drop-down list, Click the **Binding Interface** drop-down menu and select the interface name to view the link status monitoring statistics for this interface. You can select multiple interfaces.
- Click the **IP Type** drop-down menu and select the IP type to view the link status monitoring statistics for this IP type, including IPv4, IPv6 and All.

- Click 

button and select **Application** in the drop-down menu. You can select the TOP 10 or Application / Application group name to view the link status monitoring statistics according to the specified application


Notes:

- "Time" , "Binding Interface" and "IP Type" are required in the filter condition, and "IP type" is selected as "All" by default.
- If the application switch of the specified interface is not enabled in the link configuration, the **Application** filter condition cannot be added.

Statistical Period

System supports the predefined time cycle and the custom time cycle. Click **Last 60 Minutes** on the top right corner of each tab to set the time cycle.

- Real-time: Displays the current statistical information.
- Last 60 Minutes: Displays the statistical information within the latest 1 hour.
- Last 24 Hours: Displays the statistical information within the latest 1 day.
- Last 30 Days: Displays the statistical information within the latest 1 month.

Link Detection

The link detection page displays real-time traffic statistics of specified detection destination IP to link or link to detection destination IP, include latency, and jitter.

To configure the link detection, take the following steps:

1. Click **Monitor > Link Status Monitor > Link Detection**.

2. Select the interface name to view the link status monitoring statistics for this interface, you can select up to 8 interfaces. Click **New** to add interfaces, you can add up to 16 interfaces. For more information about configuration of binding interfaces, refer to Link Configuration.

3. Select the IP address to view the link status monitoring statistics for this destination address, you can select up to 8 addresses. Click **New** to add destination address, you can add up to 32 addresses. For more information about configuration of destination addresses, refer to Detection Destination.

4. Click **Start Detection**, and view the statistics of the real-time link detection at the bottom of the page. Select **Detection Destination IP->Link** or **Link->Detection Destination IP** tab to view the trend chart of latency and jitter. Click Trend Chart and Table to switch between the trend chart and table.

5. Click **End Detection** to end the real-time link detection

Link Configuration

In the link configuration page, you can configure the binding interface to monitor the link state and can enable the application switch and link user experience.

To configure the link, take the following steps:

1. Click **Monitor > Link Status Monitor > Link Configuration**.

2. Click **New**.

In the Link Configuration page, configure these values

Option	Description
Binding Interface	Select the interface in the drop down menu.
Interface Description	Type the description for the interface.
Application	Click the **Enable** button. After enabling, you can see details of the specific application in this interface.
Monitor	Click the **Enable** button. After enabling, you can see traffic statistics in this interface.

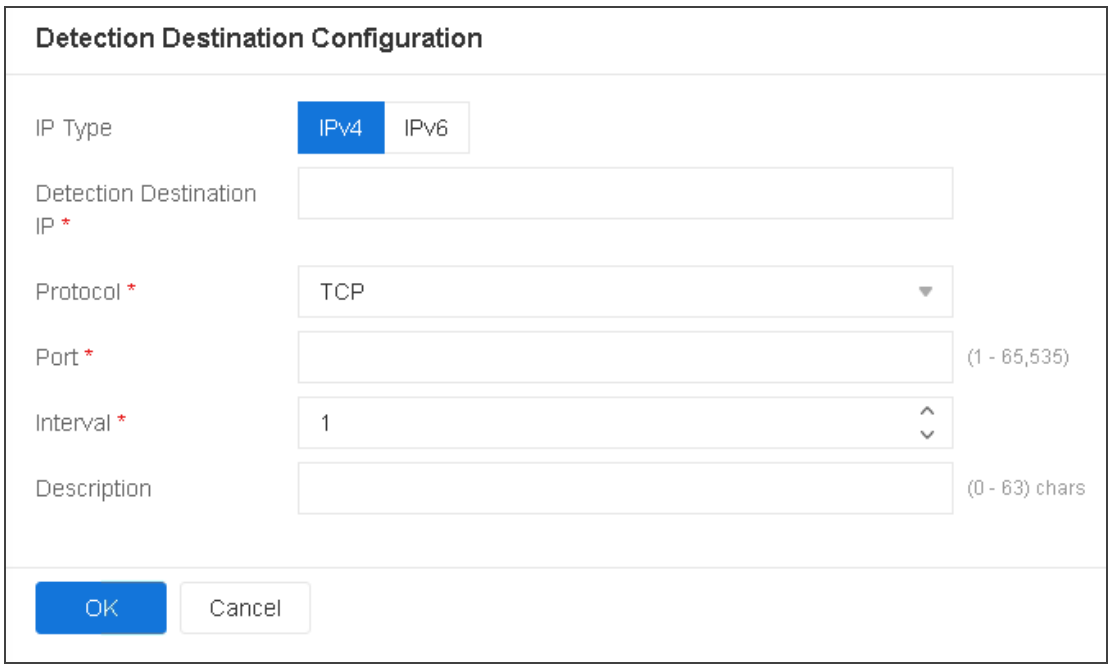
3. Click **OK**.

Detection Destination

In the detection destination page, you can configure the destination IP address to monitor the link state.

To configure the detection destination, take the following steps:

1. Click **Monitor > Link Status Monitor > Detection Destination**
2. Click **New**.



In the Detection Destination Configuration page, configure these values

Option	Description
IP Type	Select the IP address type, include IPv4 or IPv6.
Detection Destination IP	Specifies the IP address of the detection destination.
Protocol	Specifies the protocol of the detection destination,

Option	Description
	include TCP or ICMP.
Port	Specifies the port number of the detection destination.
Interval	Specifies the interval time of the detection packet. The value range is 1 to 5 seconds, the default value is 1.
Description	Type the description for the detection destination

3. Click **OK**.

IoT Monitor

IoT Monitor function displays the manufacturers and types distribution of network video monitoring devices, as well as the detailed statistics, such as device number, IP address, MAC address, up/downstream traffic, IoT profile and device status.

Summary

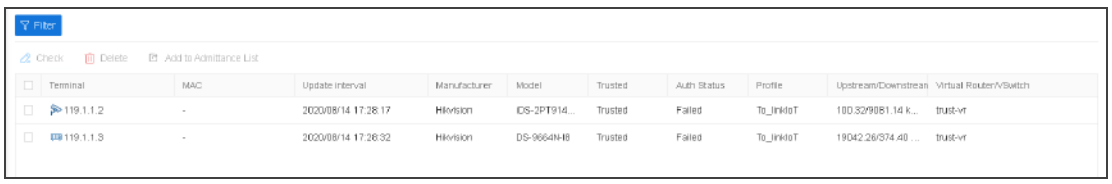
On the Summary page, you can obtain the real-time distribution of manufacturers and device types.

Click **Monitor** > **IoT Monitor** > **Summary**.

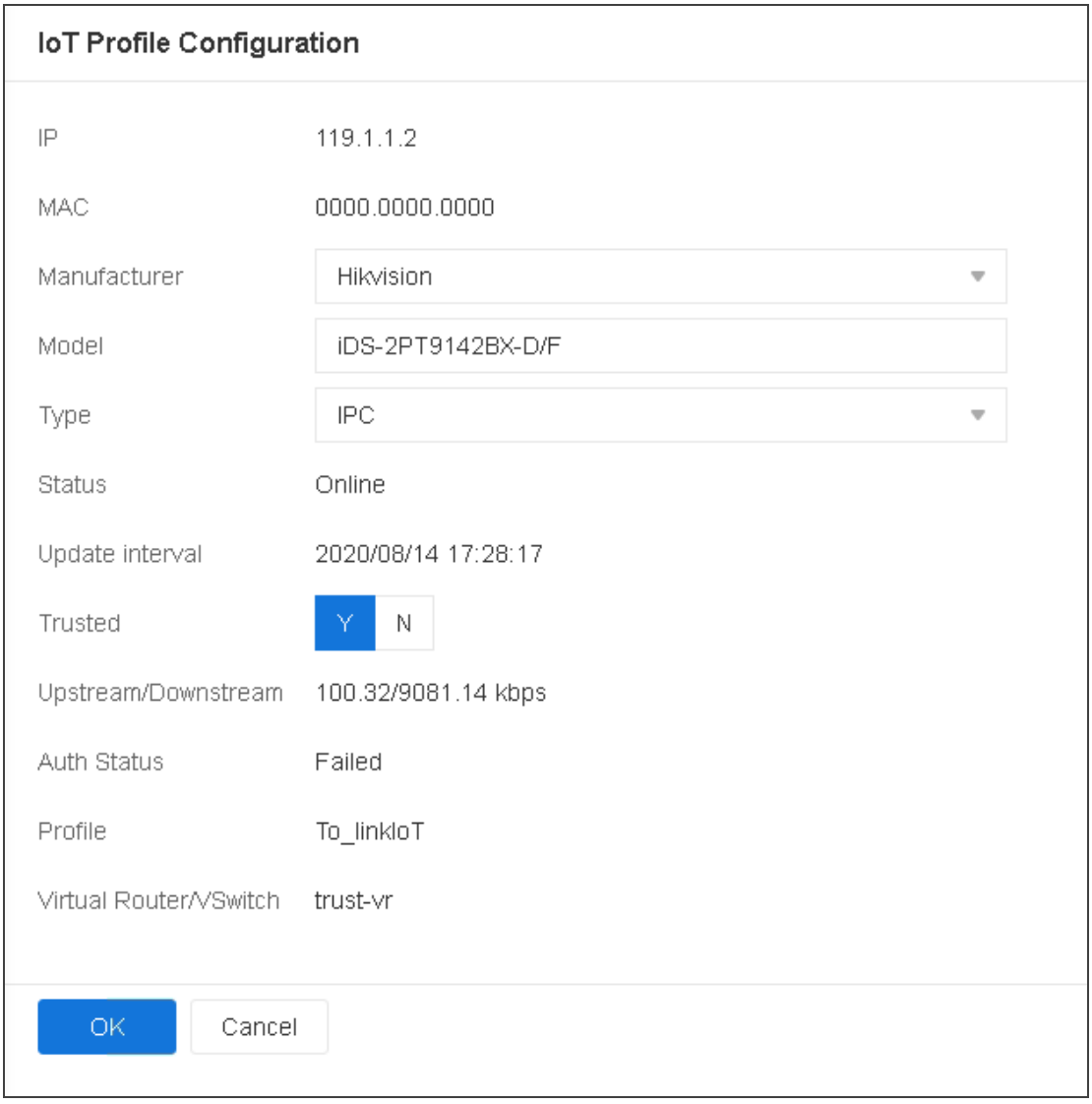
- Click the button to refresh the monitoring data.
- Hover your mouse over the bar chart to view the device number of different manufacturers and different device types.
- Different manufactures and devices are marked with different colors of legends. When your mouse hovers over an legend, the corresponded part will be highlighted on the bar chart.

Details

Click **Monitor** > **IoT Monitor** > **Details** to view the detailed information of the network video monitoring devices.



- Click the Filter button to add filter conditions and the required information will be filtered out in the following list.
- Select the check box, and click **Delete** to delete the selected item.
- Select the check box, and click **Check**, then the **IoT Profile Configuration** page pops up. You can modify the manufacturer, model, type and trust status manually. The manually changed configuration is prior to the automatically detected result. When the device logs in again, the manually changed configurations will be cleared.



- Select the check box and click **Add to Admittance List** to add the selected item to the target admittance list template. For the detailed steps, refer to Adding to Admittance List.
- For the icons in the **Terminal** list, if the icon is gray, it means that the device is offline; if the icon is blue, it means that the device is online. When you hover the mouse over the icon, you can also view the online status of the device. The icons represent the following devices respectively:
  - : The network video monitoring devices of other manufacturers.
  - : The IPC device.
  - : The NVR device.
  - Null: The item hasn't been identified.

User Quota Monitor

After the "Traffic Quota" on Page 1434 function is configured, the user quota detect page displays the user traffic quota statistics list, including the user's daily/ monthly quota, daily/ monthly used traffic value, the user group, and the corresponding traffic quota rule name.

- Type the user name into the **User Name** text box to filter the user traffic quota statistics for the specified name.
- Click in the **Clear/Reset** column of the list to clear the selected user daily used traffic.
- Click in the **Clear/Reset** column of the list to clear the selected user monthly used traffic.

- Click in the **Clear/Reset** column of the list to reset all used traffic for the selected user.
- Click **Clear All Used Traffic** to clear all used traffic of all users in the list.

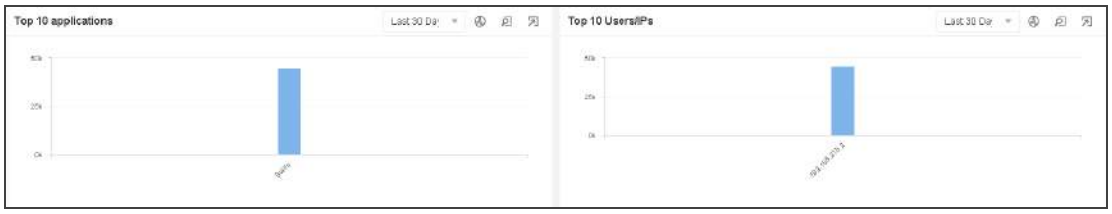
Application Block

If system is configured with "Security Policy" on Page 1286 the application block can gather statistics on the applications and user/IPs.

If IPv6 is enabled, system will support to monitor both IPv4 and IPv6 address.

Summary

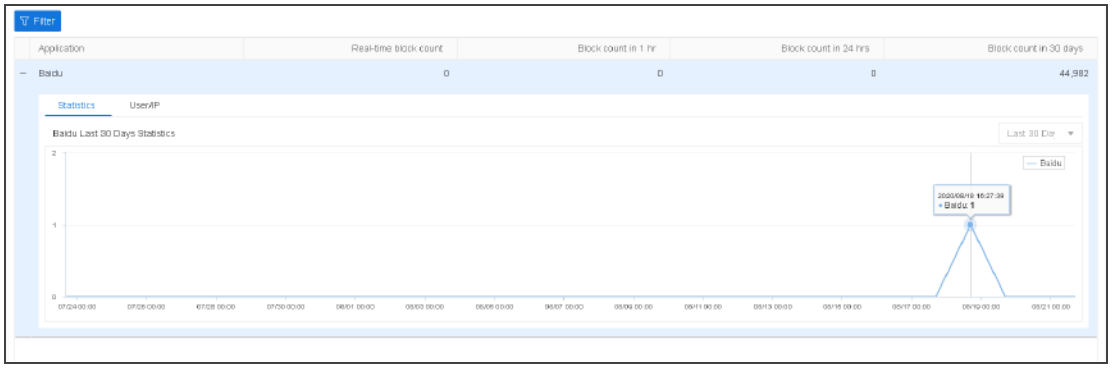
The summary displays the application block's statistics on the top 10 applications and top 10 user-/IPs. Click **Monitor>Application Block> Summary**.



- Select a different Statistical_Period to view the statistical information in that period of time.
- Hover your mouse over a bar to view the block count on the applications and user/IPs.
- Click to switch between the bar chart and the pie chart.
- Click to close the chart.
- Click at the top-right corner of every table and enter the corresponding details page.

Application

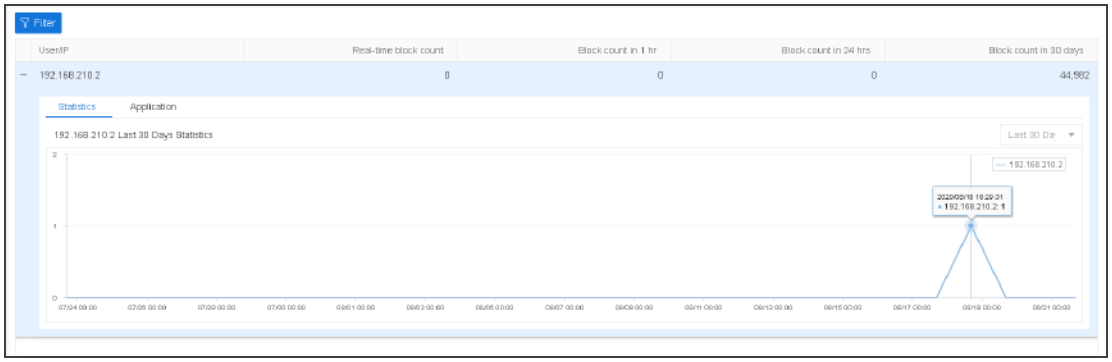
Click **Monitor>Application Block> Application**.



- The applications and detailed block count are displayed in the list.
- To view the corresponding information of application block on the applications and user/IPs, select the application entry in the list, and click "+".
  - Statistics: Displays the block count statistics of the selected application, including the real-time statistics and statistics for the latest 1 hour, 24 hours and 30 days.
  - User/IP: Displays the user/IPs that are blocked from the selected application. Click a user/IP in the list to display the corresponding block count statistics in the curve chart below. Click to jump to the corresponding user / IPs page.
- Click Filter to select the condition in the drop-down list. You can search the application block information by entering the keyword of the application name.
- Click to refresh the real-time data in the list.

User/IP

Click **Monitor>Application Block> User/IP**.



- The user/IP and detailed block count are displayed in the list.
- Click a user/IP in the list to display the corresponding block count statistics in the curve chart below. Click to jump to the corresponding user / IPs page.
- Click Filter to select the condition in the drop-down list. You can search the users/IPs information.

Statistical Period

System supports the predefined time cycle and the custom time cycle. Click (Real-time) on the top right corner of each tab to set the time cycle.

- Real-time: Displays the statistical information within the realtime.
- Last Hour: Displays the statistical information within the latest 1 hour.
- Last Day: Displays the statistical information within the latest 1 day.
- Last Month: Displays the statistical information within the latest 1 month.

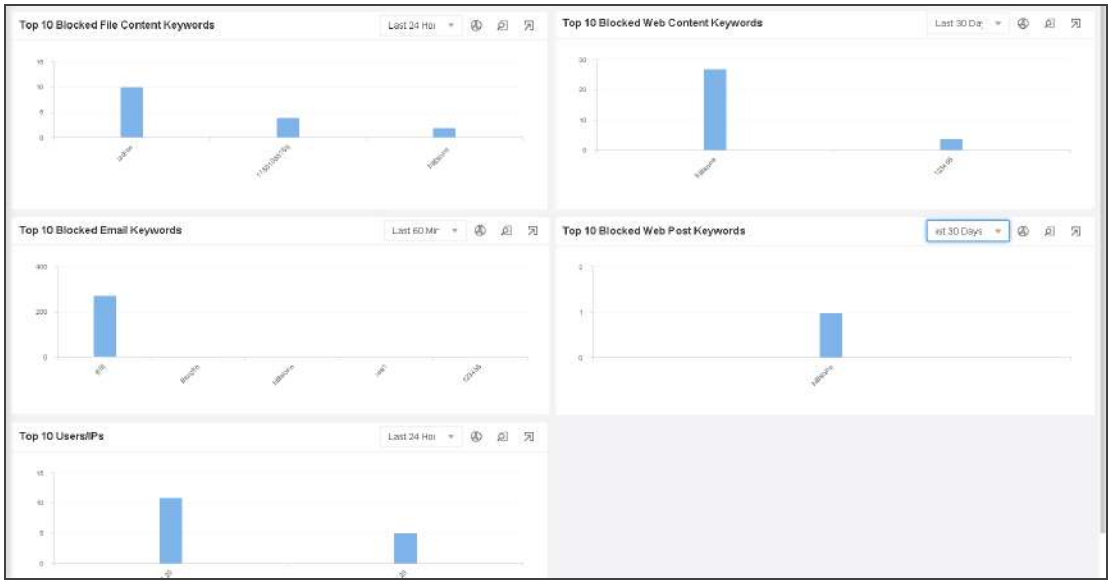
Keyword Block

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

If system is configured with "File Content Filter" on Page 897, "Web Content" on Page 1227, "Email Filter" on Page 1239, or "Web Posting" on Page 1233, the predefined stat-set of the Keyword Block can gather statistics on the file content keyword, Web keyword, Web keywords, email keywords, posting keywords and users/IPs.

Summary

The summary displays the predefined stat-set of the Keyword Block that can gather statistics on the top 10 blocked file content keywords, the top 10 blocked Web keywords, the top 10 blocked email keywords, the top 10 posting keywords, and the top 10 users/IPs. Click **Monitor > Keyword Block > Summary**.



- Select a different Statistical_Period to view the statistical information in that period of time.
- Hover your mouse over a bar to view the block count on the keywords .

- Click at the top-right corner of every table and enter the corresponding details page.
- Click to switch between the bar chart and the pie chart.

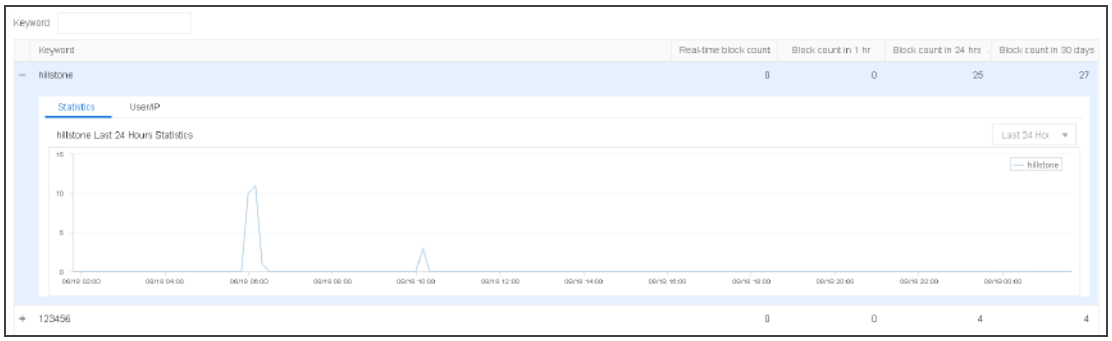
File Content

Click **Monitor>Keyword Block> File Content**.

For a page description, see Web_Content.

Web Content

Click **Monitor>Keyword Block> Web Content**.



- The Web content and detailed block count are displayed in the list below.
- To view the corresponding information of keyword block on the Web content, select the keyword entry in the list.
  - Statistics: Displays the statistics of the selected keyword, including the real-time statistics and statistics for the latest 1 hour, 24 hours and 30 days.
  - User/IP: Displays the user/IPs that are blocked by the selected keyword. Click a user-/IP in the list to display the corresponding block count statistics in the curve chart below. Click to jump to the corresponding user / IPs page.

- Click Filter to select the condition in the drop-down list. You can search the keyword block information by entering the keyword .
- Click to refresh the real-time data in the list.

Email Content

Click **Monitor>Keyword Block> Email Content**.

For a page description, see Web_Content.

Web Posting

Click **Monitor>Keyword Block>Web Posting**.

For a page description, see Web_Content.

User/IP

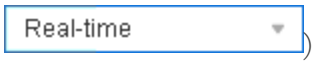
Click **Monitor>Keyword Block>User/IP**.

- The user/IP and detailed block count are displayed in the list below.
- Click a user/IP in the list to display the corresponding statistics , Web content, Email Content, Web Posting in the curve chart below. Click to jump to the corresponding detail page.

- Click 

to select the condition in the drop-down list. You can search the users/IPs information .

Statistical Period

System supports the predefined time cycle and the custom time cycle. Click (

) on the top right corner of each tab to set the time cycle.

- Real-time: Displays the current statistical information.
- Last Hour: Displays the statistical information within the latest 1 hour.
- Last Day: Displays the statistical information within the latest 1 day.
- Last Month: Displays the statistical information within the latest 1 month.

Authentication User

If system is configured with"Web Authentication" on Page 451, "Single Sign-On" on Page 465, "SSL VPN" on Page 586, "L2TP VPN" on Page 682the authentication user can gather statistics on the authenticated users. The column "IP/MAC" displays the IPv6 address of the authenticated users only when the system version is the IPv6 version.

Click **Monitor>Authenticated User**.

- Click Filter to select the condition in the drop-down list to filter the users. Filters include username/user group, AAA server, IP/IP range, and authentication type. You can set several filters at the same time.
- Click **Kick Out** under the Operation column to kick the user out.
- Click to refresh the real-time data in the list.

User-defined Monitor

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

A user-defined stat-set provides a more flexible approach to view the statistics. You can view the statistics as needed. The statistical data may vary in the data types you have selected.

If IPv6 is enabled, system will support to monitor both IPv4 and IPv6 address.

The IP type-based statistical information table.

Direction	Condition	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
No direction	Initiator	Statistics on the traffic of the initiator's IP	Statistics on the session number of the initiator's IP	Statistics on the new sessions of the initiator's IP	Statistics on the URL hit count of the specified IPs	Statistics on the keyword block count of the specified IPs	Statistics on the application block count of the specified IPs
	Responder	Statistics on the traffic of the responder's IP	Statistics on the session number of the responder's IP	Statistics on the new sessions of the responder's IP			

Direction	Condition	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
	Belong to zone	Statistics on the traffic of an IP that belongs to a specific security zone	Statistics on the session number of an IP that belongs to a specific security zone	Statistics on the new sessions of an IP that belongs to a specific security zone			
	Not belong to zone	Statistics on the traffic of an IP that does not belong to a specific security zone	Statistics on the session number of an IP that does not belong to a specific security	Statistics on the new sessions of an IP that does not belong to a specific security			

Direction	Condition	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
			zone	zone			

Direction	Condition	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
	Belong to interface	Statistics on the traffic of an IP that belongs to a specific interface	Statistics on the session number of an IP that belongs to a specific interface	Statistics on the new sessions of an IP that belongs to a specific interface			
	Not belong to interface	Statistics on the traffic of an IP that does not belong to a specific interface	Statistics on the session number of an IP that does not belong to a specific inter-	Statistics on the new sessions of an IP that does not belong to a specific inter-			

Direction	Condition	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
			face	face			

Direction	Condition	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
Bi-directional	Initiator	Statistics on the inbound and outbound traffic of the initiator's IP	Statistics on the number of received and sent sessions of the initiator's IP	Statistics on the new received and sent sessions of the initiator's IP			
	Responder	Statistics on the inbound and outbound traffic of the responder's IP	Statistics on the number of received and sent sessions of the responder's IP	Statistics on the new received and sent sessions of the responder's IP			

Direction	Condition	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
	Belong to zone	Statistics on the inbound and outbound traffic of an IP that belongs to a specific security zone	Statistics on the number of received and sent sessions of an IP that belongs to a specific security zone	Statistics on the new received and sent sessions of an IP that belongs to a specific security zone			
	Not belong to zone	Statistics on the inbound and outbound traffic of an IP that	Statistics on the number of received and sent sessions of an IP	Statistics on the new received and sent sessions of an IP that			

Direction	Condition	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
		does not belong to a specific security zone	that does not belong to a specific security zone	does not belong to a specific security zone			
	Belong to interface	Statistics on the inbound and outbound traffic of an IP that belongs to a specific interface	Statistics on the number of received and sent sessions of an IP that belongs to a specific interface	Statistics on the new received and sent sessions of an IP that belongs to a specific interface			

Direction	Condition	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
	Not belong to interface	Statistics on the inbound and outbound traffic of an IP that does not belong to a specific interface	Statistics on the number of received and sent sessions of an IP that does not belong to a specific interface	Statistics on the new received and sent sessions of an IP that does not belong to a specific interface			

The interface, zone, user, application, URL, URL category, VSYS type-based statistical information table.

Group by	Direction	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
Zone	No direction	Statistics on the traffic of the specified security zones	Statistics on the session number of the specified security zones	Statistics on the new sessions of the specified security zones	Statistics on the URL hit count of the specified security zones	N/A	N/A
	Bi-directional	Statistics on the inbound and outbound traffic of the specified security zones	Statistics on the number of received and sent sessions of the specified security zones	Statistics on the new received and sent sessions of the specified security zones			
Interface	No direction	Statistics on	Statistics on	Statistics on	Statistics	N/A	N/A

Group by	Direction	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
		the traffic of the specified interfaces	the session number of the specified interfaces	the new sessions of the specified interfaces	on the URL hit count of the specified interfaces		
	Bi-directional	Statistics on the inbound and outbound traffic of the specified interfaces	Statistics on the number of received and sent sessions of the specified interfaces	Statistics on the new received and sent sessions of the specified interfaces			
Application	N/A	Statistics on the traffic	Statistics on the session	Statistics on the new sessions	N/A	N/A	Statistics on the block

Group by	Direction	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
		of the specified applications	number of the specified applications	of the specified applications			count of the specified applications
User	No direction	Statistics on the traffic of the specified users	Statistics on the session number of the specified users	Statistics on the new sessions of the specified users	Statistics on the URL hit count of the specified users	Statistics on the keyword block count of the specified users	Statistics on the application block count of the specified users
	Bi-directional	Statistics on the inbound and outbound traffic of the specified users					

Group by	Direction	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
URL	N/A	N/A	N/A	N/A	Statistics on the hit count of the specified URLs	N/A	N/A
URL Category	N/A	N/A	N/A	N/A	Statistics on the hit count of the specified URL categories	N/A	N/A
VSYS	N/A	Statistics on the traffic	Statistics on the session	Statistics on the new sessions	Statistics on the URL	N/A	N/A

Group by	Direction	Data type					
		Traffic	Session	Ramp-up rate	URL hit count	Keyword block count	Application block count
		of the specified VSYSs	number of the specified VSYSs	of the specified VSYSs	hit count of the specified VSYSs		

You can configure a filtering condition for the stat-set to gather statistics on the specified condition, such as statistics on the session number of the specified security zone, or the traffic of the specified IP. The system supports up to 32 filters for each stat-set, among which the number of filters for each type of the user, user group and role filters cannot exceed 8. If multiple filters configured for the same stat-set belong to the same type, then the logical relationship among these conditions will be OR; if they belong to different types, the logical relationship among these conditions will be AND.

The filtering conditions supported table.

Type	Description
filter zone	Data is filtered by security zone.
filter zone zone-name ingress	Data is filtered by ingress security zone.
filter zone zone-name egress	Data is filtered by egress security zone.
filter interface	Data is filtered by interface.
filter interface if-name ingress	Data is filtered by ingress interface.
filter interface if-name egress	Data is filtered by egress interface.

Type	Description
filter application	Data is filtered by application.
filter ip	Data is filtered by address entry.
filter ip add-entry source	Data is filtered by source address (address entry).
filter ip add-entry destination	Data is filtered by destination address (address entry).
filter ip A.B.C.D/M	Data is filtered by IP.
filter ip A.B.C.D/M source	Data is filtered by source IP.
filter ip A.B.C.D/M destination	Data is filtered by destination IP.
filter user	Data is filtered by user.
filter user-group	Data is filtered by user group.
filter role	Data is filtered by user role.
filter service	Data is filtered by service.

Click **Monitor>User-defined Monitor**.

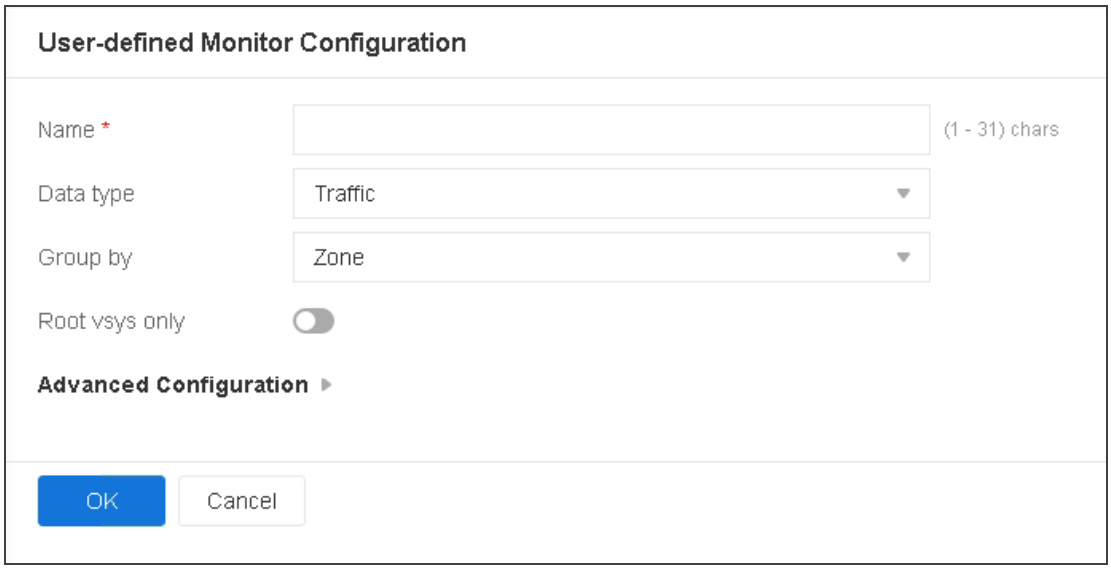
- Click **New**. For more information, see Creating_a_User-defined_Stat-set
- Click the user-defined stat-set name link. For more information, see Viewing_User-defined_Stat-set_Statistics.

Creating a User-defined Stat-set

To create a user-defined stat-set, take the following steps:

1. Click **Monitor > User Defined Monitor**.

2. Click **New**.



In the User-defined Monitor Configuration page, modify according to your needs.

Option	Description
Name	Type the name for the stat-set into the Name box.
Data Type	Select an appropriate data type from the Data type list.
Group by	Select an appropriate grouping method from the Group by list.
Root vsys only	If you only want to perform the data statistics for the root VSYS, click the **Enable** button. This button will take effect when the data type is Traffic, Session, Ramp-up rate, or URL hit. If the data grouping method is con-

Option	Description
	figured to VSYS, this button will be unavailable.
Advanced Configuration	To configure a filtering condition, expand Advanced Configuration. In the Advanced Configuration page, select a filter condition from the Type drop-down list. For more details about this option, see The_filtering_conditions_supported_table.

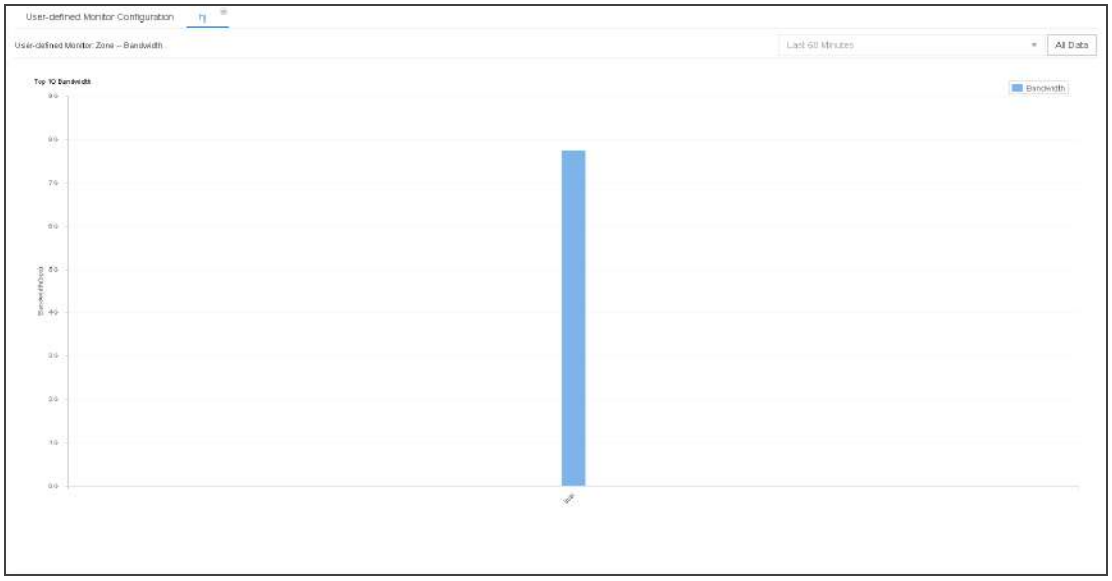
3. Click **OK** to save your settings . The configured stat-set will be displayed .

Notes: You need to pay attention to the following when configure a stat-set.

- The URL hit statistics are only available to users who have a URL license.
- If the Data type is Traffic, Session, Ramp-up rate, Virus attack count, Intrusion count or URL hit count, then the Filter should not be Attack log.
- If the Data type is URL hit count, then the Filter should not be Service.
- System will hide unavailable options automatically.

Viewing User-defined Monitor Statistics

Click the user-defined stat-set name link, and then select the stat-set you want to view.



- Displays the top 10 statistical result from multiple aspects in forms of bar chart.
- View specified historic statistics by selecting a period from the statistic period drop-down list.
- Click **All Data** to view all the statistical result from multiple aspects in forms of list, trend.

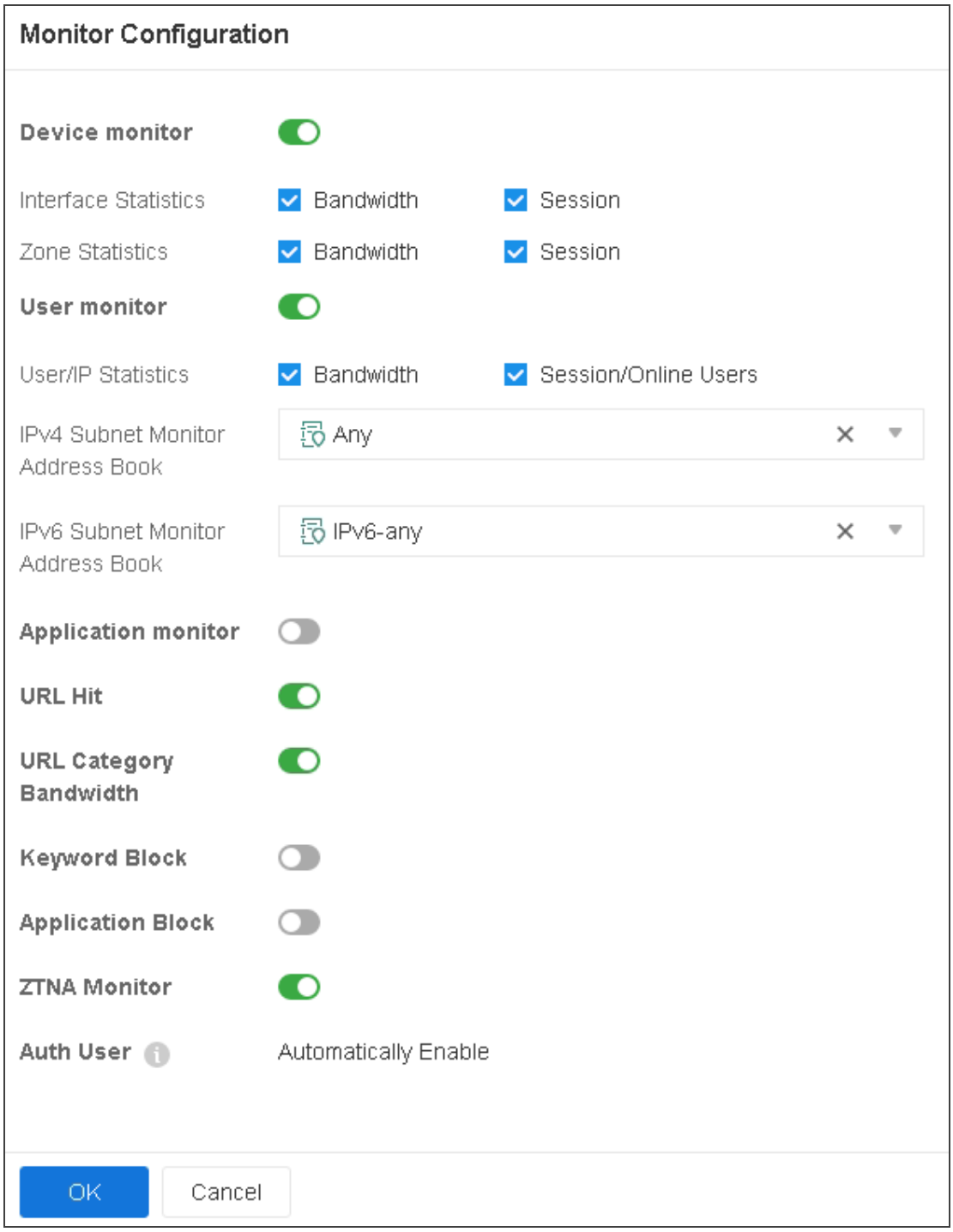
  Click **TOP 10** returns bar chart.

Monitor Configuration

You can enable or disable some monitor items as needed. The monitor items for Auth user are enabled automatically.

To enable/disable a monitor item, take the following steps:

1. Click **Monitor > Monitor Configuration**.



2. Select or clear the monitor item(s) you want to enable or disable.

3. Select subnet monitor address book in the IPv4 Subnet Monitor Address Book or IPv6 Subnet Monitor Address Book drop-down list. The system will match the traffic which is sent from the Internet to Subnet according to the specified address. If matched, the traffic will be counted to the Subnet side. You can click ▼ in the search box and enter the name and member IP address of an address book for a fuzzy search. The name and member IP address are in the logical AND relation.
4. Click **OK**.

Notes:

- In the **Address** field, you can enter a variety of address sources. For example, if you enter "10.10.10.10/32", an address book that contains the address member 10.10.10.10/24 may be matched; if you enter "9.9.9.9/24", an address book that contains the address member 9.9.0.0/16 may be matched; if you enter "10.10.10.10", an address book that contains the addresses member whose IP range is 10.10.10.0-10.10.10.255 may be matched; if you enter "10.23", an address book that contains the address member 1.10.23.10/24 may be matched; if you enter "aa", an address book that contains the address member whose hostname is aaa may be matched.
- After a monitor item is enabled or disabled in the root VSYS, the item of all VSYSs will be enabled or disabled(except that the non-root VSYS does not support this monitor item). You can not enable or disable monitor item in non-root VSYSs.

Reporting

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

System provides rich and vivid reports that allow you to analyze network risk, network access and device status comprehensively by all-around and multi-dimensional statistics and charts.

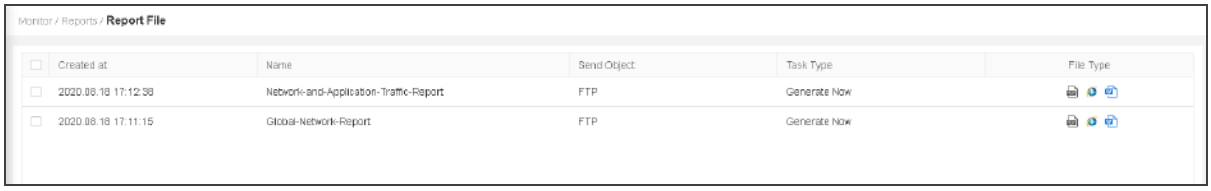
You can configure report task in "Report Template" on Page 1676 and "Report Task" on Page 1682, and view generated report files in "Report File" on Page 1674.

Related Topics:

- "Report File" on Page 1674
- "Report Template" on Page 1676
- "Report Task" on Page 1682

Report File

Go to **Monitor > Reports > Report File** and the report file page shows all of the generated report files. The report file pages may vary slightly on different platforms, which are shown below.



- Sort report files by different conditions: Select **Group by Time**, **Group by Task** or **Group by Status** from the drop-down list, and then select a time, task or status from the selective table, and the related report files will be shown in the report file table.
- The bold black entry indicates that the report file status is "unread".
- Click **Delete** to delete the selected report files.
- Click **Export** , the browser launches the default download tool, and downloads the selected report file.
- Click **Mark as Read** to modify the status of the selected report files.
- Click Filter to select the condition in the drop-down list. Search for specific report files based on filter condition.

- In the File Type column, click the icon of the report file to preview the report file. Not all platforms support this function. The content of the security report varies slightly on different platforms.
- Hover your mouse over the Send Object column, and the system will prompt the Email addresses or FTP information about sending.The content of the security report varies slightly on different platforms.

