Table 29. OpenManage Mobile subscriber information (continued)

Field	Description
USER NAME	Name of the OpenManage Mobile user.
DEVICE ID	Unique identifier of the mobile device.
DESCRIPTION	Description about the mobile device.
FILTER	Filters are policies that the subscriber has configured for alert notifications.
LAST ERROR	The date and time the last error occurred when sending an alert notification to the OpenManage Mobile user.
LAST PUSH	The date and time the last alert notification was sent successfully from OpenManage Enterprise to the Alert Forwarding Service.
LAST CONNECTION	The date and time the user last accessed OpenManage Enterprise through OpenManage Mobile.
REGISTRATION	The date and time the user added OpenManage Enterprise in OpenManage Mobile.

Troubleshooting OpenManage Mobile

If OpenManage Enterprise is unable to register with the Message Forwarding Service or successfully forward notifications, the following resolutions are available:

Table 30. Troubleshooting OpenManage Mobile

Problem	Reason	Resolution
OpenManage Enterprise is unable to connect to the Dell Message Forwarding Service. [Code 1001/1002]	Outbound Internet (HTTPS) connectivity is lost.	By using a web browser, check if outbound Internet connectivity is available. If connection is unavailable, complete the following network troubleshooting tasks: • Verify if the network cables are connected. • Verify the IP address and DNS server settings. • Verify if the firewall is configured to allow outbound traffic. • Verify if the ISP network is operating normally.
	Proxy settings are incorrect.	Set proxy host, port, username, and password as required.
	Message Forwarding Service is temporarily unavailable.	Wait for the service to become available.
The Message Forwarding Service is unable to connect to a device platform notification service. [Code 100-105, 200-202, 211-212]	The platform provider service is temporarily unavailable to the Message Forwarding Service.	Wait for the service to become available.
The device communication token is no longer registered with the platform provider service. [Code 203]	The OpenManage Mobile application has been updated, restored, uninstalled, or the device operating system has been upgraded or restored.	Reinstall OpenManage Mobile on the device or follow the OpenManage Mobile troubleshooting procedures specified in the *OpenManage Mobile User's*

Table 30. Troubleshooting OpenManage Mobile (continued)

Problem	Reason	Resolution
		Guide and reconnect the device to OpenManage Enterprise. If the device is no longer connected to OpenManage Enterprise, remove the subscriber.
The OpenManage Enterprise registration is being rejected by the Message Forwarding Service. [Code 154]	An obsolete version of OpenManage Enterprise is being used.	Upgrade to a newer version of OpenManage Enterprise.

Related tasks

OpenManage Mobile settings on page 185

Related information

OpenManage Mobile settings on page 185

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Other references and field descriptions

Definitions about some of the commonly displayed fields on the OpenManage Enterprise Graphical User Interface (GUI) are listed and defined in this chapter. Also, other information that is useful for further reference is described here.

Topics:

Firmware and DSU requirement for HTTPS

If you have enabled the use of HTTPS for network share operations, then the servers must have the following minimum firmware and DSU to support the HTTPS-enabled device operations:

Use Case / Operation	YX2X (12G) or YX3X (13G) servers	YX4X (14G) and above servers
Firmware Update	FW v. 2.70.70.70	FW v. 3.00.00.00
Driver Update	DSU v.1.9.1	DSU v.1.9.1
Server Configuration Profile (SCP) for template capture, deployment, configuration inventory, and remediation)	FW v. 2.70.70.70	FW v. 3.00.00.00
Technical Support Report (TSR)	N/A	FW v. 3.21.21.21
Remote Diagnostics	N/A	FW v. 3.00.00.00

Schedule Reference

- **Update Now**: The firmware version is updated and matched to the version available in the associated catalog. To make the update become effective during the next device restart, select the **Stage for next server reboot** check box.
- **Schedule Later**: Select to specify a date and time when the firmware version must be updated.

Firmware baseline field definitions

- **COMPLIANCE**: The health status of the firmware baseline. Even if one device associated with a firmware baseline is in critical health status, the baseline health itself is declared as critical. This is called the rollup health status, which is equal to the status of the baseline that has high severity. For more information about Rollup Health status, see the *MANAGING THE ROLLUP HEALTH STATUS BY USING IDRAC ON THE DELL EMC 14TH GENERATION AND LATER POWEREDGE SERVERS* white paper on the Dell TechCenter.
- **NAME**: The firmware baseline name. Click to view the baseline compliance report on the **Compliance Report** page. For more information about creating a firmware baseline, see Create a firmware/driver baseline on page 84.
- **CATALOG**: The firmware catalog to which the firmware baseline belongs to. See Manage firmware and driver Catalogs on page 81.
- **LAST RUN TIME**: The time when the baseline compliance report is last run. See Check the compliance of a device firmware and driver on page 86.

Supported and unsupported actions on 'Proxied' sleds

Some device actions are not available for sleds in a 'Proxied' Managed State. The following table shows supported and unsupported Redfish- actions on the proxied sleds.

Capability_ID	Action	Action_Description	RedFish
1	POWER_CONTROL_ ON	Power up	YES
2	POWER_CONTROL_ OFF	Power Down hard/graceful	YES
3	POWER_CONTROL_ RESET	Power reset hard/graceful	YES
4	SENSOR_DETAILS	Get Sensor Info, sub system health details	**No**
5	POWER_MONITOR	Power statistics retrieval	YES
6	TEMPERATURE_MO NITOR	Temp statistics retrieval	YES
8	FW_UPDATE	Remote Firmware update capability.	YES
9	BLINK LED	Identify function on server	YES
11	HW_LOGS	System Hardware logs	YES
12	DIAGS	Diagnostics	**No**
13	TSR	Tech Support Report	**No**
16	VIRTUAL_CONSOLE	Ability to execute RACADM tasks	**No**
30	REMOTE_RACADM	14G specific features	**No**
31	REMOTE_IPMI	14G specific features	**No**
32	REMOTE_SSH	14G specific features	**No**

Schedule job field definitions

- **Run now** to start the job immediately.
- **Run Later** to specify a later date and time.

- **Run On Schedule** to run repeatedly based on a selected frequency. Select **Daily**, and then select the frequency appropriately.

NOTE: By default, the job scheduler clock is reset at 12:00 A.M. everyday. The cron format does not consider the job creation time while calculating the job frequency. For example, if a job is started at 10:00 A.M. to run after every 10 hours, the next time the job runs is at 08:00 P.M. However, the subsequent time is not 06:00 A.M. next day but 12:00 A.M. This is because the scheduler clock is reset at 12:00 A.M. everyday.