Notes: If your browser has enabled "Blocking pop-up windows", you will not see the generated file. Make sure to set your browser "Always allow pop-up windows", or you can go to your blocked window history to find the report file.

Report Template

Report templates, define all the contents in the report files. To generate the report file, you need to configure the report template first.

Report templates are classified as predefined and user-defined templates, providing a variety of pre-categorized report items.

- Predefined Template: Predefined templates are built in system. By default, different report items have been selected for each predefined template category. The predefined template cannot be edited or deleted. The predefined template categories are as follows:

Category	Description
Global Network and Risk Assessment Report	Statistics of the global network and risk status, covering the overview, network and application traffic, network threats and host details.
Network and Application Traffic Report	Statistics of the current network situation, covering the network traffic, application traffic and URL hits.
Network Threat Report	Statistics of the threats in the current network, covering the threat trend, external attackers and threat categories.

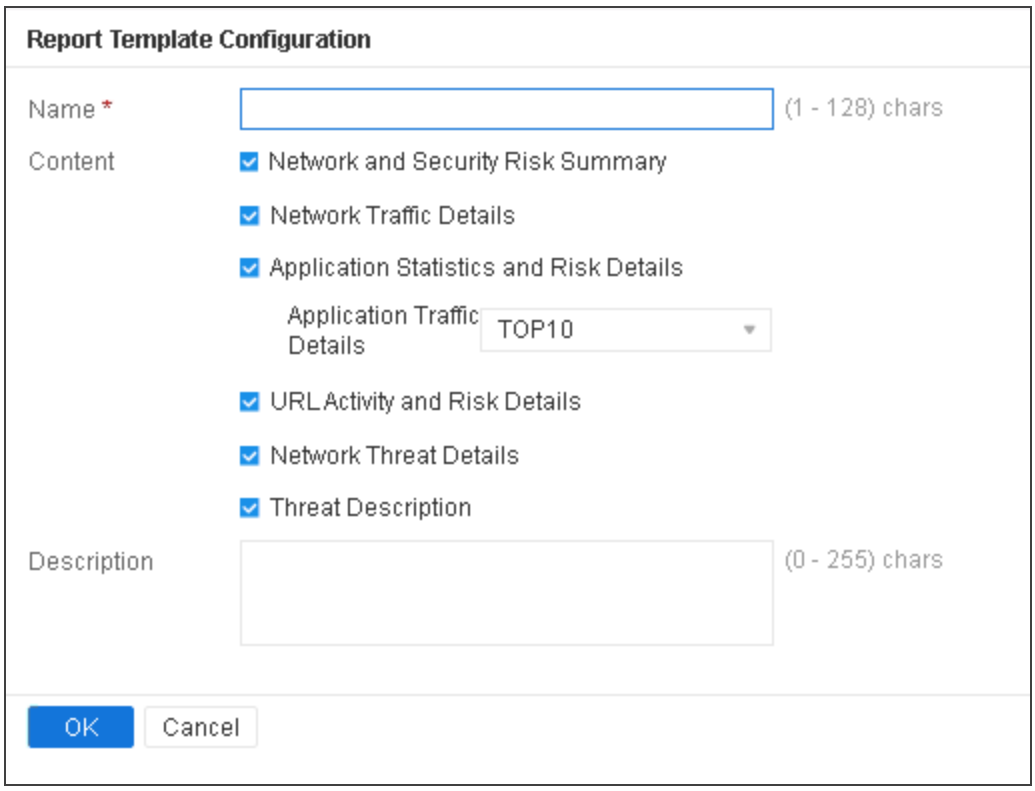
- User-defined Template: The report template created as needed. You can select the report items. Up to 32 user-defined templates can be created.

Creating a User-defined Template

To create a user-defined template, take the following steps:

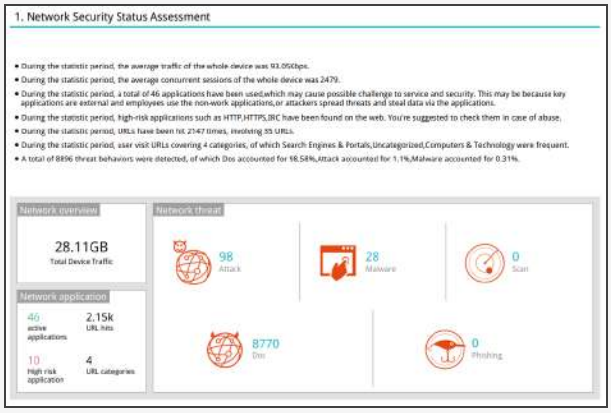
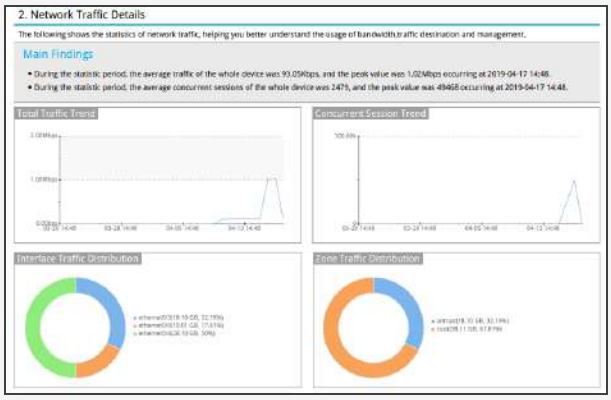
1. Click **Monitor > Reports > Template**.

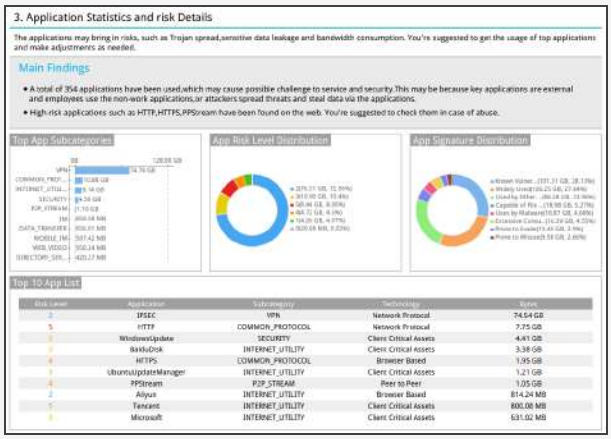
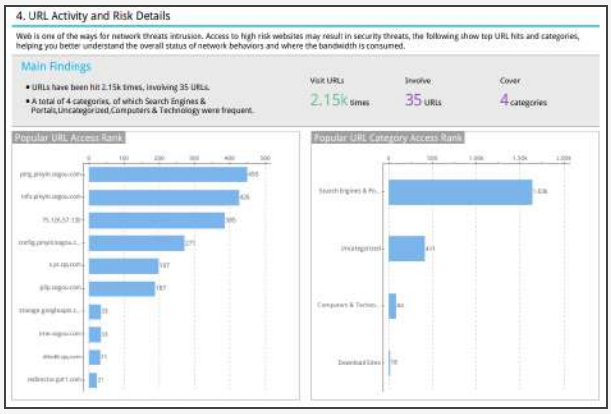
2. Click **New**.

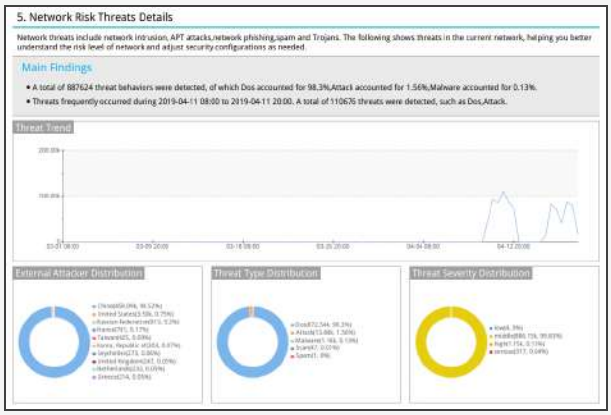
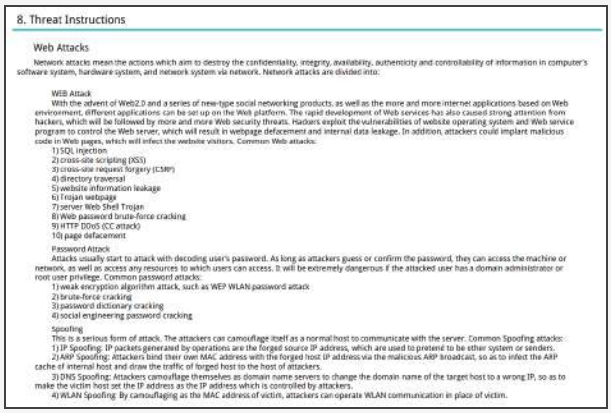


In the Report Template Configuration page, configure the following values.

Option	Description
Name	Specifies the name of the report template.
Content	Select the check box of the report item as needed. By default, all report items are selected. The report items are described as follows: • Network and Security Risk Summary: Statistics of the comprehensive and overall assessment for the health status and security risks of the entire net-

Option	Description
	work.  • Network Traffic Details: Statistics of network traffic, helping you better understand the usage of bandwidth, traffic destination and management.  • Application Statistics and Risk Details: Statistics of the traffic of all applications on the device and obtains the usage of the main service applications in the intranet. Click the **TOP** drop-down list to

Option	Description
	specify the number of applications that need to count the traffic for ranking, including TOP5, TOP10, TOP20 and TOP50.  • URL Activity and Risk Details: Statistics of device URL access trends and rankings.  • Network Threat Details: Statistics of the threat events detected by the device, the distribution of external attacks, etc., in order to know the network

Option	Description
	threats and risks existing in the current network.  5. Network Risk Threats Details Network threats include network intrusion, APT attacks,network phishing,spam and Trojans. The following shows threats in the current network, helping you better understand the risk level of network and adjust security configurations as needed. Main Findings • A total of 887624 threat behaviors were detected, of which Dos accounted for 98.3%,Attack accounted for 1.56%,Malware accounted for 0.13%. • Threats frequently occurred during 2019-04-11 08:00 to 2019-04-11 20:00. A total of 110676 threats were detected, such as Dos,Attack. Threat Trend External Attacker Distribution Threat Type Distribution Threat Severity Distribution • Threat Description: Display the detailed description of the threat, helping understand the threat information.  8. Threat Instructions Web Attacks Network attacks mean the actions which aim to destroy the confidentiality, integrity, availability, authenticity and controllability of information in computer's software system, hardware system, and network system via network. Network attacks are divided into: WEB Attack With the advent of Web2.0 and a series of new-type social networking products, as well as the more and more internet applications based on Web environment, different applications can be set up on the Web platform. The rapid development of Web services has also caused strong attention from hackers, which will be followed by more and more Web security threats. Hackers exploit the vulnerabilities of website operating system and Web service program to control the Web server, which will result in webpage defacement and internal data leakage. In addition, attackers could implant malicious code in Web pages, which will infect the website visitors. Common Web attacks: 1) SQL injection 2) cross-site scripting (XSS) 3) cross-site request forgery (CSRF) 4) directory traversal 5) website information leakage 6) Trojan webpage 7) server Web Shell Trojan 8) Web password brute-force cracking 9) HTTP DDoS (CC attack) 10) page defacement Password Attack Attacks usually start to attack with decoding user's password. As long as attackers guess or confirm the password, they can access the machine or network, as well as access any resources to which users can access. It will be extremely dangerous if the attacked user has a domain administrator or root user privilege. Common password attacks: 1) weak encryption algorithm attack, such as WEP WLAN password attack 2) brute-force cracking 3) password dictionary cracking 4) social engineering password cracking Spoofing This is a serious form of attack. The attackers can camouflage itself as a normal host to communicate with the server. Common Spoofing attacks: 1) IP Spoofing: IP packets generated by operations are the forged source IP address, which are used to pretend to be other system or senders. 2) ARP Spoofing: Attackers bind their own MAC address with the forged host IP address via the malicious ARP broadcast, so as to infect the ARP cache of internal host and draw the traffic of forged host to the host of attackers. 3) DNS Spoofing: Attackers camouflage themselves as domain name servers to change the domain name of the target host to a wrong IP, so as to make the victim host set the IP address as the IP address which is controlled by attackers. 4) WLAN Spoofing: By camouflaging as the MAC address of victim, attackers can operate WLAN communication in place of victim.
Description	Specifies the description of the report template.

3. Click **OK** to complete user-defined template configurations.

Editing a User-defined Template

To edit a user-defined report template, take the following steps:

1. Click **Monitor > Reports > Template**.
2. In the templates list, select the user-defined report template entry that needs to be edited.
3. Click **Edit**.
4. Click **OK** to save the settings.

Deleting a User-defined Template

To delete a user-defined report template, take the following steps:

1. Click **Monitor > Reports > Template**.
2. In the templates list, select the user-defined report template entry that needs to be deleted.
3. Click **Delete**.

Cloning a Report Template

System supports the rapid clone of a report template. You can clone and generate a new report template by modifying some parameters of one current report template.

To clone a report template, take the following steps:

1. Click **Monitor > Reports > Template**.
2. In the templates list, select a report template that needs to be cloned.
3. Click the **Clone** button above the list, and in the **Report Template Configuration** page, enter the newly cloned report template name into the "Name" .
4. The cloned report template will be generated in the list.

Report Task

The report task is the schedule related to report file. It defines the report template, generation period, generation time, and the output method of report files.

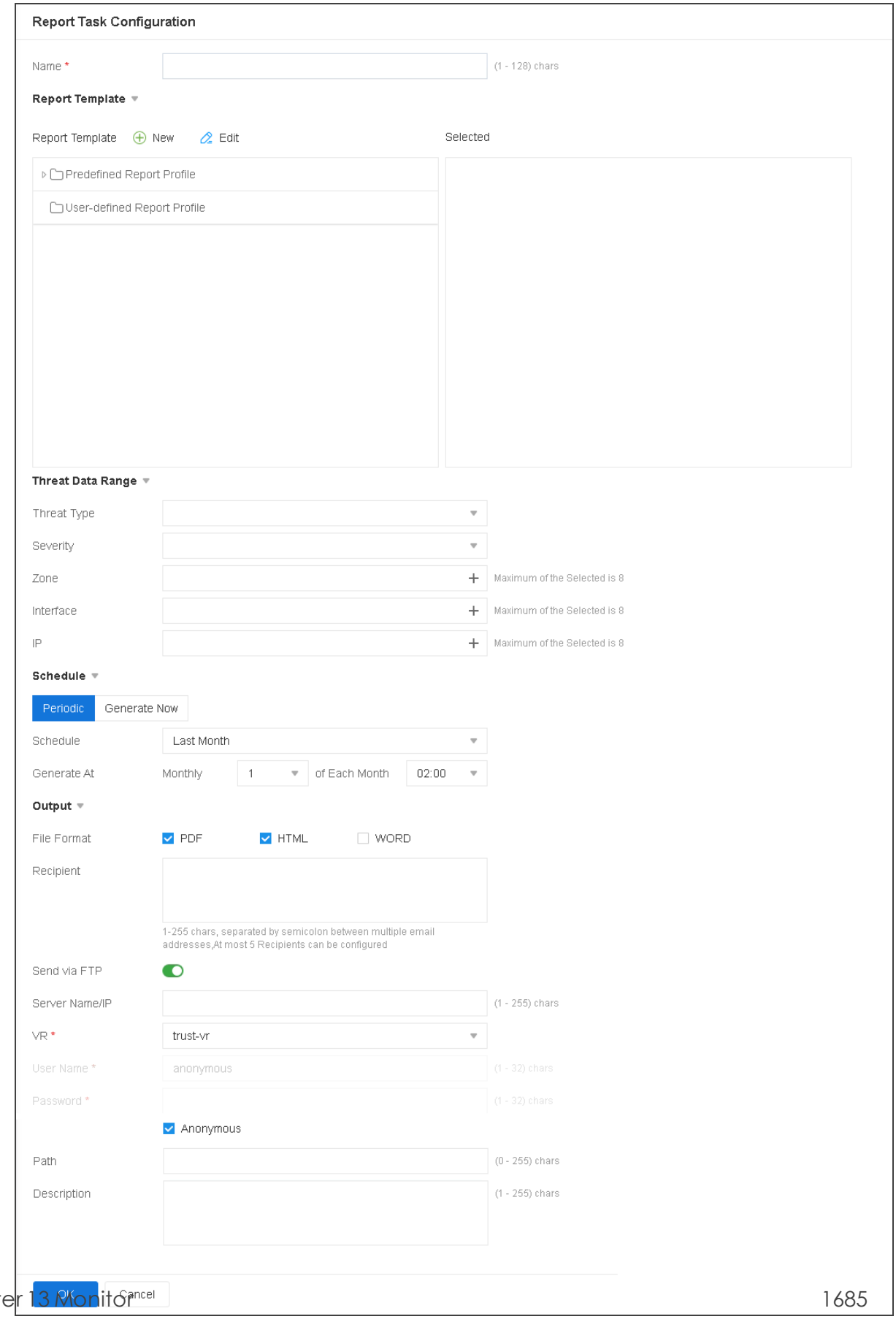
You can configure report tasks and generate report files on the device according to your needs.

Creating a Report Task

To create a report task, take the following steps:

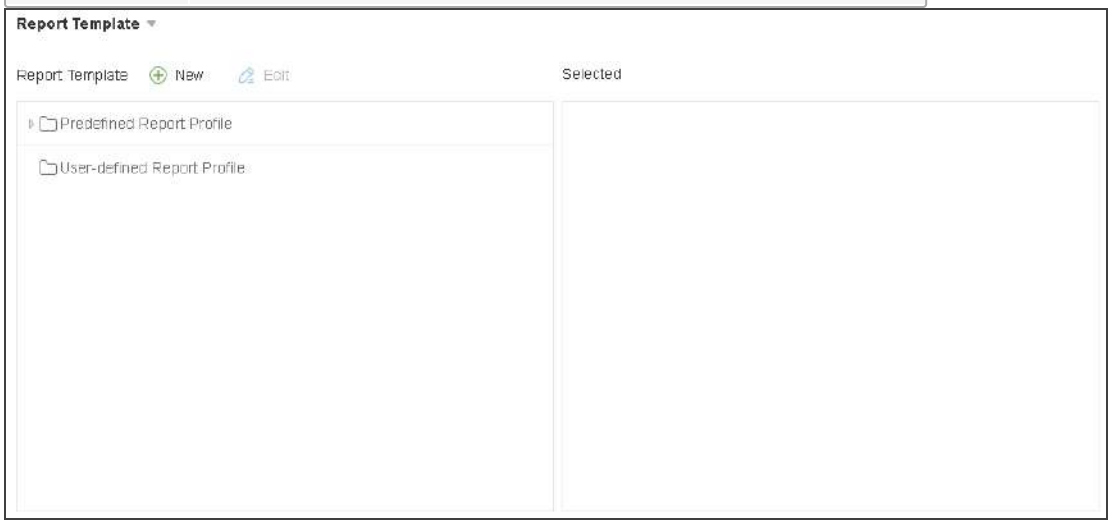
1. Select **Monitor> Reports> Report Task**.

2. Click **New**.


Report Task Configuration
Name *
(1 - 128) chars
Report Template
Report Template
New
Edit
Selected
Predefined Report Profile
User-defined Report Profile
Threat Data Range
Threat Type
Severity
Zone
Maximum of the Selected is 8
Interface
Maximum of the Selected is 8
IP
Maximum of the Selected is 8
Schedule
Periodic
Generate Now
Schedule
Last Month
Generate At
Monthly
1
of Each Month
02:00
Output
File Format
PDF
HTML
WORD
Recipient
1-255 chars, separated by semicolon between multiple email addresses,At most 5 Recipients can be configured
Send via FTP
Server Name/IP
(1 - 255) chars
VR *
trust-vr
User Name *
anonymous
(1 - 32) chars
Password *
(1 - 32) chars
Anonymous
Path
(0 - 255) chars
Description
(1 - 255) chars
OK
Cancel

In this page, configure the values of report task.

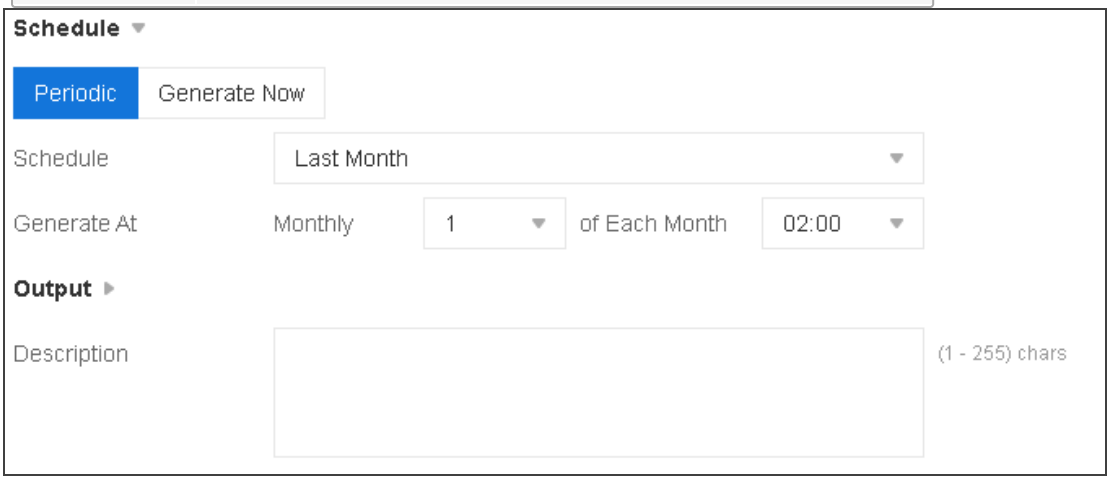
Option	Description
Name	Specifies the name of the report task.
Description	Specifies the description of the report task. You can modify it according to your requirements.



Expand Report Template, select the report template you want to use for the report task.

Option	Description
Report Template	Specifies the report template to be used by the report task: 1. Select the report template (predefined report template or created user-defined report template) from the **Report Template** list on the left. 2. When the report template is selected, the selected report template list shows the description of the template and the details of the report item on

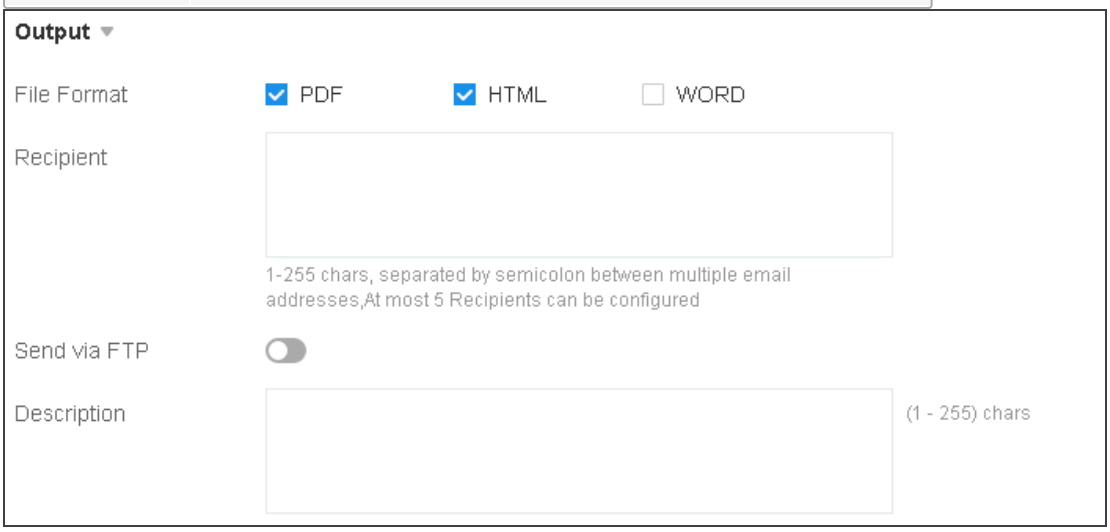
Option	Description
	the right. You can also click **New** or **Edit** button in the **Report Template** list on the left to open the **Report Template Configuration** page and create or edit a user-defined report template quickly.



Expand Schedule, configure the running time of the report task.

Option	Description
Schedule	The schedule specifies the running time of the report task. The report task can be run periodically or run immediately. Periodic: Generates report files as planned. • Schedule: Specifies the statistical period - last day, last month的数据生成报表。 • Generate At: Specifies the generation time. Generate Now: Generates report files immediately.

Option	Description
	• Type: Generates report file based on the data in the specified statistical period.



Expand Output, configure the output mode information of the report.

Option	Description
File Format	Specifies the output format of the report file, including PDF, HTML, and WORD formats.
Recipient	Sends report file via email. To add recipients, enter the email addresses in to the recipient text box (use ";" to separate multiple email addresses. Up to 5 recipients can be configured).
Send via FTP	Click the **Enable** button to send the report file to a specified FTP server. • Server Name/IP: Specifies the FTP server name or the IP address.

Option	Description
	• Virtual Router: Specifies the virtual router of the FTP server from the drop-down list. To create a new virtual router, click the drop-down list and then click on the expanded virtual router list to go to the **Virtual Router Configuration** page. • Username: Specifies the username used to log on to the FTP server. • Password: Enter the password of the FTP user-name. • Anonymous: Select the check box to log on to the FTP server anonymously. • Path: Specifies the location where the report file will be saved.

3. Click **OK**.

Editing the Report Task

To edit the report task, take the following steps:

1. Select **Monitor > Reports > Report Task**.
2. In the report task list, select the report task entry that needs to be edited.
3. Click the **Edit** button on the top to open the **Report Task Configuration** page to edit the selected report task.
4. Click **OK** to save the settings.

Deleting the Report Task

To delete the report task, take the following steps:

1. Select **Monitor > Reports > Report Task**.
2. In the report task list, select the report task entry that needs to be deleted.
3. Click the **Delete** button on the top to delete the selected report task.

Enabling/Disabling the Report Task

To enable or disable the report task, take the following steps:

1. Select **Monitor > Reports > Report Task**.
2. Select the task, and click the **Enable** or **Disable** button on the top.

   By default, the user-defined task is enabled.

Report Status

The generation of a report might take a long time. You can view the running status of report tasks on the Report Status page. You can view the status of an immediate report task as soon as it is created. For a periodic report task, you can the status of it when the execution time reaches.

Select **Monitor** > **Report** > **Report Status**, click **Processing** to view the status of current report tasks.

- Time: indicates the time used by executing the report task.
- Name: indicates the name of the report task.
- Status: indicates the status of the report task, including "waiting", "generating" and "complete".
- Stop: click **Stop** after selecting a report task to terminate its execution.

Select **Monitor** > **Report** > **Report Status**, click **Failed** to view the report tasks that fail to be executed.

- Time: indicates the time when the report task execution ends.
- Name: indicates the name of the report task.
- Status: indicates the status of the report task. For reports that fail to be executed, the status is "Failed".
- Fail Cause: indicates the cause of execution failure.

Logging

Logging is a feature that records various kinds of system logs, including device log, threat log, session log, NAT log, Content filter log, File filter log, , Network Behavior Record log share access logs, and URL logs.

- Device log
    - Event - includes 8 severity levels: debugging, information, notification, warning, error, critical, alert, emergency.
    - Network - logs about network services, like PPPoE and DDNS.
    - Configuration - logs about configuration on command line interface, e.g. interface IP address setting.
- Threat - logs related to behaviors threatening the protected system, e.g. attack defense and application security.
- Session - Session logs, e.g. session protocols, source and destination IP addresses and ports.
- NAT - NAT logs, including NAT type, source and destination IP addresses and ports.
- EPP - logs related with end point protection function.
- File Filter - logs related with file filter function.
- Content filter logs – logs related with content filter function, e.g. Web content filter, Web posting, Email filter and HTTP/FTP control.
- Network behavior record logs – Logs related with network behavior record function, e.g. IM behavior ,etc.
- URL - logs about network surfing, e.g. Internet visiting time, web pages visiting history, an URL filtering logs.

- PBR - logs about policy-based route.
- CloudSandBox - logs about sandbox.
- Share Access Logs - logs about share access rule.

The system logs the running status of the device, thus providing information for analysis and evidence.

Log Severity

Event logs are categorized into eight severity levels.

Severity	Level	Description	Log Definition
Emergencies	0	Identifies illegitimate system events.	LOG_EMERG
Alerts	1	Identifies problems which need immediate attention such as device is being attacked.	LOG_ALERT
Critical	2	Identifies urgent problems, such as hardware failure.	LOG_CRIT
Errors	3	Generates messages for system errors.	LOG_ERR
Warnings	4	Generates messages for warning.	LOG_WARNING
Notifications	5	Generates messages for notice and special attention.	LOG_NOTICE
Informational	6	Generates informational messages.	LOG_INFO

Severity	Level	Description	Log Definition
Debugging	7	Generates all debugging messages, including daily operation messages.	LOG_DEBUG

Destination of Exported Logs

Log messages can be sent to the following destinations:

- Console - The default output destination. You can close this destination via CLI.
- Remote - Includes Telnet and SSH.
- Buffer - Memory buffer.
- File - By default, the logs are sent to the specified USB destination in form of a file.
- Syslog Server - Sends logs to UNIX or Windows Syslog Server.
- Email - Sends logs to a specified email account.
- Local database - Sends logs to the local database of the device.

Log Format

To facilitate the access and analysis of the system logs, StoneOS logs follow a fixed pattern of information layout, i.e. **date/time, severity level@module: descriptions**.See the example below:

2000-02-05 01:51:21, WARNING@LOGIN: Admin user "admin" logged in through console from localhost.

Event Log

This feature may vary slightly on different platforms. Please see the actual page of the feature that your device delivers.

To view event logs, select **Monitor > Log > Event Log**.

In this page, you can perform the following actions:

- Filter: Click Filter to add conditions to show logs that march your filter.
- Configure: Click to jump to the configuration page.
- Clear: Click to clear the selected logs. (Note: This option is not supported for devices that support sending log information to the local database)
- Export: Click to export the displayed logs as a TXT or CSV file.Then, you can add an encryption password to the exported file based on your requirements. This way, only users that enter the specified password can view this file.
- Modify Log Parameter: Click to modify parameter of specified log, including the description, level of the log, and enabling/disabling the log generation.

Network Log

This feature may vary slightly on different platforms. Please see the actual page of the feature that your device delivers.

To view network logs, select **Monitor > Log > Network Log**.

In this page, you can perform the following actions:

- Filter: Click 

to add conditions to show logs that march your filter.
- Configure: Click to jump to the configuration page.
- Clear: Click to clear the selected logs. (Note: This option is not supported for devices that support sending log information to the local database)
- Export: Click to export the displayed logs as a TXT or CSV file.Then, you can add an encryption password to the exported file based on your requirements. This way, only users that enter the specified password can view this file.
- Modify Log Parameter: Click to modify parameter of specified log, including the description, level of the log, and enabling/disabling the log generation.

Configuration Log

This feature may vary slightly on different platforms. Please see the actual page of the feature that your device delivers.

To view configuration logs, select **Monitor > Log > Configuration Log**.

In this page, you can perform the following actions:

- Filter: Click 

to add conditions to show logs that march your filter.
- Configuration: Click to jump to the configuration page.
- Clear: Click to clear the selected logs. (Note: This option is not supported for devices that support sending log information to the local database)
- Export: Click to export the displayed logs as a TXT or CSV file.Then, you can add an encryption password to the exported file based on your requirements. This way, only users that enter the specified password can view this file.
- Modify Log Parameter: Click to modify parameter of specified log, including the description, level of the log, and enabling/disabling the log generation.

Share Access Logs

To view share access logs, select **Monitor > Log > Share Access Log**.

In this page, you can perform the following actions:

- Configuration: Click to jump to the Log Management page.
- Clear: Click to clear the selected logs.
- Export: Click to export the displayed logs as a TXT or CSV file.

- Add to My Log: Click to add the current filtered results to MyLog list.
- Filter: Click 

to add conditions to show logs that march your filter.

Threat Log

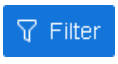
This feature may vary slightly on different platforms. Please see the actual page of the feature that your device delivers.

Threat logs can be generated under the conditions that:

- Threat logging in the Logging feature is enabled. Refer to "Log Configuration" on Page 1713.
- You have enabled one or more of the following features: "Anti-Virus" on Page 1483, " Intrusion Prevention System" on Page 1495, "Attack-Defense" on Page 1556 or "Perimeter Traffic Filtering" on Page 1460 .

To view threat logs, select **Monitor > Log > Threat Log**.

In this page, you can perform the following actions:

- Merge Log: Select the merge type from the drop-down list, which includes Do Not Merge, Threat Name, Source IP, Destination IP.
- Configure: Click to jump to the configuration page.
- Clear: Click to clear the selected logs. (Note: This option is not supported for devices that support sending log information to the local database)
- Export: Click to export the displayed logs as a TXT or CSV file.Then, you can add an encryption password to the exported file based on your requirements. This way, only users that enter the specified password can view this file.
- Filter: Click 

to add conditions to show logs that march your filter.You can enter the IPv4 or IPv6 address if the filter condition is selected as source or destination IP.
- Select a threat log in the table and then you can view the detailed information in the Log Details tab. In the Log Details tab, you can do the following:

- View the severity, application/protocol, source/destination port, threat start time, end time, and other threat-related information (such as plain-text SQL command, plain-text paths to URI, etc.).
- Click "ViewPcap" to see the message package of the threat, or click "Download" to download the packet to local for viewing. IPv6 and IPv4 protocol type messages are both supported for users to view.
- Click "Signature ID" "Add Whitelist" "Disable Rule" to quickly link to the relevant page.
- For threat logs whose detection engine is IPS or antivirus, you can click **Add Blacklist** to block the IP address of the attack source by adding it into the blacklist. For more information about how to configure IP blacklist, refer to Static IP Blacklist.

Session Log

Session logs can be generated under the conditions that:

- Session logging in the Logging feature is enabled. Refer to "Log Configuration" on Page 1713.
- The logging function has been enabled for policy rules. Refer to "Security Policy" on Page 1286.

To view session logs, select **Monitor > Log > Session log**.

Notes:

- For ICMP session logs, the system will only record the ICMP type value and its code value. As ICMP 3, 4, 5, 11 and 12 are generated by other communications, not a complete ICMP session, system will not record such kind of packets.
- For TCP and UDP session logs, system will check the packet length first. If the packet length is 20 bytes (i.e., with IP header, but no loads), it will be defined as a malformed packet and be dropped; if a packet is over 20 bytes, but it has errors, system will drop it either. So, such abnormal TCP and UDP packets will not be recorded.
- The **Clear** option is not supported for devices that support sending log information to the local database.

PBR Log

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

PBR logs can be generated under the conditions that:

- PBR logging in the Logging feature is enabled. Refer to "Log Configuration" on Page 1713.
- You have enabled logging function in PBR rules. Refer to "Creating a Policy-based Route Rule" on Page 399 .

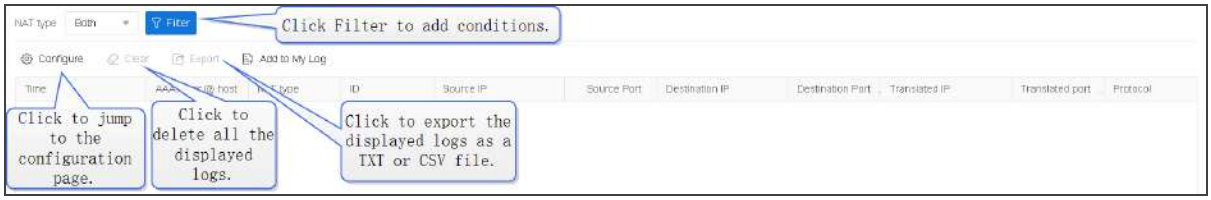
To view PBR logs, select **Monitor > Log > PBR Log**.

NAT Log

NAT logs are generated under the conditions that:

- NAT logging in the Logging feature is enabled. Refer to "Log Configuration" on Page 1713.
- NAT logging of the NAT rule configuration is enabled. Refer to"Configuring SNAT" on Page 1384 and"Configuring DNAT" on Page 1402.

To view NAT logs, select **Monitor > Log > NAT Log**.



Notes: The **Clear** option is not supported for devices that support sending log information to the local database.

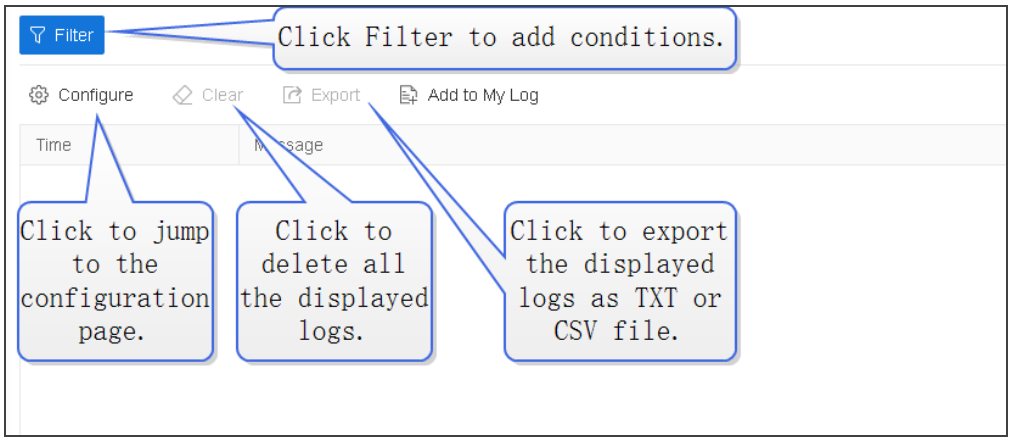
URL Log

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

URL logs can be generated under the conditions that:

- URL logging in the Logging feature is enabled. Refer to "Log Configuration" on Page 1713.
- You have enabled logging function in URL rules. Refer to " URL Filtering" on Page 1176

To view URL logs, select **Monitor > Log > URL Log**.



EPP Log

To view EPP logs, select **Monitor > Log > EPP**.

In this page, you can perform the following actions:

- Configuration: Click to jump to the EPP page.
- Clear: Click to clear the selected logs.
- Export: Click to export the displayed logs as a TXT or CSV file.Then, you can add an encryption password to the exported file based on your requirements. This way, only users that enter the specified password can view this file.
- Filter: Click 

to add conditions to show logs that march your filter.

IoT Log

You can view, configure, clear or export IoT logs.

The following condition should be met before log's generation:

- The IoT logging function has been enabled on the device. For the detailed configurations, refer to Log Management.

Click **Monitor** > **Log** > **IoT Log** to enter the <IoT Log> page.

- Click the 

button to add filter conditions and the required information will be filtered out in the following list.
- Configure: Click the **Configure** button and enter the **Log Management** page.
- Clear: Click the **Clear** button to delete all the filtered IoT logs in system.
- Export: Click the **Export** button to export part or all logs in the format of TXT or CSV. Then, you can add an encryption password to the exported file based on your requirements. This way, only users that enter the specified password can view this file.

File Filter Log

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

File Filter logs can be generated under the conditions that:

- File Filter logging in the Logging feature is enabled. Refer to "Log Configuration" on Page 1713.
- You have enabled the function of "File Filter" on Page 1220.

To view File Filter logs, select **Monitor > Log > File Filter**.

- Filter: Click Filter to add conditions to show logs that march your filter
- Configure: Click to jump to the configuration page
- Clear: Click to delete all the displayed logs.
- Export: Click to export the displayed logs as a TXT or CSV file. Then, you can add an encryption password to the exported file based on your requirements. This way, only users that enter the specified password can view this file.

Content Filter Log

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

Content Filter logs can be generated under the conditions that:

- Content Filter logging in the Logging feature is enabled. Refer to "Log Configuration" on Page 1713.
- You have enabled one or more of the following features: "Web Content" on Page 1227, "Web Posting" on Page 1233, "Email Filter" on Page 1239 and"APP Behavior Control" on Page 1245 function.

To view Content Filter logs, select **Monitor > Log > Content Filter**.

- Filter: Click Filter to add conditions to show logs that march your filter
- Configure: Click to jump to the configuration page
- Clear: Click to delete all the displayed logs.
- Export: Click to export the displayed logs as a TXT or CSV file. Then, you can add an encryption password to the exported file based on your requirements. This way, only users that enter the specified password can view this file.

Network Behavior Record Log

This feature may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

Network Behavior Record logs can be generated under the conditions that:

- Network Behavior Record logging in the Logging feature is enabled. Refer to "Log Configuration" on Page 1713.
- You have enabled the function of"Network Behavior Record" on Page 1252.

To view Network Behavior Record logs, select **Monitor > Log > Network Behavior Record**.

- Filter: Click Filter to add conditions to show logs that march your filter
- Configure: Click to jump to the configuration page
- Clear: Click to delete all the displayed logs.
- Export: Click to export the displayed logs as a TXT or CSV file. Then, you can add an encryption password to the exported file based on your requirements. This way, only users that enter the specified password can view this file.

CloudSandBox Log

This feature may vary slightly on different platforms. Please see the actual page of the feature that your device delivers.

To view sandbox logs, select **Monitor > Log > Cloud SandBox Log**.

In this page, you can perform the following actions:

- Configure: Click to jump to the CloudSandBox page.
- Clear: Click to clear the selected logs. (Note: This option is not supported for devices that support sending log information to the local database)

- Export: Click to export the displayed logs as a TXT or CSV file.Then, you can add an encryption password to the exported file based on your requirements. This way, only users that enter the specified password can view this file.
- Filter: Click 

to add conditions to show logs that march your filter.You can enter the IPv4 or IPv6 address if the filter condition is selected as source or destination IP.

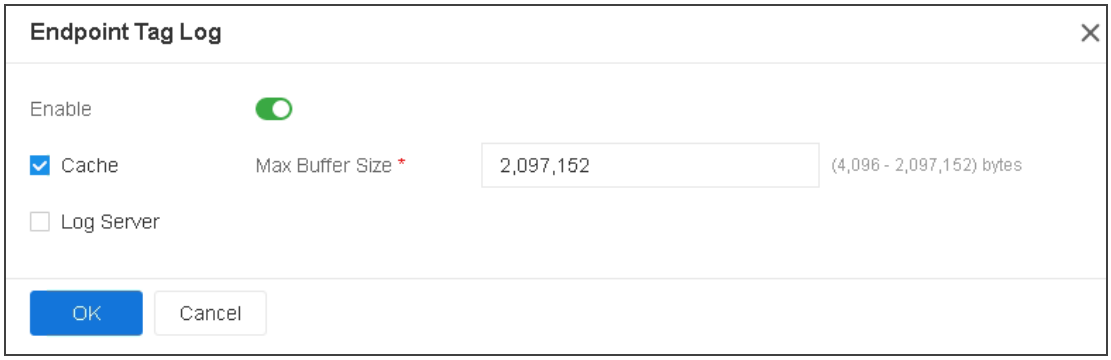
Endpoint Tag Log

The system support management of endpoint tag logs by using the endpoint tag log function. To configure and manage endpoint tag logs, take the following steps:

1. Select **Monitor** > **Log** > **Endpoint Tag Log** or select **ZTNA** > **Endpoint Tag Log**.
    - Time: indicates the endpoint tag log's generation time.
    - Type: indicates the endpoint tag log type, including login, logout, abnormal logout, endpoint tag update and application resource update.
    - User Name: indicates the user name.
    - User IP: indicates the user IP address.
    - AAA Server: indicates the AAA server to which the user belongs.
    - Endpoint Name: indicates the endpoint name.
    - Endpoint IP: indicates the endpoint IP address.
    - OS: indicates the operating system of the endpoint.
    - Endpoint Tags: indicates the endpoint tag associated with the user.
    - ZTNA Server: indicates the ZTNA service name that the user accesses.