Alert categories after EEMI relocation

Table of EEMI relocations

Table 31. Alert categories in OpenManage Enterprise

Previous Category	Previous Subcategory	New Category	New Subcategory
Audit	Devices	System Health	Devices
Audit	Devices	Configuration	Devices
Audit	Devices	Configuration	Devices
Audit	Devices	Configuration	Devices
Audit	Devices	Configuration	Devices
Audit	Application	Configuration	Application
Audit	Application	Configuration	Application
Audit	Application	Configuration	Application
Audit	Application	Configuration	Application
Audit	Devices	Audit	Users
Audit	Templates	Configuration	Templates
Audit	Templates	Configuration	Templates
Audit	Templates	Configuration	Templates
Audit	Templates	Configuration	Templates
Audit	Templates	Configuration	Templates
Configuration	Inventory	Configuration	Job
Configuration	Inventory	Configuration	Job
Configuration	Inventory	Configuration	Job
Configuration	Inventory	Configuration	Devices
Configuration	Inventory	Configuration	Devices
Configuration	Inventory	Configuration	Devices
Configuration	Firmware	Configuration	Jobs
Configuration	Firmware	Configuration	Jobs
Miscellaneous	Jobs	Configuration	Jobs
Miscellaneous	Jobs	Configuration	Jobs
Miscellaneous	Jobs	Configuration	Jobs
Miscellaneous	Generic	Configuration	Generic
Miscellaneous	Generic	Configuration	Generic

Table 31. Alert categories in OpenManage Enterprise (continued)

Previous Category	Previous Subcategory	New Category	New Subcategory
Miscellaneous	Generic	Configuration	Generic
Miscellaneous	Generic	Configuration	Generic
Miscellaneous	Generic	Configuration	Generic
Miscellaneous	Generic	Configuration	Generic
Miscellaneous	Generic	Configuration	Generic
Miscellaneous	Generic	Configuration	Generic
Miscellaneous	Devices	Configuration	Devices
Miscellaneous	Devices	Configuration	Devices
Audit	Security	Configuration	Security
Audit	Security	Configuration	Security
Audit	Security	Configuration	Security

Token substitution in remote scripts and alert policy

OpenManage Enterprise supports use of tokens to enhance remote scripting and creation of the alert policies.

Table 32. Tokens supported in OpenManage Enterprise

Tokens	Description
$IP	Device IP Address
$MSG	Message
$DATE	Date
$TIME	Time
$SEVERITY	Severity
$SERVICETAG	Service tag
$RESOLUTION	Recommended Resolution
$CATEGORY	Alert Category Name
$ASSETTAG	Asset tag
$MODEL	Model Name
$HOSTNAME	FQDN or Hostname (if FQDN is not present)

Field service debug workflow

In OpenManage Enterprise, you can authorize console debugging by using the Field Service Debug (FSD) option.

About this task

By using FSD, you can perform the following tasks:

- Allow enabling and copying of debug logs
- Allow copying of real-time logs
- Allow backing up or restoring of database to VM.

The topics referenced in each task provide detailed instructions. To enable FSD, perform the following tasks:

Steps

1. Unblock FSD capability. See Unblock the FSD capability on page 195.
2. Install or grant signed FSD DAT.ini file. See Install or grant a signed FSD DAT.ini file on page 195.
3. Invoke FSD. See Invoke FSD on page 196.
4. Disable FSD. See Disable FSD on page 196.

Unblock the FSD capability

About this task

You can unblock the FSD capability through the TUI screen.

Steps

1. Navigate to the TUI main menu.
2. On the TUI screen, to use the FSD option, select **Enable Field Service Debug (FSD) Mode**.
3. To generate a new FSD unblock request, on the **FSD Functions** screen, select **Unblock FSD Capabilities**
4. To determine the duration of the debug capabilities being requested, select a start and end date.
5. On the **Choose Requested Debug Capabilities** screen, select a debug capability from a list of debug capabilities unique to the console. In the lower-right corner, select **Generate**.

   NOTE: The debug capability that is currently supported is `RootShell`.

   a. You can download the generated .dat file from the **Audit Logs** > **Troubleshoot** menu in UI. Then, to complete the FSD enablement, upload the signed .dat file and SSH public key using the Upload options under the **Troubleshoot** menu.
   b. If you have enabled CIFS share using the **Enable CIFS share for FSD (emergency use only)** option in TUI, then, use **Install/Grant Signed FSD DAT File** on the FSD Functions screen. See Install or grant a signed FSD DAT.ini file on page 195
6. On the **Download DAT file** screen, view the signing instructions and the URL address of the share where the DAT.ini file exists.
7. Use an external client to extract the DAT.ini file from the URL address of the share mentioned in step 6.

   NOTE:
   - The download share directory has read-only privileges and supports only one DAT.ini file at a time.
   - If the DAT file is downloaded as DAT.txt, you must rename it to DAT.ini.
8. Perform either of the following tasks depending on whether you are an external user or an internal Dell EMC user:
   - Send the DAT.ini file to a Dell EMC contact for signing if you are an external user.
   - Upload the DAT.ini file to appropriate Dell Field Service Debug Authentication Facility (FSDAF) and submit.
9. Wait for a Dell EMC signed and approved DAT.ini file to be returned.

Install or grant a signed FSD DAT.ini file

Prerequisites

Ensure that you have received the DAT.ini file, which is signed and approved by Dell EMC.

About this task

NOTE:
- If the DAT file is downloaded as DAT.txt, you must rename it to DAT.ini.
- After Dell EMC approves the DAT.ini file, you must upload the file to the console appliance that generated the original unblock command.

Steps

1. To upload a signed DAT.ini file, on the **FSD Functions** screen, select **Install/Grant Signed FSD DAT File**.

NOTE: The upload share directory has write-only privileges and supports only one DAT.ini file at a time. The DAT.ini file size limit is 4 KB.

2. On the **Upload signed DAT file** screen, follow the instructions about uploading the DAT.ini file to a given file share URL.
3. Use an external client to upload the DAT.ini file to a share location.
4. On the **Upload signed DAT file** screen, select **I have uploaded the FSD DAT file**.

Results

If there are no errors during DAT.ini file upload, a message confirming the successful installation of the certificate is displayed. To continue, click **OK**.