- Allowed Application Resources: indicates the application resources that the user are allowed to access.
- Denied Application Resources: indicates the application resources that the user are not allowed to access.

2. Click **Configure** and enter the **Endpoint Tag Log** page.



Configure the options

Option	Description
Enable	Click the button to enable the endpoint tag log function and select the destinations where the endpoint tag logs will be sent to. You can select multiple destinations. By default, the endpoint tag log function is enabled and the logs will be sent to the memory buffer.
Cache	Select the check box to send endpoint tag logs to the memory buffer.
Max Buffer Size	When configuring the system to send endpoint tag logs to the memory buffer, you can define the memory buffer size for storing the endpoint tag logs. The range is 4096 to 2097152, in bytes. The default value is 2097152.

Option	Description
Log Server	Select the check box to send endpoint tag logs to the syslog server, in plaintext. You need to configure a syslog server first. Click the "" link to view all syslog servers that have been configured. For configuration information about syslog server, refer to Creating a Log Server.

3. Click **Filter** to view endpoint tag logs that match the specified filtering conditions.
4. Click **Clear** to clear all endpoint tag logs.

   Note: This option is not supported for devices that support sending log information to the local database.
5. Click **Export** to export all endpoint tag logs to a local file.

Log Configuration

You can create log server, set up log email address, add UNIX serversand configure sending sourceport .

Creating a Log Server

To create a log server, take the following steps:

1. Select **Monitor > Log > Log Configuration**.
2. Click **Log Server Configuration** tab.
3. Click **New**.

In the Log Server Configuration page, configure these values.

Option	Description
Hostname	Enter the name or IP of the log server.
Log Format	Specify the log formats of Syslog Server log Server, including Hillstone, SGCC S5000 and SGCC S6000. Select the format according to the log Server type. • Hillstone： Syslog Server log Server can only receive the Hillstone log format. • S5000 - Syslog Server log Server can only receive SGCC-S5000 log format, such as the log Server's of State Grid Corporation of China. • S6000 - Syslog Server log Server can only receive SGCC- 6000 log format, such as the monitoring Server's of State Grid Corporation of China.
Binding	Specifies the source IP address to receive logs. • Virtual Router: Select **Virtual Router** and then select a virtual router form the drop-down list. If a virtual router is selected, the device will determine the source IP address by searching the reachable routes in the virtual router. • Source Interface: Select **Source Interface** and then select a source interface from the drop-down list. The device will use the IP address of the interface as the source IP to send logs to the syslog server. If management IP address is configured on the inter-

Option	Description
	face, the management IP address will be preferred.
Protocol	Specifies the protocol type of the syslog server. If "Secure-TCP" is selected, you can select **Do not validate the server certificate** option, and system can transfer logs normally and do not need any certifications.
Port	Specifies the port number of the syslog server.
Log Type	Specifies the log types the syslog server will receive.

4. Click **OK** to save the settings.

Notes: You can add at most 15 log servers.

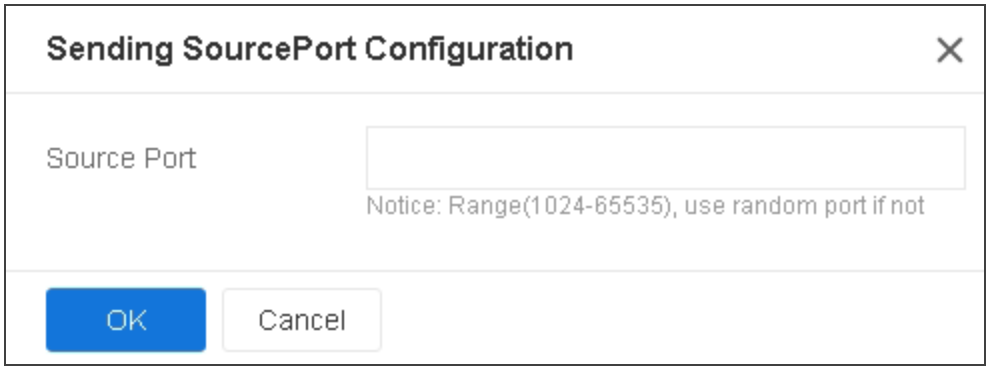
Configuring Sending Souceport Number

The system supports to specify the sending sourceport number used to send log messages to the Syslog Server. When the sending sourceport number is specified, the system will use the specified sending sourceport to send log messages to the Syslog Server. If the sending sourceport number is not specified, the system will use the random sourceport to send log messages to the Syslog Server by default.

To configure sending souceport number, take the following steps:

1. Click **Monitor > Log > Log Configuration** and select the Log Server Configuration tab.

2. Click the **Sending Sourceport Configuration** button to open the Sending Sourceport Configuration page.



3. Enter the specified sourceport number. The range is from 1024 to 65535. If you want to cancel the configuration of the currenr sourceport number, delete the value.

4. Click **OK**.

Notes:

- The binary logs sent to the Syslog Server is not influenced by the sending sourceport configuration. The binary logs are sent by UDP protocol using 5566 sourceport.
- When SNAT is enabled, the system will randomly select port as the sending sourceport according to the port resources of network addresses translated by NAT.

Configuring Log Encoding

The default encoding format for the log information that is output to the log server is utf-8, and the user can start GBK encoding as needed. After the GBK encoding format is opened, the log encoding format that is output to the log server will be GBK encoding. To enable the GBK encoding :

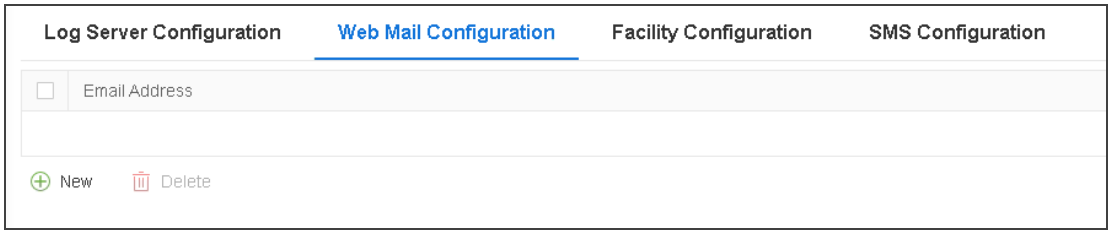
1. Select **Monitor > Log > Log Configuration**.
2. Click **Log Server Configuration** tab.
3. Click the **Log Encoding Configuration** button in the upper right corner to open the Log Encoding Configuration page.
4. Click the button to enable the GBK Encoding.
5. .Click **OK** to save the settings.

Adding Email Address to Receive Logs

An email in the log management setting is an email address for receiving log messages.

To add an email address, take the following steps:

1. Select **Monitor > Log > Log Configuration**.
2. Click **Web Mail Configuration** tab.



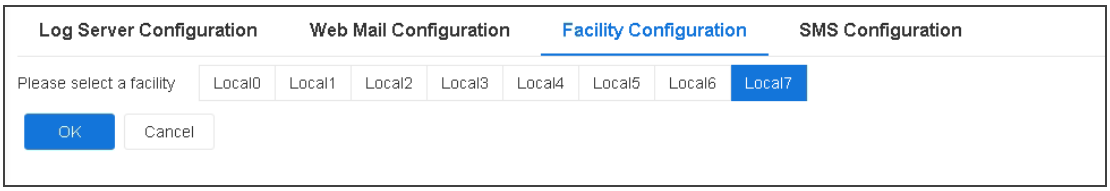
3. Enter an email address and click **New**.
4. If you want to delete an existing email, click **Delete**.

Notes: You can add at most 3 email addresses.

Specifying a Unix Server

To specify a Unix server to receive logs, take the following steps:

1. Select **Monitor > Log > Log Configuration**.
2. Click the **Facility Configuration** tab.



3. Select the device you want and the logs will be exported to that Unix server.
4. Click **OK**.

Specifying a Mobile Phone

To specify a mobile phone to receive logs, take the following steps:

1. Select **Monitor > Log > Log Configuration**.
2. Click **SMS Configuration** tab.
3. Enter a mobile phone number and click **New**.
4. If you want to delete an existing mobile phone number, click **Delete**.

Notes: You can add at most 3 mobile phone numbers.

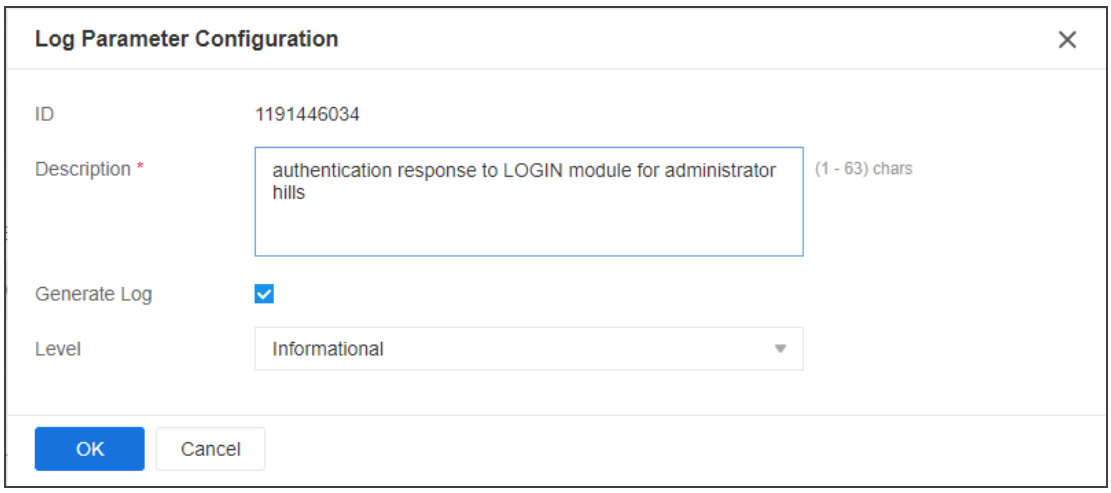
Log Parameter Configuration

The system supports to modify parameter of the event log, network log, and configuration log, including the description, level of the log, and enabling/disabling the log generation. You can modify the parameters of the specified log through the corresponding log page, and view it through the log parameter configuration page, edit or delete log entries on the log parameter configuration page.

To edit the log parameter, take the following steps:

1. Select **Monitor > Log > Log Configuration > Log Parameter Configuration**.

2. Select the log entry that needed to be edited, click **Edit**, modify the description, level in the Log Parameter Configuration page.



3. Click **OK**.

Managing Logs

You can configure system to enable the logging function, including enabling various logs.

Configuring Logs

To configure parameters of various log types, take the following steps:

1. Select **Monitor > Log > Log Management**.
2. Click the **Enable** button of the log type that you want, and click the  button to enter the corresponding log settings.
3. Click **OK**.

Option Descriptions of Various Log Types

This section describes the options when you set the properties of each log types.

Event Log

Option	Description
Enable	Click the button to enable the event logging function.
Console	Select the check box to send a syslog to the Console. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported.
Terminal	Select the check box to send a syslog to the terminal. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported.
Cache	Select the check box to send a syslog to the cache.

Option	Description
	• Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported. • Max Buffer Size - The maximum size of the cached logs. The default value may vary for different hardware platforms.
File	Select the check box to send a syslog to a file. • Max File Size - Specifies the maximum size of the syslog file. The value range is 4096 to 1048576 bytes. The default value is 1048576 bytes. • Save logs to USB - Select the check box and select a USB drive (USB0 or USB1) from the drop-down list. Type a name for the syslog file into the File Name box.
Log Server	Select the check box to export event logs to the syslog server. • View Log Server - Click to see all existing syslog servers or to add new server. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported.
Email Address	Select the check box to send event logs to the email. • View Email Address: Click to see all existing email

Option	Description
	addresses or add a new address. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported.
SMS	Select the check box to send event logs to the SMS. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported.

Network Log

Option	Description
Enable	Click the button to enable the network logging function.
Cache	Select the check box to export network logs to the cache. • Max Buffer Size - The maximum size of the cached network logs. The value range is 4096 to 524288 bytes. The default value may vary for different hardware platforms.
File	Select the check box to send a syslog to a file. • Max File Size - Specifies the maximum size of the syslog file. The value range is 4096 to 1048576 bytes. The default value is 1048576 bytes. • Save logs to USB - Select the check box and select a USB drive (USB0 or USB1) from the drop-down list. Type a name for the syslog file into the File Name box.
Log Server	Select the check box to export network logs to the syslog

Option	Description
	server. • View Log Server - Click to see all existing syslog servers or to add a new server.

Configuration Log

Option	Description
Enable	Click the button to enable the configuration logging function.
Cache	Select the check box to export configuration logs to the cache. • Max Buffer Size - The maximum size of the cached configuration logs. The value range is 4096 to 524288 bytes. The default value may vary for different hardware platforms.
Log Server	Select the check box to export network logs to the syslog server. • View Log Server - Click to see all existing syslog servers or to add new server.
Log Speed Limit	Select the check box to define the maximum efficiency of generating logs. • Maximum Speed - Specified the speed (messages per second).

Session Log

Option	Description
Enable	Click the button to enable the session logging function.

Option	Description
	• Record User Name: Select to show the user's name in the session log messages. • Record Host Name: Select to show the host's name in the session log messages.
Cache	Select the check box to export session logs to cache. • Max Buffer Size - The maximum size of the cached session logs. The value range is 4096 to 2097152 bytes. The default value may vary for different hardware platforms.
Log Server	Select the check box to export session logs to the syslog server. • View Log Server - Click to see all existing syslog servers or to add a new server. • Syslog Distribution Methods - The distributed logs can be in the format of binary or text. If you select the check box, you will send log messages to different log servers, which will relieve the pressure of a single log server. The algorithm can be Round Robin or Src IP Hash.

PBR Log

Option	Description
Enable	Click the button to enable a PBR logging function. • Record User Name: Select to show the user's name in

Option	Description
	the PBR log messages. • Record Host Name: Select to show the host's name in the PBR log messages.
Cache	Select the check box to export PBR logs to the cache. • Max Buffer Size - The maximum size of the cached PBR logs. The value range is 4096 to 2097152 bytes. The default value may vary for different hardware platforms.
Log Server	Select the check box to export PBR logs to the syslog server. • View Log Server - Click to see all existing syslog servers or to add a new server. • Syslog Distribution Methods - The distributed logs can be in the format of plain text. If you select the check box, you will send log messages to different log servers, which will relieve the pressure of a single log server. The algorithm can be Round Robin or Src IP Hash.

NAT Log

Option	Description
Enable	Click the button to enable the NAT logging function. • Record Host Name: Select to show the host's name in the NAT log messages.
Cache	Select the check box to export NAT logs to cache. • Max Buffer Size - The maximum size of the cached NAT logs.

Option	Description
	The default value may vary for different hardware platforms.
Log Server	Select the check box to export NAT logs to log servers. • View Log Server - Click to see all existing syslog servers or to add a new server. • Syslog Distribution Methods - The distributed logs can be in the format of binary or text. If you select the check box, you will send log messages to different log servers, which will relieve the pressure of a single log server. The algorithm can be Round Robin or Src IP Hash.

IoT Log

Option	Description
Enable	Click the button to enable the IoT logging function. • Record Host Name: Select to show the host's name in the IoT log messages.
Cache	Select the check box to export IoT logs to cache. • Max Buffer Size - The maximum size of the cached IoT logs.
Log Server	Select the check box to export IoT logs to log servers. • View Log Server - Click to see all existing servers or to add a new server. • Syslog Distribution Methods - The distributed logs can be in the format of binary or text. If you select the check box, you will send log messages to different log

Option	Description
	servers, which will relieve the pressure of a single log server. The algorithm can be Round Robin or Src IP Hash.

EPP Log

Option	Description
Enable	Click the button to enable the EPP logging function.
Terminal	Select the check box to send a syslog to the terminal. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported.
Cache	Select the check box to export EPP logs to cache. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported. • Max Buffer Size - The maximum size of the cached logs.
File	Select the check box to send EPP logs to a file. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported. • Max File Size - Specifies the maximum size of the EPP log file. The value range is 4096 to 1048576 bytes. The default value is 1048576 bytes.

Option	Description
Log Server	Select the check box to export EPP logs to log servers. • View Log Server - Click to see all existing servers or to add a new server. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported. • Syslog Distribution Methods - The distributed logs can be in the format of binary or text. If you select the check box, you will send log messages to different log servers, which will relieve the pressure of a single log server. The algorithm can be Round Robin or Src IP Hash.
Email Address	Select the check box to send EPP logs to the email. • View Email Address: Click to see all existing email addresses or add a new address. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported.

URL Log

Option	Description
Enable	Click the button to enable the URL logging function. • Record Host Name: Select to show the host's name in the URL log messages.

Option	Description
Cache	Select the check box to export URL logs to the cache. • Max Buffer Size - The maximum size of the cached URL logs. The default value may vary for different hardware platforms.
Log Server	Select the check box to export URL logs to a log server. • View Log Server - Click to see all existing syslog servers or to add a new server. • Syslog Distribution Methods - The distributed logs can be in the format of binary or text. If you select the check box, you will send log messages to different log servers, which will relieve the pressure of a single log server. The algorithm can be Round Robin or Src IP Hash.

File Filter Log

Option	Description
Enable	Click the button to enable the File Filter logging function.
Cache	Select the check box to export File Filter logs to cache. • Max Buffer Size - The maximum size of the cached File Filter logs. The default value may vary for different hardware platforms.
Log Server	Select the check box to export File Filter logs to log server. • View Log Server - Click to see all existing syslog servers or to add a new server.

Option	Description
	• Syslog Distribution Methods - The distributed logs can be in the format of binary or text. If you select the check box, you will send log messages to different log servers, which will relieve the pressure of a single log server. The algorithm can be Round Robin or Src IP Hash.

Content Filtering Log

Option	Description
Enable	Click the button to enable the Content Filter logging function.
Cache	Select the check box to export Content Filter logs to cache. • Max Buffer Size - The maximum size of the cached Content Filter logs. The default value may vary for different hardware platforms.
Log Server	Select the check box to export Content Filter logs to log server. • View Log Server - Click to see all existing syslog servers or to add a new server. • Syslog Distribution Methods - The distributed logs can be in the format of binary or text. If you select the check box, you will send log messages to different log servers, which will relieve the pressure of a single log server. The algorithm can be Round Robin or Src IP Hash.

Network Behavior Record Log

Option	Description
Enable	Click the button to enable the Network Behavior Record logging function.
Cache	Select the check box to export Network Behavior Record logs to cache. • Max Buffer Size - The maximum size of the cached Network Behavior Record logs. The default value may vary from different hardware platforms.
Log Server	Select the check box to export Network Behavior Record logs to log server. • View Log Server - Click to see all existing syslog servers or to add a new server. • Syslog Distribution Methods - The distributed logs can be in the format of binary or text. If you select the check box, you will send log messages to different log servers, which will relieve the pressure of a single log server. The algorithm can be Round Robin or Src IP Hash.

CloudSandBox Log

Option	Description
Enable	Click the button to enable the CloudSandBox logging function.
Cache	Select the check box to export CloudSandBox logs to the cache. • Max Buffer Size - The maximum size of the cached

Option	Description
	CloudSandBox logs.
File	Select to export CloudSandBox logs as a file. • Max File Size - Specifies the maximum size of the syslog file. The value range is 4096 to 1048576 bytes. The default value is 1048576 bytes. • Save logs to USB - Select the check box and select a USB drive (USB0 or USB1) from the drop-down list. Type a name for the syslog file into the File Name box.
Log Server	Select the check box to export CloudSandBox logs to log server. • View Log Server - Click to see all existing syslog servers or to add a new server.

Threat Log

Option	Description
Enable	Click the button to enable the threat logging function. • Record User Name: Select to show the user's name in the threat log messages.
Record User Information	Click the button to enable the Record User Information function for Threat Log. With this function enabled, threat logs will record information about the authenticated user, including AAA server, username, and hostname.
Cache	Select the check box to export threat logs to the cache. • Max buffer size - The maximum size of the cached threat logs. The default value may vary from different

Option	Description
	hardware platforms. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported.
File	Select to export threat logs as a file to USB. • Lowest Severity - Specifies the lowest severity level. Logs below the severity level selected here will not be exported. • Max File Size - Exported log file maximum size. • Save logs to USB - Select a USB device and enter a name as the log file name.
Terminal	Select to send logs to terminals.
Log Server	Select the check box to export threat logs to log server. • View Log Server - Click to see all existing syslog servers or to add a new server. • Syslog Distribution Methods - the distributed logs can be in the format of binary or text. If you select the check box, you will send log messages to different log servers, which will relieve the pressure of a single log server. The algorithm can be Round Robin or Src IP Hash.
Email address	Select the check box to export logs to the specified email address.

Option	Description
	• Viewing Email Address: Click to see or add email address.
Database	Select the checkbox to save logs in the local device. Only several platforms support this parameters. • Disk Space - Enter a number as the percentage of a storage the logs will take. For example, if you enter 30, the threat logs will take at most 30% of the total disk size. • Disk Space Limit - If **Auto Overwrite** is selected, the logs which exceed the disk space will overwrite the old logs automatically. If **Stop Storing** is selected, system will stop storing new logs when the logs exceed the disk space.

Share Access Log

Option	Description
Enable	Click the button to enable the Share Access logging function.
Console	Select to export Share Access logs to the console.
Cache	Select the check box to export Share Access logs to the cache. • Max buffer size - The maximum size of the cached Share Access logs.
Log Server	Select the check box to export Share Access logs to log server.

Option	Description
	• View Log Server - Click to see all existing syslog servers or to add a new server.

Endpoint Tag Log

Option	Description
Enable	Click the button to enable the endpoint tag log function and select the destinations where the endpoint tag logs will be sent to. You can select multiple destinations. By default, the endpoint tag log function is enabled and the logs will be sent to the memory buffer.
Console	Select to export Share Access logs to the console.
Cache	Select the check box to send endpoint tag logs to the memory buffer. • Max Buffer Size - Specify the memory buffer size for storing the endpoint tag logs. The range is 4096 to 2097152, in bytes. The default value is 2097152.
Localdb	Select the check box to send endpoint tag logs to the local data base on hard disk. This option is supported on platforms installed with hard disks.
Log Server	Select the check box to send endpoint tag logs to the syslog server, in plaintext. You need to configure a syslog server first. Click the "View Log Server" link to view all syslog servers that have been configured. For configuration information about syslog server, refer to Creating a Log Server.

Chapter 14 Diagnostic Center

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

System supports the following diagnostic methods:

- Packet Capture Tool: Captures packets in the system. After capturing the packets, you can export them to your local disk and then analyze them using third-party tools.
- Test Tools: DNS Query, Ping and Traceroute can be used when troubleshooting the network.

Packet Path Detection

This feature may not be available on all platforms. Please check your system's actual page if your device delivers this feature.

Based on the packet process flow, the packet path detection function detects the packets and shows the detection processes and results to the users with charts an descriptions. This function can detect the following packet sources: emulation packet, online packet, and imported packet (system provides the Packet Capture Tool for you that can help you capture the packets).

The detectable packets from different packet sources have different detection measures. System supports the following measures:

- Emulation packet detection: Emulate a packet and detect the process flow in the system of this packet.
- Online packet detection: Perform a real-time detection of the process flow of the packets in system.
- Imported packet detection: Import the existing packets and detect the process flow in system of the packets.

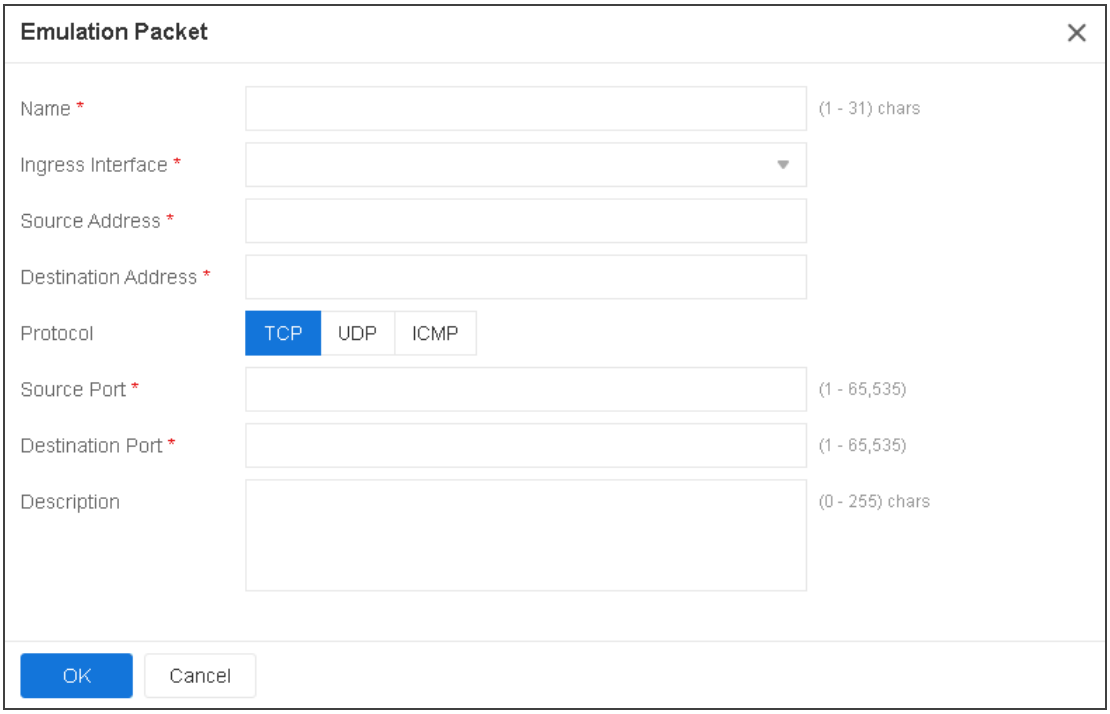
Configuring Packet Path Detection

You can configure the packet path detection configurations and view the detection results in the report.

Emulation Detection

To perform the emulation detection, take the following steps:

1. Select **System > Diagnostic Center > Packet Path Detection**.
2. Click **Choose Detected Source**.
3. Click **New** , in the drop-down list, select **Emulation Packet** tab.



Configure options as follows.

Option	Description
Name	Specifies the name of the emulation packet.
Ingress Interface	Select the ingress interface of the emulation packet from the drop-down list.
Source Address	Specifies the source IP address of the emulation packet in the text box.
Destination Address	Specifies the destination IP address of the emulation packet in the text box.
Protocol	Select the protocol of the emulation packet from the drop-down list. When selecting TCP or UDP, specify the source and destination ports in the Source Port and

Option	Description
	Destination Port text boxes; when selecting ICMP, enter the ICMP type and code in the Type and Value text boxes.
Description	Specifies the description for this emulation packet.

4. Click **Start** to start the detection. The system displays the detection flow in the flow chart and describes the detection process. The flow chart contains all modules the packets passes in the system. After the detection for a particular module is completed, the status indicator above the module indicates the detection results.

    - Green indicator() - Indicates the detection for this module has been passed. System will proceed with the detection. Hover your mouse over this step to view its introduction.

    - Yellow indicator() - Indicates the detection for this module has been passed, but there are potential security risks. System will proceed with the detection. Hover your mouse over this step to view its introduction and the detection results. You can click the **View Results** link to view the detailed detection report.

    - Red indicator() - Indicates the detection for this module fails to pass. System has stopped the detection. Hover your mouse over this step to view its introduction and the detection results. You can click the **View Results** link to view the detailed detection report. If the failure is caused by the policy rule configurations, you can click the link in the Policy Rule step to jump to the policy rule configuration page.

5. After the detection is completed, view the detection results in the Detection Result tab. The detection results include the status indicator and detection result summary. You can

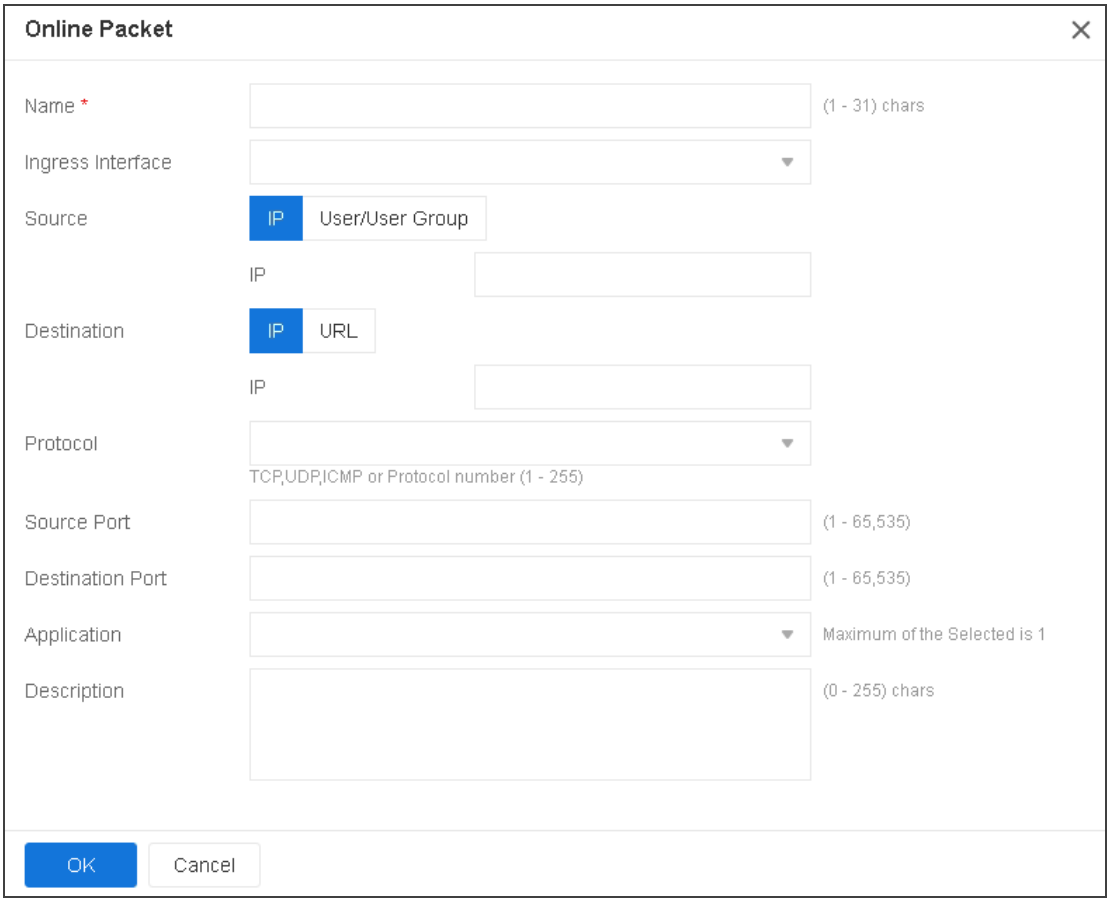
click the **View Details** link to view the detailed detection report. The meanings of status indicators are as follows:

- Green indicator() - Indicates the detected source has passed all detection.
- Yellow indicator() - Indicates the detected source has passed all detection, but there are potential security risks in one or more steps. You can click the **View Details** link to view the potential risks and advice.
- Red indicator() - Indicates not all detection is passed by the detected source. You can click the **View Details** link to view the failure reasons and advice.

Online Detection

To perform the online detection, take the following steps:

1. Select **System > Diagnostic Center > Packet Path Detection**.
2. Click **Choose Detected Source**.
3. Click **New** , in the drop-down list, select **Online Packet** tab.



Configure options as follows.

Option	Description
Name	Specifies the name of the online packet.
Ingress Interface	Select the ingress interface of the online packet from the drop-down list.
Source	Specifies the source IP address or the user/user group of the online packet. • Address: Select the Address radio button and enter the IP address in the text box.

Option	Description
	• User/User Group: Select the User/User Group radio button and select the user/user group from the drop-down list.
Destination	Specifies the destination IP address of the online packet. • Address: Select the radio button and enter the IP address in the text box. • URL: Select the radio button and enter the URL in the text box.
Protocol	Specifies the protocol type or the protocol number of the packet.
Source Port	Specifies the source port of the online packet.
Destination Port	Specifies the destination port of the online packet.
Application	Specifies the application type of the online packet.
Description	Enter the description of the online packet in the text box.

4. Click **OK**.
5. If needed, specify the detecting duration in the Detecting Duration section. After reaching the specified duration, system will automatically stop the detection. The default value is 30 minutes.
6. Click **Start** to start the detection. The system displays the detection process. If errors occurr during the detection, a flow thumbnail in the area of the flow chart pops up to display the

corresponding errors. After the detection is completed, you can click the flow thumbnail to view the details. During each detection process, the system can pop up at most six thumbnails.

7. After the detection is completed, view the detection results in the Detection Result tab. The detection results include the status indicator and detection result summary. You can click the **View Details** link to view the detailed detection report. About the meanings of status indicators, view step 3 in Emulation Detection.

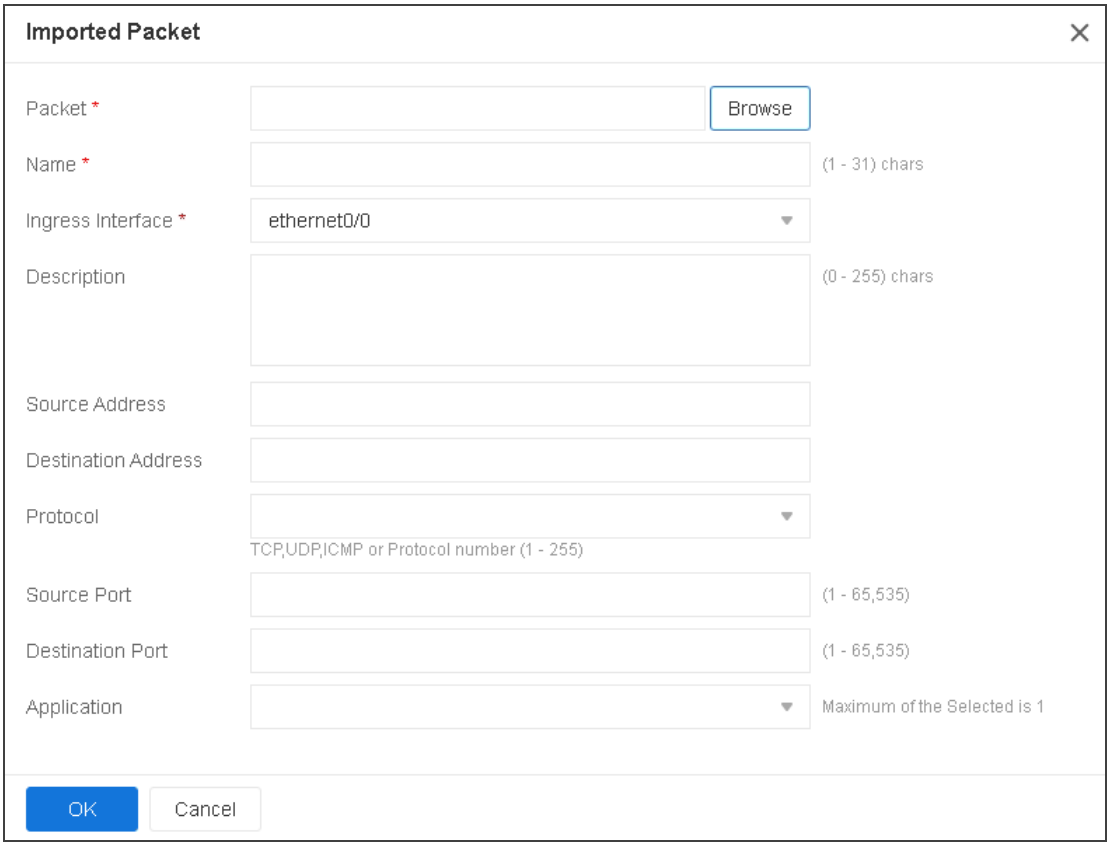
Notes: If one of the following situations happens during the detection, the system will stop the detection.

- Click the **Stop** button.
- Reach the upper limit of the detecting duration. If you do not set the detecting duration, the detecting duration keeps the default value (30 minutes).
- The total number of errors of the same type reaches 10. For example, the flow is blocked by the same policy.
- The total number of errors of different types reaches 5. Errors of different types mean the errors occurred in different modules or errors occurred in one module but are different types.

Imported Detection

To perform the imported detection, take the following steps:

1. Select **System > Diagnostic Center > Packet Path Detection**.
2. Click **Choose Detected Source**.
3. Click **New** , in the drop-down list, select **Imported Packet** tab.



Configure options as follows.

Option	Description
Packet	Click the **Browse** button and select the packet file to import it. The maximum size of the imported packet file can be 20M.
Name	Specifies the name of the imported packet.
Ingress Interface	Select the ingress interface of the imported packet from the drop-down list.
Description	Enter the description of the online packet in the text box.

Option	Description
Advanced	
Source Address	Specifies the source IP address of the imported packet.
Destination Address	Specifies the destination IP address of the imported packet.
Protocol	Specifies the protocol type or the protocol number of the imported packet.
Source Port	Specifies the source port of the imported packet.
Destination Port	Specifies the destination port of the imported packet.
Application	Specifies the application type of the imported packet.

4. Click **OK**.

5. Click **Start** to start the detection. The system displays the detection process in the Detection Process tab. If errors occurr during the detection, a flow thumbnail in the area of the flow chart pops up to display the corresponding errors. After the detection is completed, you can click the flow thumbnail to view the details. During each detection process, the system can pop up at most six thumbnails.

6. After the detection is completed, view the detection results in the Detection Result tab. The detection results include the status indicators and detection result summary. You can click the **View Details** link to view the detailed detection report. For the meanings of the status indicators, view step 3 in Emulation Detection.

Notes: If one of following situations happens during the detection, the system will stop the detection.

- Click the **Stop** button.
- The total number of errors of the same type reaches 10. For example the flow is blocked by the same policy.
- The total number of errors of different types reaches 5. Errors of different types mean the errors occurred in different modules or errors occurred in one module but are different types.
- The imported packets have been all detected.

Detected Sources

The detected sources dialog box lists all detected sources in the system, including the emulation packet, online packet, and imported packet.

Click **Choose Detected Source**. In the Choose Detected Source dialog box, select the **Detected Sources** tab. You can then perform the following actions:

- Click **Details** in the Result column to view the detection report of the detected source.
- Click **Export** in the Export Packet column to export the detected packet to the desired directory.
- Click **Edit** in the Option column to edit the configurations of the detected source.
- Click **Delete** in the Option column to delete the detected source.

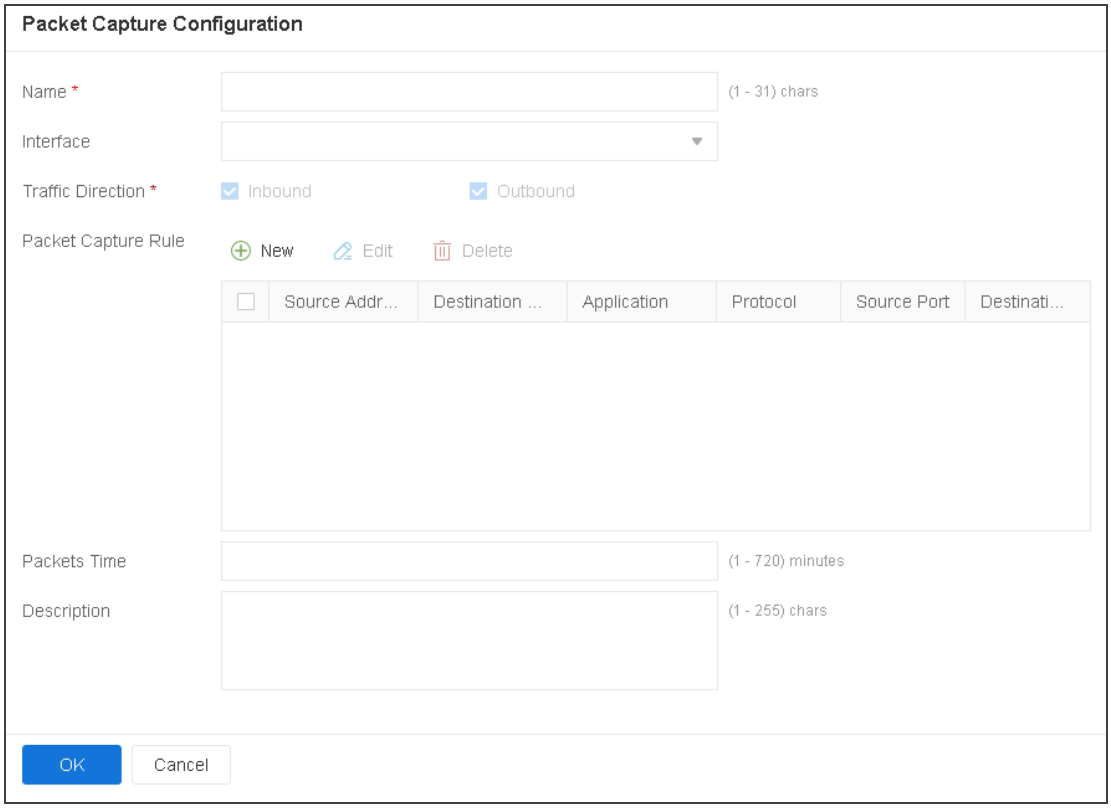
Packet Capture Tool

You can capture packets in the system with multiple capture tasks by Packets Capture Tools. You can set inbound and outbound traffic interfaces and add one or more packets capture rules to the task. This allows the system to capture packages with multiple conditions in real time. At the same time, you can view the current captured and lost packages at any time. The captured packages can be downloaded or exported to a local location and then viewed through a third-party packet capture tool.

Configuring Packet Capture Tools

To capture packets, take the following steps:

1. Select **System > Diagnostic Center > Packet Capture Tool**.
2. Click **New**.



In the Packet Capture Configuration page, configure as follows.

Option	Description
Name	Enter the name of the packets capture entry.
Interface	Select the interface used for the online packet capture task from the drop-down list.
Traffic Direction	Specifies the traffic direction of the interface. Valid values: Inbound and Outbound. By default, both Inbound and Outbound are selected. • Inbound: The online packet capture task captures packets of the inbound interface. If fails, the packets may be blocked by the firewall or not flow into the firewall. If no packets flow into the firewall, you can troubleshoot the upstream link or upstream device as needed. • Outbound: The online packet capture task captures packets of the outbound interface. If succeeds, you can troubleshoot the downstream link or downstream device as needed. • Inbound+Outbound: You can select both inbound and outbound and determine the actual traffic direction of the interface based on captured packets.
Packet Capture Rule	Click **New**, and configure the packet capture rules in the **Packet Capture Rules** page. For the configuration method, refer to the Create a Packet Capture Rule. Select the check box of the packet capture rule in the list

Option	Description
	and click the **Edit** button to edit the configuration of the packet capture rule again. Select the check box of the packet capture rule in the list and click the **Delete** button to delete the packet capture rule.
Packets Time	Enter the packets time in the text box.
Description	Enter the entry description in the text box.

3. Click **OK**.
4. For each task, click **Start** button in the Capture Packets column to start capturing packets, and **Start** button will change to **Capturing**. Click the **Status** to view the current size/number of packets captured.
5. To stop capturing packets, click **Capturing** button in the Capture Packets column.
6. After you stop capturing packets or the capturing is completed, click **Download** at the top-right corner of the Capture Grid List to save the captured packets to a specified location.
7. You can select one or more file entries, and click **Export** at the top right corner of the list to export the package files. The exported grab package files are in compressed format.
8. To clear packet capture data, select a packet capture task and click the **Clear Data** button. All files captured under this task will be cleared.