The DAT.ini file upload can fail because of any of the following reasons:

- The upload share directory has insufficient disk space.
- The uploaded DAT.ini file does not correspond to the previous debug capability request.
- The signature provided by Dell EMC for the DAT.ini file is not valid.

Invoke FSD

Prerequisites

Ensure that the DAT.ini file is signed, returned by Dell EMC, and uploaded to OpenManage Enterprise.

Steps

1. To invoke a debug capability, on the **FSD Functions** screen, select **Invoke FSD Capabilities**.
2. On the **Invoke Requested Debug Capabilities** screen, select a debug capability from a list of debug capabilities that is approved in the Dell EMC signed DAT.ini file. In the lower-right corner, click **Invoke**.

   NOTE: The debug capability that is currently supported is, `RootShell`.

Next steps

While the `invoke` command is run, OpenManage Enterprise can start an SSH daemon. The external SSH client can attach with OpenManage Enterprise for debugging purposes.

Disable FSD

About this task

After you invoke a debug capability on a console, it continues to operate until the console is restarted, or the debug capability is stopped. Else, the duration determined from the start and end date exceeds.

Steps

1. To stop the debug capabilities, on the **FSD Functions** screen, select **Disable Debug Capabilities**.
2. On the **Disable Invoked Debug Capabilities** screen, select a debug capability or capabilities from a list of currently invoked debug capabilities. From the lower right corner of the screen, select **Disable**.

Results

Ensure that you stop any SSH daemon or SSH sessions that are currently using the debug capability.

Catalog Management field definitions

CATALOG NAME: Name of the catalog. Built-in catalogs cannot be edited.

DOWNLOAD: Indicates the download status of catalogs from its repository folder. Statuses are: Completed, Running, and Failed.

REPOSITORY: Repository types such as Dell.com, CIFS, and NFS.

REPOSITORY LOCATION: Location where the catalogs are saved. Examples are Dell.com, CIFS, and NFS. Also, indicates the completion status of a job running on the catalog.

CATALOG FILE: Type of catalog file.

CREATED DATE: Date when the catalog file was created.

Firmware/driver compliance baseline reports—devices with 'Unknown' compliance status

The firmware or driver compliance status of the following storage, networking, and hyperconverged infrastructure (HCI) devices in the firmware/driver baseline compliance reports is displayed as Unknown as the Dell firmware/driver catalog does not support the firmware or software updates for these devices.

Table 33. Firmware/driver compliance baseline reports—'false' compliant devices

Device Category	Device List
Storage	• SC Series • MD Series • ME Series
Network devices in the FX2, VRTX, and M1000e chassis	• F10 switches • IOAs (Input/Output Aggregators) • IOMs (Input/Output Modules)
Hyperconverged Appliances (HCI)	• VXRail • XC Series
Devices updatable using individual device's Dell Update Package (DUP) but not directly supported on Dell catalog	• MX9116n Fabric Engine • MX5108n Ethernet Switch • PowerEdge MX5000s
Devices that cannot be updated using the Dell catalog or the individual DUP ⓘ NOTE: For firmware/driver update of these devices, please refer the respective device's Installation Guide.	• MX7116n Fabric Expander Module • PowerEdge MX 25GbE PTM

ⓘ NOTE: For the complete list of devices in the SC, MD, ME, and XC series, refer https://topics-cdn.dell.com/pdf/dell-openmanage-enterprise_compatibility-matrix2_en-us.pdf

Generic naming convention for Dell EMC PowerEdge servers

To cover a range of server models, the PowerEdge servers are now be referred to using the generic naming convention and not their generation.

This topic explains how to identify the generation of a PowerEdge server that are referred to using the generic naming convention.

Example:

The R740 server model is a rack, two processor system from the 14th generation of servers with Intel processors. In the documentation, to refer to R740, generic naming convention **YX4X** server is used, where:

- The letter **Y** (alphabet) is used to denote the following server form factors:
  - **C** = Cloud - Modular server nodes for hyper-scale environments
  - **F** = Flexible - Hybrid rack-based sleds for rack-based FX2/FX2s enclosure
  - **M** or **MX*** = Modular - Blade servers for the modular enclosure MX7000, M1000e and/or VRTX
  - **R** = Rack-mountable servers

- **T** = Tower Servers

- The letter **X** (digit) denotes the class (number of processors) of the server.
- The digit **4** denotes the generation of the server.
- The letter **X** (digit) denotes the make of the processor.

Table 34. PowerEdge servers naming convention and examples

YX3X servers	YX4X systems
PowerEdge M630	PowerEdge M640
PowerEdge M830	PowerEdge R440
PowerEdge T130	PowerEdge R540

DELL EMC

OpenManage Enterprise Solution Brief

Many IT organizations are dealing with increased workloads and decreased budgets. Under these conditions, IT professionals often have less time and fewer resources. It is critical for IT professionals to work smarter.

Dell EMC OpenManage Enterprise is an intuitive infrastructure management console. It is designed to take the complexity out of IT infrastructure management. It delivers better results with less time and fewer steps. OpenManage Enterprise helps IT professions balance time and energy between complex IT infrastructure and business goals.

SIMPLIFY

Robust, intuitive, management capabilities, regardless of form-factor

UNIFY

One-to-many management from a single console: built for scale

AUTOMATE

Automated IT processes for greater efficiency

SECURE

Design for security throughout the infrastructure lifecycle

Dell EMC OpenManage Enterprise

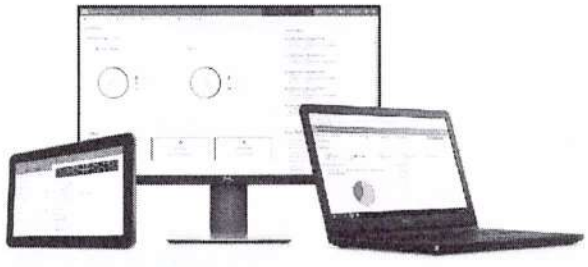
Simplify: OpenManage Enterprise reduces learning time with HTML5 GUI with elastic search engine. It navigates to critical information and tasks easier and quicker. The automatable processes, templates and policies can be created and edited through a simple menu driven method.

Unify: OpenManage Enterprise supports up to 8,000 devices regardless of form factors. It supports Dell EMC PowerEdge racks, towers, and modular servers. It also monitors and creates alerts for third-party devices or PowerVault MD and ME Storage systems.

The innovative plugin design provides future extendibility. Through the same interface, plugins can be easily installed, updated and disabled. The first plugin will be OpenManage Enterprise – Power Manager.[1]

Automate: From discovery to retirement, activities can be managed in the same console. In minutes, devices can be deployed automatically with templates based on service tags or node IDs.

Secure: Security is always the top priority. To protect your infrastructure, OpenManage Enterprise detects drift from a user-defined configuration template, alerts users, and remediates misconfigurations based on pre-setup policies.



Dell EMC OpenManage Enterprise systems management console

Advantages

Reduce the time and effort required to manage IT environments seamlessly with one unified tool

- Monitor third-party infrastructure in the same tool
- Require minimal training through an intuitive dashboard and elastic search engine
- Reduce repetitive tasks with templates
- Deploy as a secure virtual appliance, supporting ESXi, Hyper-V and KVM environments
- Integrate the OpenManage Mobile application to receive alerts anytime, anywhere

[1] Dell EMC OpenManage Power Manager will be launched in July 2019

Simplify – robust, intuitive, management capabilities, regardless of form-factor

Features	Description	Benefits
Modern user interface with elastic search capabilities	Leverage the modern HTML5 standard while enabling an elastic search engine. Allow IT pros to find anything within the console in a single search	Minimize training time and maximize efficiency by delivering quick results on searches involving devices, hardware, and software inventory
Flexible mobile notifications	Integrate the OpenManage Mobile application to stay connected with your data center	Provide visible notification to the IT infrastructure and data center events anytime, anywhere
Full-lifecycle configuration management	Manage, deploy, and monitor server, chassis, and IOA through editable templates	Gain time back to focus on management tasks that drive more value for your business and your customers
Accurate log information	Locate root causes with detailed log information	Gain immediate insights for remediations

Unify – One-to-many management from a single console; built for scale

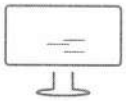
Features	Description	Benefits
Full infrastructure management	Manage up to 8,000 devices regardless of form factors - PowerEdge tower, rack, and modular. Monitor 3rd party infrastructure	Reduce the time and effort required to manage and monitor IT environments seamlessly
Extendable plug-in architecture	Extend management capabilities with an intuitive plug-in architecture that integrates data center management tasks into a single interface	Streamline and enable power management from the intuitive OpenManage Enterprise interface
Extended modular support	Support modular servers, storage, and networking sleds with OpenManage Enterprise - Modular edition	Require minimal training through integration between OpenManage Enterprise and OpenManage Enterprise - Modular Edition

Automate – Automated IT processes for greater efficiency

Features	Description	Benefits
Streamlined remote management	Create a series of remote commands in a single batch, run immediately or schedule for later	Maximize IT efficiency and minimize IT downtime by automating a series of tasks
Automated server deployment	Automatically apply a template to selected devices based on service tag or node IDs	Decrease deployment time while preventing costly errors and downtime
Dynamic update repository refresh	Create or schedule searches for new available updates on Dell.com or through Dell Repository Manager. Maintain up-to-date repositories from OpenManage Enterprise interface	Maximize efficiency by identifying new available updates for systems or software within users' infrastructure
Customizable reports	Create customized reports to fit your business needs – for example, to quickly locate and filter NIC card information when there is a recall by vendor	Align automated reports to your business needs

Secure – Design for security

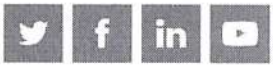
Features	Description	Benefits
Packaged as a virtual appliance	Readily deploy as a virtual appliance in ESXi, Hyper-V and KVM environments	High security standard throughout appliance testing, development, deployment, and user experience
Configuration and firmware drift detection	Create firmware and configuration baselines for compliance monitoring and enable automated updates on your schedule	Employ baselines to maintain security standards, performance optimizations and management conformity
Customizable alert policies	Build and design customized alert notifications that align with your business needs – detect, notify, and remediate	Improve efficiency and security by alerting the right contacts at the right time in the right way



Learn more about Dell EMC OpenManage Enterprise

Contact a Dell EMC Expert

View more resources



Join the conversation with #HashTag

DELL EMC

Dell Technologies PowerEdge RAID Controller 11 User's Guide

PERC H755 adapter, H755 front SAS, H755N front NVMe, H755 MX adapter, H750 adapter SAS, H355 adapter SAS, H355 front SAS, and H350 adapter SAS

Regulatory Model: UCPA-1101, UCPF-1100, UCPF-1110, UCPN-1100, UCSA-1111, and UCSF-1100
December 2021
Rev. A03

DELL Technologies

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

1

Dell Technologies PowerEdge RAID Controller 11

Dell Technologies PowerEdge RAID Controller 11, or PERC 11 is a series of RAID disk array controllers made by Dell for its PowerEdge servers. The PERC 11 series consists of the PERC H755 adapter, PERC H755 front SAS, and PERC H755N front NVMe, PERC H750 adapter SAS, PERC H755 MX adapter, PERC H355 adapter SAS, PERC H355 front SAS, and PERC H350 adapter SAS cards which have the following characteristics:

- Provides reliability, high performance, and fault-tolerant disk subsystem management
- Offers RAID control capabilities including support for RAID levels 0, 1, 5, 6, 10, 50, 60
- Complies with Serial Attached SCSI (SAS) 3.0 providing up to 12 Gb/sec throughput
- Supports Dell-qualified Serial Attached SCSI (SAS), SATA hard drives, Solid State Drive (SSD), and PCIe SSD (NVMe)
- Supported drive speeds for NVMe drives are 8 GT/s and 16 GT/s at maximum x2 lane width.

NOTE: Mixing disks of different speed (7,200 RPM, 10,000 RPM, or 15,000 rpm) and bandwidth (3 Gbps, 6 Gbps, or 12 Gbps) while maintaining the same drive type (SAS or SATA) and technology (HDD or SSD) is supported.

NOTE: Mixing NVMe drives with SAS and SATA is not supported. Also, mixing HDD and SSD in a virtual disk is not supported.

NOTE: PERC H750 adapter SAS, PERC H355 front SAS, PERC H355 adapter SAS, and PERC H350 adapter SAS do not support NVMe drives.

NOTE: RAID levels 5, 6, 50 and 60 are not supported on PERC H355 adapter SAS, PERC H355 front SAS, and PERC H350 adapter SAS.