Notes:

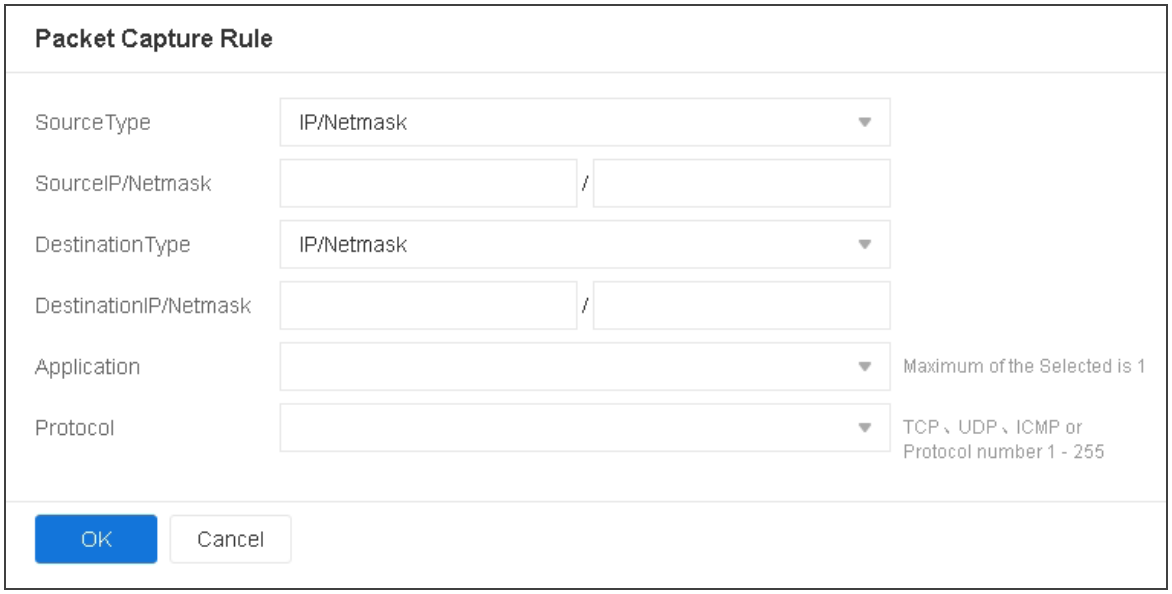
- At most 5 online packet capture tasks can be created.

- An online packet capture task cannot capture packets based on the tunnel interface and management interface.
- We recommend that the packet you capture at a time does not exceed 500 MB because a larger packet may fail to be exported caused by timeout.

Create a Packet Capture Rule

To create a packet capture rule, take the following steps:

1. Select **System > Diagnostic Center > Packet Capture Tool**.
2. Click **New**.
3. Click **New** at **Package Capture Rule** to open the **Packet Capture Rule** page.



In the Packet Capture Rule page, configure as follows.

Option	Description
Source Type	Specify the source IP address/range or the user/user

Option	Description
	group of the packet. • IP/Netmask: Enter the IPv4 address and its mask in the text box. • IP Range: Enter the IPv4 range in the text box. • IPv6/Prefix: Enter the IPv6 address and its prefix in the text box. • IPv6 Range: Enter the IPv6 range in the text box. • User/User Group: Select the user/user group from the drop-down list.
Destination Type	Specify the destination IP address/range of the packet. • IP/Netmask: Enter the IPv4 address and its mask in the text box. • IP Range: Enter the IPv6 address and its range in the text box • IPv6/Prefix: Enter the IPv6 address and its prefix in the text box. • IPv6 Range: Enter the IPv6 range in the text box. • URL: Enter the URL in the text box.
Application	Specifies the application type of the packet.
Protocol	Specifies the protocol type or the protocol number of the packet.

Option	Description
Source Port	When the protocol is TCP or UDP, the source port number can be specified. Specifies the source port of the packet.
Destination Port	When the protocol is TCP or UDP, the destination port number can be specified. Specifies the destination port of the packet.

4. Click **OK**.

Notes: A maximum of 8 packet capture rules can be created in the same packet capture task.

Packet Capture Global Configuration

The global configuration items of packet capture vary according to the type of device:

- For devices with hard disks, you can configure the percentage of the packet capture files to the total hard disk size.
- For devices without hard disks, you can configure the packet capture file save percent and the packet capture file save time.

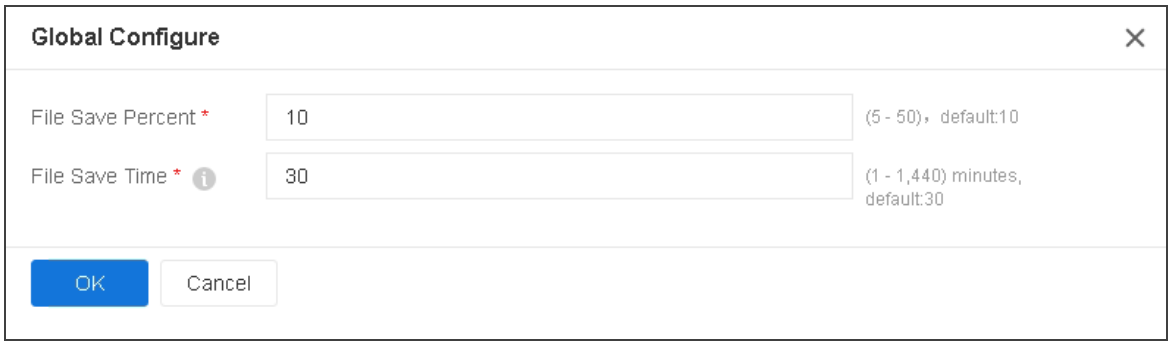
To configure the global configuration, take the following steps:

1. Select **System > Diagnostic Center > Packet Capture Tool**.
2. Click the **Global Configuration** button in the upper right corner of the page to open the **Global Configuration** page.

3. The global configuration page of the device with hard disk is as follows:

Option	Description
Disk Space Percent	Enter the percentage of the packet capture file to the total hard disk size in the text box. The range is 5%-50%. The default value is 10%.

4. The global configuration page of packet capture for devices without hard disk is as follows:



Option	Description
File Save Percent	Enter the maximum percentage of the remaining memory allowed by the packet capture file in the text box, the range is 5%-50%, and the default value is 10%.
File Save Time	Enter the length of time the packet capture file is saved in the text box, the unit is minutes, the range is 1-1440 minutes, and the default value is 30 minutes.

5. Click **OK**.

Test Tools

DNS Query, Ping and Traceroute can be used when troubleshooting the network.

DNS Query

To check the DNS working status of the device, take the following steps:

1. Select **System** > **Diagnostic Center** > **Test Tools**.
2. Type a domain name into the **DNS Query** box.
3. Click **Test**, and the testing result will be displayed in the list below.

Ping

To check the network connecting status, take the following steps:

1. Select **System** > **Diagnostic Center** > **Test Tools**.
2. Type an IP address into the **Ping** box.
3. Click **Test**, and the testing result will be displayed in the list below.
4. The testing result contains two parts:
    - The Ping packet response. If there is no response from the target after timeout, it will print Destination Host Not Response, etc. Otherwise, the response contains sequence of packet, TTL and the response time.
    - Overall statistics, including number of packet sent, number of packet received, percentage of no response, the minimum, average and maximum response time.

Traceroute

Traceroute is used to test and record gateways the packet has traversed from the originating host to the destination. It is mainly used to check whether the network connection is reachable, and

analyze the broken point of the network. The common Traceroute function is performed as follows: first, send a packet with TTL 1, so the first hop sends back an ICMP error message to indicate that this packet can not be sent (because of the TTL timeout); then this packet is re-sent, with TTL 2, TTL timeout is sent back again; repeat this process till the packet reaches the destination. In this way, each ICMP TTL timeout source address is recorded. As the result, the path from the originating host to the destination is identified. The system supports IPv4 and IPv6 peer addresses.

To test and record gateways the packet has traversed by Traceroute, take the following steps:

1. Select **System** > **Diagnostic Center** > **Test Tools**.
2. Select the VR in the Virtual Router drop-down list.
3. Select **IPv4** or **IPv6**.
4. Type an IP address into the **Traceroute** box.
5. Click **Test**, and the testing result will be displayed in the list below.

Chapter 15 High Availability

HA, the abbreviation for High Availability, provides a fail-over solution for communications lines or device failure to ensure the smooth communication and effectively improve the reliability of the network.

To implement the HA function, you need to configure the two devices as HA clusters with identical settings for the following:

- Hardware platform
- Firmware version
- VSYS （enable VSYS on two devices that are installed with VSYS license or not use VSYS on both devices)
- Virtual Router (enable VR simultaneously on two devices or not use VR on both devices)

When one device is not available or cannot handle the request from the client properly, the request will be promptly directed to the other device that works normally, thus ensuring uninterrupted network communication and greatly improving the reliability of communications.

Notes: The configuration of HA clusters is not affected if certain functions, such as AV, are not consistent on the two HA devices. In this scenario, the system sends an alarm showing that certain settings on the two devices are not consistent. It indicates that when the master device fails, the backup device may have problems taking over its work. Settings that cause the above scenario include but are not limited to the below ones:

- enable or disable Antivirus, IPS, URL DB, Perimeter Traffic Filtering, Threat Prevention, Botnet C&C Prevention, Sandbox, IoT Monitor, and Antispam.
- install or not install licenses such as Antivirus License, IPS License, URL

DB License, PTF License, Threat Prevention License, Antispam License, Botnet Prevention License, IoT Monitor License, Twin-mode License, Cloud Sandbox Prevention License, Signature Database Application License, and QoS/iQoS License.

It is suggested to concern on the alarms when the above functions are not consistent on the two HA devices.

System supports two HA modes: Active-Passive (A/P) and Peer Active-Active (A/A).

- Active-Passive (A/P) mode: In the HA cluster, configure two devices to form an HA group, with one device acting as a primary device and the other acting as its backup device. The primary device is active, forwarding packets, and meanwhile synchronizes all of its network and configuration information and current session information to the backup device. When the primary device fails, the backup device will be promoted to primary and takes over its work to forward packets. This A/P mode is redundant, and features a simple network structure for you to maintain and manage.
- Peer Active-Active (A/A) mode: the Peer A/A mode is an HA Active-Active mode. In the Peer A/A mode, two devices are both active, perform their own tasks simultaneously, and monitor the operation status of each other. When one device fails, the other will take over the work of the failure device and also run its own tasks simultaneously. In the Peer A/A mode, only the device at the active status can send/receive packets. The device at the disabled status can make two devices have the same configuration information but its interfaces do not send/receive any packets. The Peer A/A mode is more flexible and is suitable for the deployment in the asymmetric routing environment.

HA Peer Active-Active (A/A) mode may not be available on all platforms. Please check your system's actual page to see if your device delivers this feature.

Basic Concepts

HA Cluster

For the external network devices, an HA cluster is a single device which handles network traffic and provides security services. The HA cluster is identified by its cluster ID. After specifying an HA cluster ID for the device, the device will be in the HA state to implement HA function.

HA Group

System will select the primary and backup device of the same HA group ID in an HA cluster according to the HCMP protocol and the HA configuration. The primary device is in the active state and processes network traffic. When the primary device fails, the backup device will take over its work.

When assigning a cluster ID to the device, the HA group with ID 0 will be automatically created. In Active-Passive (A/P) mode, the device only has HA group 0. In Peer Active-Active (A/A) mode, the latest Hillstone version supports two HA groups, i.e., Group 0 and Group 1.

HA Node

To distinguish the HA devices in an HA group, you can use the value of HA Node to mark the devices. StoneOS support the values of 0 and 1.

In the HA Peer mode, the system can decide which device is the master according to the HA Node value. In the HA group 0, the device whose HA Node value is 0 will be active and the device whose HA Node value is 1 is at the disabled status. In the HA group 1, this does not make sense because both times is HA Node value of 0

Virtual Forward Interface and MAC

In the HA environment, each HA group has an interface to forward traffic, which is known as the Virtual Forward Interface. The primary device of each HA group manages a virtual MAC (VMAC) address which is corresponding with its interface, and the traffic is forwarded on the interface. Different HA groups in an HA cluster cannot forward data among each other. VMAC address is defined by HA base MAC, HA cluster ID, HA group ID and the physical interface index.

HA Selection

In an HA cluster, if the group ID of the HA devices is the same, the one with higher priority will be selected as the primary device.

HA Synchronization

To ensure the backup device can take over the work of the primary device when it fails, the primary device will synchronize its information with the backup device. There are three types of information that can be synchronized: configuration information, files and RDO (Runtime Dynamic Object). The specific content of RDO includes:

- Session information (The following types of session information will not be synchronized: the session to the device itself, tunnel session, deny session, ICMP session, and the tentative session)
- IPsec VPN information
- SCVPN information
- DNS cache mappings
- ARP table
- PKI information
- DHCP information
- MAC table
- WebAuth information

System supports two methods to synchronize: real-time synchronization and batch synchronization. When the primary device has just been selected successfully, the batch synchronization will be used to synchronize all information of the primary device to the backup device. When the configurations change, the real-time synchronization will be used to synchronize the changed information to the backup device. Except for the HA related configurations

and local configurations (for example, the host name), all the other configurations will be synchronized.

Configuring HA Active-Passive (A/P) Mode

This feature may vary slightly on different platforms, if there is a conflict between this guide and the actual page, the latter shall prevail.

The main configuration steps of the HA Active-Passive (A/P) mode include:

1. Configure an HA Virtual Forward Interface. For more information on configuring the interface, see "Configuring an Interface" on Page 176.
2. Configure the HA working mode as Active-Passive.
3. Configure the HA link, including an HA link interface and an HA link IP address, for the device synchronization and HA packets transmission.
4. Configure an HA cluster. Specify the HA cluster ID and HA node ID to enable the HA function.
5. Configure an HA group. Specify the priority for devices (for selecting the master) and HA messages parameters.

To configure HA Active-Passive (A/P) mode, take the following steps:

1. Go to **System > HA**.
2. Select the HA working mode as Active-Passive, which means that one device in the HA cluster works in active mode and the other works in backup mode.

Configure HA Active-Passive (A/P) mode.

Option	Description
Control link interface 1	Specifies the name of the HA control link interface 1. The control link interface is used to synchronize all data between two devices.

Option	Description
Control link interface 2	Specifies the name of HA control link interface 2 (Backup interface). **Note**: You can specify at most one aggregate interface as the HA control link interface, or at most two physical interfaces as the HA control link interface.
Assist link interface	Specifies the name of the HA assist link interface to receive and send heartbeat packets (Hello packets) and ensure the main and backup device of HA switches normally when the HA link fails. **Notes**: • Before the HA link is restored, the HA assist link interface can only receive and send heartbeat packets and the data packets cannot be synchronized. You are advised not to modify the current configurations. After the HA link is restored, manually synchronize session information. • The HA assist link interface must use an interface other than the HA link interface and be bound to the zone. • You need to specify the same interface as the HA assist link interface for the main and backup device, and ensure that the interface of the main and backup device belongs to the same VLAN.

Option	Description
Data link interface 1	Specifies the name of the HA data link interface 1. The data link interface is used to synchronize the data packet information, such as session information. After specifying this data link, the session information will be synchronized over this data link. You can configure the physical interface or aggregate interface as the interface of the data link.
Data link interface 2	Specifies the name of the HA data link interface 2 (backup interface). **Notes:** • You can specify at most one aggregate interface as the HA data link interface, or at most two physical interfaces as the HA data link interface. • When both the control link interface and data link interface are configured, you are advised to configure the data link interface as being an aggregate interface to prevent session synchronization failures at a data link failure.
IP Type	Specifies the IP address type of the HA link. This option is available only when the device's IP version is IPv6.
IP Address/IPv6 Address	Specifies the IP address of the HA link, which is used to synchronize all data between two devices and transmit HA packets.

Option	Description
	• When the IP address type is IPv4 or the device's IP version is IPv4, specifies the IPv4 address and netmask of the HA link interface, in format A.B.C.D/M. The value of M can be an integer ranging from 1 to 32 or a string in dotted decimal notation. • When the IP address type is IPv6, specifies the IPv6 address and prefix length of the HA link interface, in format X.X.X.X::X/M. X.X.X.X::X is the IPv6 address prefix. M is the prefix length. The value range of the prefix length is 1 to 128.
HA cluster ID	Specifies an ID for HA cluster. Saving the configuration of an HA cluster ID will enable the HA function. Deleting the configuration of it will disable the HA function. The value ranges from 1~8.
Node ID	Specify the node ID. The two devices should be configured with different node IDs. The value range is 0 to 1. Certain devices support automatic negotiation of the node ID. It is recommended to manually configure the node ID.
Layer 2 unicast negotiation	After enabling this function, the two devices will negotiate through two-layer unicast mode. You need to enter the address of HA link interface of peer device in the

Option	Description
	"HA Peer IP" text box, and you can also enter the MAC address of HA link interface of peer device in the "HA Peer MAC" text box. This function is disabled by default.
HA Peer IP/HA Peer IPv6	Specifies the IP address of the peer device, which is used to synchronize all data between two devices and transmit HA packets. • When the IP address type of HA link is IPv4 or the device's IP version is IPv4, enter the IPv4 address of HA peer device. • When the IP address type of HA link is IPv6, enter the IPv6 address of HA peer device.
HA Peer MAC	Enter the MAC address of HA peer device, i.e. the MAC address of the heartbeat interface.
MTU	Specifies the MTU value of HA link interface. If the size of the message exceeds the MTU value of the HA link interface, the sender will fragment and send the message and the receiver will reassemble the fragments. Valid values: 1280 to 1600. Unit: bytes. Default value: 1500.
L3 port down-up	If this function is disabled, the following types of physical interfaces do not perform down-up operations when the device is switched from a master device to a backup device for HA switchover:

Option	Description
	• The physical interface that is bound to a Layer 3 zone. • The physical interface that belongs to a redundant interface, and the redundant interface is bound to a Layer 3 zone. • The physical interface that belongs to an aggregate interface, and the aggregate interface is bound to a Layer 3 zone.
HA group configuration	HA group configuration consists of the following items: • Group: After you specify the HA working mode, the group ID is automatically generated and cannot be changed. In A/P mode, only Group 0 is available. • Priority: Specifies the priority of the current device in the HA group. The device with the highest priority (the lowest value) is elected as the primary device. Valid values: 1 to 254. • Preempt: Specifies whether to enable the preempt mode and the preempt time. If you enable this mode, the device will upgrade itself to the primary device once its priority is higher than the current primary device, and the current primary device

Option	Description
	becomes a secondary device. If you enter a value of 0, it indicates that you disable the preempt mode. In this case, the device can only substitute the primary device in case of primary device failure even if the priority of the device is higher than that of the primary device. Valid values: 0 to 600. Unit: seconds. • Hello interval: Specifies the Hello interval value. The Hello interval indicates the interval for the HA device to send heartbeats (Hello packets) to other devices in the HA group. The Hello interval in the same HA group must be identical. Valid values: 50 to 10000. Unit: milliseconds. • Hello threshold: Specifies the threshold value of the Hello message. If the device does not receive the specified number of Hello messages from the other device, it will suppose the other device's heartbeat stops. Valid values: 3 to 255. • Gratuitous ARP packet number: Specifies the number of gratuitous ARP packets. When the backup device is elected as the primary device, it will send an ARP request packet to the network to inform the relevant network devices to update its ARP table. Valid values: 10 to 180.

Option	Description
	• Track Object: Specifies the track object you have configured or click  to create a track object. The track object is used to monitor the working status of the device. Once finding the device stop working normally, system will take the corresponding action. • Description: Specifies the description of the HA group.
Auto-check for Configuration Consistency of Master and Backup	Enable this function to automatically check whether configurations between the master and the backup devices are the same. After this function is enabled, the system will perform one check immediately and afterward at the interval of 1 hour. After every check, the system will refresh the Latest Check Result option. If a configuration inconsistency is found, a log will be also recorded. To view inconsistency details, you can perform a check again via the Manual Check for Consistency of Master and Backup option. This function is disabled by default. **Note**: Please enable the "Auto-check for Configuration Consistency of Master and Backup" function on the master device after the HA negotiation is successful. When this function is enabled, the backup device synchronizes the configuration.

Option	Description
Manual Check for Consistency of Master and Backup	Click **Query** to perform one-time configuration consistency check between the master and the backup devices. After the check is finished, the Latest Check Result option will be automatically refreshed. If different configurations exist, a page showing detailed configuration differences will be prompted. **Notes:** • On devices supporting the VSYS function and loaded with the VSYS license, click **Details** to view the details for each VSYS. In other conditions, the details are directly displayed. • Please perform one-time configuration consistency check on the master device after the HA negotiation is successful.
Latest Check Result	Displays the configuration consistency check result, check time and query type.

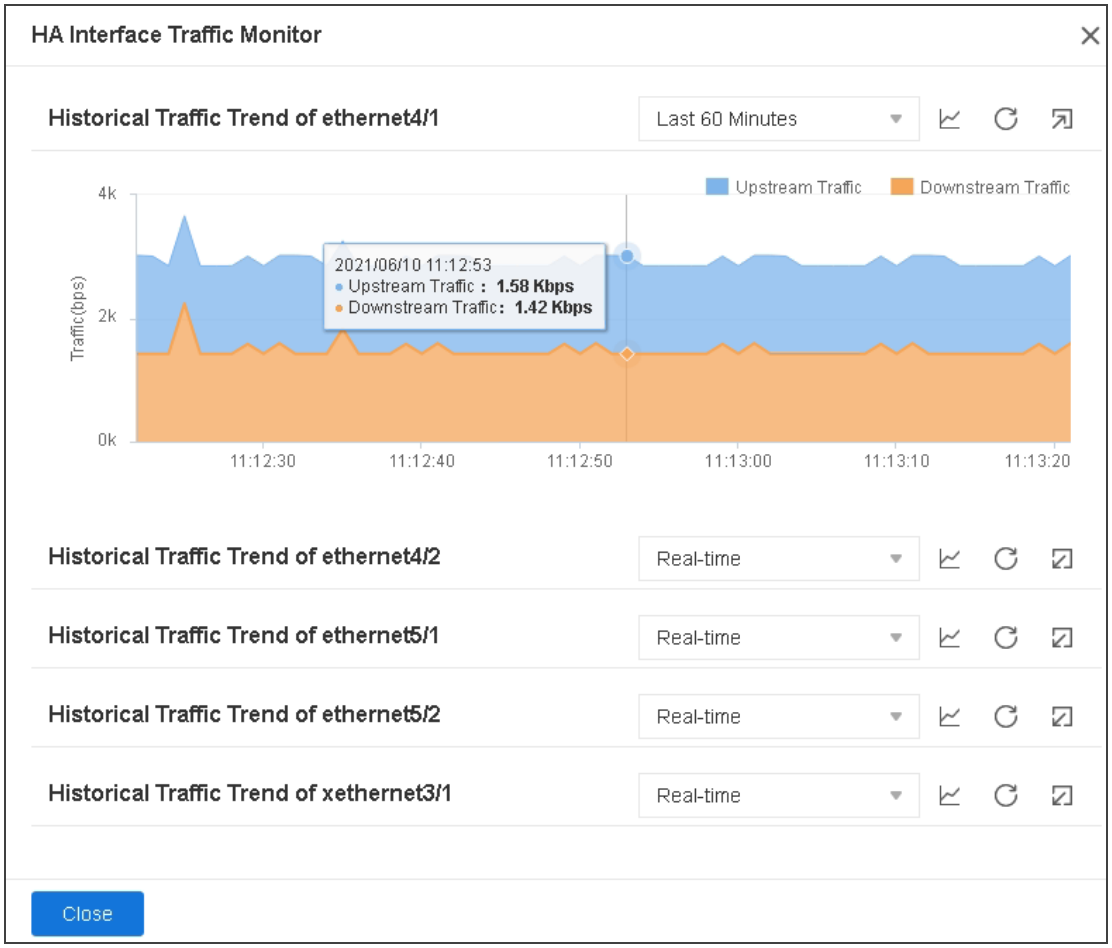
3. Click **OK.**

HA Interface Traffic Monitor

The HA interface traffic monitor function statistically analyzes the historical traffic trend of HA interfaces in a specified statistical period.

To view the historical traffic trend of HA interfaces, go to **System > HA**, and then click the 

button.



- Select a different Statistical Period from the drop-down menu to view the statistical information in that period of time.
- Click and to switch between the curve chart and the area chart.
- Click " " to refresh the monitoring data.
- Click " " to collapse the chart or click " " to expand the chart.
- Hover your mouse over the chart to view upstream traffic, downstream traffic or total traffic of the HA interface.

- Click **Upstream Traffic**, **Downstream Traffic** or **Total Traffic**, system displays the interface traffic of the specified object.

HA Configuration Synchronization

In some cases, primary and secondary configurations may be out of synchronization. If this occurs, you need to manually synchronize the configuration between the primary device and secondary device. To do this, select **System** > **HA**. On the **HA** page, click **HA Synchronize Configuration**.

HA Session Synchronization

By default, information about sessions between HA devices are automatically synchronized. This process generates additional traffics, which may compromise the performance when the device is overloaded. You can use the **ha sync rdo session disable** command to disable the automatic synchronization function of HA sessions based on device loads. This ensures device stability.

To manually synchronize HA sessions after the automatic synchronization function of HA sessions is disabled, select **System** > **HA**. On the **HA** page, click **HA Synchronize Session**.

HA Primary/Secondary Switchover

To manually performs primary/secondary switchover, select **System** > **HA**. On the **HA** page, click **HA Master Switch Over**.

Viewing the HA Status of the Device

In the HA environment, you can view the HA status of current device at the **Device Name** in the upper right corner of the main page of system.

- M: **M** state that represents the current device is the master.
- B: **B** state that represents the current device is the backup.

Configuring HA Peer Active-Active (A/A) Mode

This feature may vary slightly on different platforms, if there is a conflict between this guide and the actual page, the latter shall prevail.

The main configuration steps of the HA Peer Active-Active (A/A) mode include:

1. Configure an HA Virtual Forward Interface. For more information on configuring the interface, see "Configuring an Interface" on Page 176.
2. Configure the HA working mode as Peer Active-Active.
3. Configure the HA link, including an HA link interface and an HA link IP address, for the device synchronization and HA packets transmission.
4. Configure an HA cluster. Specify the HA cluster ID and HA node ID to enable the HA function.
5. Enable the HA peer mode.
6. Configure an HA group. Specify the priority for devices (for selecting the master) and HA messages parameters.

To configure HA Peer Active-Active (A/A) mode, take the following steps

1. Go to **System > HA**.
2. Select the HA working mode as Peer Active-Active, which means that both devices in the HA cluster work in active mode.

Configure HA Peer Active-Active (A/A) mode.

Option	Description
Control link interface 1	Specifies the name of the HA control link interface 1. The control link interface is used to synchronize all data

Option	Description
	between two devices.
Control link interface 2	Specifies the name of HA control link interface 2 (Backup interface). **Note**: You can specify at most one aggregate interface as the HA control link interface, or at most two physical interfaces as the HA control link interface.
Assist link interface	Specifies the name of the HA assist link interface to receive and send heartbeat packets (Hello packets) and ensure the main and backup device of HA switches normally when the HA link fails. **Notes**: • Before the HA link is restored, the HA assist link interface can only receive and send heartbeat packets and the data packets cannot be synchronized. You are advised not to modify the current configurations. After the HA link is restored, manually synchronize session information. • The HA assist link interface must use an interface other than the HA link interface and be bound to the zone. • You need to specify the same interface as the HA assist link interface for the main and backup device, and ensure that the interface of the main

Option	Description
	and backup device belongs to the same VLAN.
Data link interface 1	Specifies the name of the HA data link interface 1. The data link interface is used to synchronize the data packet information, such as session information. After specifying this data link, the session information will be synchronized over this data link. You can configure the physical interface or aggregate interface as the interface of the data link.
Data link interface 2	Specifies the name of the HA data link interface 2 (backup interface). **Notes:** • You can specify at most one aggregate interface as the HA data link interface, or at most two physical interfaces as the HA data link interface. • When both the control link interface and data link interface are configured, you are advised to configure the data link interface as being an aggregate interface to prevent session synchronization failures at a data link failure.
IP Type	Specifies the IP address type of the HA link. This option is available only when the device's IP version is IPv6.
IP Address/IPv6	Specifies the IP address of the HA link, which is used to synchronize all data between two devices and transmit

Option	Description
Address	HA packets. • When the IP address type is IPv4 or the device's IP version is IPv4, specifies the IPv4 address and netmask of the HA link interface, in format A.B.C.D/M. The value of M can be an integer ranging from 1 to 32 or a string in dotted decimal notation. • When the IP address type is IPv6, specifies the IPv6 address and prefix length of the HA link interface, in format X.X.X.X::X/M. X.X.X.X::X is the IPv6 address prefix. M is the prefix length. The value range of the prefix length is 1 to 128.
HA cluster ID	Specifies an ID for HA cluster. Saving the configuration of an HA cluster ID will enable the HA function. Deleting the configuration of it will disable the HA function. The value ranges from 1~8.
Node ID	Specify the node ID. The two devices should be configured with different node IDs. The value range is 0 to 1. Certain devices support automatic negotiation of the node ID. It is recommended to manually configure the node ID.
Peer-mode	Click to enable the HA peer mode. By default, the group 0 in the device whose HA Node ID is 0 will be active

Option	Description
	and the group 0 in the device whose HA Node ID is 1 will be in the disabled status. The group 1 in the device whose HA Node ID is 1 will be active and the group 1 in the device whose HA Node ID is 0 will be in the disabled status.
Symmetric-routing	Enable this function to make the device work in the symmetrical routing environment. It is recommended to enable this function when the inbound and outbound packets of a session are processed on the same device. When enabled, the system will simplify the session processing process. This function is disabled by default, that is, the device works in asymmetric routing mode by default.
Layer 2 unicast negotiation	After enabling this function, the two devices will negotiate through two-layer unicast mode. You need to enter the address of HA link interface of peer device in the "HA Peer IP" text box, and you can also enter the MAC address of HA link interface of peer device in the "HA Peer MAC" text box. This function is disabled by default.
HA Peer IP/HA Peer IPv6	Specifies the IP address of the peer device, which is used to synchronize all data between two devices and transmit HA packets. • When the IP address type of HA link is IPv4 or

Option	Description
	the device's IP version is IPv4, enter the IPv4 address of HA peer device. • When the IP address type of HA link is IPv6, enter the IPv6 address of HA peer device.
HA Peer MAC	Enter the MAC address of HA peer device, i.e. the MAC address of the heartbeat interface.
MTU	Specifies the MTU value of HA link interface. If the size of the message exceeds the MTU value of the HA link interface, the sender will fragment and send the message and the receiver will reassemble the fragments. Valid values: 1280 to 1600. Unit: bytes. Default value: 1500.
L3 port down-up	If this function is disabled, the following types of physical interfaces do not perform down-up operations when the device is switched from a master device to a backup device for HA switchover: • The physical interface that is bound to a Layer 3 zone. • The physical interface that belongs to a redundant interface, and the redundant interface is bound to a Layer 3 zone. • The physical interface that belongs to an aggregate interface, and the aggregate interface is bound to a Layer 3 zone.

Option	Description
HA group configuration	HA group configuration consists of the following items: • Group: After you specify the HA working mode, the group ID is automatically generated and cannot be changed. In peer A/A mode, both Group 0 and Group 1 are available. • Priority: Specifies the priority of the current device in the HA group. The device with the highest priority (the lowest value) is elected as the primary device. Valid values: 1 to 254. • Preempt: Specifies whether to enable the preempt mode and the preempt time. If you enable this mode, the device will upgrade itself to the primary device once its priority is higher than the current primary device, and the current primary device becomes a secondary device. If you enter a value of 0, it indicates that you disable the preempt mode. In this case, the device can only substitute the primary device in case of primary device failure even if the priority of the device is higher than that of the primary device. Valid values: 0 to 600. Unit: seconds. • Hello interval: Specifies the Hello interval value.

Option	Description
	The Hello interval indicates the interval for the HA device to send heartbeats (Hello packets) to other devices in the HA group. The Hello interval in the same HA group must be identical. Valid values: 50 to 10000. Unit: milliseconds. • Hello threshold: Specifies the threshold value of the Hello message. If the device does not receive the specified number of Hello messages from the other device, it will suppose the other device's heartbeat stops. Valid values: 3 to 255. • Gratuitous ARP packet number: Specifies the number of gratuitous ARP packets. When the backup device is elected as the primary device, it will send an ARP request packet to the network to inform the relevant network devices to update its ARP table. Valid values: 10 to 180. • >Track Object: Specifies the track object you have configured or click  to create a track object. The track object is used to monitor the working status of the device. Once finding the device stop working normally, system will take the corresponding action. • Description: Specifies the description of the HA

Option	Description
	group.
Auto-check for Configuration Consistency of Master and Backup	Enable this function to automatically check whether configurations between the master and the backup devices are the same. After this function is enabled, the system will perform one check immediately and afterward at the interval of 1 hour. After every check, the system will refresh the Latest Check Result option. If a configuration inconsistency is found, a log will be also recorded. To view inconsistency details, you can perform a check again via the Manual Check for Consistency of Master and Backup option. This function is disabled by default. **Note**: Please enable the "Auto-check for Configuration Consistency of Master and Backup" function on the master device after the HA negotiation is successful. When this function is enabled, the backup device synchronizes the configuration.
Manual Check for Consistency of Master and Backup	Click **Query** to perform one-time configuration consistency check between the master and the backup devices. After the check is finished, the Latest Check Result option will be automatically refreshed. If different configurations exist, a page showing detailed configuration differences will be prompted. **Notes**: • On devices supporting the VSYS function and

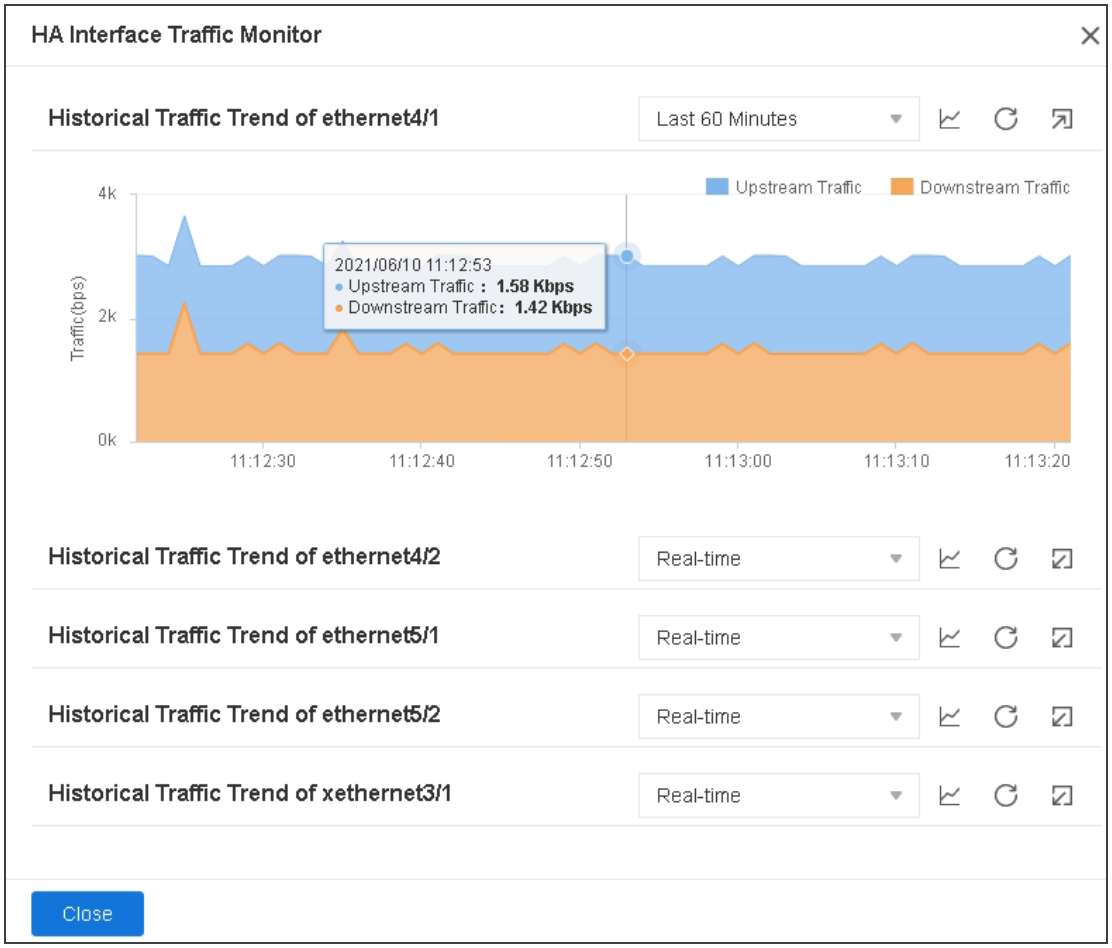
Option	Description
	loaded with the VSYS license, click **Details** to view the details for each VSYS. In other conditions, the details are directly displayed. • Please perform one-time configuration consistency check on the master device after the HA negotiation is successful.
Latest Check Result	Displays the configuration consistency check result, check time and query type.

3. Click **OK**.

HA Interface Traffic Monitor

The HA interface traffic monitor function statistically analyzes the historical traffic trend of HA interfaces in a specified statistical period.

To view the historical traffic trend of HA interfaces, go to **System > HA**, and then click the HA Interface Traffic Monitor button.



- Select a different Statistical Period from the drop-down menu to view the statistical information in that period of time.
- Click and to switch between the curve chart and the area chart.
- Click " " to refresh the monitoring data.
- Click " " to collapse the chart or click " " to expand the chart.
- Hover your mouse over the chart to view upstream traffic, downstream traffic or total traffic of the HA interface.

- Click **Upstream Traffic**, **Downstream Traffic** or **Total Traffic**, system displays the interface traffic of the specified object.

HA Configuration Synchronization

In some cases, primary and secondary configurations may be out of synchronization. If this occurs, you need to manually synchronize the configuration between the primary device and secondary device. To do this, select **System** > **HA**. On the **HA** page, click **HA Synchronize Configuration**.

HA Session Synchronization

By default, information about sessions between HA devices are automatically synchronized. This process generates additional traffics, which may compromise the performance when the device is overloaded. You can use the **ha sync rdo session disable** command to disable the automatic synchronization function of HA sessions based on device loads. This ensures device stability.

To manually synchronize HA sessions after the automatic synchronization function of HA sessions is disabled, select **System** > **HA**. On the **HA** page, click **HA Synchronize Session**.

HA Primary/Secondary Switchover

To manually performs primary/secondary switchover, select **System** > **HA**. On the **HA** page, click **HA Master Switch Over**.

Viewing the HA Status of the Device

In the HA environment, you can view the HA status of current device at the **Device Name** in the upper right corner of the main page of system.

- M: **M** state that represents the current device is the master.
- B: **B** state that represents the current device is the backup.

Chapter 16 System Management

The device's maintenance and management include:

System Information

Users can view the general information of the system in the System Information page, including Serial Number, Hostname, Platform, System Time, System Uptime, HA State, Firmware, Boot File, Signature Database and so on.

Viewing System Information

To view system information, select **System** > **System and Signature Database**.

System Information	
Serial Number	Show the serial number of device.
Hostname	Show the name of device.
Platform	Show the platform model of device.
System Time	Show the system date and time of device.
System Uptime	Show the system uptime of device.
HA State	Show the HA status of device. • Standalone: Non-HA mode that represents HA is disabled. • Init: Initial state. • Hello: Negotiation state that represents the device is consulting the relationship between the master and backup. • Master: Master state that represents the current device is the master. • Backup: Backup state that represents the current device

System Information	
	is the backup. • Failed: Fault state that represents the device has failed. • Disabled: Disabled state which represents the interface is disabled. Only Peer Active-Active mode has this state.
Firmware	Show the current firmware version of the device.
Boot File	Show the version name of the current device boot file and the time when the file was compiled.
API	Get RESTful API User Guide.
Signature DB Information	
Check Immediately	Click the **Check Immediately** to update and display the latest version number of the signature library. Note: The signature database license should been activated and the system already has a signature library version.
Application Identification Signature	Show the current version of the application signature database and the date of the last update.
URL Category Signature	Show the current version of the URL signature database and the date of the last update.
IP Reputation Database	Show the current version of the perimeter traffic filtering signature database and the date of the last update.
Anti-Virus Signature	Show the current version of the antivirus signature database and the date of the last update.

System Information	
IPS Signature	Show the current version of the IPS signature database and the date of the last update.
Botnet Prevention Signature	Show the current version of the Botnet Prevention signature database and the date of the last update.
Sandbox Whitelist DB	Show the current version of the Sandbox Whitelist DB and the date of the last update.
ISP Information Database	Show the current version, release date, and latest version of the ISP information database.

Notes: Except ISP Information Database, the signature is all license controlled, so you need to make sure that your system has installed that license. Refer to "License" on Page 1879.

Device Management

Introduces how to configure the Administrator, Trust Host, MGT Interface, System Time, NTP Key and system options.

Administrators

Device administrators of different roles have different privileges. The system supports pre-defined administrator roles and customized administrator roles. By default, the system supports the following administrators, which cannot be deleted or edited:

- **admin**: Permission for reading, executing and writing. This role has the authority over all features. You can view the current or historical configuration information.
- **admin-read-only**: Permission for reading and executing. You can view the current or historical configuration information.
- **operator**: Permission for reading, executing and writing. You have the authority over all features except modify the Administrator's configuration, view the current or historical configuration information , but no permission to check the log information.
- **auditor**: You can only operate on the log information, including view, export and clear.

The following table shows the permissions to different types of administrators.

Operation	Administratior	Administratior (read-only)	Auditor	Operator
Configure (including saving configuration)	√	χ	χ	√
Configure administrator	√	χ	χ	χ

Operation	Administratior	Administratior (read-only)	Auditor	Operator
Restore factory default	√	χ	χ	χ
Delete con-figuration file	√	χ	χ	√
Roll back con-figuration	√	χ	χ	√
Reboot	√	χ	χ	χ
View configuration information	√	√	χ	√
View log inform-ation	√	√	√	χ
Modify current admin password	√	√	χ	√
ping/traceroute	√	√	χ	√

Notes:

- The device ships with a default administrator named hillstone. You can modify the setting of hillstone.
- Other administrator roles (except default administrator) cannot configure the admin settings, except modifying its own password.
- The system auditor can manage one or more logs, but only the system admin-istrator can manage the log types.

VSYS Administrator

Administrators in different VSYSs are independent from each other. Administrators in the root VSYS are known as root administrators and administrators in the non-root VSYS are known as non-root administrators. The system supports four types of administrator, including Administrators, Administrator(read-only), Operator, and Auditor.

When creating VSYS administrators, you must follow the rules listed below:

- Backslash (\) cannot be used in administrator names.
- The non-root administrators are created by root administrators or root operators after logging into the non-root VSYS.
- After logging into the root VSYS, the root administrators can switch to the non-root VSYS and configure it.
- Non-root administrators can enter the corresponding non-root VSYS after a successful login, but the non-root administrators cannot switch to the root VSYS.
- Each administrator name should be unique in the VSYS it belongs to, while administrator names can be the same in different VSYSs. In such a case, when logging in, you must specify the VSYS the administrator belongs to in form of vsys_name\admin_name. If no VSYS is specified, you will enter the root VSYS.

The following table shows the permissions to different types of VSYS administrators.