NOTE: For the safety, regulatory, and ergonomic information that is associated with these devices, and for more information about the Integrated Dell Remote Access Controller (iDRAC) or Lifecycle Controller (LC) remote management, see your platform documentation.

Topics:

Features of PERC H755 adapter

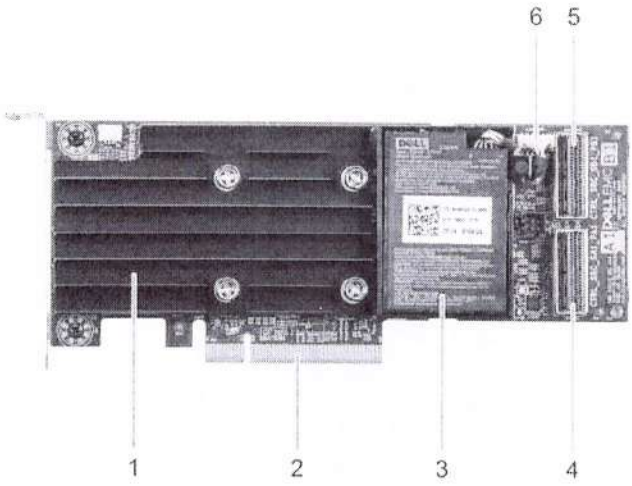


Figure 1. Features of PERC H755 adapter

1. Heatsink
2. PCIe connector
3. Battery
4. Backplane connector A
5. Backplane connector B
6. Battery cable connector

Features of PERC H755 front SAS

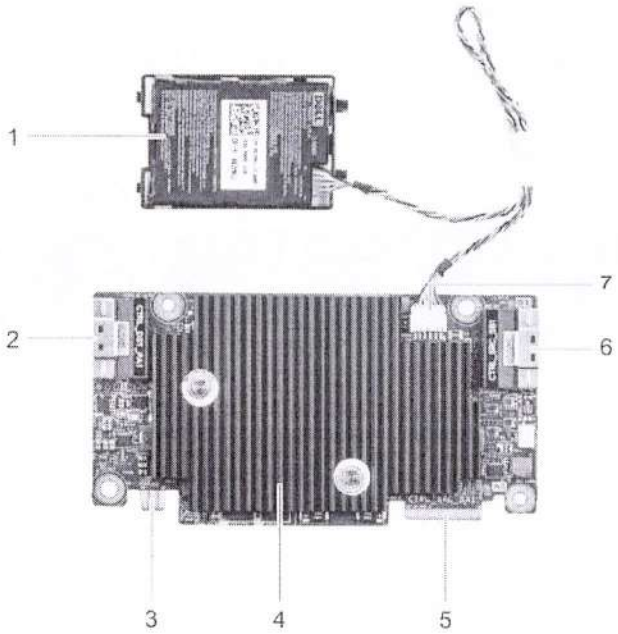


Figure 2. Features of PERC H755 front SAS

1. Battery
2. PCIe input connector
3. Power card edge connector
4. Heatsink
5. Backplane connector A
6. Backplane connector B

7. Battery cable connector

Features of PERC H755N front NVMe

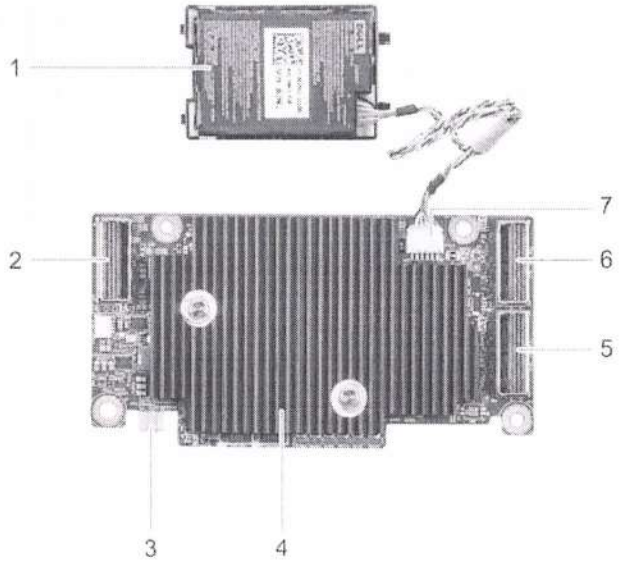


Figure 3. Features of PERC H755N front NVMe

1. Battery
2. PCIe cable connector
3. Power card edge connector
4. Heatsink
5. Backplane connector A
6. Backplane connector B
7. Battery cable connector

Features of PERC H755 MX adapter

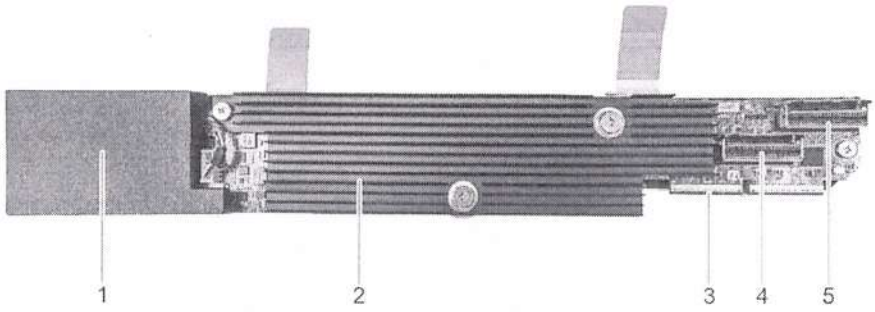


Figure 4. Features of PERC H755 MX adapter

1. Battery under cover
2. Heatsink
3. PCIe cable connector
4. Backplane connector A
5. Backplane connector B

Features of PERC H750 adapter SAS

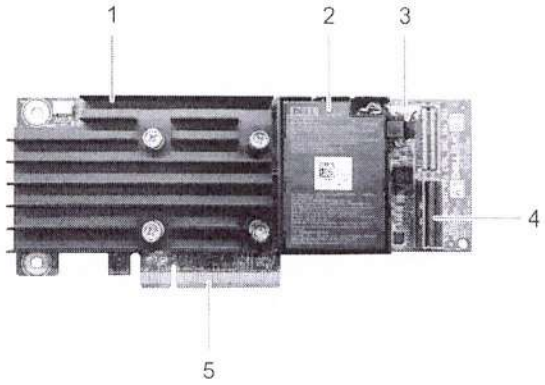


Figure 5. Features of PERC H750 adapter SAS

1. Heat sink
2. Battery
3. Battery cable connector
4. Backplane connector A
5. PCIe connector

Features of PERC H355 adapter SAS

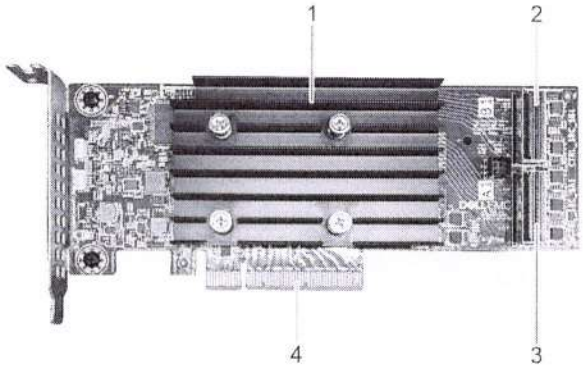


Figure 6. Features of PERC H355 adapter SAS

1. Heat sink
2. Backplane connector B
3. Backplane connector A
4. PCIe connector

Features of PERC H355 front SAS

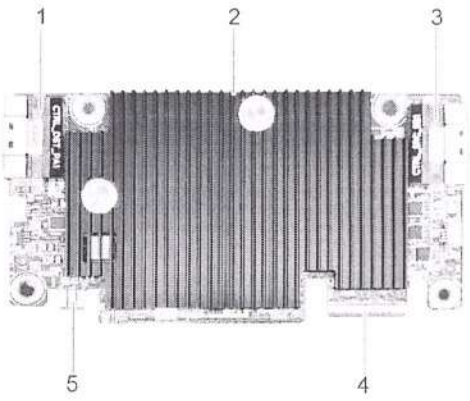


Figure 7. Features of H355 front SAS

1. PCIe input connector
2. Heat sink
3. Backplane connector B
4. Backplane connector A
5. Power card edge connector

Features of PERC H350 adapter SAS

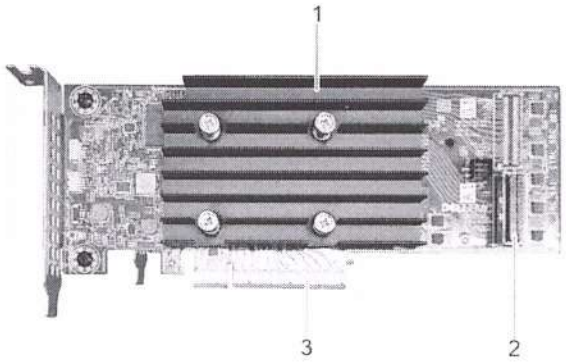


Figure 8. PERC H350 adapter SAS

1. Heat sink
2. Backplane connector A
3. PCIe connector

Operating systems supported by PERC 11 cards

See Dell Technologies Enterprise operating systems support for a list of supported operating systems by a specific server for the PERC 11 cards.

NOTE: For the latest list of supported operating systems and driver installation instructions, see the operating system documentation at www.dell.com/operatingsystemmanuals. For specific operating system service pack requirements, see the Drivers and Downloads section at www.dell.com/manuals.

Technical specifications of PERC 11 cards

The following table lists the specifications of PERC 11 cards:

Table 1. Technical specifications of PERC 11 cards

Feature	PERC H755 adapter	PERC H755 front SAS	PERC H755N front NVMe	PERC H755 MX adapter	PERC H750 adapter SAS
RAID levels	0, 1, 5, 6, 10, 50, 60	0, 1, 5, 6, 10, 50, 60	0, 1, 5, 6, 10, 50, 60	0, 1, 5, 6, 10, 50 ,60	0, 1, 5, 6, 10, 50 ,60
Non-RAID	Yes	Yes	Yes	Yes	Yes
Enclosures per port	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Processor	Broadcom RAID-on-chip, SAS3916 chipset	Broadcom RAID-on-chip, SAS3916 chipset	Broadcom RAID-on-chip, SAS3916 chipset	Broadcom RAID-on-chip, SAS3916 chipset	Broadcom RAID-on-chip, SAS3916 chipset
Battery backup unit	Yes	Yes	Yes	Yes	Yes
Local Key Management security	Yes	Yes	Yes	Yes	Yes
Controller queue depth	5120	5120	5120	5120	5120
Secure enterprise key manager security	Yes	Yes	Yes	No	Yes
Non-volatile cache	Yes	Yes	Yes	Yes	Yes
Cache memory	8 GB DDR4 2666 MT/s cache	8 GB DDR4 2666 MT/s cache	8 GB DDR4 2666 MT/s cache	8 GB DDR4 2666 MT/s cache	8 GB DDR4 2666 MT/s cache
Cache function	Write back, write through, no read ahead, and read ahead	Write back, write through, no read ahead, and read ahead	Write back, write through, no read ahead, and read ahead	Write back, write through, no read ahead, and read ahead	Write back, write through, no read ahead, and read ahead
Max no of VDs in RAID mode	240	240	240	240	240
Max no of disk groups	240	240	240	240	240
Max no of VDs per disk group	16	16	16	16	16
Hot swap devices supported	Yes	Yes	Yes	Yes	Yes
Autoconfig	Yes	Yes	Yes	Yes	Yes
Hardware XOR engine	Yes	Yes	Yes	Yes	Yes
Online capacity expansion	Yes	Yes	Yes	Yes	Yes
Dedicated and global hot spare	Yes	Yes	Yes	Yes	Yes
Drives types	3 Gbps SATA, 6 Gbps SATA/SAS, and 12 Gbps SAS,	3 Gbps SATA, 6 Gbps SATA/SAS, and 12 Gbps SAS	Gen3 (8 GT/s) and Gen4 (16 GT/s) NVMe	3 Gbps SATA, 6 Gbps SATA/ SAS, and 12	3 Gbps SATA, 6 Gbps SATA/SAS, and 12 Gbps SAS

Table 1. Technical specifications of PERC 11 cards (continued)