Operation	Root VSYS Admin-istratior	Root VSYS Admin-istratior (read-only)	Root VSY-S Aud-itor	Root VSY-S Oper-ator	Non-root VSYS Admin-istratior	Non-root VSYS Admin-istratior (read-only)	Non-root VSYS Oper-ator	No-n-root VSY-S Aud-itor
Configure (including saving con-fig-uration)	√	χ	χ	√	√	χ	√	χ
Configure admin-istrator	√	χ	χ	χ	√	χ	χ	χ
Restore factory default	√	χ	χ	χ	χ	χ	χ	χ
Delete con-figuration file	√	χ	χ	√	√	χ	√	χ
Roll back con-figuration	√	χ	χ	√	√	χ	√	χ

Operation	Root VSYS Administratior	Root VSYS Administratior (read-only)	Root VSYS Auditor	Root VSYS Operator	Non-root VSYS Administratior	Non-root VSYS Administratior (read-only)	Non-root VSYS Operator	Non-root VSYS Auditor
Reboot	√	χ	χ	χ	χ	χ	χ	χ
View configuration information	√	√	χ	√	View information in current VSYS	View information in current VSYS	View information in current VSYS	χ
View log information	√	√	√	χ	√	√	χ	√
Modify current admin password	√	√	√	√	√	√	√	√
ping/traceroute	√	√	χ	√	χ	χ	χ	χ

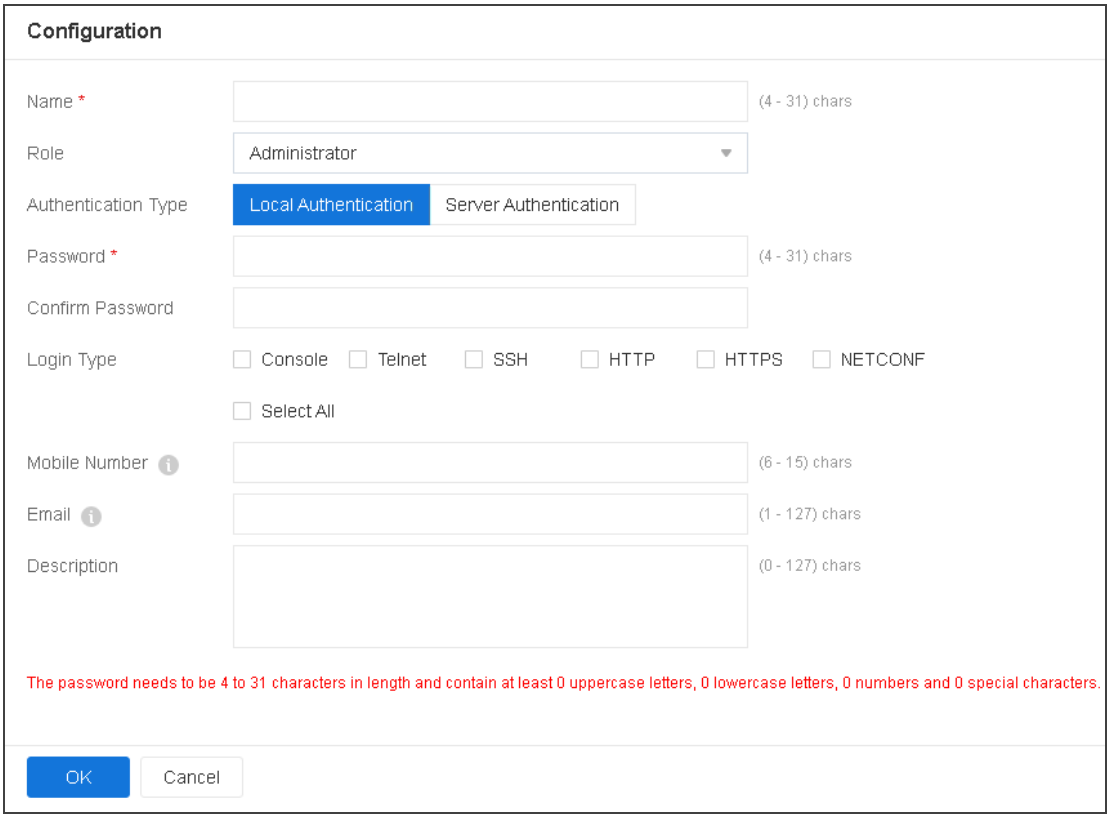
Creating an Administrator Account

To create an administrator account, take the following steps:

1. Select **System** > **Device Management** > **Administrators**.

2. Click **New**.

3. In the **Configuration** dialog box, configure the following.



Configure the following options.

Option	Description
Name	Type a name for the system administrator account.
Role	From the **Role** drop-down list, select a role for the administrator account. Different roles have different privileges. • Administrator: Permission for reading, executing and writing. This role has the authority

Option	Description
	over all features. • Operator: This role has the authority over all features except modifying the Administrator's configurations, and has no permission to check the log information • Auditor: You can only operate on the log information, including the view, export and clear. • Administrator-read-only: Permission for reading and executing. You can view the current or historical configuration information.
Authentication Type	Select the authentication type, including: • Local Authentication: When an administrator accesses StoneOS, the administrator is authenticated based on the administrator information (including the account and password) configured in StoneOS. • Server Authentication: When an administrator accesses StoneOS, the administrator is authenticated based on the administrator information (including the account and password) configured on the authentication server.

Option	Description
Authentication Server	If **Authentication Type** is set to **Server Authentication**, you need to select an authentication server from the drop-down list or click ⊕ to create an authentication server. For details, see AAA Server. The following servers are supported: • Radius Server • Active Directory Server • LDAP Server • TACACS+ Server
Retry Local	After this function is enabled, local password verification will be performed if the server is unreachable. If the server returns the notification of the password error to StoneOS, this function is invalid. By default, the function is disabled.
Password	Type a login password for the admin into the **Password** box. The password should meet the requirements of Password Strategy.
Confirm Password	Re-type the password into the **Confirm Password** box.
Login Type	Select the access method(s) for the admin, including Console, Telnet, SSH, HTTP, HTTPS, and NETCONF. If you need all access methods, select **Select All**.

Option	Description
Mobile Number	Enter a mobile number. After the SMS authentication is enabled, the administrator who does not configure the mobile number will be unable to log in to the device. For more information, see Security Authentication Management.
Email	Enter an email address. After the Email authentication is enabled, the administrator who does not configure the email address will be unable to log in to the device. For more information, see Security Authentication Management.
Description	Enter descriptions for the administrator account.

4. Click **OK**.

Notes: If you select the **Local Authentication Model** on the **Option** page, you need to configure the administrator and authentication information.

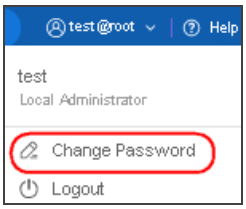
Changing the Password for Admin Users

Device administrators can change the password of other admin users (including other administrators, operators and auditors) by editing the users. To change the password of other admin users, take the following steps:

1. Select **System** > **Device Management** > **Administrators**.
2. Select the admin users from the user list, click **Edit** and change the password in the Configuration page.

Admin users can change their own password by clicking the user name in the top-right corner. To change the password, , take the following steps:

1. Click the user icon or user name in the top-right corner, and select **Change Password** from the drop-down list.



2. In the Password Configuration page, enter the old password and the new one. The new password should be set in accordance with the password policy.

> **Notes:** If the old password is entered incorrectly three times in one minute, the user will be locked for two minutes during which the user cannot change the passwords.

3. Click **OK**.

Configuring Login Options for the Default Administrator

System has a default administrator "hillstone" and a default password "hillstone". However, there is a risk that the default username and password may be cracked. To avoid that risk, when you

logs in with the default username and password for the first time, the system will prompt to change the default password. Then, you can log in again with the new password.

Notes: In the HA Active-Passive (A/P) mode, the backup device does not support this function, and you can log in with the default username and password.

Enabling Telnet/HTTP Login Type for the Default Administrator

Admin users can access the device via Console, Telnet, SSH, HTTP or HTTPS. By default, The Telnet and HTTP login types for the default administrator "hillstone" are disabled. To enable the Telnet or HTTP login type for the default administrator, take the following steps:

1. Select **System** > **Device Management** > **Administrators**.
2. Select "hillstone" from the user list, and click **Edit** to open the Configuration page.
3. Select **Telnet** or **HTTP** .
4. Click **OK**.

Notes: When the "Telnet" or "HTTP" login type is enabled, the system will prompt the protocols are not secure.

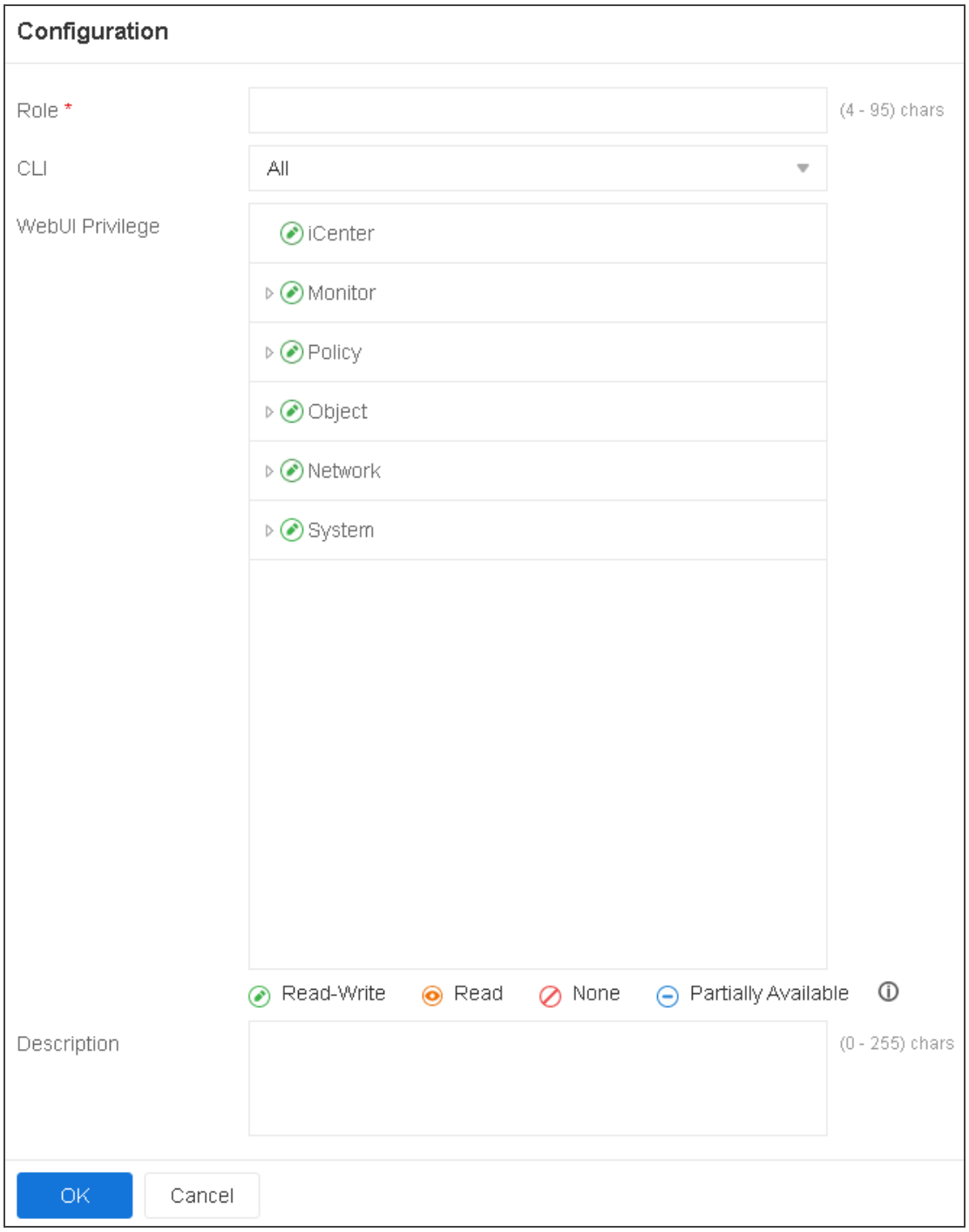
Admin Roles

Device administrators of different roles have different privileges. The system supports pre-defined administrator roles and customized administrator roles. The pre-defined administrator role cannot be deleted or edited. You can customize administrator roles according to your requirements:

To create a new administrator role, take the following steps:

1. Select **System > Device Management > Admin Roles**.

2. Click **New**.



3. In the Configuration dialog box, configure the following:

Option	Description
Role	Enter the role name.
CLI	Specify the administrator role's privileges of CLI.
WebUI Privilege	Click module name to set the administrator role's privilege. represents the administrator role does not have privilege of the specified module, and cannot read and edit the configurations of the specified module. represents the administrator role has the read privilege of the specified module, and cannot edit the configurations. represents the administrator role can read and edit the configurations of the specified module.
Description	Specify the description for this administrator role.

4. Click **OK** to save the settings.

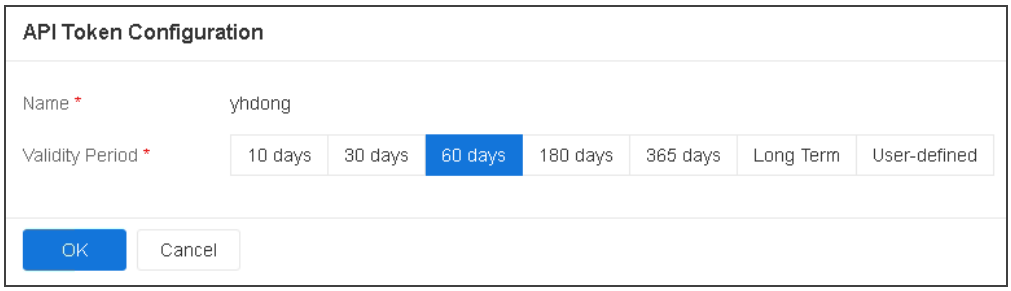
API Token

After you enable the SMS or Email authentication, the administrator can only use the API token authentication when logging in to the device by using RESTful API. You can create an API token for a specified administrator and update, renew, clear, enable, and disable the API token.

Creating an API Token

To create an API token, take the following steps:

1. Select **System** > **Device Management** > **API Token**.
2. Select the administrator that you want to manage and click **Create**.



3. On the API Token Configuration page, configure the following options:

Option	Description
Name	Displays the name of the administrator that wants to create an API token.
Validity Period	Specifies the validity period of the API token. Valid values: 10 days, 30 days, 60 days, 180 days, 365 days, Long Term, and User-defined. Default value: 60 days.
Custom Validity Period	If the Validity Period parameter is set to User-defined, you need to configure this parameter. Valid values: 0 to 365 days.

4. Click **OK**. The newly created API token will be displayed in the API token list and will be enabled by default.

In the API token list, you can also perform the following operations after selecting an API token:

- Click **Update** to update the API token and its validity period. A new API token will be generated after the update.
- Click **Renew** to renew the API token in the enabled or expired state. The value of the API token does not change after the renewal. For example, if the validity period of the

administrator "test" is 10 days, the current date November 17, 2022, and the expiration date November 25, 2022, the expiration date will be renewed to November 27, 2022 after the renewal.

- Click **Clear** to delete an API token. If you delete an administrator, the system automatically deletes its API token.
- Click **Enable** to enable an API token. The validity period of the API token will be recalculated. For example, if the original validity period is 30 days, the validity period will become 30 days again after you enable this API token.
- Click **Disable** to disable an API token.
- Click  in the **Operation** column to copy the API token, which can be used for RESTful API login.

Trusted Host

The device only allows the trusted host to manage the system to enhance the security. Administrator can specify an IP range, MAC address or MAC range, and the hosts in the specified range are the trusted hosts. Only trusted hosts could access the management interface to manage the device.

Notes:

- If system cannot be managed remotely, check the trusted host configurations.
- System allows users to configure 128 trusted hosts at most.

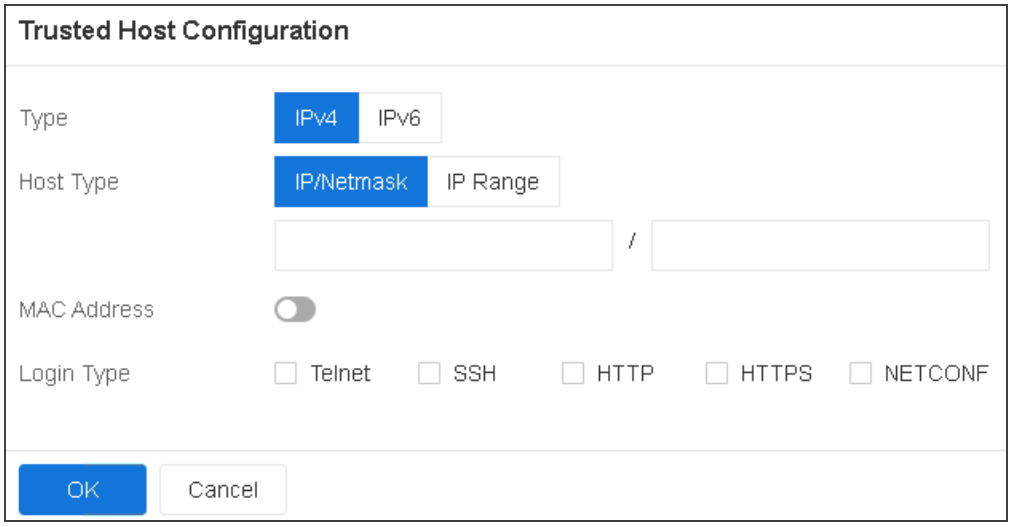
Creating a Trusted Host

To create a trust host, take the following steps:

1. Select **System** > **Device Management** > **Trusted Host**.

2. Click **New**.

3. In the Trusted Host Configuration dialog box, configure these values.



Configure the following options.

Option	Description
When the system is IPv4 version, configure the following options:	
Match Address Type	Select the address type to match the trusted host. • When "IPv4" is selected, you need to specify the IP range, and only the hosts in the IP range can be the trust hosts; • When "IPv4&MAC" is selected, you need to specify the IP range or MAC address/range, and only

Option	Description
	the hosts in the specified IP range and MAC range can be the trusted hosts.
IP Type	Specify the IP range of the trusted hosts: • IP/Netmask: Type the IP address and netmask of the trusted hosts. • IP Range: Type the start IP and end IP of the trusted hosts.
MAC Type	Specifies the MAC address or MAC range of the trusted hosts: • MAC Address: Type the MAC address of the trusted hosts. • MAC Range: Type the start MAC address and end MAC address of the trusted hosts.
Login Type	Select the access methods for the trusted host, including "Telnet", "SSH", "HTTP", "HTTPS", and "NETCONF".
When the system is IPv6 version, configure the following options:	
Type	Select the address type to match the trusted host: "IPv4" or "IPv6".

Option	Description

Host Type	Configure the IPv6 trusted host or the IPv4 trusted host.
	• If the user chooses "IPv4" type, specify the IP address or the IP range of the IPv4 trusted host:
	  • IP/Netmask: Type the IP address and netmask of the trusted hosts.
	  • IP Range: Type the start IP and end IP of the trusted hosts.
	• If the user chooses "IPv6" type, specify the IPv6 address or the IPv6 range of the IPv6 trusted host:
	  • IPv6/Prefix: Type the IPv6 address and prefix of the trusted hosts.
	  • IPv6 Range: Type the start IPv6 address and end IPv6 address of the trusted hosts.

Login Type	Select the access methods for the trust

Option	Description
	host, including "Telnet", "SSH", "HTTP", "HTTPS" and "NETCONF".

4. Click **OK**.

Management Interface

The device supports the following access methods: Console, Telnet, SSH and WebUI. You can configure the timeout value, port number, PKI trust domain of HTTPS,and PKI trust domain of certificate authentication. When accessing the device through Telnet, SSH, HTTP or HTTPS, if login fails three times in one minute, the IP address that attempts the login will be blocked for 2 minutes during which the IP address cannot connect to the device.

To configure the access methods:

1. Select **System** > **Device Management** > **Management Interface**.
2. In the Management Interface tab, configure these values.

Configure the following options.

Option	Description
Console	Configure the Console access method parameters. • Timeout: Type the Console timeout value into the **Timeout** box. The value range is 0 to 60. The default value is 10. The value of 0 indicates never timeout. If there is no activity until the timeout, system will drop the console connection.
Telnet	Configure the Telnet access method parameters. • Timeout: Specifies the Telnet timeout value. The

Option	Description
	value range is 1 to 60. The default value is 10. • Port: Specifies the Telnet port number. The value range is 1 to 65535. The default value is 23.
SSH	Configure the SSH access method parameters. • Timeout: Specifies the SSH timeout value. The value range is 1 to 60. The default value is 10. • Port: Specifies the SSH port number. The value range is 1 to 65535. The default value is 22.
Web	Configure the WebUI access method parameters. • Multiple Login with Same Account: Select the check box and users are allowed to log in to devices with the same account simultaneously. By default, the function is disabled. In the default situation, when a same account is used to log in again, the previous login account will be kicked out. • Timeout: Specifies the WebUI timeout value. The value range is 1 to 1440. The default value is 10. • HTTP Port: Specifies the HTTP port number. The value range is 1 to 65535. The default value is 80. • HTTPS Port: Specifies the HTTPS port number. The value range is 1 to 65535. The default value is 443.

Option	Description
	• HTTPS Guomi Algorithm: With this checkbox selected, GM HTTPS is enabled. In this case, the system communicates with the client (GM browser) based on the GM TLS/SSL protocol. In the SSL authentication process, two certificates are used, including the signature certificate and the encryption certificate. • HTTPS Trust Domain: Select the configured PKI trust domain from the dropdown list. When users access the device via HTTPS, in the SSL authentication process, the HTTPS server uses the certificate stored in the specified PKI trust domain. When users access the device via GM HTTPS, in the GMSSL authentication process, the HTTPS server uses the certificate stored in the specified PKI trust domain as the signature certificate. By default, the system uses the below default PKI trust domain: trust_domain_default. • HTTPS Encryption Trust Domain: Select the configured PKI trust domain from the dropdown list. GM HTTPS applies two certificates. Therefore, when GM HTTPS is enabled, you should specify the PKI trust domain of the encryption certificate. In the GMSSL authentication process, the HTTPS

Option	Description
	server uses the certificate stored in the specified PKI trust domain as the encryption certificate. By default, the system uses the below default PKI trust domain: trust_domain_default. • Certificate Authentication: With this checkbox selected, The system enables the certificate authentication of the client. The certificate includes the digital certificate of users and secondary CA certificate signed by the root CA.Certificate authentication is one of two-factor authentication. The two-factor authentication does not only need the user's name and password authentication, but also needs other authentication methods, like a certificate or fingerprint. • Certificate Trust Domain: After enabling the certificate authentication and logging into the device over HTTPS, the system verifies the validity of the CA signature of the certificate in the client by using the CA root certificate stored in this PKI trust domain. Make sure that root CA certificate is imported into it. • CN Check： After the CN Check function is enabled, the system checks the CN field of the client certificate when the user logs into the device.

Option	Description
	Only when the CN field of the client certificate matches the username can the user successfully log into the device.

3. Click **OK**.

Notes: When changing HTTP port, HTTPS port or HTTPS Trust Domain, the web server will restart. You may need to log in again if you are using the Web interface.

System Time

You can configure the current system time manually, or synchronize the system time with the NTP server time via NTP protocol.

Configuring the System Time Manually

To configure the system time manually, take the following steps:

1. Select **System** > **Device Management** > **System Time**.

2. Under System Time Configuration in the System Time tab, configure the following.

Option	Description
Sync with Local PC	Specifies the method of synchronize with local PC. You can select **Sync Time** or **Sync Zone&Time**. • Sync Time: Synchronize the system time with local PC. • Sync Zone&Time: Synchronize the system zone&-

Option	Description
	time with local PC.
Specified the system time.	Configure parameter of system time. • Time Zone: Select the time zone from the drop-down list. • Date: Specifies the date. • Time: Specifies the time.

3. Click **OK**.

Configuring NTP

The system time may affect the establishment time of VPN tunnel and the schedule, so the accuracy of the system time is very important. To ensure the system is able to maintain an accurate time, the device allows you to synchronize the system time with a NTP server on the network via NTP protocol.

To configure NTP:

1. Select **System** > **Device Management** > **System Time**.

2. Under NTP Configuration in the System Time tab, configure the following.

Option	Description
Enable	Select the **Enable** check box to enable the NTP function. By default, the NTP function is disabled.
Authentication	Select the **Authentication** check box to enable the NTP Authentication function.
Server	Specifies the NTP server that device need to syn-

Option	Description
	chronize with. You can specify at most 3 servers. • IP: Type IP address of the server . • Key: Select a key from the **Key** drop-down list. If you enable the NTP Authentication function, you must specify a key. • Virtual Router: Select the Virtual Router of interface for NTP communication from the drop-down list. • Source interface: Select an interface for sending and receiving NTP packets. • Specify as a preferred server: Click **Specify as a preferred server** to set the server as the first preferred server. The system will synchronizate with the first preferred server.
Sync Interval	Type the interval value. The device will synchronize the system time with the NTP server at the interval you specified to ensure the system time is accurate.
Time Offset	Type the time value. If the time difference between the system time and the NTP server's time is within the max adjustment value you specified, the synchronization will succeed, otherwise it will fail.

3. Click **OK**.

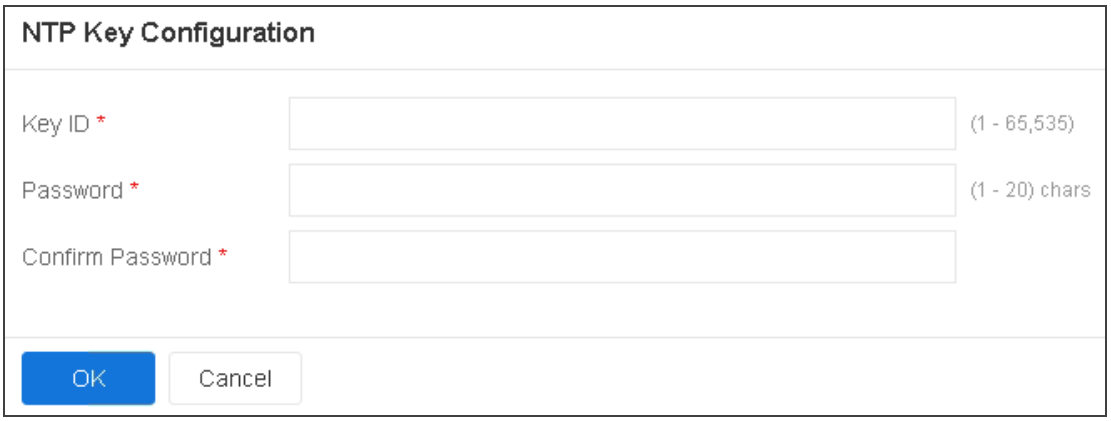
NTP Key

After enabling NTP Authentication function, you need to configure MD5 key ID and keys. The device will only synchronize with the authorized servers.

Creating a NTP Key

To create an NTP key:

1. Select **System** > **Device Management** > **NTP Key**.
2. Click **NEW**.
3. In the NTP Key Configuration dialog box, configure these values.



Configure the following options.

Option	Description
Key ID	Type the ID number into the Key ID box. The value range is 1 to 65535.
Password	Type a MD5 key into the **Password** box. The value range is 1 to 31.
Confirm Password	Re-type the same MD5 key you have entered into the **Confirm** box.

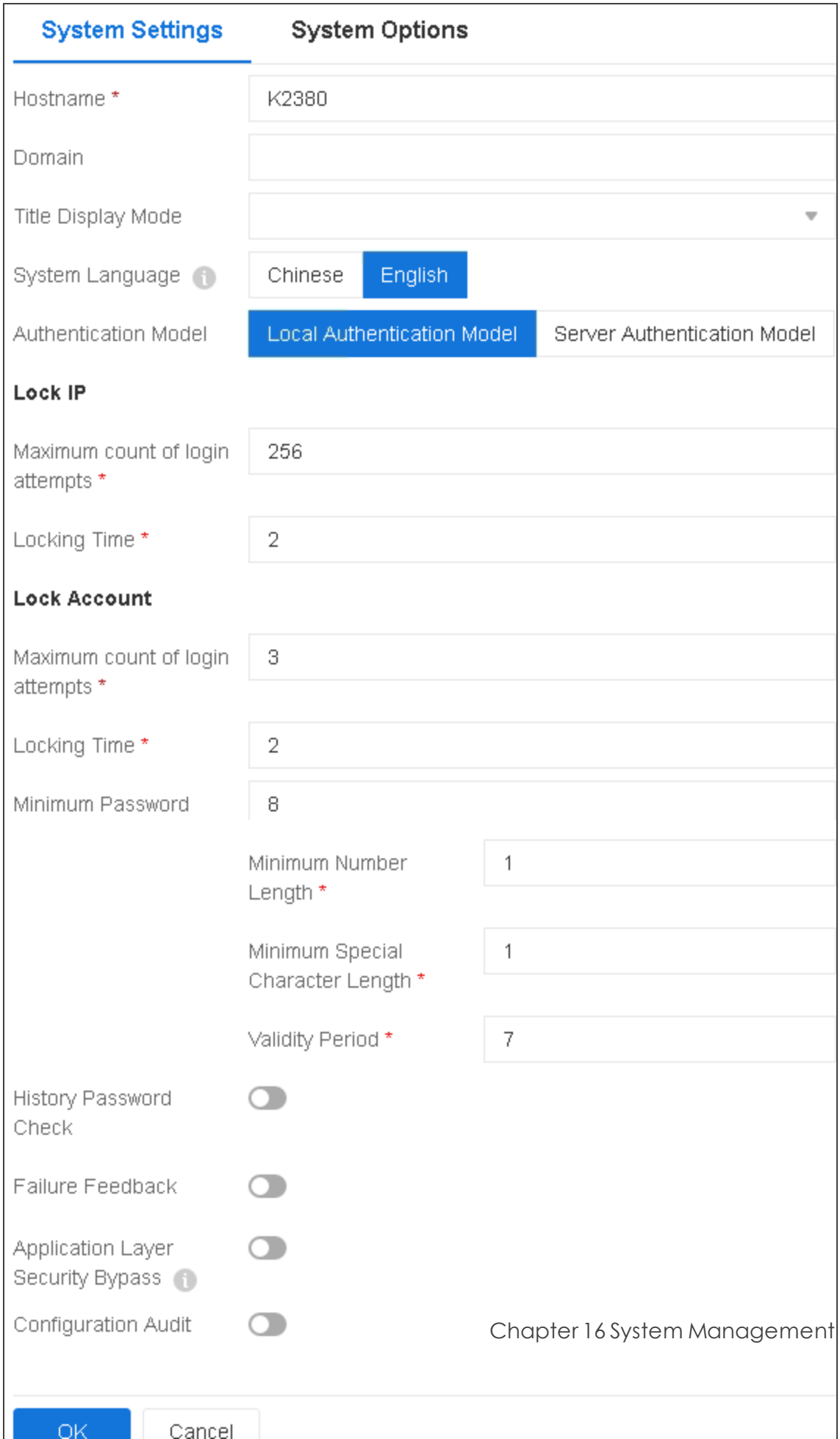
4. Click **OK**.

Option

Specifies system options, including system language, administrator authentication server, host name, password strategy, reboot and exporting the system debugging information.

To change system option, take the following steps:

1. Select **System** > **Device Management** > **Option**.
2. Select **System Setting** .Configure the following.


System Settings
System Options
Hostname *
K2380
Domain
Title Display Mode
System Language
Chinese
English
Authentication Model
Local Authentication Model
Server Authentication Model
Lock IP
Maximum count of login attempts *
256
Locking Time *
2
Lock Account
Maximum count of login attempts *
3
Locking Time *
2
Minimum Password
8
Minimum Number Length *
1
Minimum Special Character Length *
1
Validity Period *
7
History Password Check
Failure Feedback
Application Layer Security Bypass
Configuration Audit
OK
Cancel

Option	Description
Hostname	Type a host name you want to change into the **Hostname** box.
Domain	Type a domain name you want to specify into the **Domain** box.
Title Display Mode	Configure the browser tab title at WebUI login. You can configure the host name, platform and management address as the tab title. Multiple items can be selected. The sequence of these items displayed in the actual tab title is consistent with the selection sequence. The default title is "Hillstone Networks".
System Language	You can select **Chinese** or **English** according to your own requirements.
Authentication Model	Select the authentication model, including: • Local Authentication Model: After **Local Authentication Model** is configured, you need to configure administrator and authentication information. • Server Authentication Model: After **Server Authentication Model** is configured, you need to configure administrator and authentication information.
Authentication Server	If **Authentication Model** is set to **Server Authentication Model**, you need to select an authentication

Option	Description
	server from the drop-down list or click  to create an authentication server. For details, see AAA Server. The following servers are supported: • Radius Server • TACACS+ Server
Local Password Retry	After this function is enabled, local password verification will be performed if the server returns the notification of the password error to StoneOS. If the server is unreachable, the StoneOS system will enable the **Local Password Retry** by default. By default, the function is enabled.
Minimum Password Length	Specifies the minimum length of password. The value range is 4 to 16 characters. The default value is 4.
Password Complexity	**None** means no restriction on the selection of password characters. You can select **Password Complexity Settings** to enable password complexity checking and configure password complexity. • Minimum Capital letters length: The default value is 2 and the range is 0 to 16. • Minimum Lowercase Letter Length: The default value is 2 and the range is 0 to 16. • Minimum Number Length: The default value is 2 and the range is 0 to 16.

Option	Description
	• Minimum Special Character Length: The default value is 2 and the range is 0 to 16. • Validity Period: The unit is day.The range is 0 to 365.The default value is 0, which indicates that there is no restriction on validity period of the password.
History Password Check	The system supports the History Password Check function to ensure the security of passwords. With this function enabled, when you change your password, the system verifies that whether the new password is the same as the historical password. If your new password is the same as the historical password, the prompt "The new password cannot be the same as the old one" appears, reminding you of re-entering another new password. Click the enable button to enable History Password Check function and specify the number of historical passwords to be verified. The value rage is from 3 to 8. The default value is 5, indicating that the new password cannot be the same as the last five historical passwords.

3. Click **OK**.

Rebooting the System

Some operations like license installation or image upgrading will require the system to reboot before it can take effect.

To reboot a system, take the following steps:

1. Go to **System > Device Management > Option** .
2. Click **Reboot**, and select **Yes** in the prompt.
3. The system will reboot. You need to wait a while before it can start again.

System Debug

System debug is supported for you to check and analyze the problems.

Failure Feedback

To enable the failure feedback function, take the following steps:

1. Select **System > Device Management> Option**.
2. In the System Tools dialog box, select the **Enable** check box for Failure feedback, and then system will automatically send the technical support file to the manufacturer.

System Debug Information

System debugging helps you to diagnose and identify system errors by the exported file.

To export the system debugging information, take the following steps:

1. Select **System > Device Management> Option**.
2. Click **Export**, system will pack the file in /etc/local/core and prompt to save tech-support file. After selecting the saved location and click **OK**, you can export the file successfully.

Application Layer Security Bypass

System supports to bypass the application layer functions, including Intrusion Prevention System, Anti Virus, and other application layer security protection function.

To enable application layer security bypass, take the following steps:

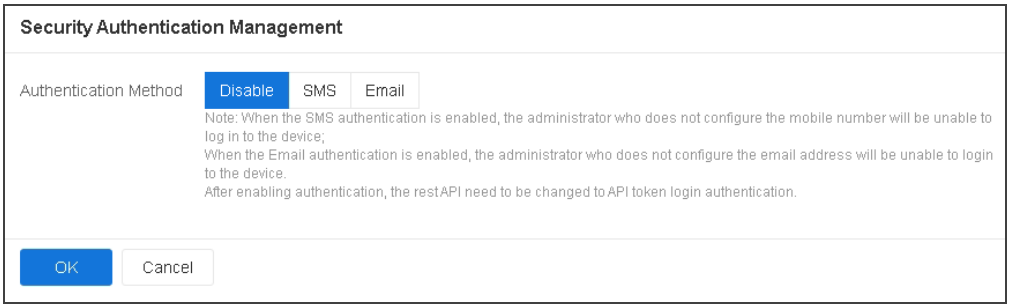
1. Select **System > Device Management> Option**.
2. In the System Setting page, select the **Enable** button for application layer security bypass, and click **OK**.

Security Authentication Management

After you enable Security Authentication Management, SMS or Email two-factor authentication is required for logging in to the device.

To enable Security Authentication Management, take the following steps:

1. Select **System > Device Management > Security Authentication Management**.
2. On the Security Authentication Management page, configure the following options:



Option	Description
Disable	Select **Disable** to disable authentication. By default, this option is selected.
SMS	Select **SMS** to enable the SMS authentication. After the SMS authentication is enabled, the administrator who does not configure the mobile number will be unable to log in to the device.

Option	Description
	• SMS Authentication: Specifies the method of the SMS authentication. Valid values: SMS Modem and SMS Gateway. If you select **SMS Gateway**, select an SMS gateway from the **SMS Gateway** drop-down list. For more information, see "SMS Parameters" on Page 1894. • Verification Code Timeout: Specifies the validity period of SMS verification codes. Valid values: 1 to 30 minutes. Default value: 5 minutes. You cannot log in to the device if you do not enter the verification code within the validity period. • Sender Name: Specifies the sender name, which can be 1 to 64 characters. The name will be displayed in the text message.
Email	Select **Email** to enable the Email authentication. After the Email authentication is enabled, the administrator who does not configure the email address will be unable

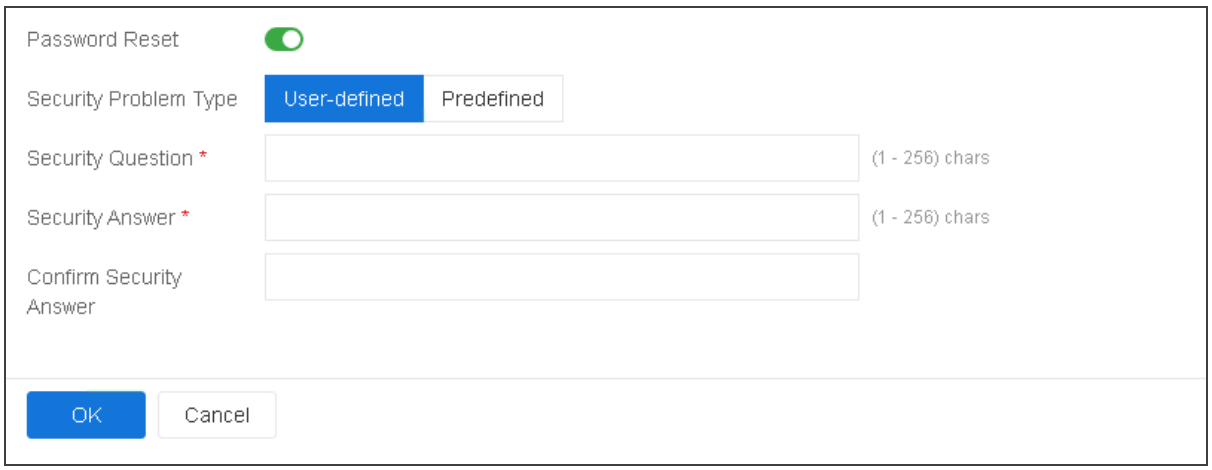
Option	Description
	to log in to the device. • Mail Server: Select a mail server from the drop-down list. For more information, see "Mail Server" on Page 1891. • Verification Code Timeout: Specifies the validity period of email verification codes. Valid values: 1 to 30 minutes. Default value: 5 minutes. You cannot log in to the device if you do not enter the verification code within the validity period. • Sender Name: Specifies the sender name, which can be 1 to 64 characters. The name will be displayed in the email.

3. Click **OK**.

Password Reset Management

The password reset function enables you to change passwords through the security question. You can easily reset the password without knowing the previous password. If this function is configured and enabled, when you enter the wrong username or password for three consecutive times through the console port, the system will prompt you to reset the password by the security question. To configure the password reset function, take the following steps:

1. Select **System** > **Device Management** > **Password Reset Management**.



2. Click the Enable button and configure the following options.

Option	Description
Password Reset	Click the **Enable** button to enable the password reset function.
Security Problem Type	Specify the type of Security Problem as User-defined or Predefined.
Security Question	Configure the security question. If the type of Security Problem is specified as user-defined, enter a user-defined security question in the text box. If the type of Security Problem is specified as predefined, select a predefined security question from the drop-down list. The value range is 1 to 256 characters. The security question can only include letters, numbers, and special characters (excluding "). Chinese characters cannot be included in the security question.
Security Answer	Configure the security answer. The value range is 1 to 256 characters. The security answer can only include letters, numbers, and special characters (excluding "). Chinese characters cannot be included in the security question.

Option	Description
Confirm Security Answer	Enter the security answer again in the text box which must be consistent with the content in the security answer text box.

3. Click **OK**.

Startup Wizard

After logging in to the firewall and changing the password via WebUI, you will be presented with a Startup Wizard. You can follow the steps to complete initial configuration of the firewall, including the host name, system time and license, routing mode deployment, and security policy configuration. You can also skip the Startup Wizard and configure the firewall.

Notes:

Under any of the following conditions, the Startup Wizard will not be prompted when the administrator logs in the WebUI:

- The firewall is deployed in HA mode;
- The login address does not point to the WebUI homepage, such as "http://x.x.x.x/#icenter";
- Logging in to the firewall WebUI on the HSM device;
- Logging in to the firewall WebUI via SSO on the cloud platform.

Skipping the Startup Wizard

To skip the Startup Wizard, take the following steps:

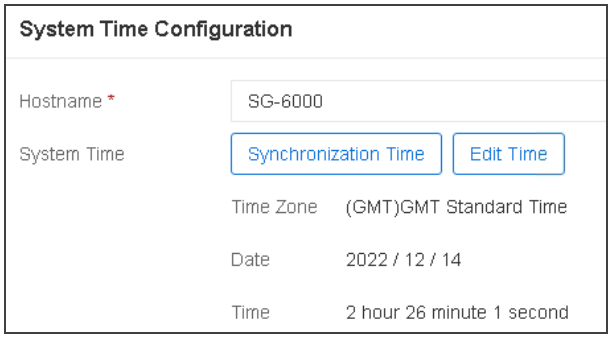
1. On the Startup Wizard welcome page, Click **Skip**.
2. The Skip page will be displayed, asking "Are you sure to skip the startup wizard?". You can select the **Do not display next-time login** check box as required. If this check box is not selected, the Startup Wizard will be displayed at your next login.
3. Click **OK** to close the Startup Wizard.

Starting the Startup Wizard

If the Startup Wizard is skipped, you can restart it again as follows:

1. Select **System** > **Device Management** > **Startup Wizard**.
2. On the Startup Wizard page, configure whether to restore the device to factory defaults as required:
    a. If **Restore to Factory Defaults** is enabled, the system will erase all system configuration after you start the Startup Wizard.
    b. If **Restore to Factory Defaults** is disabled, the security policies created in the Startup Wizard have a higher priority than the policies (if any) previously configured in the Policy module. Other configuration, except policies, will be updated to the one configured in the Startup Wizard. By default, **Restore to Factory Defaults** is disabled.
3. Click **Open** to go to the Startup Wizard.