Feature	PERC H755 adapter	PERC H755 front SAS	PERC H755N front NVMe	PERC H755 MX adapter	PERC H750 adapter SAS
	Gen3 (8 GT/s), and Gen4 (16 GT/s) NVMe			Gbps SAS, Gen3 (8 GT/s), and Gen4 (16 GT/s) NVMe	
VD strip size	64 KB, 128 KB, 256 KB, 512 KB, 1 MB	64 KB, 128 KB, 256 KB, 512 KB, 1 MB	64 KB, 128 KB, 256 KB, 512 KB, 1 MB	64 KB, 128 KB, 256 KB, 512 KB, and 1 MB	64 KB, 128 KB, 256 KB, 512 KB, 1 MB
PCIe support	Gen 4	Gen 4	Gen 4	Gen 4	Gen 4
SAS/SATA maximum drive support	• Without SAS Expander: 16 drives per controller • With SAS Expander: Limited by platform offerings	• Without SAS Expander: 16 drives per controller • With SAS Expander: Limited by platform offerings	Not applicable	Limited by platform: 8 drives per controller	• Without SAS Expander: 8 drives per controller • With SAS Expander: Limited by platform offerings
NVMe maximum drive support	• Without PCIe Switch Expander: 8 drives per controller • With PCIe Switch Expander: Limited by platform offerings	Not applicable	• Without PCIe Switch Expander: 8 drives per controller • With PCIe Switch Expander: Limited by platform offerings	Limited by platform:8 drives per controller	Not applicable

NOTE: PERC H755 adapter and PERC H755 MX supports either SAS, SATA, or NVMe drives depending on the backplane/server configuration.

NOTE: PERC controller supports only conventional magnetic recording (CMR) drives, and does not support shingled magnetic recording (SMR) drives.

NOTE: PERC H755 family of controllers currently support SEKM starting with firmware version 52.14.0-3901.

NOTE: For information on number of drives in a disk group per virtual disk, see Summary of RAID levels

NOTE: As 14G PowerEdge Servers do not support Gen 4 speeds, PERC H750 adapter SAS will downtrain to Gen 3 speeds.

Feature	PERC H355 adapter SAS	PERC H355 front SAS	PERC H350 adapter SAS
RAID levels	0, 1, 10	0, 1, 10	0, 1, 10
Non-RAID	Yes	Yes	Yes
Enclosures per port	Not applicable	Not applicable	Not applicable
Processor	Broadcom RAID-onchip, SAS3816 chipset	Broadcom RAID-onchip, SAS3816 chipset	Broadcom RAID-onchip, SAS3816 chipset
Battery backup unit	No	No	No
Local Key Management security	No	No	No
Controller queue depth	1536	1536	1536

Feature	PERC H355 adapter SAS	PERC H355 front SAS	PERC H350 adapter SAS
Secure enterprise key manager security	No	No	No
Non-volatile cache	No	No	No
Cache memory	Not applicable	Not applicable	Not applicable
Cache function	Write through, no read ahead	Write through, no read ahead	write through, no read ahead
Max no of VDs in RAID mode	32	32	32
Max no of disk groups	32	32	32
Max no of VDs per disk group	16	16	16
Hot swap devices supported	Yes	Yes	Yes
Autoconfig	Yes	Yes	Yes
Hardware XOR engine	Yes	Yes	Yes
Online capacity expansion	Yes	Yes	Yes
Dedicated and global hot spare	Yes	Yes	Yes
Drives types	3 Gbps SATA, 6 Gbps SATA/ SAS, and 12 Gbps SAS, Gen3 (8 GT/s)	3 Gbps SATA, 6 Gbps SATA/ SAS, and 12 Gbps SAS, Gen3 (8 GT/s)	3 Gbps SATA, 6 Gbps SATA/ SAS, and 12 Gbps SAS, Gen3 (8 GT/s)
VD strip size	64 KB	64 KB	64 KB
PCIe support	Gen 4	Gen 4	Gen 4
SAS/SATA maximum drive support	• Without SAS Expander: 16 • With SAS Expander: Limited by platform offering	• Without SAS Expander: 16 • With SAS Expander: Limited by platform offering	• Without SAS Expander: 8 drives per controller • With SAS Expander: Limited by platform offering
NVMe maximum drive support	Not applicable	Not applicable	Not applicable

NOTE: As 14G PowerEdge Servers do not support Gen 4 speeds, PERC H350 adapter SAS will downtrain to Gen 3 speeds.

2

Applications and User Interfaces supported by PERC 11

PERC 11 card Management applications include the Comprehensive Embedded Management (CEM), Dell OpenManage Storage Management, The Human Interface Infrastructure (HII) configuration utility, and The PERC Command Line Interface (CLI). They enable you to manage and configure the RAID system, create and manage multiple disk groups, control and monitor multiple RAID systems, and provide online maintenance.

Topics:

Comprehensive Embedded Management

Comprehensive Embedded Management (CEM) is a storage management solution for Dell systems that enables you to monitor the RAID and network controllers installed on the system using iDRAC without an operating system installed on the system.

Using CEM enables you to do the following:

- Monitor devices with and without an operating systems installed on the system
- Provide a specific location to access monitored data of the storage devices and network cards
- Allows controller configuration for all PERC 11 cards

NOTE: If you boot the system to HII (F2) or Lifecycle Controller (F10), then you cannot view the PERC cards on the CEM UI. The PERC cards are displayed on the CEM UI only after the system boot is complete.

NOTE: It is not recommended that you create more than 8 VDs simultaneously with CEM.

Dell OpenManage Storage Management

Dell OpenManage Storage Management is a storage management application for Dell systems that provides enhanced features for configuring locally attached RAID disk storage. The Dell OpenManage storage management application enables you to perform controller and enclosure functions for all supported RAID controllers and enclosures from a single graphical or Command Line Interface (CLI). The User Interface (UI) is wizard-driven with features for novice and advanced users, and detailed online help. Using the Dell OpenManage storage management application, you can protect your data by configuring data-redundancy, assigning hot spares, or rebuilding failed physical disks. The fully featured CLI, which is available on select operating systems, allows you to perform RAID management tasks either directly from the console or through scripting.

NOTE: For more information, see the *Dell OpenManage Storage Management User's Guide* at www.dell.com/openmanagemanuals.

Human Interface Infrastructure Configuration Utility

The Human Interface Infrastructure (HII) configuration utility is a storage management application integrated into the system BIOS <F2>. It is used to configure and manage your Dell PowerEdge RAID Controller (PERC) virtual disks, and physical disks. This utility is independent of the operating system.

NOTE: The BIOS configuration utility <Ctrl> <R> is not supported on PERC 11 cards.