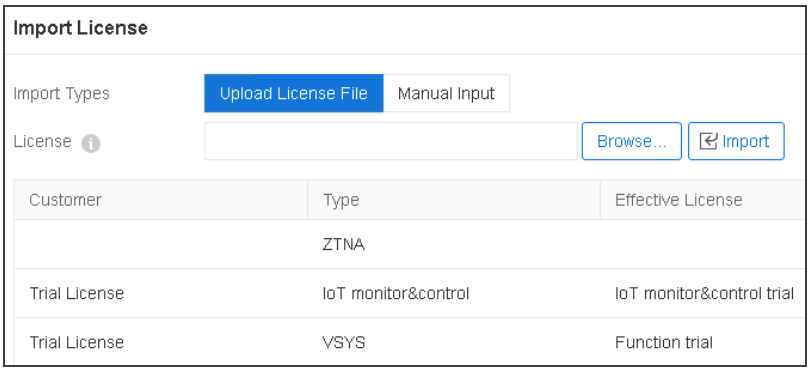
4. Click **Start Wizard** to start the Startup Wizard and enter the **System Time Configuration** page.



Configure the hostname and system time

Option	Description
Hostname	Type the hostname. The value length is from 1 to 63 characters. The default value is SG-6000. Click **Next** to deploy the configuration.
System Time	Set the system time in either of the following ways: • Click **Synchronization Time** and the corresponding panel appears, where you can view your current timezone. Click **OK**. • Click **Edit Time,** and the corresponding panel appears, where you can set the timezone, date and time and then click **OK**.

5. Click **Next** to go to the **Import License** page.



Import the license

Option	Description
Import Types	Specifies the method to import licenses. When licenses are imported, they are listed on the current page. Note that some licenses take effect only after a system restart. Please restart the system when Startup Wizard is fully configured. There are two ways of importing the licenses: • **Upload License File**: Click **Browse**, select the license that needs to be imported and then click **Import**. • **Manual Input**: Type the license content in the **License** text box and then click **Import**.

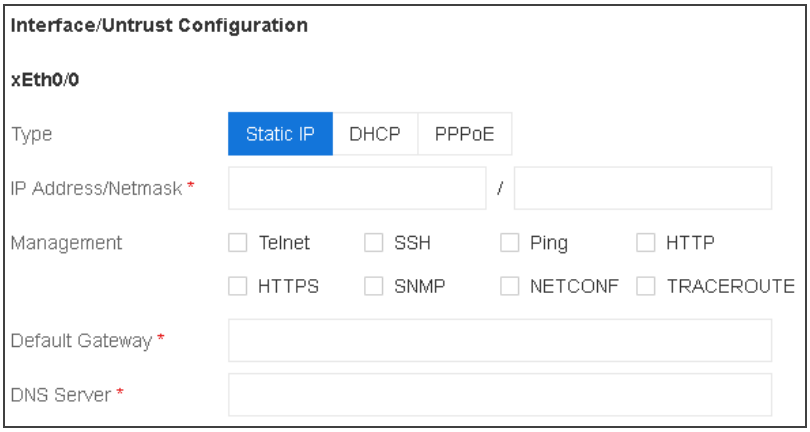
6. Click **Next** to go to the **Network Configuration** page. Network configuration will be deployed when the Startup Wizard is fully configured. In the Network Configuration section, in addition to the configuration that you can manually add in the Startup Wizard, the system automatically configures an SNAT rule that enables the Sticky function, translating

the Intranet IP to the IP address of the Intranet exit IP.

Select the Intranet Interface and the Internet Interface.

Option	Description
Untrust	Select the Internet interface and add it to the untrust zone.
Trust	Select the Intranet interface and add it to the trust zone.

7. Click **Next** and configure the Internet interface.



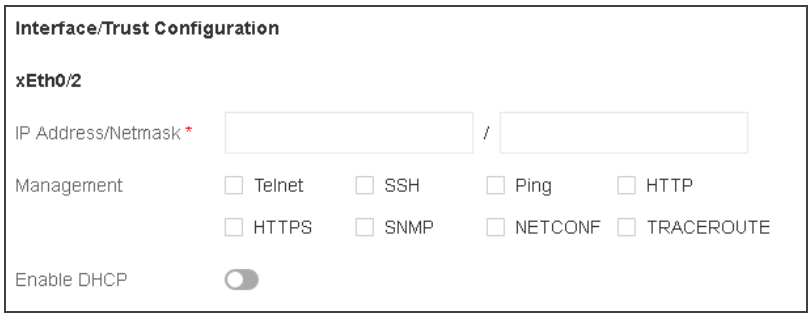
Configure the Internet (untrust) interface

Option	Description
Type	Select the method of obtaining IP addresses for the Internet interface.
Static IP	Specifies the IP address and netmask for the interface when **Static IP** is selected.

Option	Description
DHCP	When DHCP is selected, the interface will automatically obtain IP addresses using DHCP.
PPPoE	When PPPoE is selected, configure the following parameters: • User: Specifies the PPPoE user name. The value length is from 1 to 31 characters. • Password: Specifies the password of the PPPoE user. The value length is from 1 to 31 characters. • Confirm Password: Type the password again. • Idle Interval: Specifies the idle interval. The uint is in minutes. The value range from is 0 to 10,000 minutes. When the idle time of the PPPoE interface reaches the specified value, the system will terminate the connection. By default, the value is 0, meaning the connection will not be terminated by the system. • Reconnect Interval: Specifies the interval after which the system will automatically reconnect after a disconnection The unit is in seconds. The value range is from 1 to 10,000 seconds.
Management	Specifies the interface management method, including Telnet, SSH, Ping, HTTP, HTTPS, SNMP, NETCONF and TRACEROUTE.

Option	Description
Default Gateway	Specifies the default gateway address.
DNS Server	Specifies the DNS server address.

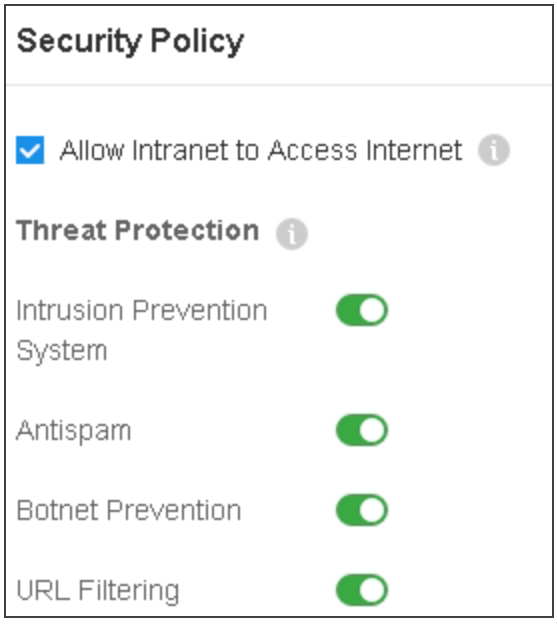
8. Click **Next** to configure the Intranet interface.



Configure the Intranet (trust) interface

Option	Description
IP Address/Netmask	Specifies the IP address and netmask of the interface.
Management	Specifies the interface management method, including Telnet, SSH, Ping, HTTP, HTTPS, SNMP, NETCONF and TRACEROUTE.
Enable DHCP	After DHCP service is enabled, the interface will be configured as a DHCP server.
DHCP lease range	Specifies the address pool range. After the interface is configured as a DHCP server, the system will assign IP addresses from the address pool to the hosts, attempting to connect the interface.

9. Click **Next** to go to the **Security Policy** page. Security policy configuration will be deployed when the Startup Wizard is fully configured.



Configure the security policy

Option	Description
Allow Intranet to Access Internet	Select this check box to configure a security policy from the source zone (trust) to the destination zone (untrust), which will allow Intranet users to access the Internet. If this check box is not selected, the security policy will not be created.
Threat Protection	After **Allow Intranet to Access Internet** is selected, enable threat prevention functions as required. The threat prevention functions take effect only after corresponding licenses are imported. Initially, enabled threat prevention functions apply their default profile. To configure specific profiles, nav-

Option	Description
	igate to related modules after the Startup Wizard is fully configured. Note that some licenses take effect after a system reboot.

10. Click **Next** to go to the **Connecting to Hillstone Cloud Service Platform** page. Select the **Join the User Experience Program** check box to connect the system to the default Hillstone Cloud Platform account. This way, the system obtains broader threat intelligence so as to improve its protection capability.

11. Click **Next** to go to the **Options** page. You can view all configurations configured via the Startup Wizard.

12. Make sure the configurations are correct. Click **OK** to deploy network configuration and security policy configuration.

Configuration File Management

System configuration information is stored in the configuration file, and it is stored and displayed in the format of command line. The information that is used to initialize the Hillstone device in the configuration file is known as the initial configuration information. If the initial configuration information is not found, the Hillstone device will use the default parameters for the initialization. The information being taking effect is known as the current configuration information.

System initial configuration information includes current initial configuration information (used when the system starts) and backup initial configuration information. System records the latest ten saved configuration information, and the most recently saved configuration information for the system will be recorded as the current initial configuration information. The current configuration information is marked as "Startup"; the previous nine configuration information is marked with number from 0 to 8, in the order of save time.

You can not only export or delete the saved configuration files, but also export the current system configurations.

Notes: If you have rolled back to a specified saved initial configuration, the configuration information is marked as "Startup".

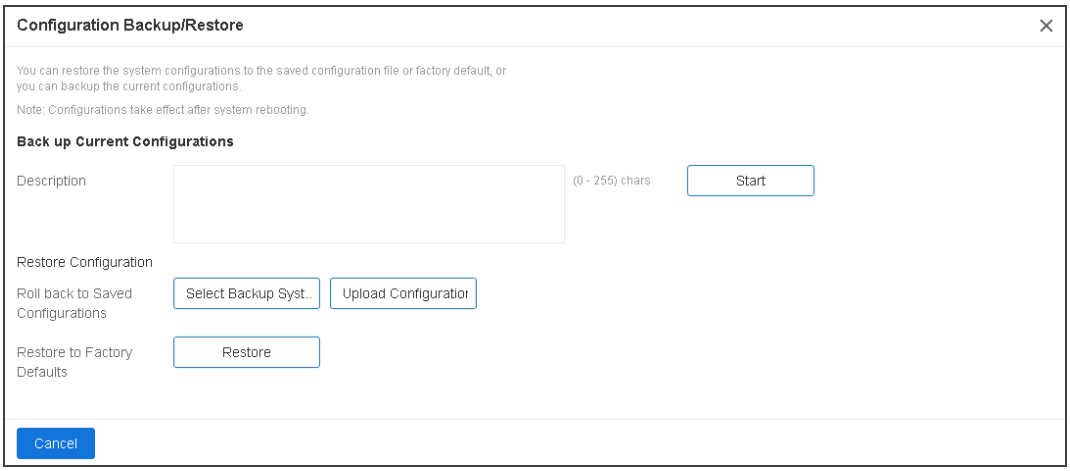
Managing Configuration File

This feature may vary slightly on different platforms. If there is a conflict between this guide and the actual page, the latter shall prevail.

To manage the system configuration files, take the following steps:

1. Select **System** > **Configuration File Management** > **Configuration File List**.
2. In the Configuration File List page, configure the following.
    - Export: Select the configuration file you want to export, and click **Export**. You can export DAT and ZIP files. For the ZIP type, you can set a compression password as required.

- Delete: Select the configuration file you want to delete, and click **Delete**.
- Backup Restore: You can restore the system configurations to the saved configuration file or factory default, or you can backup the current configurations.



Option	Description
Back up Current Configurations	Type descriptions for the configuration file into **Description** box. Click **Start** to backup.
Restore Configuration	Roll back to Saved Configurations: • Select Backup System Configuration File: Click this button, then select Backup Configuration File from the list. Click **OK**. • Upload Configuration File: Click this button. In the Importing Configuration File dialog box, click **Browse** and choose a local configuration file you need in your PC. If you need to make the configuration file take

Option	Description
	effect, select the check box. Click **OK**. You can upload DAT and ZIP files. For the encrypted ZIP file, you need to enter the compression password. Restore to Factory Defaults: • Click **Restore**, in the Restore to Factory Defaults dialog box, click **OK**.

Notes: Device will be restored to factory defaults. Meanwhile, all the system configurations will be cleared, including backup system configuration files.

Viewing the Current Configuration

To view the current configuration file:

1. Select **System** > **Configuration File Management** > **Current Configurations**.
2. Click **Export** to export the current configuration file.

Importing/Exporting the Configuration of All VSYS

You can export the current configuration file of VSYS, and import the saved configuration file of VSYS.

To export the current configuration file of VSYS, take the following steps:

1. Select **System > Configuration File Management > Configuration File List**.
2. Click **Export All Vsys Configuration** to export the current configuration file of VSYS.

To import the saved configuration file of VSYS, take the following steps:

1. Select **System > Configuration File Management > Configuration File List**.
2. Click **Import All Vsys Configuration** .
3. Click **Brown** to select the configuration file needed to be imported. The file type can be GZ and ZIP.
4. After importing the configuration file, you need to reboot to take effect. Select the **Restart now**, make the new configuration take effect checkbox to reboot immediately.
5. Click **OK**.

Warning Page Management

Warning page management includes picture management and page management of user-defined warning pages.

Related links:

- Configuring URL Filtering Objects -Warning Page
- Configuring Content Filtering Objects - Warning Page

Page Management

You can upload the required pictures and reference the picture in the user-defined warning page as needed. In the picture management page, the name , previews and the last modification time of uploaded picture will be displayed in a list.

Uploading the Picture

To upload the picture, take the following steps:

1. Select **System** > **Warning Page Management** > **Picture Management**.
2. Click **New** to open the **Upload Picture Configuration** dialog.

3. Type the name of the user-defined picture into the **Name** box.
4. Click **Upload Picture** and select the local picture file to be uploaded.
5. After uploading, the picture will be previewed in the dialog.
6. Click **OK** to save the configuration.

Notes: Only the following types of pictures can be uploaded: jpeg, jpg, png, gif, jfif; the size of uploaded pictures is limited to 24KB; the system allows up to 32 picture files to be uploaded.

Editing the Picture

To replace and modify the uploaded picture, take the following steps:

1. Select **System** > **Warning Page Management** > **Picture Management**.
2. Select the check box of the picture to be edited in the list and click the **Edit**.
3. In the **Upload Picture Configuration** dialog, click the **Upload Picture** button to upload the picture file.
4. Click **OK** to save the configuration.

Deleting the Picture

To delete the picture, take the following steps:

1. Select **System** > **Warning Page Management** > **Picture Management**.
2. Select the check box of the picture to be deleted in the list and click the **Delete**.
3. In the delete confirmation dialog, click the **Yes** button to complete the deletion.

Notes: Before deleting the picture, please make sure that the picture is not referenced by the user-defined warning page, otherwise it cannot be deleted.

Page Management

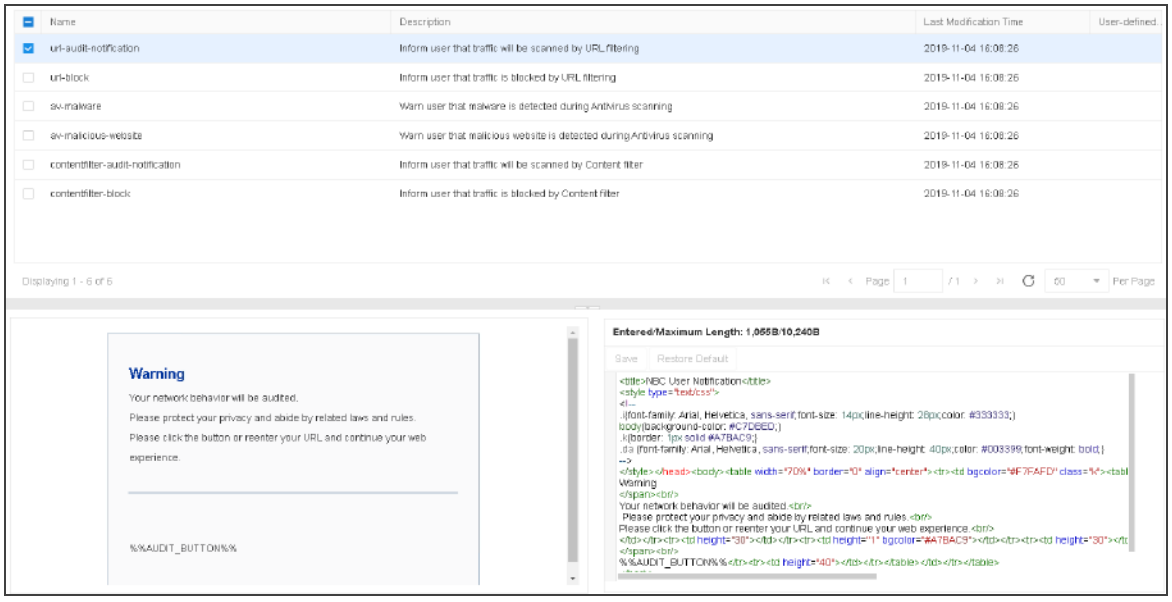
System supports 6 types of user-defined warning pages, and the user-defined warning page already contains the reference string and warning information content displayed by default. You can add

or modify the reference string by using html encoding to customize the warning message text, pictures and other content.

- url-adudit-notification: Inform user that traffic will be scanned by URL filtering.
- url-block: Inform user that traffic is blocked by URL filtering.
- av- malware: Warn user that malware is detected during Antivirus scanning.
- av-malicious-website: Warn user that malicious website is detected during Antivirus scanning.
- ontentfilter-audit-notification: Inform user that traffic will be scanned by Content filter.
- contentfilter-block: Inform user that traffic is blocked by Content filter.

To configure the user-defined warning page, take the following steps:

1. Select **System** > **Warning Page Management** > **Page Management**.

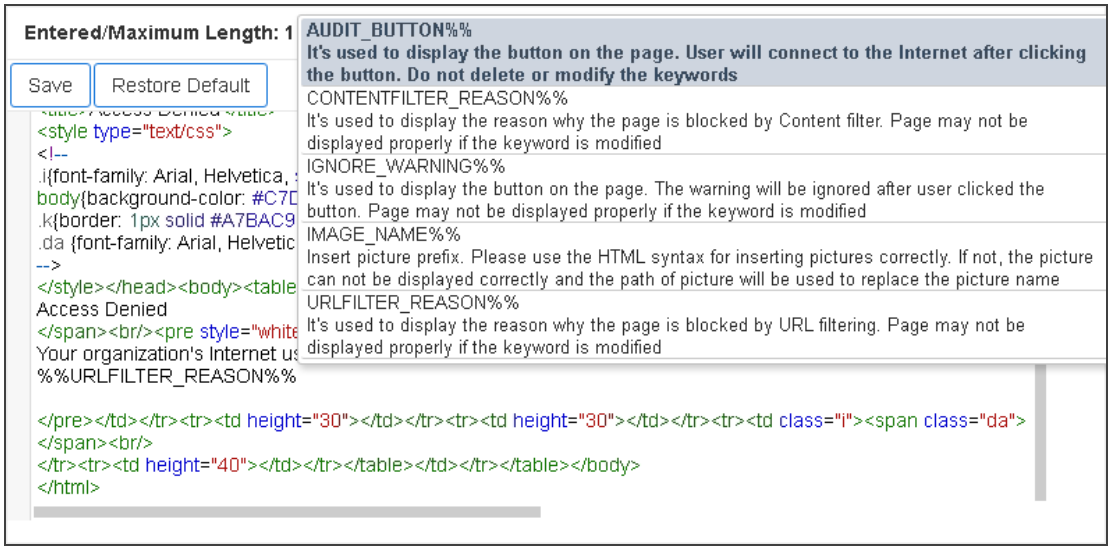


In the Page Management page, view the details of user-defined warning page.

- The list at the top of the page shows the name, description, last modification time and the enable status of 6 types of user-defined warning pages supported by system.

- In the lower left part of the page, a page preview showing the selected user-defined warning page.
- In the lower right part of the page, the default html encoding of the user-defined warning page is displayed, and you can use the html encoding method to customize the page content in this part.

2. In the list above, select the check box of the warning page that needs to be customized.
3. In the html encoding page below, modify the content of the warning message, or enter "%%" to select the reference string to be added and reference the corresponding content or picture.



User-defined warning page can contain the following reference strings.

Reference String	Description
%%AUDIT_BUTTON%%	It's used to display a button on the page. When you click the button, you can connect to the Internet. **Note**: This reference string is required in the

Reference String	Description
	"url-adudit-notification" and "contentfilter-audit-notification" pages. Please do not delete or modify this keyword.
%%IGNORE_ WARNING%%	It is used to display a button on the page. You can click the button to ignore the prompt and continue browsing. **Note**: This reference string is the default reference string displayed on the page. After modification, it may cause ignore prompts and buttons to be displayed normally.
%%IMAGE_NAME%%	Picture prefix, which is used to reference a picture uploaded in Picture Management, and output the picture on the user-defined warning page.
%%URLFILTER_ REASON%%	It's used to display the reason for URL filtering blocking on the "url-block" page. **Note**: This reference string is the default reference string displayed on the page. After modification, the reason may not be displayed normally.
%%VIRUS_NAME%%	It's used to display the virus name on the "av- malware" page. **Note**:This reference string is the default reference string displayed on the page. After

Reference String	Description
	modification, the virus name may not be displayed normally.
%%CONTENTFILTER_REASON%%	It's used to display the reason for content filtering blocking on the "contentfilter-block" page. **Note**:This reference string is the default reference string displayed on the page. After modification, the reason may not be displayed normally.

4. After modifying the html encoding, click **Save** to save the configuration. At the same time, the user-defined warning page will be enabled, and  will be displayed in the "User-defined" column of the upper list.

5. If you need to restore the default content of the cuser-defined warning page, click the **Restore Default**.

Extended Services

System supports to connect to other Hillstone products to provide more services. Currently, the extended services include connecting Hillstone Security Management (HSM) and CloudPano (NFV Management System) . For specific configurations, refer to one of the following topics:

- Connecting to Centralized Management

Connecting to Centralized Management

System supports to connect to other Hillstone products, include connecting to HSM and CloudPano.

Connecting to HSM

Hillstone Security Management (HSM) is a centralized management platform to manage and control multiple Hillstone devices. Using WEB2.0 and RIA (Rich Internet Application) technology, HSM supports visualized interface to centrally manage policies, monitor devices, and generates reports.

Each firewall system has an HSM module inside it. When the firewall is configured with correct HSM parameters, it can connect to HSM and be managed by HSM.

In addition, firewall can also send the following information to HSM:

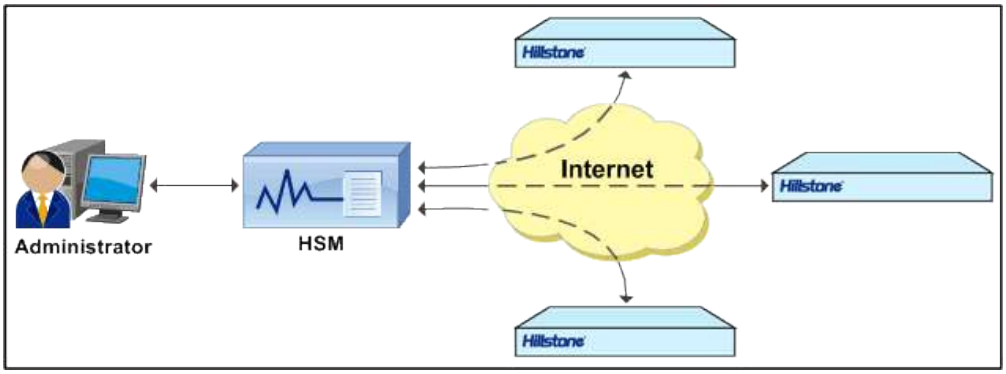
- Interface information, including latency, jitter, packet loss rate, etc.
- Application data information on the interface, including application latency, jitter, upstream and downstream packet loss rate, etc.

Notes: For more information about HSM, please refer to HSM User Guide.

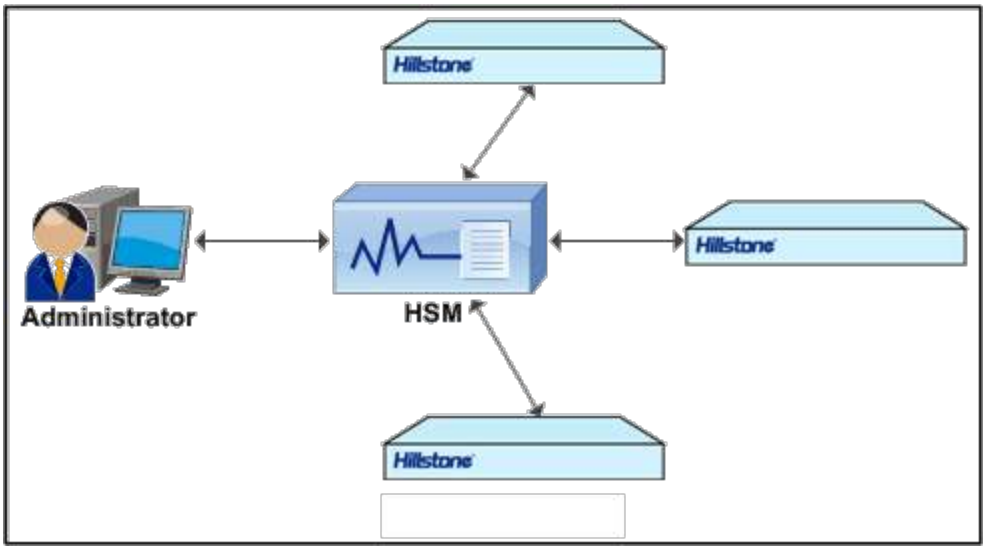
HSM Deployment Scenarios

HSM normally is deployed in one of the two scenarios: installed in public network or in private network:

- Installed in public network: HSM is remotely deployed and connected to managed devices via Internet. When the HSM and managed devices have a accessible route, the HSM can control the devices.



- Installed in private network: In this scenario, HSM and the managed devices are in the same subnet. HSM can manage devices in the private network.



Connecting to CloudPano

CloudPano (NFV Management System) is deployed on the cloud platform as a cloud host. It provides an integrated service among firewall, cloud platform and SDN. It can also manage the life-cycle of VNF and check whether configurations of VNF are consistent with that on the cloud platform.

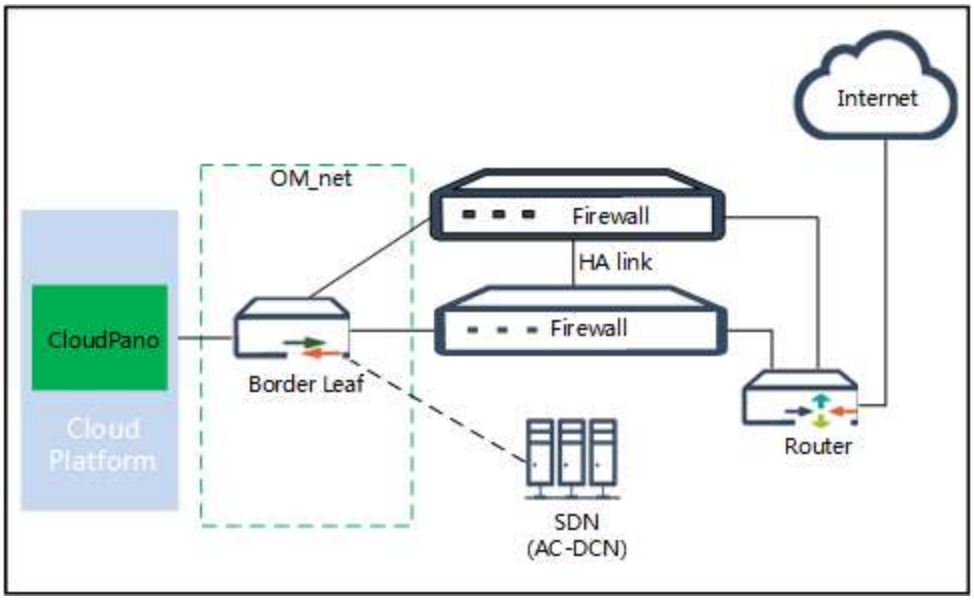
After the server IP/domain name and port of the CloudPano are correctly configured on the device, the device can be connected to the CloudPano, and the CloudPano can manage and control the device. If the connection is disconnected for a period of time, all configurations cannot be delivered.

Notes: All platforms support the registration of the CloudPano, but the CloudPano can manage only certain types of devices. If the CloudPano does not support management, the configuration may not be delivered properly. For details about the devices that can be managed by the CloudPano, see the *CloudPano WebUI User Guide*.

CloudPano Deployment Scenarios

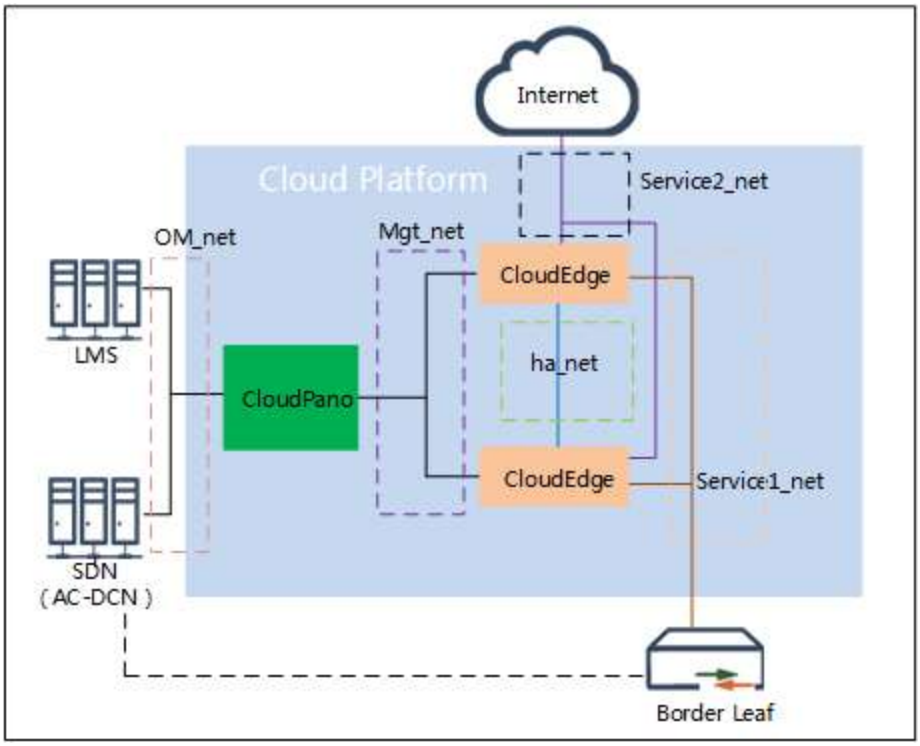
CloudPano provides two deployment typologies, including selecting hardware firewall or virtual firewall.

- The deployment typology of hardware firewall: After the hardware firewall is deployed, CloudPano will be deployed as the cloud host on the Compute node of the cloud platform. It will also be connected with the SDN controller and two HA firewall devices via the OM_net. When you create a router via the cloud platform WebUI, CloudPano will create VSYS on the hardware firewall automatically to protect the network of the router.



- The deployment typology of the virtual firewall: After the deployment, CloudPano will be deployed as the cloud host on the Compute node of the cloud platform. It will be connected with the LMS server and SDN controller via the OM_net, and be connected with the MGT

interface via the Mgt_net. The Border Leaf will connect to the Service1_net of CloudEdge at the same time. When you create a route on the cloud platform, CloudPano will create an HA environment of the virtual firewall automatically to protect the network of the router.



Connecting to Centralized Management

To configure HSM or CloudPano parameters in the firewall, take the following steps:

1. Select **System > Extended Services > Connecting to Centralized Management**.Click **Edit** button.

2. Click **Enable** button of HSM/CloudPano Agent field to enable this feature.

3. Input HSM/CloudPano server's IP address in the Sever IP/Domain text box. The address cannot be 0.0.0.0 or 255.255.255.255, or mutlicast address.

4. Enter the port number of HSM/CloudPano server.

5. Click **OK**.

Notes: The Syslog Server part shows the HSM/CloudPano server's syslog server and its port.

Connecting to Hillstone Cloud Service Platform

Hillstone Cloud Service Platform is a cloud security services platform, which provides cloud services including CloudView, Cloud Sandbox and CloudVista (Threat Intelligence Center). Hillstone Cloud Service is the cloud capability center of Hillstone and the brain of the cloud-network integration. After the service is enabled, your device will be connected with the Hillstone cloud, which will provide you with a wider range of threat intelligence, improve the protection capability of your device, and enable you to carry out real-time monitoring, inspection and report acquisition of the device and traffic on the cloud anytime and anywhere. These Hillstone cloud applications can greatly enhance the security, visibility, and usability of networks.

- CloudView: CloudView is a SaaS product. It is deployed on the public cloud to provide users with online on-demand services. Hillstone devices register with the cloud service platform and upload device information, traffic data, threat events, system logs and so on to the cloud

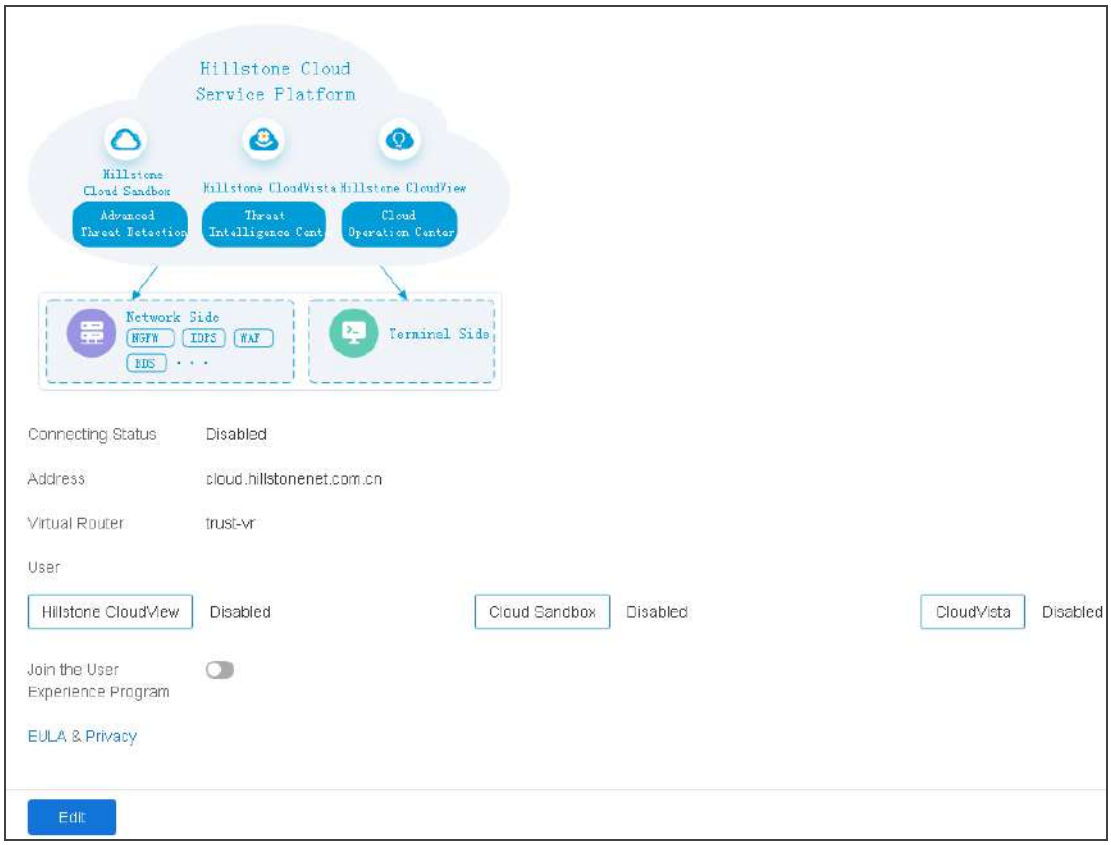
service platform, and the visual display is provided by CloudView . Users can monitor the device status, gain reports and threat analysis through the Web or mobile phone APP. In addition, you can also use CloudView to send configuration to the device. For more information about CloudView, refer to the *CloudView FAQs*.

- Cloud Sandbox: It is a technology adopted by the Sandbox function. After a suspicious file being uploaded to the Hillstone cloud service platform, the cloud sandbox will collect behaviors of the file, analyze the collected data, verify the legality of the file, send the analysis result to system and deal with the malicious file according to the actions set by system. For specific configurations of cloud sandbox, refer to **Threat Prevention > Sandbox**.
- CloudVista (Threat Intelligence Center): Threat Intelligence function can upload some elements in the logs generated by each module to the cloud service platform, such as IP address, domain, etc. The cloud service platform will check whether the elements have threat intelligence through the threat center. You can view threat intelligence information related to elements through the threat intelligence center.

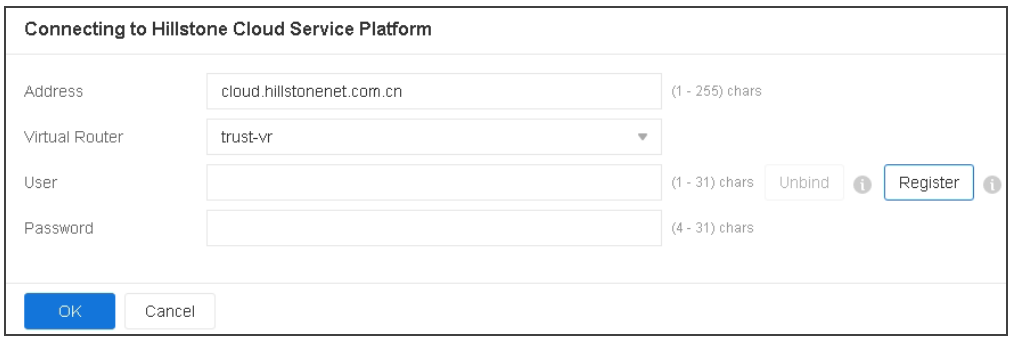
Connecting to Hillstone Cloud Service Platform

To connect to the Hillstone Cloud Service Platform, take the following steps:

1. Select **System > Connecting to Hillstone Cloud Service Platform**.



2. At the lower-left corner, click the **Edit** button. The Hillstone Cloud Service Platform configuration page appears.



In this page, configure the following options.

Option	Description
Address	Enter the IP address or domain name of the cloud service platform. The default value is cloud.hillstonenet.com.cn.
Virtual Router	Select the VRouter of the Cloud service platform from the drop-down list.
User	Enter the username of the cloud service platform and bind the device with this account. Click the **Register** button and sign up for an account on the Hillstone cloud service login page. Click **Unbind** to remove the binding relationship between the device and the account.
Password	Enter the password of the user.

3. Click the **Hillstone CloudView** button. The Hillstone CloudView page appears.

In this page, configure the following options.

Option	Description
Enable	Click the **Enable** button to enable the Hillstone CloudView service.
Upload Data Item	Check the checkbox of the data items that need to be uploaded to the cloud service platform, including traffic data, threat events, system logs, session data, URL data, and encrypted traffic.
Cloud Configuration	You can configure this function only when CloudView is enabled. Click the enable button to allow CloudView to send configuration to the device. The system will load the real-time configuration sent by CloudView.

Option	Description
	• PTF Dynamic IP Blacklist: Log in to CloudView to send the configuration of the PTF dynamic IP blacklist to the root VSYS of the device. Both IPv4 and IPv6 addresses are supported. You can also specify the virtual router to take effect as well as the block duration. When the system receives the configuration task from CloucView, corresponding dynamic IP blacklist entries, configuration logs, and operation logs are generated.
Cloud Inspection	Click the **Enable** button to enable the cloud inspection function and upload the collected inspection data to the cloud service platform. With the cloud inspection function, the device can receive and execute the inspection instructions from the cloud, and upload the collected inspection data to the cloud service platform, which enables you to carry out real-time monitoring and management on the cloud anytime and anywhere.
Scan QR code to connect to Hillstone CloudView use APP	Scan the QR code using a QR reader app on your smartphone or mobile device to connect to Hillstone CloudView via APP.
Visit	Click the button to visit CloudView.

Option	Description
CloudView	

4. Click the **Cloud Sandbox** button. In the Cloud Sandbox page, click **Sandbox** and configure the cloud sandbox function in the sandbox configuration page. For more information about the cloud sandbox, refer to **Threat Prevention** > Sandbox.

5. Click the **CloudVista** button. In the CloudVista page, click the **Enable** button to enable the CloudVista service. The CloudVista service is controlled by license. To use the CloudVista service, install the threat intelligence license.

6. Click the **Enable** button to join the user experience improvement program. This function will upload the threat prevention data to the cloud service platform. The uploaded data will be used for internal research to reduce the false positives and improve the protection capability of your device.

7. Click **EULA & Privacy** to read confidentiality and privacy statements, user authorizations and other content.

SNMP

The device is designed with a SNMP Agent, which can receive the operation request from the Network Management System and give the corresponding information of the network and the device.

The device supports SNMPv1 protocol, SNMPv2 protocol and SNMPv3 protocol. SNMPv1 protocol and SNMPv2 protocol use community-based authentication to limit the Network Management System to get device information. SNMPv3 protocol introduces an user-based security module for information security and a view-based access control module for access control.

The device supports all relevant Management Information Base II (MIB II) groups defined in RFC-1213, the Interfaces Group MIB (IF-MIB) using SMIv2 defined in RFC-2233, the User-based Security Model (USM) for version 3 defined in RFC-2574 and the View-based Access Control Model (VACM) defined in RFC-2575. Besides, the system offers a private MIB, which contains the system information, IPSec VPN information and statistics information of the device. You can use the private MIB by loading it into an SNMP MIB browser on the management host.

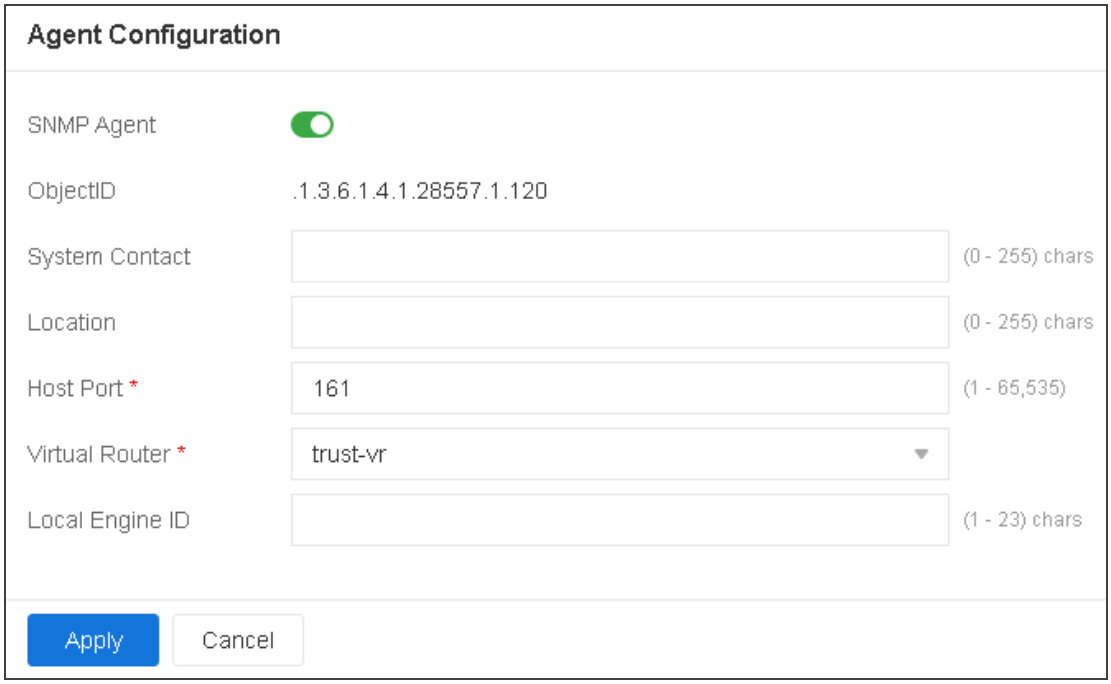
SNMP Agent

The device is designed with a SNMP Agent, which provides network management and monitors the running status of the network and devices by viewing statistics and receiving notification of important system events.

To configure an SNMP Agent, take the following steps:

1. Select **System** > **SNMP** > **SNMP Agent**.

2. Click **Enable** button. In the SNMP Agent page, configure these values.



Option	Description
SNMP Agent	Select the **Enable** check box for Service to enable the SNMP Agent function.
ObjectID	The Object ID displays the SNMP object ID of the system. The object ID is specific to an individual system and cannot be modified.
System Contact	Type the SNMP system contact information of the device into the **System Contact** box. System contact is a management variable of the group system in MIB II and it contains the ID and contact of relevant administrator of the managed device. By configuring this parameter, you can save the important information to the device for the possible use in case of emergency.

Option	Description
Location	Type the location of the device into the **Location** box.
Host Port	Type the port number of the managed device into the **Host Port** box.
Virtual Router	Select the VRouter from the **Virtual Router** drop-down list.
Local EnginelID	Type the SNMP engine ID into the **Local EngineID** box.

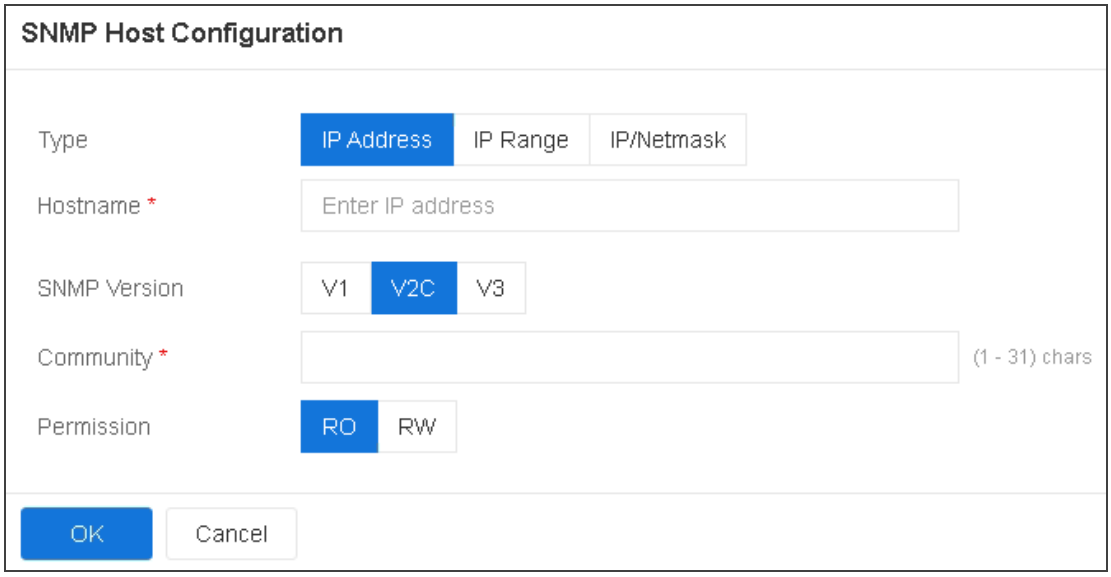
3. Click **Apply**.

Notes: SNMP Engine ID identifies an engine uniquely. SNMP Engine is an important component of the SNMP entity (Network Management System or managed network device) which implements the functions like the reception/sending and verification of SNMP messages, PDU abstraction, encapsulation, and communications with SNMP applications.

SNMP Host

To create an SNMP host, take the following steps:

1. Select **System** > **SNMP** > **SNMP Host**.
2. Click **New**.
3. In the SNMP Agent dialog box, configure these values.



Option	Description
Type	Select the SNMP host type from the **Type** drop-down list. You can select **IP Address**, **IP Range** or **IP/Netmask**. • IP Address: Type the IP address for SNMP host into **Hostname** box. • IP Range: Type the start IP and end IP into the **Hostname** box respectively. • IP/Netmask: Type the start IP address and Net-mask for SNMP host into the **Hostname** box respectively.
SNMP Ver-sion	Select the SNMP version from the **SNMP Version** drop-down list.
Community	Type the community for the SNMP host into the **Com-**

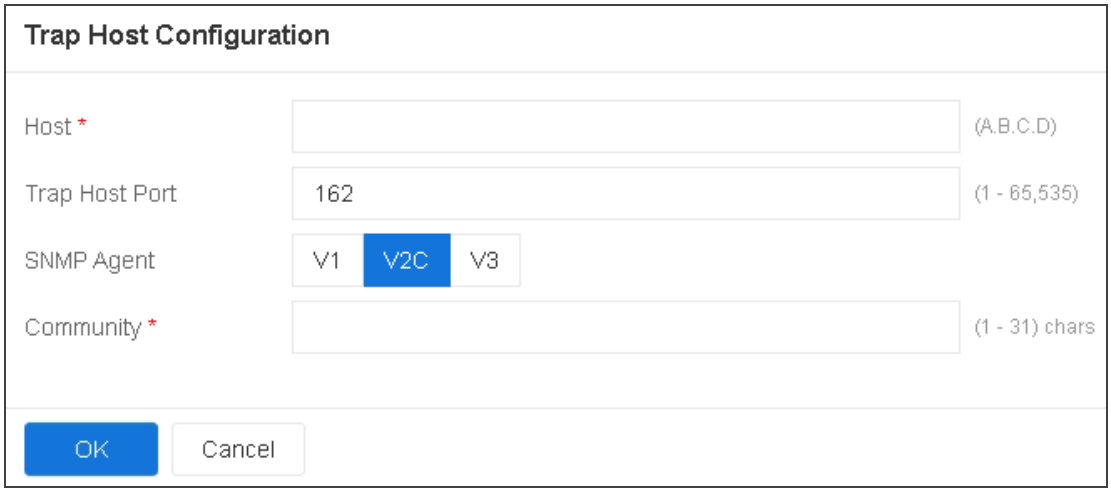
Option	Description
	munity box. Community is a password sent in clear text between the manager and the agent. This option is only effective if the SNMP version is V1 or V2C.
Permission	Select the read and write permission for the community from the Permission drop-down list. This option is only effective if the SNMP version is V1 or V2C. • RO: Stand for read-only, the read-only community is only allowed to read the MIB information. • RW: Stand for read-write, the read-write community is allowed to read and modify the MIB information.

4. Click **OK**.

Trap Host

To create a Trap host, take the following steps:

1. Select **System** > **SNMP** > **Trap Host**.
2. Click **New**.
3. In the Trap Host Configuration dialog box, configure these values.



Option	Description
Host	Type the domain name or IP address of the Trap host into the **Host** box.
Trap Host Port	Type the port number for the Trap host into the **Trap Host Port** box.
SNMP Agent	Select the SNMP version from the **SNMP Agent** drop-down list. • V1 or V2C: Type the community for the Trap host into the **Community** box. • V3: Select the V3 user from the **V3 User** drop-down list. Type the Engine ID for the trap host into the **Engine ID** box.

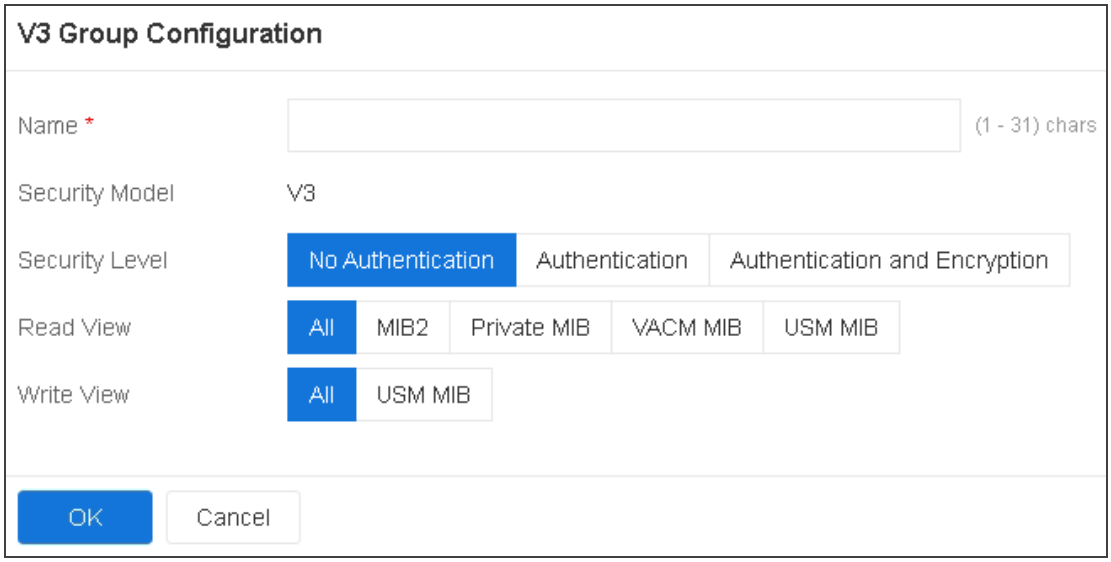
4. Click **OK**.

V3 User Group

SNMPv3 protocol introduces a user-based security module. You need to create an SNMP V3 user group for the SNMP host if the SNMP version is V3.

To create a V3 user group:

1. Select **System** > **SNMP** > **V3 User Group**.
2. Click **New**.
3. In the V3 Group Configuration dialog box, enter values.



Option	Description
Name	Type the SNMP V3 user group name into the **Name** box.
Security Model	The Security model option displays the security model for the SNMP V3 user group.
Security Level	Select the security level for the user group from the **Security Level** drop-down list. Security level determines the security mechanism used in processing an SNMP packet. Security levels for V3 user groups include **No Authentication** (no authentication and encryption), **Authentication** (authentication algorithm based on MD5 or SHA) and **Authentication and Encryption** (authentication algorithm based on MD5 or SHA and message encryption based on AES and DES).
Read View	Select the read-only MIB view name for the user group: • All: The user group can read all MIB views.

Option	Description
	• MIB2: The user group can read the public MIB (MIB-II) defined in RFC-1213 and RFC-2233. • Private MIB: The user group can read Hillstone Networks private MIB. • VACM MIB: The user group can read the View-based Access Control Model (VACM) MIB defined in RFC-2575. • USM MIB: The user group can read the User-based Security Model (USM) MIB for version 3 defined in RFC-2574.
Write View	Select the write MIB view name for the user group: • All: The user group can modify all MIB views (USM MIB). • USM MIB: The user group can modify the User-based Security Model (USM) MIB for version 3 defined in RFC-2574.

4. Click **OK**.

V3 User

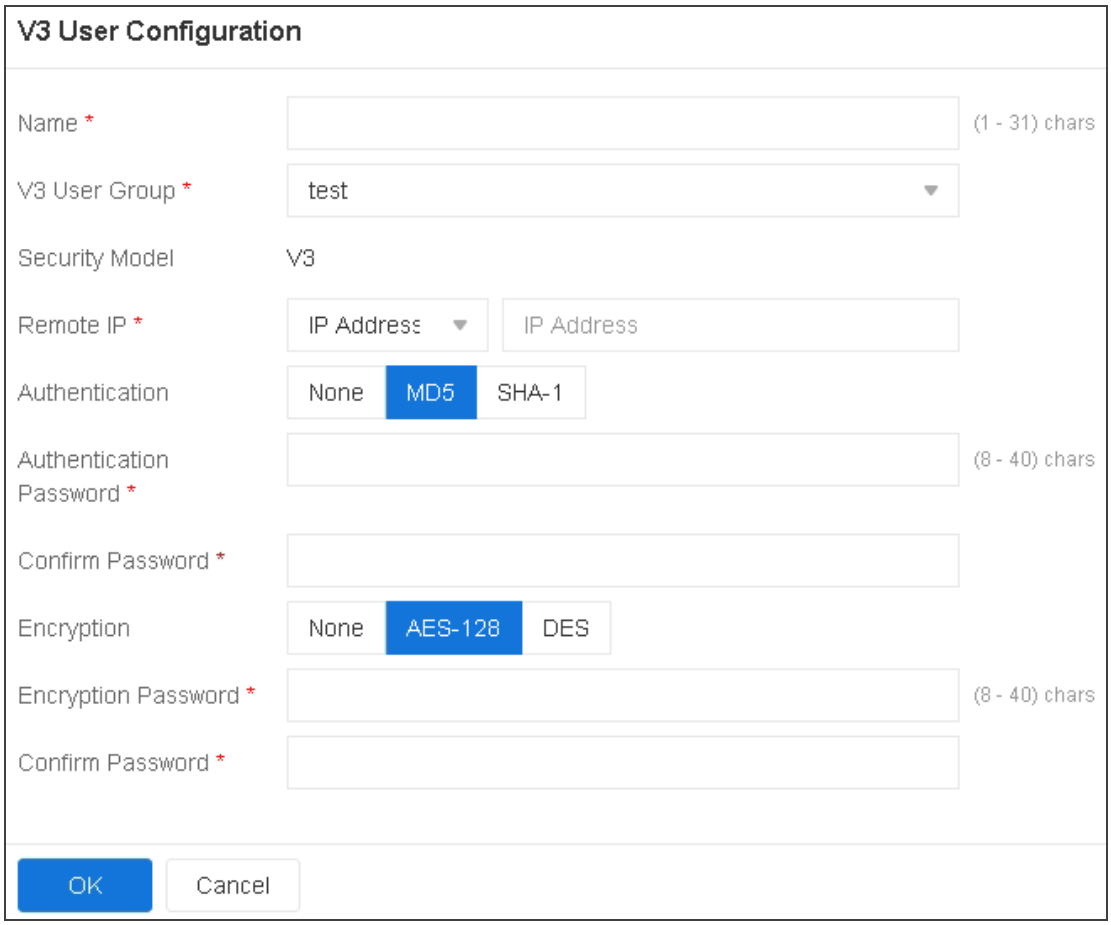
If the selected SNMP version is V3, you need to create an SNMP V3 user group for the SNMP host and then add users to the user group.

To create a user for an existing V3 user group, take the following steps:

1. Select **System** > **SNMP** > **V3 User**.

2. Click **New**.

3. In the V3 User Configuration dialog box, configure these values.



Option	Description
Name	Type the SNMP V3 user name into the **Name** box.
V3 User Group	Select an existing user group for the user from the Group drop-down list.
Security Model	The Security model option displays the security model for the SNMP V3 user.

Option	Description
Remote IP	Type the IP address of the remote management host into the **Remote IP** box.
Authentication	Select the authentication protocol from the **Authentication** drop-down list. By default, this parameter is None, i.e., no authentication.
Authentication Password	Type the authentication password into the **Authentication password** box.
Confirm Password	Re-type the authentication password into the **Confirm Password** box to confirm.
Encryption	Select the encryption protocol from the **Encryption** drop-down list.
Encryption Password	Type the encryption password into the **Encryption Password** box.
Confirm Password	Re-type the encryption password into the **Confirm Password** box to confirm.

4. Click **OK**.

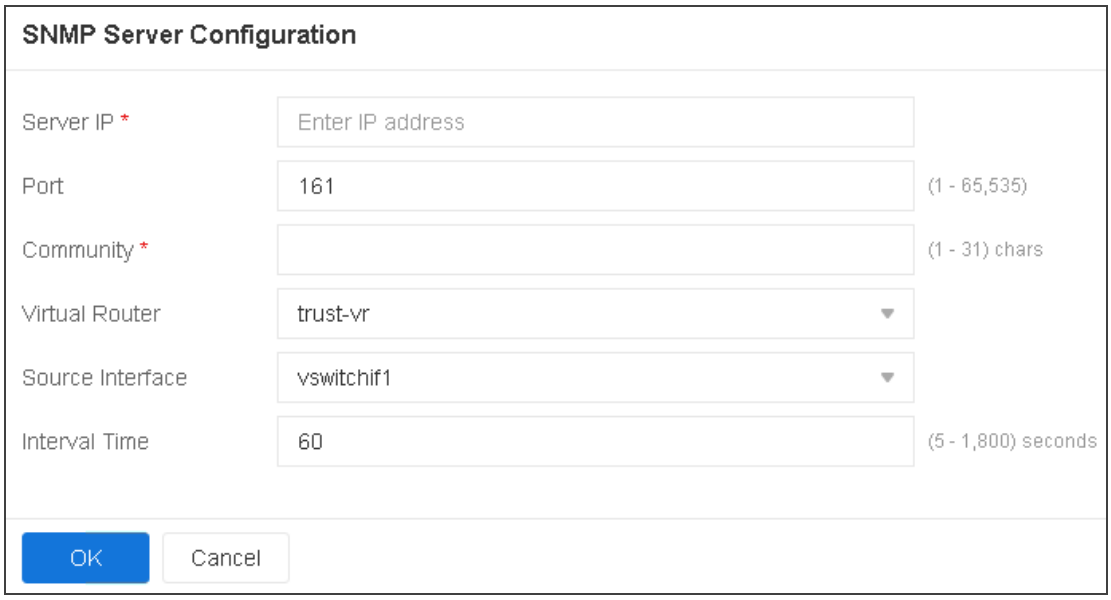
SNMP Server

You can configure the SNMP server to get the ARP information through the SNMP protocol.

Creating an SNMP Server

To create an SNMP server, take the following steps:

1. Select **System** > **SNMP server**.
2. Click **New**.



In the SNMP Server Configuration dialog box, configure these values

Option	Description
Server IP	Type the SNMP server IP address into the **Server IP** box.
Port	Type the port number for the SNMP server into the **Port** box. The value range is 1 to 65535, the default value is 161.

Option	Description
Community	Type the community for the SNMP server into the **Community** box. This option is only effective if the SNMP version is V1 or V2C.
Virtual Router	Select the VRouter from the drop-down list.
Source Interface	Select the source interface from the drop-down list for receiving ARP information on the SNMP server.
Interval Time	Type the the interval into the **Interval Time** box for receiving ARP information on the SNMP server. The value range is 5 to 1800 seconds, the default value is 60 seconds.

3. Click **OK**.

NETCONF

Network Configuration Protocol (NETCONF) provides a mechanism for managing network devices. You can add, modify, and delete configurations of network devices, and obtain configuration and status information of network devices. Through NETCONF, network devices provide standard application programming interfaces (API). Applications can directly use these application programming interfaces to send and obtain configurations from network devices.

Comparison between NETCONF and SNMP:

Function	SNMP	NETCONF
Configuration management	SNMP does not provide a locking mechanism.	NETCONF provides a locking mechanism to avoid configuration conflicts arising from multi-user operations.
Inquiry	You can inquire about one or more nodes of	You can inquire about all configurations of the system.

Function	SNMP	NETCONF
	the table through multiple interactions with the system.	
Extensibility	Poor extensibility	Good extensibility. NETCONF adopts a layered architecture and each layer is independent. Therefore, the impact on the upper-layer protocol will be minimalized when you extend a layer of NETCONF. Also, NETCONF adopts the XML, which allows the protocol to be extensible in terms of management ability and system compatibility.
Security	Take the latest SNMPv3 as an example. SNMPv3 only provides the user-based security module and cannot be added to other security modules.	NETCONF exploits current security protocols to provide security protection. It is not bound to a specific security protocol. Therefore, in practice, NETCONF is more flexible than SNMP. **Note:** SSH is the priority at the NETCONF transport layer. XML message is carried by SSH protocol.

Through the NETCONF client, you can modify the configuration of Hillstone devices and obtain configuration and status information. You can configure the following function modules:

- Object module: You can create/delete/edit address book and host book through the NETCONF client.
- Network module: You can create/delete/edit zone, interface, DNS server, DNS proxy, DHCP, destination route, source route, policy route, OSPF, BGP, IPsec VPN, and SSL VPN through the NETCONF client.

- Policy module: You can create/delete/edit a policy, SNAT, and DNAT through the NETCONF client.

Notes:

- NETCONF function requires you to configure the login type of administrators and the trusted host as NETCONF, and the management method of interfaces as NETCONF. It is recommended to configure the three options before you enable NETCONF.
- When the root VSYS enables NETCONF, you can configure the login type of non-root administrators as NETCONF to enable NETCONF on non-root VSYS.

Configuring the NETCONF Agent

The StoneOS system is equipped with a NETCONF agent, which manages the configuration of the device.

You can configure the NETCONF agent only by CLI. For more information, refer to the chapter on **Network Configuration Protocol (NETCONF)** of the **StoneOS CLI User Guide**.

Configuring NETCONF Candidate

NETCONF candidate enables you to modify the configuration of the current device but apply the modification later so that the current service traffic is not influenced. You can modify the configuration of the candidate, and replace the current configuration with the candidate configuration according to your own needs. The replacement takes effect immediately. By default, the NETCONF candidate is disabled.

You can configure the NETCONF candidate only by CLI. For more information, refer to the chapter on **Network Configuration Protocol (NETCONF)** of the **StoneOS CLI User Guide**.

Configuring NETCONF Timeout

You can perform operations such as offering configuration to a Hillstone device through the NETCONF client. If you do not perform any operations on the NETCONF client for a certain amount of time, you will be required to log in again to perform subsequent operations. By default, the timeout period is 10 minutes.

You can configure NETCONF timeout only by CLI. For more information, refer to the chapter on **Network Configuration Protocol (NETCONF)** of the **StoneOS CLI User Guide**.

Upgrading System

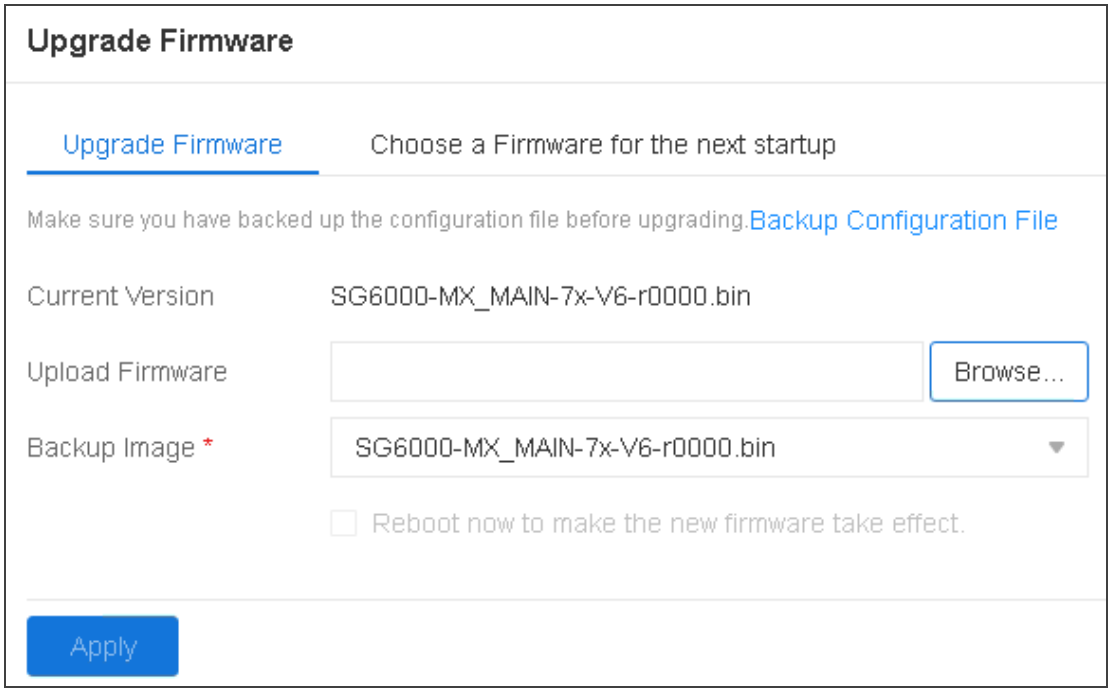
The firmware upgrade wizard helps you:

- Upgrade system to a new version or roll back system to a previous version.
- Upgrade the format of earlier-version data such as logs, monitoring data, and reports in the database or delete the data.
- Update the Signature Database.
- Update the Trusted Root Certificate Database.

Upgrading Firmware

To upgrade firmware, take the following steps:

1. Select **System** > **Upgrade Management** > **Upgrade Firmware**.
2. In the **Upgrade Firmware** tab, configure the following.



Upgrade Firmware	
Backup Configuration File	Make sure you have backed up the configuration file before upgrading. Click **Backup Configuration File** to backup the current firmware file and the system will automatically redirect the Configuration File Management page after the backup.
Current Version	The current firmware version.
Upload Firmware	Click **Browse** to select a firmware file from your local disk.
Backup Image	The backup firmware version.
Reboot	Select the **Reboot now to make the new firmware take**

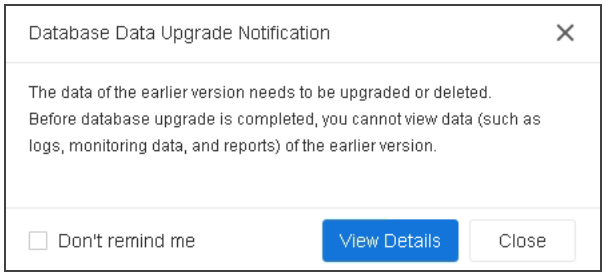
Upgrade Firmware	
	effect check box and click **Apply** to reboot system and make the firmware take effect. If you click **Apply** without selecting the check box, the firmware will take effect after the next startup.
Choose a Firmware for the next startup	
Select the firmware that will take effect for the next startup.	Select the firmware that will take effect for the next start-tup.
Reboot	Select the **Reboot now to make the new firmware take effect** check box and click **Apply** to reboot system and make the firmware take effect. If you click **Apply** without selecting the check box, the firmware will take effect after the next startup.

Upgrading Database Data

After you upgrade the system to a new version, both the earlier and new versions of data, such as logs, monitoring data, and reports, exist in the database. Due to the format inconsistency between these two versions of data, you may not be able to view the earlier version of data. To ensure that system features can be displayed and used properly, you need to upgrade the earlier version of data in the database to the data in the format that complies with the new version. If you do not need the earlier version of data, delete it.

Notes: Only manual database data upgrade is supported.

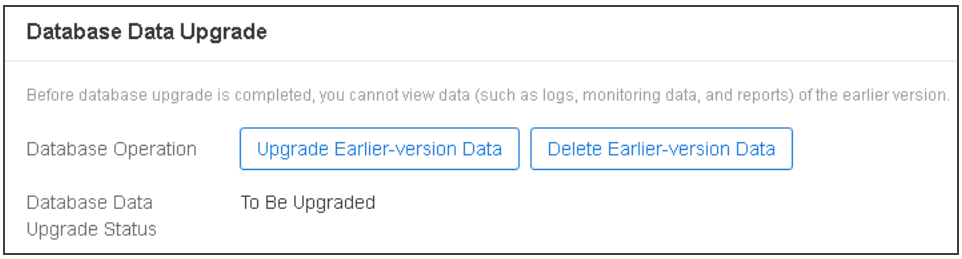
If earlier version of data exists in the system, a message that reminds you to upgrade data appears when you logs into the system. You can view the data before the upgrade is completed.



- Select **Don't remind me** to close the dialog box. To view the dialog box again, hover your mouse over the notification icon in the upper-right corner and select **Database Data Upgrade Notification** from the drop-down list.
- Click **View Details** to upgrade or delete database data on the Database Data Upgrade page.

To upgrade database data, take the following steps:

1. Select **System** > **Upgrade Management** > **Database Data Upgrade**.
2. Configure the following options:



Option	Description
Database Operation	You can upgrade or delete earlier-version data in the system database. • Upgrade Earlier-version Data: If you click this option, you can upgrade earlier version of data whose format is inconsistent with that of new version of data.

Option	Description
	• Delete Earlier-version Data: If you click this option, you can delete earlier version of data whose format is inconsistent with that of new version of data. This operation does not affect other data whose format complies with the format of the new version of data. Note: If the system is downgraded to a lower version, **To Be Upgraded** is displayed in the Database Data Upgrade Status field. In this case, you can click **Upgrade Earlier-version Data** to downgrade database data to data in the format that complies with the new version. For more information about how to downgrade the system version, see Upgrading Firmware.
Database Data Upgrade Status	Displays the upgrade status of data in the system database. • To Be Upgrade: If earlier version of data whose format is inconsistent with that of new version of data exists in the system, this status is displayed. • Upgrading: If earlier version of data whose format is inconsistent with that of new version of data exists in the system, this status is displayed after you click **Upgrade Earlier-version Data**. In the meantime, the upgrade progress and the time consumed are displayed. • Upgrade Not Required: If earlier version of data

Option	Description
	is upgraded or deleted, this status is displayed because all database data are in the complied format.

Updating Signature Database

You can directly view ISP Information Database on the device and view other signature databases only after the corresponding licenses are installed.

To update signature database, take the following steps:

1. Select **System** > **Upgrade Management** > **Signature Database Update**.

2. In the **Signature Database Update** page, configure the following.

Option	Description
Current Version	Show the current version number.
Latest Version	Show the latest version number. **Note:** The latest version of the ISP information database can be displayed only when the current version exists. The latest version of other signature databases can be displayed only when the corresponding signature database licenses are activated and the current version exists.
Remote Update	Application signature database, URL signature database, Antivirus signature database, IPS signature database , IP reputation database , Botnet Prevention signature database, and ISP information database. • Protocol: Select the update method of the sig-

Option	Description
	nature database, including HTTP and HTTPS. Click **Restore Default** to restore the default HTTPS transmission method. • Update Server: By default the system updates the signature database everyday automatically. You can change the update configuration as needed. The IPv4 and IPv6 address are supported for configuring the update server address. Hillstone devices provide two default update servers: https://update1.hillstonenet.com and https://update2.hillstonenet.com. You can customize the servers according to your need. In **Update Server**, specify the server IP or domain name and Virtual Router. • Update Proxy Server: When the device accesses the Internet through a HTTP proxy server, you need to specify the IP address and the port number of the HTTP proxy server. With the HTTP proxy server specified, various signature database can update normally. In **Update Proxy Server**, enter the IP addresses and ports of the main proxy server and the backup proxy server. • Auto Update: Click the **Enable** button of **Auto Update** and specify the auto update time. Click **Ok**

Option	Description
	to save your changes. • Update Now: Click **Ok And Online Update** to update the signature database right now.
Local Update	Download the update package from the default feature update server for local update. • Download the upgrade packages of the application signature database, URL signature database, Antivirus signature database, IPS signature database , IP reputation database , Botnet Prevention signature database, and ISP information database from https://update1.hillstonenet.com and https://update2.hillstonenet.com. • Click **Browse** and select the signature file in your local PC, and then click **Upload**.  **Notes:** Before StoneOS R8P4 version, please download the Botnet Prevention signature database upgrade package through the "Botnet C&C Detection Package" link of the default update server. From StoneOS R8P4 version, please download the Botnet Prevention signature database upgrade package through the "Encrypt Botnet C&C Detection Package" link of the default update server.

Updating Trusted Root Certificate Database

To ensure that the root certificates stored on your device are sufficient and up-to-date, and to reduce errors occurred during server certificate verification, you need to update the trusted root certificate database timely. System supports both remote upgrade and local upgrade. When updating the trusted root certificate database, system will delete revoked certificates and expired certificates, and add new certificates.

To update the trusted root certificate database, take the following steps:

1. Select **System** > **Upgrade Management** > **Trusted Root Certificate Update**.

2. In the **Trusted Root Certificate Update** page, configure the following.

Option	Description
Current Version	Show the current version number.
Remote Update	Click **Remote Update** and configure the following update parameters. • Update Server: By default, system updates the trusted root certificate database everyday automatically. You can change the update configuration as needed. Hillstone devices provide two default update servers: https://update1.hillstonenet.com and https://update2.hillstonenet.com. You can customize the servers as needed. Under **Update Server**, specify the server IP or domain name and virtual router. • Update Proxy Server: When the device accesses the Internet through an HTTP proxy server, you

Option	Description
	need to specify the IP address and the port number of the HTTP proxy server to ensure the trusted root certificate database can be updated normally. Under **Update Proxy Server**, enter the IP addresses and ports of the main proxy server and the backup proxy server. • Auto Update: Click the **Enable** button and specify the auto update time. Click **OK** to save your changes. • OK And Online Update: Click the button to update the trusted root certificate database immediately.
Local Update	Click **Local Update**, and click **Browse** to select a trusted root certificate database file in your local PC, and then click Upload.

License

Licenses are used to authorize the users' features, authorize the users' services, or extend the performance. If you do not buy and install the corresponding license, the features, services, and performance which is based on the license will not be used or cannot be achieved.

License classes and rules.

Platform License	Description	Valid Time	Whether to Restart
Platform Trial	Platform license is the basis of the other licenses operation. If the platform license is invalid, the other licenses are not effective. The device have been pre-installed platform trial license for 15 days in the factory.	You cannot modify the existing configuration when License expires. The system will restore to factory defaults when the device reboot.	Not required.
Platform	You can install the platform license after the device formal sale. The license provide basic firewall and VPN function.	System cannot upgrade the OS version when the license expires, but the system could still work normally.	Not required.

Function License	Description	Valid Time	Whether to Restart
VSYS	Authorizing the available number of VSYS.	Permanent	Restart is required for each installation.
SSL VPN Trial License	Authorizes the maximum number of SSL VPN users that can be connected to the platform. The duration of use of the license is short. The actual available duration is determined by the protocol for the license. The available duration is a relative time, such as 30 days. Multiple SSL VPN trial licenses can be used together.	After the trial license expires, the number of SSL VPN users that can be connected to the platform is restored to its prior value.	No
SSL VPN	Authorizing the number of SSL VPN access. Through installing multiple SSL VPN licenses, you can add the number of SSL VPN access.	Permanent	All versions, except the following should be restarted after each installation. Versions that do not need restart-

			ing are5.5R6P21 and later 5.5R6P versions, 5.5R8P7 and later 5.5R8P versions, 5.5R9 and later.
ZTNA	Authorizing the maximum number of ZTNA access. ZTNA license has a higher priority than the ZTNA trial license. Multiple ZTNA licenses can be installed to increase the authorized number of ZTNA access. When the authorized number of SCVPN access is inadequate, SCVPN access can use the ZTNA license. ZTNA access cannot use the SCVPN license.	Permanent	ZTNA
ZTNA Upgrade	Converting the specified number of SSL VPN access to the equal number of ZTNA access. The SSL VPN license type is	Permanent	ZTNA Upgrade

	not limited. Multiple ZTNA Upgrade Licenses can be installed, but the converted number of access cannot exceed the total number of SSL VPN access. If the converted SSL VPN license is not permanent, the validity period of the ZTNA license is the same as the SSL VPN license before the conversion.		
ZTNA Trial	Providing ZTNA trial. Multiple ZTNA trial licenses can be installed to increase the number and validity period of ZTNA access.	When the license expires, you can only use the default authorization of 8 ZTNA concurrent users.	ZTNA Trial
QoS	Enable QoS function.	Permanent	Not required.
Cloud sandbox License	Providing Cloud sandbox function and white list update, authorizing the number of suspicious files uploaded per day.	The valid time including 1 year, 2 years and 3 years. System	Restart is required for the first installation. Do not

	Including 4 licenses: Cloud sandbox-200, Cloud sandbox-300, Cloud sandbox-500 and Cloud sandbox-1000. The number of files allowed to upload per day is different for different licenses.	cannot analyze the collected data and cannot update the white list when the license expires. The Cloud sandbox protection function can only be used according to the local database cache results. If you restart the device, the function cannot be used.	require restart when you renew the subscription.
Twin-mode License	Providing the twin-mode function. The related parameters of the twin-mode function can be displayed and configured.	System cannot upgrade the twin-mode function and cannot provide the maintenance service when License	Not required.

		expired.	
EPP	Providing the End Point Prevention function.	The End Point Prevention function cannot be used when the license expires.	Not required.
Service License	**Description**	**Valid Time**	**Whether to Restart**
AntiVirus	Providing antivirus function and antivirus signature database update.	System cannot update the antiviru signature database when the license expires, but the antivirus function could still be used normally	Restart is required for the first installation. Do not require restart when you renew the subscription.
URL DB	Providing URL database and URL signature database update.	System cannot provide the search URL database online function when the license expires, but	Restart is required for the first installation. Do not require restart when you renew

		the user-defined URL and URL filtering function can be used normally.	the subscription.
IPS	Providing IPS function and IPS signature database update.	System cannot update the IPS signature database when the license expires, but the IPS function could still be used normally.	Restart is required for the first installation. Do not require restart when you renew the subscription.
APP signature	APP signature license is issued with platform license, you do not need to apply alone. The valid time of license is same as platform license.	System cannot update the APP signature database when the license expires, but the included functions and rules could still be used normally.	Not required.

Threat Prevention	A package of features, including AntiVirus, IPS, threat intelligence, and corresponding signature database update.	System cannot update all signature databases when the license expires, but the included functions and rules could still be used normally.	Whether to restart, please refer to the restart policies for the individual licenses of AntiVirus, IPS, threat intelligence.
IP Reputation	Providing Perimeter Traffic Filtering function of IP reputation and IP reputation database update. From 5.5R6, StoneOS will support the Perimeter Traffic Filtering function of IP Reputation instead of predefined black list. You can buy the license of IP reputation to upgrade.	System cannot update the IP reputation database when the license expires.	Restart is required for the first installation. Do not require restart when you renew the subscription.
Botnet Prevention	Providing Botnet Prevention function and Botnet Prevention database update.	System cannot update all signature databases when license expires. But the functions included and	Restart is required for the first installation. Do not require restart when you renew

		rules could be used normally.	the subscription.
IoT monitor&control	Providing the IoT policy function.	Permanent.	Not required.
IoT monitor&control trail	After the installation of IoT monitor&control trail license, you will get the same IoT policy function as system with IoT monitor&control license. But the duration will be shorter.	The IoT policy function cannot be used when the license expires. If you restart the device, the existing IoT policy configurations will not be lost, but won't take effect.	Not required.
Threat intelligence License	Providing the threat intelligence function.	The threat intelligence function cannot be used when the license expires.	Not required.
Bundle License1	A package of features, including IPS, AntiVirus, threat intelligence, QoS,	For expiration, refer to the respective	Whether to restart, please refer

	URL DB, and corresponding signature database update.	license policy.	to the restart policies for the individual licenses of IPS, AntiVirus, threat intelligence, QoS, URL DB.
Expansion and Enhancement License	**Description**	**Valid Time**	**Whether to Restart**
AEL	Advance the maximum value of concurrent sessions and performance.	Permanent	

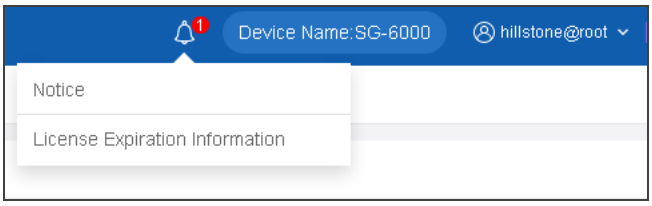
Viewing License List

Select **System** > **License** to enter the License List page. All licenses the system supports will be displayed in this page, including the authorized licenses and unauthorized licenses.

If there is license that is about to expire (the remaining valid period is within 30 days) or has expired:

- When you log into the device, the **License Expiration Information** dialog box will pop up, which prompts for licenses that are about to expire or have expired. Check the **Don't remind me again** checkbox so that the dialog box will never prompt again when you login. Click the **Update Now** button to jump to the License List page.

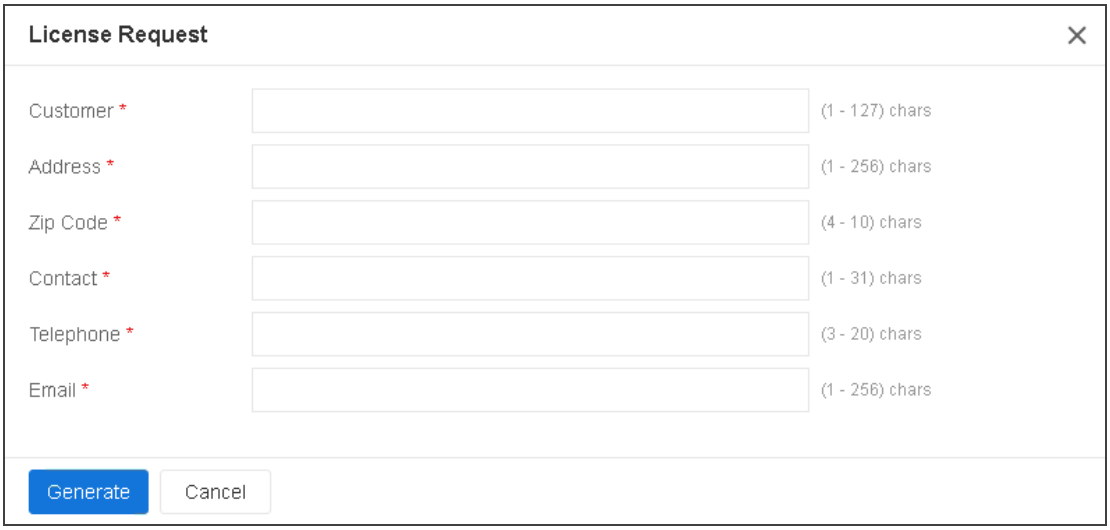
- The notification icon with the number of notifications is displayed in the upper-right corner. Hover your mouse over the icon, and click **Details** after the License Expiration Information, the **License Expiration Information** dialog will pop up.



Applying for a License

Before you apply for a license, you have to generate a license request first.

1. Click **Apply For**. Under License Request, input user information. All fields are required.



2. Click **Generate**, and then appears a bunch of code.

3. Send the code to your sales contact. The sales person will issue the license and send the code back to you.

Installing a License

After obtaining the license, you must install it to the device.

To install a license, take the following steps:

1. Select **System** > **License** , and click **Import**.

2. On the **Import License** page, configure options below.

Option	Description
Upload License File	Select **Upload License File**. Click **Browse** to select the license file, using the TXT format, and then click **OK** to upload it.
Manual Input	Select **Manual Input**. Type the license string into the box.

3. Click **OK**.

4. Go to **System > Device Management**, and click the **Option** tab.

5. Click **Reboot**, and select **Yes** in the prompt.

6. System will reboot. When it starts again, installed license(s) will take effect.

Mail Server

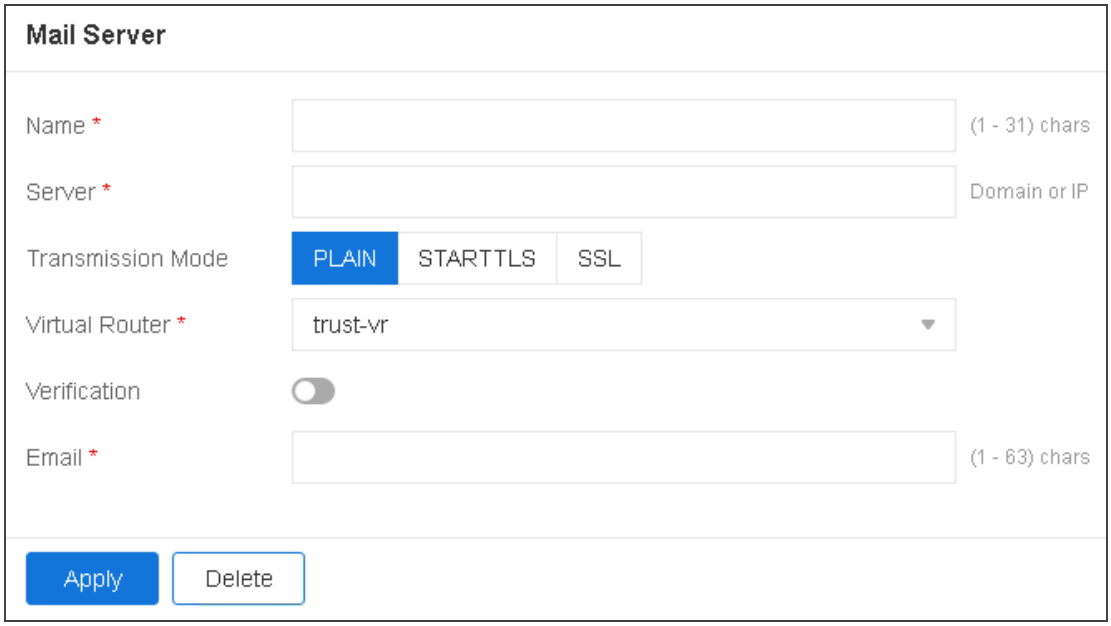
By configuring the mail server in the Mail Server page, the system can send the log messages, report or alarm information to the specified email address.