The PERC Command Line Interface

The PERC Command Line Interface (CLI) is a storage management application. This utility allows you to set up, configure, and manage your Dell PowerEdge RAID Controller (PERC) by using the Command Line Interface (CLI).

NOTE: For more information, see *Dell EMC PowerEdge RAID Controller CLI Reference Guide* at www.dell.com/storagecontrollermanuals.

3

Features of PowerEdge RAID Controller 11

Topics:

- Controller features
- Virtual disk features
- Virtual disk initialization
- Reconfiguration of virtual disks
- Background operations
- Hard drive features
- Fault tolerance

Controller features

This section lists the following controller features supported on Dell Technologies PowerEdge RAID Controller 11 cards in detail:

- Non-Volatile Memory Express
- Opal Security Management
- Hardware Root of Trust
- 1 MB I/O
- Auto Configure RAID 0
- Disk roaming
- FastPath
- Non-RAID disks
- Physical disk power management
- Profile Management
- Secure firmware update
- Snapdump

Non-Volatile Memory Express

Non-Volatile Memory Express (NVMe) is a standardized, high-performance host controller interface and a storage protocol for communicating with non-volatile memory storage devices over the peripheral component interconnect express (PCIe) interface standard. The PERC 11 controller supports up to 8 direct-attach NVMe drives. The PERC 11 controller is a PCIe endpoint to the host, a PowerEdge server, and configured as a PCIe root complex for downstream PCIe NVMe devices connected to the controller.

NOTE: The NVMe drive on the PERC 11 controller shows up as a SCSI disk in the operating system, and the NVMe command line interface will not work for the attached NVMe drives.

Conditions under which a PERC supports an NVMe drive

- In NVMe devices the namespace identifier (NSID) with ID 1, which is (NSID=1) must be present.
- In NVMe devices with multiple namespace(s), you can use the drive capacity of the namespace with NSID=1.
- The namespace with NSID=1 must be formatted without protection information and cannot have the metadata enabled.
- PERC supports 512-bytes or 4 KB sector disk drives for NVMe devices.

Drive repair for NVMe initialization failure

If an NVME drive fails to initialize, the drive that is connected to PERC can be corrected in HII. The NVME initialization errors in the drives are listed as correctable and non-correctable errors in HII.

Repair drives with correctable NVMe initialization errors

Repair the drives with correctable NVMe initialization errors in HII to enable the drives to work properly.

About this task

Repairs can lead to permanent data loss in drives. Also, certain types of repairs can take a long time.

Steps

1. Log in to HII.
2. Go to **Main Menu** > **Hardware Components** > **Enclosure Management.**
   The drives with correctable and non-correctable errors are listed.
3. Select the drive and click **Repair**.
   If the repair is successful, the drive is listed under physical drives and removed from the correctable error list. If the drive has other correctable errors, the drive is listed again in the correctable errors list.
4. If the repair is not successful, click **Repair** again.

   NOTE: In case you want to stop the repair, stop the repair from the **Ongoing repairs** list.

   If the error is still not resolved or if the drive has other non-correctable errors, the drive is moved to the non-correctable error list.

Opal Security Management

Opal Security Management of Opal SED drives requires security key management support. You can use the application software or The Integrated Dell Remote Access Controller (iDRAC) to generate the security key that is set in the Opal drives and used as an authentication key to lock and unlock the Opal drives.

Hardware Root of Trust

Hardware RoT (RoT) builds a chain of trust by authenticating all the firmware components prior to its execution, and it permits only the authenticated firmware to perform and be flashed. The controller boots from an internal boot ROM (IBR) that establishes the initial root of trust and this process authenticates and builds a chain of trust with succeeding software using this root of trust.

1 MB I/O

PERC 11 controllers support a 1 MB I/O feature; if the capacity of I/O frame is greater than 1 MB, the I/O frame is broken into smaller chunks.

Autoconfigure RAID 0

The Autoconfigure RAID 0 feature creates a single drive RAID 0 on each physical disk that is in the ready state. For more information, see Auto Configure RAID 0.

NOTE: The Autoconfigure RAID 0 feature is not supported on PERC H355 adapter SAS, PERC H355 front SAS, and PERC H350 adapter SAS.

Autoconfigure behavior

The autoconfigure behavior automatically configures unconfigured drives during reboot and hot insertion. As per the setting, unconfigured drives are configured as per the option; but the configured drives remain unaffected. PERC 11 supports **Off and Non-RAID** settings.

Table 2. Autoconfigure behavior settings

Settings	Description
Off	Autoconfigure behavior is turned off
Non-RAID	Unconfigured drives are configured as non-RAID disk during boot or during hot insertion; all the configured drives will remain unaffected
Off to Non-RAID disk	Unconfigured drives are converted to non-RAID disk; all the configured drives will remain unaffected
Non-RAID disk to Off	Unconfigured drives remain unconfigured good; all the configured drives will remain unaffected

NOTE: PERC H355 front SAS, PERC H355 adapter SAS, and PERC H350 adapter SAS converts an unconfigured good drive to non-RAID only if the drive has never been used before by that specific PERC.

Disk roaming

Disk roaming is when a physical disk is moved from one cable connection or backplane slot to another on the same controller. The controller automatically recognizes the relocated physical disks and logically places them in the virtual disks that are part of the disk group. If the physical disk is configured as a non-RAID disk, then the relocated physical disk is recognized as a non-RAID disk by the controller.

CAUTION: **It is recommended that you perform disk roaming when the system is turned off.**

CAUTION: **Do not attempt disk roaming during RAID level migration (RLM) or online capacity expansion (OCE). This causes loss of the virtual disk.**

Using disk roaming

About this task

Perform the following steps to use disk roaming:

Steps

1. Turn off the power to the system, physical disks, enclosures, and system components.
2. Disconnect power cables from the system.
3. Move the physical disks to desired positions on the backplane or the enclosure.
4. Perform a safety check. Make sure the physical disks are inserted properly.
5. Turn on the system.

Results

The controller detects the RAID configuration from the configuration data on the physical disks.

FastPath

FastPath is a feature that improves application performance by delivering high I/O per second (IOPs) for solid-state drives (SSDs). The PERC 11 series of cards support FastPath.

To enable FastPath on a virtual disk, the cache policies of the RAID controller must be set to write-through and no read ahead. This enables FastPath to use the proper data path through the controller based on command (read/write), I/O size, and RAID type. For optimal solid-state drive performance, create virtual disks with strip size of 64 KB.