Creating a Mail Server

To create a mail server, take the following steps:

1. Select **System** > **Mail Server**.

2. In the Mail Server Configuration page, configure these values.



Option	Description
Name	Type a name for the mail server into the box.
Server	Type Domain name or IP address for the mail server into the box.
Transmission Mode	Select the transmission mode for the email. • PLAIN: Specifies that the mail is sent in plain text and is not encrypted. This mode is the default transmission mode. • STARTTLS: STARTTLS is an extension to the plain text communication protocol that upgrades plain text connections to encrypted connections. Specified in this mode, the mail will be transmitted using encrypted mode.

3. Click **Apply**.

SMS Parameters

This Section contains the following contents:

SMS Modem

An external GSM modem device is required for sending SMS messages. First, you need to prepare a mobile phone SIM card and a GSM SMS Modem . Insert the SIM card into your modem and then, connect the modem and the firewall using a USB cable.

The following one models of SMS modem is recommended:

Model	Type	Interface
4G MODEM M1806-NC5	LTE(FDD) LTE(TDD) WCDMA TD-SCOMA GSM/GPRS/EDGE CDMA2000	USB interface
GSM MODEM M1206B	GSM	USB interface

System will show the modem connection status: correctly connected, not exist or no signal.

Configuring SMS Parameters

You can define the maximum SMS message number in one hour or in one day. If the messages exceed the maximum number, system will not make the modem to send messages, but it will keep a log for this behavior.

Option	Description
Maximum messages per hour	Defines the maximum message number the modem can send in one hour.
Maximum messages per day	Defines the maximum messages number the modem can send in one day.

Testing SMS

To test if the message sending works, you can send a test text to a mobile.

To send a text message to a specified mobile number, take the following steps:

1. Select **System > SMS Parameters**.
2. Enter a mobile phone number in the text box.
3. Click **Send**. If the SMS modem is correctly configured and connected, the phone using that number will receive a text message; if it fails, an error message will indicate where the error is.

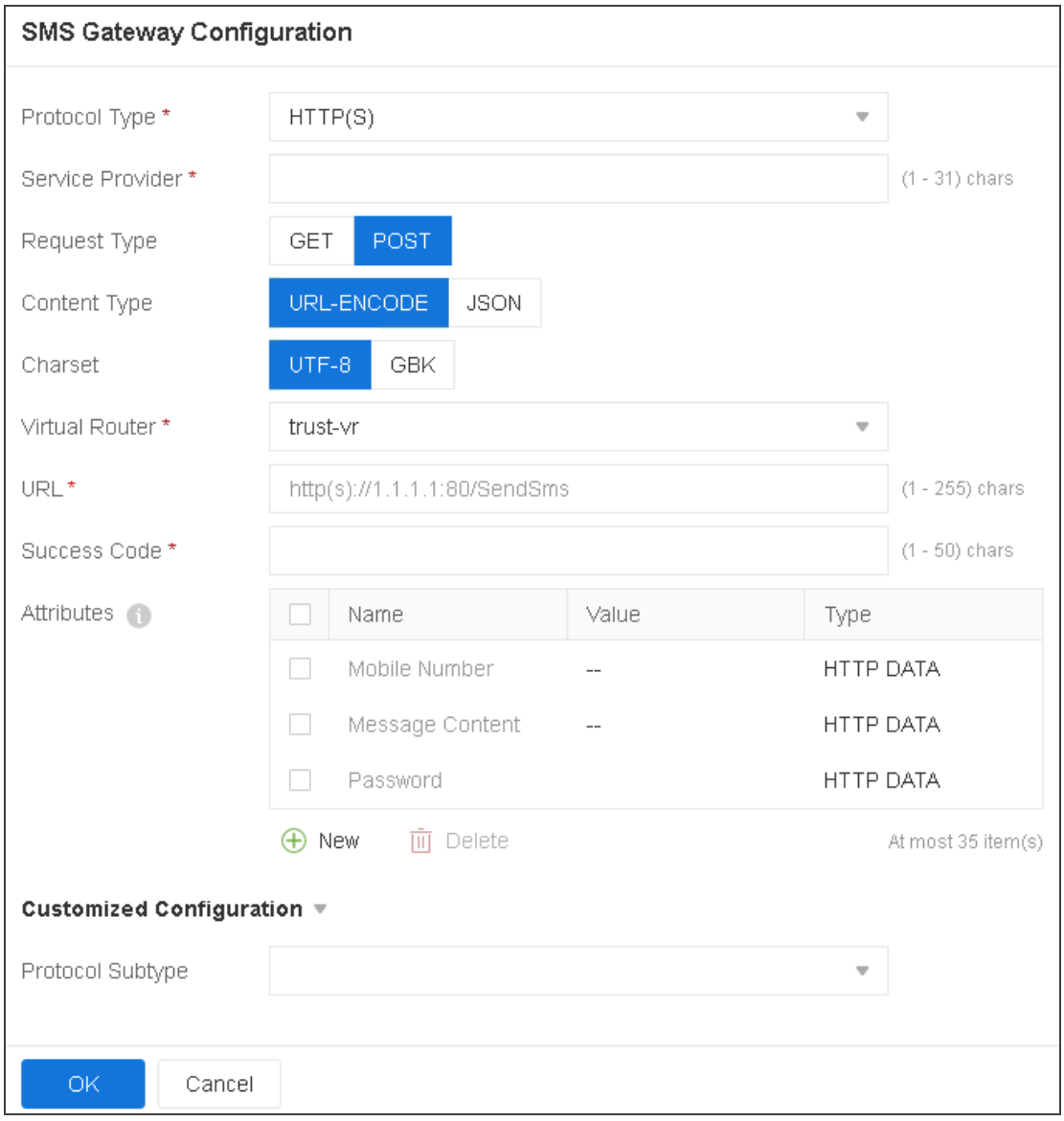
SMS Gateway

Configuring SMS Gateway

To configure the SMS gateway, take the following steps:

1. Select **System > SMS Parameters >SMS Gateway**.

2. Click **New**.



In the SMS Gateway Configuration dialog box, configure the following options.

Option	Description
Protocol Type	Specifies the protocol of SMS gateway. SGIP indic-

Option	Description
	ates the SGIP protocol of Chinaunicom. UMS indicates the enterprise information platform of Chinaunicom. ACC indicates the ACC protocol of Chinatelecom. ALIYUNSMS indicates the SMS service platform of Alibaba Cloud. XUANWU indicates the Xuanwu Technology SMS service platform. CAS indicates the 12302 SMS service platform. BEIKE indicates BEIKE SMS gateway. HTTP(S) indicates HTTP/HTTPS protocol.
Service Provider	Specifies the service provider name. The value range is 1 to 31.
Request Method	When the HTTP (S) protocol type is specified for the SP instance, you can specify the request method of HTTP(S). The default request method is POST.
Charset	When the HTTP (S) protocol type is specified for the SP instance, you can specify the charset of HTTP(S). The default charset is UTF-8.
UMS Protocol	When the protocol type is specified as "UMS", users can specify the UMS protocol type. The default protocol type is HTTPS.
Protocol	When the protocol type is specified as "ACC", "ALIYUNSMS", "CAS" or BEIKE, users can specify the protocol type. When the protocol type is specified as "CAS", the

Option	Description
	default protocol type is HTTPS. The default protocol type is HTTP for ACC and ALIYUNSMS, and HTTPS for BEIKE.
Virtual Router	Specifies the VRouter which gateway belongs to. The system supports multi-VR, and the default VR is trust-vr.
URL	When the HTTP (S) protocol type is specified for the SP instance, you can specify the URL of HTTP (S). You need to enter a complete access path, such as "http(s)://1.1.1.1:80/SendSms". The system requests to communicate with the SMS gateway based on the specified URL address. The range is 1 to 255 characters.
Success code	When the HTTP (S) protocol type is specified for the SP instance, you can specify the success code of HTTP(S). Success code is used to determine whether the SMS gateway successfully sent an authentication message. Refer to the status code in the SMS gateway manual. For example, if an SMS gateway sent an authentication message successfully, the status code returned is "OK: 325689", and if failed, the status number returned is "ERROR: eUser". In this instance, you can specify the success code as "OK". The range is 1 to 50 characters.

Option	Description
Attributes	When the HTTP (S) protocol type is specified for the SP instance, you can configure attributes to communicate with the SMS gateway. • The mobile number field specifies the parameter name of the mobile number. This is a default attribute and must be specified. The range is 1 to 20 characters. • The message content field specifies the parameter name of the authentication message. This is a default attribute and must be specified. The range is 1 to 20 characters. • The password field specifies the parameters of password to log in the SMS gateway. The parameter name and parameter value must exist at the same time or be empty. This is an optional attribute. The range of parameter name is 1 to 20 characters and the range of parameter value is 1 to 255 characters. • Click "New". Create an username field to specify the parameters of username to log in the SMS gateway. The parameter name and parameter value must exist at the same time or be empty. This is an optional property. The range of parameter name is 1 to 20 characters and the range of parameter value is 1 to 255 characters. You can create new attributes as needed, with up

Option	Description
	to 32 at the same time. Select the check box of the attributes bar and click "Delete".
Host	Specifies the gateway address.
Port	Specifies the port number of the gateway. When the protocol type is specified as "SGIP", the default port number is 8801; When the protocol type is specified as "ACC", the default port number is 80; When the protocol type is specified as "BEIKE", the default port number is 8086; When the protocol type is specified as "UMS", the default port number is 9600. When the protocol type is specified as "XUANWU" or "CAS", the default port number is 8080.
Device Code	Specifies the device code, the range is 1 to 4294967295. When the protocol type is specified as "SGIP", and before configuring the SMS gateway, you have to ask your supplier to provide the device ID of SP, which sends the SMS messges.
Source Number	When the protocol type is specified as "SGIP", and aftering enabling the SMS Authentication function, the system will send an Auth-message to the mobile phone number. Specifies the user's phone number, the range is 1 to 21.
Company Code	When the protocol type is specified as "UMS", users can specify the enterprise code registered on the UMS platform. The range is 1 to 31 digits.

Option	Description
Username	Specifies the username to log in SMS gateway. When the protocol type is specified as "UMS", "SGIP" or "CAS", the range is 1-31. When the protocol type is specified as "XUANWU", the range is 1-6.
Password	Specifies the password for the user. When the protocol type is specified as "UMS", "SGIP" or "CAS", the range is 1-31. When the protocol type is specified as "XUANWU", the range is 1-6.
Template Name	Specifies the template parameter of BEIKE SMS gateway.
Confirm Password	Re-type the password into the **Confirm Password** box to confirm.
SMS Limit/hour	Defines the maximum message number the gateway can send in one hour.
SMS Limit/day	Defines the maximum messages number the gateway can send in one day.
AccessKeyId	Specifies the AccessKeyId which will be used as the username for authentication between the device and the SMS gateway of Alibaba Cloud. This parameter should be the same with the template AccessKeyId applied in the SMS of Alibaba Cloud.
AccessKeySecret	Specifies the AccessKeySecret which will be used as the password for authentication between the device and the SMS gateway of Alibaba Cloud. This para-

Option	Description
	meter should be the same with the template AccessKeySecret applied in the SMS of Alibaba Cloud.
Confirm AccessKeySecret	Re-type the AccessKeySecret to confirm.
Trading Code	If the protocol of SMS gateway that the SP instance is running is XUANWU, you must ask the Xuanwu Technology SMS service platform for the trading code. The range is 1-7.
Channel	If the protocol of SMS gateway that the SP instance is running is XUANWU, you must ask the Xuanwu Technology SMS service platform for the channel. The range is a-z.
Request Type	If the protocol of SMS gateway that the SP instance is running is CAS, you can ask the 12302 SMS service platform for the request type. The range is 1-6.
Organization Code	If the protocol of SMS gateway that the SP instance is running is CAS, you can ask the 12302 SMS service platform for the organization code. The range is 1-31.
SMS Service Type	If the protocol of SMS gateway that the SP instance is running is CAS, you can ask the 12302 SMS service platform for the SMS service type. The range is 1-31.

Option	Description
Send Sign Code	When the protocol type is specified as "ACC", select the **Enable** check box to enable the Send Sign Code function. When this function is enabled, the ACC SMS gateway will add a sign code field when sending a request to the ACC server, which will prevent the content of the SMS from being tampered with.

Testing SMS

To test if the message sending works, you can send a test text to a mobile.

To send a text message to a specified mobile number, take the following steps:

1. Select **System > SMS Parameters >SMS Gateway**.
2. Click the "SMS test" link in the **SMS Test** column of the SMS gateway list.
3. In the **Mobile Phone Number** dialog box, enter a mobile phone number in the text box.
4. In the **Test Message Content** dialog box, enter the content of text messages sent to the specified phone number. The default value is "This is a test message, please don't feedback!".
5. Click **Send**. If the SMS modem is correctly configured and connected, the phone using that number will receive a text message; if it fails, an error message will indicate where the error is.

VSYS (Virtual System)

This feature may vary slightly on different platforms. If there is a conflict between this guide and the actual page, the latter shall prevail.

VSYS (Virtual System) logically divides the physical firewall into several virtual firewalls. Each virtual firewall can work independently as a physical device with its own system resources, and provides most firewall features. A VSYS is separated from other VSYS, and by default, they cannot directly communicate with each other.

VSYS has the following characteristics:

- Each VSYS has its own administrator;
- Each VSYS has an its own virtual router, zone, address book and service book;
- Each VSYS can have its own physical or logical interfaces;
- Each VSYS has its own security policies.

Notes:

- SG-6000-A1100、SG-6000-A1000、SG-6000-A200 and SG-6000-A200W do not support this function.
- The maximum VSYS number is determined by the platform capacity and license. You can expand VSYS maximum number by purchasing addition licenses.

VSYS Objects

This section describes VSYS objects, including root VSYS, non-root VSYS, administrator, VRouter, VSwitch, zone, and interface.

Root VSYS and Non-root VSYS

System contains only one root VSYS which cannot be deleted. You can create or delete non-root VSYSs after installing a VSYS license and rebooting the device. When creating or deleting non-root VSYSs, you must follow the rules listed below:

- When creating or deleting non-root VSYSs through CLI, you must be under the root VSYS configuration mode.
- Only the root VSYS administrators and root VSYS operators can create or delete non-root VSYS. For more information about administrator permissions, see "Device Management" on Page 1788.
- When creating a non-root VSYS, the following corresponding objects will be created simultaneously:
    - A non-root VSYS administrator named admin. The password is vsys_name-admin.
    - A VRouter named vsys_name-vr.
    - A L3 zone named vsys_name-trust.

  For example, when creating the non-root VSYS named vsys1, the following objects will be created:
    - The RXW administrator named admin with the password vsys1-admin.
    - The default VRouter named vsys1-vr.
    - The L3 zone named vsys1-trust and it is bound to vsys1-vr automatically.
- When deleting a non-root VSYS, all the objects and logs in the VSYS will be deleted simultaneously.
- The root VSYS contains a default VSwitch named VSwitch1, but there is no default VSwitch in a newly created non-root VSYS. Therefore, before creating l2 zones in a non-root VSYS, a

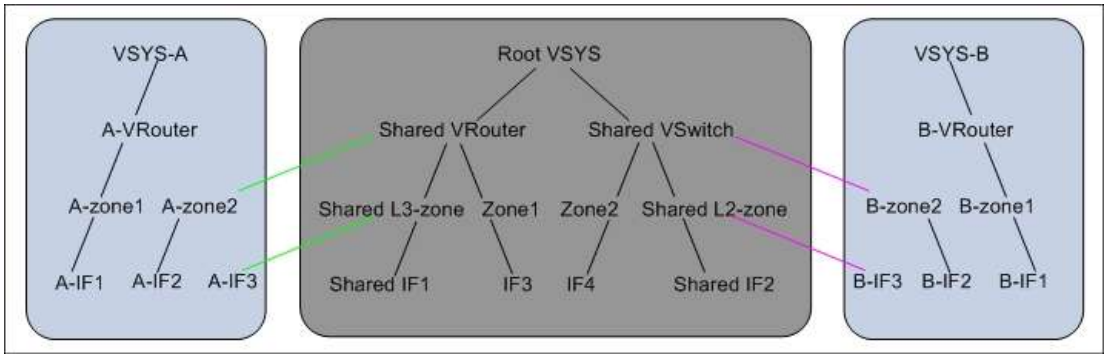
VSwitch must be created. The first VSwitch created in a non-root VSYS will be considered as the default VSwitch, and the l2 zone created in the non-root VSYS will be bound to the default VSwitch automatically.

VRouter, VSwitch, Zone and Interface

VRouter, VSwitch, zone, and interface in VSYS have two properties which are shared and dedicated. Objects with dedicated property are dedicated objects, while doing specific operations to the object with the shared property will make it a shared object. The dedicated object and shared object have the following characters:

- **Dedicated object**: A dedicated object belongs to a certain VSYS, and cannot be referenced by other VSYSs. Both root VSYS and non-root VSYS can contain dedicated objects.
- **Shared object**: A shared object can be shared by multiple VSYSs. A shared object can only belong to the root VSYS and can only be configured in the root VSYS. A non-root VSYS can reference the shared object, but cannot configure them. The name of the shared object must be unique in the whole system.

The figure below shows the reference relationship among dedicated and shared VRouter, VSwitch, zone, and interface.



As shown in the figure above, there are three VSYSs in StoneOS: Root VSYS, VSYS-A, and VSYS B.

Root VSYS contains shared objects (including Shared VRouter, Shared VSwitch, Shared L3-zone, Shared L2-zone, Shared IF1, and Shared IF2) and dedicated objects.

VSYS-A and VSYS-B only contain dedicated objects. The dedicated objects VSYS-A and VSYS-B can reference the shared objects in Root VSYS. For example, A-zone2 in VSYS-A is bound to the shared object Shared VRouter in Root VSYS, and B-IF3 in VSYS-B is bound to the shared object Shared L2-zone in Root VSYS.

Shared VRouter

A shared VRouter contains the shared and dedicated L3 zones of the root VSYS. Bind a L3 zone to a shared VRouter and configure this L3 zone to have the shared property. Then this zone becomes a shared zone.

Shared VSwitch

A shared VSwitch contains the shared and dedicated L2 zones of the root VSYS. Bind a L2 zone to a shared VSwitch and configure this L2 zone to have the shared property. Then this zone becomes a shared zone.

Shared Zone

The shared zones consist of L2 shared zones and L3 shared zones. After binding the L2 zone with the shared property to a shared VSwitch, it becomes a shared L2 zone; after binding the L3 zone with shared property to a shared VRouter, it becomes a shared L3 zone. A shared zone can contain interfaces in both root VSYS and non-root VSYS. All function zones cannot be shared.

Shared Interface

After binding an interface in the root VSYS to a shared zone, it becomes a shared interface automatically.

Interface Configuration

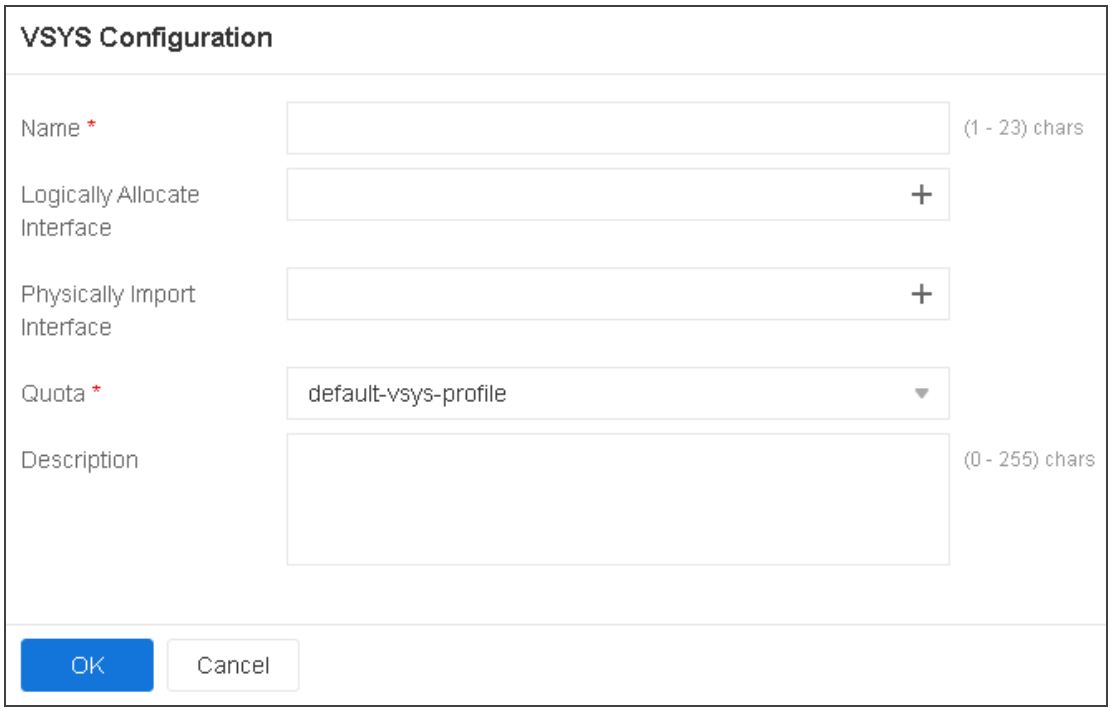
Only RXW administrator in the root VSYS can create or delete interfaces. Configurations to an interface and its sub-interfaces must be performed in the same VSYS.

Notes: Only adminitrator has the authority ot delete or create interfaces. If you are about to delete an interface and its-subinterfaces, you have to do it under the same VSYS.

Creating Non-root VSYS

To create a new non-root VSYS, take the following steps:

1. Select **System > VSYS > VSYS**.
2. Click **New** to add a non-root VSYS.
3. In the prompt, configure these values.



Option	Description
Name	Enter a name for the non-root VSYS.

Option	Description
Description	Enter the description information for the non-root VSYS.
Interface Binding	Select a physical or a logical interface. In VSYS, a physical interface can have its sub-interfaces, but logical interfaces cannot. • Physically Import: Select the interface you want, and click **Physically Import** to add it to the right pane. • Logically Allocate: Select the interface you want, and click **Logically Allocate** to add it to the right pane. • Release: Select the added interface(s), and click **Release** to delete it.
Quota	Select an existing quota.

4. Click **OK** to save configuration. The new VSYS will be seen in the VSYS list.

Configuring Dedicated and Shared Objects for Non-root VSYS

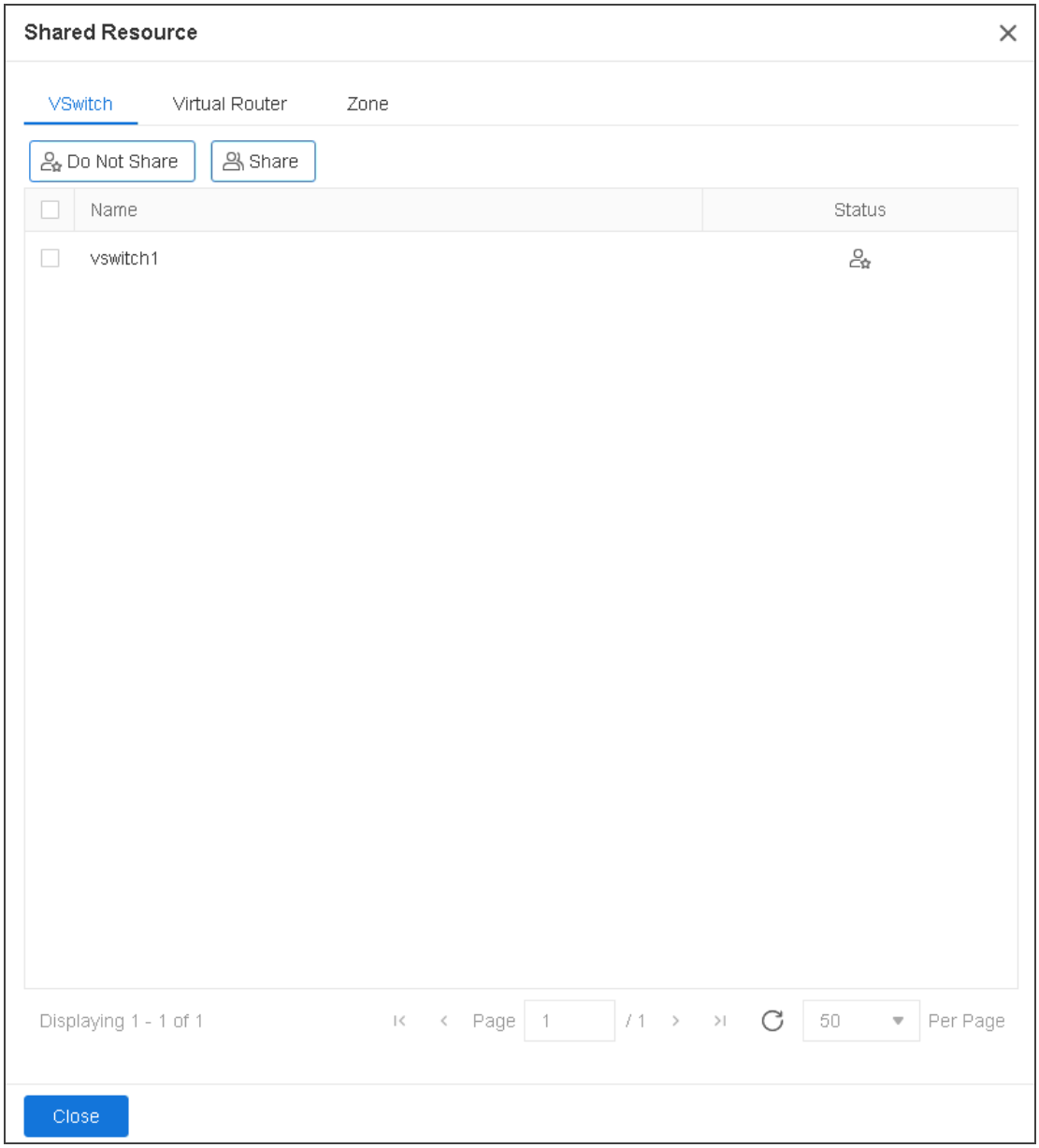
VRouter, VSwitch, zone, and interface in VSYS have two properties which are shared and dedicated. Objects with dedicated property are dedicated objects, while doing specific operations to the object with the shared property will make it a shared object. The dedicated object and shared object have the following characters:

- **Dedicated object**: A dedicated object belongs to a certain VSYS, and cannot be referenced by other VSYSs. Both root VSYS and non-root VSYS can contain dedicated objects.
- **Shared object**: A shared object can be shared by multiple VSYSs. A shared object can only belong to the root VSYS and can only be configured in the root VSYS. A non-root VSYS can

reference the shared object, but cannot configure them. The name of the shared object must be unique in the whole system.

To configure VSYS shared object, take the following steps:

1. Select **System > VSYS > VSYS**.
2. Click **Share Resource**.
3. In the prompt, configure these values for VSwitch, VRouter and Zone.



Option	Description
VSwitch	In the VSwtich tab, select a Vswitch and click **Share** to set it as a shared object; to make a VSwitch as a dedicated object, click **Do Not Share**.
Virtual	In the Virtual Router tab, select a Vswitch and click

Option	Description
Router	**Share** to set it as a shared object; to make a Virtual Router as a dedicated object, click **Do Not Share**.
Zone	In the Zone tab, select a Zone and click **Share** to set it as a shared object; to make a Zone as a dedicated object, click **Do Not Share**.

4. Click **Close** to exit.

Configuring VSYS Quota

VSYSs work independently in functions but share system resources including concurrent sessions, zone number, policy rule number, SNAT rule number, DNAT rule number, session limit rules number, memory buffer, URL resources, IPS resources, AV resources and PTF resources. You can specify the reserved quota and maximum quota for each type of system resource in a VSYS by creating a VSYS profile. Reserved quota refers to the resource number reserved for the VSYS; maximum quota refers to the maximum resource number available to the VSYS. The root administrator have the permission to create VSYS quota. The total for each resource of all VSYSs cannot exceed the system capacity.

To define a quota for VSYS, take the following steps:

1. Select **System > VSYS > Quota**.
2. Click **New** .
3. **In the prompt, configure these values.**


Quota Configuration
Name *
(1 - 31) chars
CPU
Limit
10000
(1 - 10,000)‰
Reserve
0
(0 - 10,000)‰
Alarm Threshold
0
(0, 50 - 99)%
If the threshold is reached, alarm logs will be recorded. 0 means no alarm
System Resources
Limit
Reserve (less than the limit)
Sessions
1062
(256 - 1,062)
0
Zone
17
(1 - 17)
0
Policy rules
50
(0 - 50)
0
Policy Groups
1000
(0 - 1,000)
0
Mini Policy Rules
50
(0 - 50)
0
SNAT rules
1024
(0 - 1,024)
0
DNAT rules
2048
(0 - 2,048)
0
Stat-set(session)
32
(0 - 32)
0
Stat-set(others)
32
(0 - 32)
0
IPSec
512
(0 - 512)
0
SCVPN users
100
(0 - 100)
0
Session Limit Rules
118
(0 - 118)
0
Keyword Categories
16
(0 - 16)
0
URL Regex Keywords
10
(0 - 10)
0
Keyword
128
(0 - 128)
0
New Session Rate
50000000
(10 - 50,000,000)
IQOS
Protection
Log Configuration
OK
Cancel

Option	Description
Basic Configuration	
Name	Enter a name for the new quota.
CPU	Specify values for parameters of CPU. • Limit: Specifies the maximum performance limit for processing 1 Mbps packets. • Reserve: A dedicated reservered value for CPU in this VSYS. The value range is 0 to 10000. • Alarm Threshold: Specifies a percentage value for alarms. When the CPU usage reaches this value, the system will generate alarm logs.
System Resources	
System Resources	Specify the maximum quota and reserved quota of system resources. • Sessions: Specifies the maximum and reserved number for sessions in the VSYS. • Zone: Specifies the maximum and reserved number for zones in the VSYS. • Policy rules: Specifies the maximum and reserved number for policy rules in the VSYS. • Policy Groups: Specifies the maximum and reserved number for policy groups in the VSYS.

Option	Description
Basic Configuration	
	• SNAT rules: Specifies the maximum and reserved number for SNAT rules in the VSYS. • DNAT rules: Specifies the maximum and reserved number for SNAT rules in the VSYS. • Stat-set (session): Specifies the maximum and reserved number for sessions of a staticstic set in the VSYS. • Stat-set (others): Specifies the maximum and reserved number for other items than sessions of a staticstic set in the VSYS. • IPSec: Specifies the maximum and reserved number for IPSec tunnels in the VSYS. • SCVPN users: Specifies the maximum and reserved number for SCVPN users. • Session Limit Rules: Specifies the maximum and reserved number for session limit rules in the VSYS. • Keyword Categories: Specifies the maximum and reserved number for keyword categories in the VSYS. • URL Regex Keywords: Specifies the maximum and

Option	Description
Basic Configuration	
	reserved number for regular expression keywords in a URL category in the VSYS. • Keyword: Specifies the maximum and reserved number for simple keywords in a URL category in the VSYS. • New Session Rate: Specifies the maximum number for the new session rate in the VSYS. • IQoS: Select the **Enable** check box to enable the QoS function and specifies the maximum and reserved number for root-pipe in the VSYS.
Protection	
AV Resources	Specify the maximum quota and reserved quota of AV resources. • AV: Select the **Enable** check box to enable the Anti-Virus function. • AV Profile: Specifies the maximum and reserved number for AV profiles in a VSYS. The range of maximum quota varies from 0 to 32. The reserved quota should not exceed the maximum quota. The default value of maximum quota is 32 and the default value of reserved quota is 0.

Option	Description
Basic Configuration	
URL Resources	Specify the maximum quota and reserved quota of URL resources. • URL: Select the **Enable** check box to enable the URL filter function. • URL Profiles: Specifies the maximum and reserved number for URL filter profiles in a VSYS. • URL Categories: Specifies the maximum and reserved number for user-defined URL categories in a VSYS. • URL: Specifies the maximum and reserved number for URLs in a VSYS.
IPS Resources	Specify the maximum quota and reserved quota of IPS resources. • IPS: Select the **Enable** check box to enable the IPS function. • IPS Profiles: Specifies the maximum and reserved number for IPS profiles in a VSYS. You can create up to four IPS profiles in a non-root VSYS. That is, the range of maximum quota is from 0 to 4. The default value is 4. The default value of reserved quota is 0, which means only predefined IPS Profiles can be used in non-root VSYS.

Option	Description
Basic Configuration	
Perimeter Traffic Filtering Resources	Enable or disable perimeter traffic filtering and configure user-defined black/white list resources in a VSYS Profile. • Perimeter Traffic Filtering: Select the **Enable** check box to enable the perimeter traffic filtering function.
Log Configuration	
Log Configuration	Specify the maximum quota and reserved quota of memory buffer for each type of log in a VSYS. The reserved quota should not exceed the maximum quota. If the logs' capacity in a VSYS exceeds its maximum quota, the new logs will override the earliest logs in the buffer. • Config Logs: Specify the maximum and reserved value of buffer for configuration logs in a VSYS. • Event Logs: Specify the maximum and reserved value of buffer for event logs in a VSYS. • Network Logs: Specify the maximum and reserved value of buffer for network logs in a VSYS. • Threat Logs: Specify the maximum and reserved value of buffer for threat logs in a VSYS.

Option	Description
Basic Configuration	
	• Session Logs: Specify the maximum and reserved value of buffer for session logs in a VSYS. • NAT Logs: Specify the maximum and reserved value of buffer for NAT logs in a VSYS. • Web Surfing: Specify the maximum and reserved value of buffer for websurf logs in a VSYS. • PBR: Surfing: Specify the maximum and reserved value of buffer for PBR logs in a VSYS.

4. Click **OK** to save settings. The new VSYS quota will be shown in the list.

Notes:

- Up to 128 VSYS quotas are supported.
- The default VSYS profile of the root VSYS named root-vsys-profile and the default VSYS profile of non-root VSYS named default-vsys-profile cannot be edited or deleted.
- Before deleting a VSYS profile, you must delete all the VSYSs referencing the VSYS profile.
- The maximum quota varies from one platform to another. The reserved quota cannot exceed maximum quota.

Entering the VSYS

To enter a root VSYS, take the following steps:

1. In your browser's address bar, type "https://IP" ("IP" is the management IP of the root VSYS) and press **Enter**.
2. In the login interface, type the username and password, which can be the username and password of the root administrator or the user configured in the authentication server (local server / Radius server / TACACS+ server) of the root VSYS.
3. Click **Login** and enter the root VSYS.

To enter a non-root VSYS, the following two ways are available:

The first way: to enter a non-root VSYS, take the following steps:

1. Enter a root VSYS.
2. In the root VSYS, create a non-root VSYS. For more information on creating non-root VSYS, see **System Management** > **VSYS(Virtual System)** in *StoneOS_WebUI_User_Guide*.
3. In your browser's address bar, type "https://IP" ("IP" is the management IP of the root VSYS) and press **Enter**.
4. In the login interface, type the username (vsys_name\admin) and password (vsys_name-admin) of the non-root administrator. For more information on configuring administrators, see **System Management** > **Device Management** in *StoneOS_WebUI_User_Guide*.
5. Click **Login** and enter the non-root VSYS.

The second way: the root VSYS administrator can enter the non-root VSYS from root VSYS. The administrator in the root VSYS can configure the functions of the non-root VSYS after entering it. To enter a non-root VSYS, take the following steps:

1. Enter a root VSYS.
2. Select **System > VSYS > VSYS** to enter the VSYS page.
3. In the VSYS list, click the name of non-root VSYS, and enter the non-root VSYS.

4. Return to the root VSYS, click in the right top corner of the page, and click **Return Root VSYS** in the pop-up dialog box.

   Note: If you enter the non-root VSYS directly, you cannot back to the root VSYS.

Secure Connect Client Management

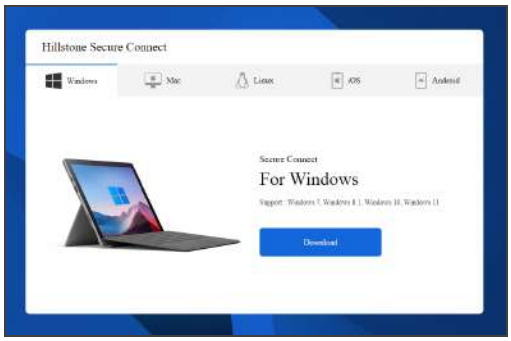
End users can download Secure Connect clients at the following addresses:

- Client download address on the device: https://IP-Address:Port-Number. The "IP-Address" and "Port-Number" refer to the IP address of the egress interface and HTTPS port number specified in the configuration of the SSL VPN or ZTNA instance.
- Client download address provided by Hillstone Networks Official Website https://www.hillstonenet.com/more/services/product-downloads/.

By default, the two addresses use the same download source, and the downloaded Secure Connect client is also the same.

Customizing Secure Connect Download Page

You can customize the title and background of the download address on the device. The default download page is shown as below:



To customize the Secure Connect download page, take the following steps:

1. Select **System > Secure Connect Client Management**.
2. In the "Configure Secure Connect Client Download Page" area, click **Upload Background Picture > Browse** to select the background picture. The picture needs to be PNG format. The recommended resolution is 1920px*1080px. The size cannot exceed 2MB.
3. Click **Upload** to upload the background picture to system. After uploading successfully, you will have completed the background picture modification.
4. Enter the title in the **Download Page Tittle** box to customize the title of the download page. The length is 1 to 63 characters.
5. Click **OK** to save the settings. Clicking **Cancel** will only affect the authentication page title modification.

If you want to restore the default picture, click **Restore Default Background** . Then click **OK**.

Customizing Client Download Source

By default, the client download source on the device is the same with that on Hillstone Networks Official Website. In the application scenario where you want end users to download and use specific Secure Connect clients, such as a client of the specified version or a customized client, you can import the client into the system to overwrite the default download source on the device. You can import Windows, macOS and Linux type clients.

To import the client, take the following steps:

1. Select **System > Secure Connect Client Management**.
2. In the "Secure Connect Client List" area, locate the type of client to be imported and click **Upload**.
3. In the "Upload Secure Connect Client for Windows/macOS/Linux" dialog box, click **Browse** and select the client file to be imported, and click **Upload**. The file name should be in the "xxx_version_check.exe/run/dmg/pkg" format. "xxx" indicates the file name; "version"indicates the client version, starting with the letter "v"; "exe" is the extension for Windows type client file; "run" is the extension for Linux type client file; "dmg" and "pkg" are the extensions for macOS type client file. The file size cannot exceed 100MB. An example is "secure-connect_v1.4.9.2000_1a6755fe.exe".
4. After uploading, the download source for this client will change from "Offical" to "Local" in the "Secure Connect Client List".
5. Click **Download** to check the downloaded client is the imported one.
6. Click **Delete** to delete the imported client. After the imported client is deleted, the download source will be resorted to "Official".

The Maximum Concurrent Sessions

If multi-VR, AV, IPS, URL signature database, Sandbox, Anti-Spam, Botnet Prevention and/or NetFlow is enabled on devices, or IPv6 firmware version is used, the maximum concurrent sessions might change. For more information, see the table below:

Platform / Expansion Module	Firmware	Max Concurrent Sessions
E3965, E5168, E5260, E5268, E5560, E5568, E5660, E5760, E5960, E6160, E6168, E6360, E6368	StoneOS IPv4 version	• With multiple virtual routers enabled: the maximum concurrent sessions will drop by 15%. The formula is: Actual maximum concurrent sessions = original maximum concurrent sessions* (1-0.15); • With anti-virus, IPS, URL signature database, Sandbox, Anti-Spam and/or Botnet Prevention enabled: the maximum concurrent sessions will drop by 50%. The formula is: Actual maximum concurrent sessions = original maximum concurrent sessions* (1-0.5); • With multiple virtual routers plus anti-virus, IPS, URL signature database, Sandbox, Anti-Spam and/or Botnet Prevention enabled simultaneously, the maximum concurrent sessions will further drop by 50%. The formula is: Actual maximum concurrent sessions = original maximum concurrent sessions* (1-0.15)*(1-0.5);

Platform / Expansion Module	Firmware	Max Concurrent Sessions
		• With NetFlow enabled: the maximum concurrent sessions will drop by 25%. The formula is: Actual maximum concurrent sessions = original maximum concurrent sessions* (1-0.25); • With multiple virtual routers and NetFlow plus anti-virus, IPS, URL signature database, Sandbox, Anti-Spam and/or Botnet Prevention enabled simultaneously, the maximum concurrent sessions will further drop. The formula is: Actual maximum concurrent sessions = original maximum concurrent sessions* (1-0.15)*(1-0.25)*(1-0.5).
	StoneOS IPv6 version	• The original maximum concurrent sessions of the IPv6 version is 75% of that of the IPv4 version; • With multiple virtual routers, anti-virus, IPS, URL signature database, Sandbox, Anti-Spam, Botnet Prevention and/or NetFlow enabled on the system , the change of the maximum concurrent sessions in the IPv6 version is the same as that in the IPv4 version.
Other SG-6000 E-series devices	StoneOS IPv4 version	• With multiple virtual routers enabled: the maximum concurrent sessions will drop by 15%. The formula is: Actual maximum concurrent ses-

Platform / Expansion Module	Firmware	Max Concurrent Sessions
except the devices listed above		sions = original maximum concurrent sessions* (1-0.15); • With anti-virus, IPS, URL signature database, Sandbox, Anti-Spam and/or Botnet Prevention enabled: the maximum concurrent sessions will drop by 50%. The formula is: Actual maximum concurrent sessions = original maximum concurrent sessions* (1-0.5); • With multiple virtual routers plus anti-virus, IPS, URL signature database, Sandbox, Anti-Spam and/or Botnet Prevention enabled simultaneously, the maximum concurrent sessions will further drop by 50%. The formula is: Actual maximum concurrent sessions = original maximum concurrent sessions* (1-0.15)*(1-0.5); • With NetFlow enabled: the maximum concurrent sessions will drop by 25%. The formula is: Actual maximum concurrent sessions = original maximum concurrent sessions* (1-0.25); • With multiple virtual routers and NetFlow plus anti-virus, IPS, URL signature database, Sandbox,

Platform / Expansion Module	Firmware	Max Concurrent Sessions
		Anti-Spam and/or Botnet Prevention enabled simultaneously, the maximum concurrent sessions will further drop. The formula is: Actual maximum concurrent sessions = original maximum concurrent sessions* (1-0.15)*(1-0.25)*(1-0.5).
	StoneOS IPv6 version	• The original maximum concurrent sessions of the IPv6 version is 50% of that of the IPv4 version; • With multiple virtual routers, anti-virus, IPS, URL signature database, Sandbox, Anti-Spam, Botnet Prevention and/or NetFlow enabled on the system , the change of the maximum concurrent sessions in the IPv6 version is the same as that in the IPv4 version.