

### Overview

## HPE MR Gen11 Storage Controllers

### A versatile, simplified and flexible choice for data centers

HPE introduces an expansive and agile PCIe Gen 4.0 storage controller portfolio based on Broadcom(R) MegaRAID(R) technology delivering quality, performance and security for mission-critical applications.

### Accelerate performance of NVMe and SAS SSD's while minimizing power consumption

- HPE MR Gen11 Storage controllers offer up to 13,700 MBs of bandwidth, 3M Random Read IOPs, and 240K RAID5 Random Write IOPs; more than double previous Broadcom(R) MegaRAID(R) generations.
- Support for PCIe Gen 4.0 enables these adapters for high bandwidth by delivering twice the bandwidth and 75% more IOPs.
- Support up to 16 internal ports providing high IOPS performance and data protection.
- Provide low power consumption equating to power savings for any data center environment.
- **Hardware root of trust and secure encryption and decryption of critical drive data**
- The HPE MR Gen11 Storage Controller portfolio provides confidence in the security and data protection offered with hardware secure boot, as well as self-encrypting drives support.
- HPE MR Gen11 Storage Controllers manage SEDs attached to the RAID controller for higher levels of security of Data at Rest (DAR).
- SEDs constantly perform encryption and decryption of all drive contents, and the ability to lock a drive so that its contents remain safely beyond the reach of hackers and thieves is crucial.

### Jobs to be done

- HPE MR416i-a / HPE MR416i-p Gen11 Storage Controllers are ideal for all data center environments where RAID is applicable offering reduced rebuild times, high-bandwidth and 240K RAID5 Random Write IOPs
- HPE MR416i-a / HPE MR416i-p Gen11 Storage Controllers are ideal for all virtualized environments where HBA / Pass-through mode is applicable offering high-bandwidth and 3M Random Write IOPs

HPE has enabled customers to go further, faster with the latest generation of Broadcom(R) Tri-Mode Controllers supporting PCIe Gen 4.0, Tri-Mode, and SED while enhancing SAS and NVMe RAID performance. The HPE MR Gen11 Storage Controllers use a new, user-friendly web-based interface called MR Storage Administrator (MRSA) that makes it easy to configure, monitor, maintain, and troubleshoot.

For those customers familiar with MegaRAID(R) technology the MR Controllers use CLI Management Tool called StorCLI.

**Notes:** MR Storage Administrator and StorCLI can only be used on HPE MR Gen11 Storage Controllers.

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## Models

HPE MR416i-p Gen11 16 Internal Lanes/8GB Cache SPDM PCI Plug-in Storage Controller	P47777-B21
HPE MR416i-o Gen11 16 Internal Lanes/8GB Cache SPDM OCP Storage Controller	P47781-B21
HPE MR216i-p Gen11 16 Internal Lanes/No Cache SPDM PCI Plug-in Storage Controller	P47785-B21
HPE MR216i-o Gen11 16 Internal Lanes/No Cache SPDM OCP Storage Controller	P47789-B21
HPE MR408i-o Gen11 8 Internal Lanes/4GB Cache SPDM OCP Storage Controller	P58335-B21

**Notes:** An HPE Smart Storage energy pack (available in both battery and hybrid capacitor options) is required with the HPE MR416i-a Gen11 and HPE MR416i-p Gen11 storage controller. See below for energy pack options.

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## Compatibility

### Overview

SKU	P47777-B21	P47781-B21	P47785-B21	P47789-B21	P58335-B21
<b>Description</b>	HPE MR416i-p Gen11 SPDM Storage Cntrl	HPE MR416i-o Gen11 SPDM Storage Cntrl	HPE MR216i-p Gen11 SPDM Storage Cntrl	HPE MR216i-o Gen11 SPDM Storage Cntrl	HPE MR408i-o Gen11 SPDM Storage Cntrl
ProLiant DL320 Gen11	✓	✓	✓	✓	✓
ProLiant DL325 Gen11	✓	✓	✓	✓	✓
ProLiant DL345 Gen11	✓	✓	✓	✓	✓
ProLiant DL360 Gen11	✓	✓	✓	✓	✓
ProLiant DL365 Gen11	✓	✓	✓	✓	✓
ProLiant DL380 Gen11	✓	✓	✓	✓	✓
ProLiant DL385 Gen11	✓	✓	✓	✓	✓
ProLiant DL560 Gen11	✓	✓	✓	✓	✓

### Operating System Support

- [Microsoft Windows Server](#)
- [Red Hat Enterprise Linux \(RHEL\)](#)
- [SUSE Linux Enterprise Server \(SLES\)](#)
- [VMware ESXi](#)
- [Canonical Ubuntu](#)
- [CentOS](#)

**Notes:** HPE MR Gen11 Storage Controllers are supported by the server operating system. For more information on HPE's server operating systems and virtualization software, please visit:

<http://www.hpe.com/info/ossupport>

### Storage Management Software Suite

- HPE MR Storage Administrator
- HPE StorCLI
- UEFI System Utilities (storage configuration)

### Additional Information

**HPE MR Gen11 Storage Controllers** For additional information on the features for HPE MR Gen11 Controllers, please see the HPE MR Gen11 Controller User Guide

### Standard Features

#### GUI Management Tool

##### MR Storage Administrator

The MR Storage Administrator is a web-based application that enables you to monitor, maintain, troubleshoot, and configure MegaRAID (MR) storage controllers. The MR Storage Administrator graphical user interface (GUI) helps you to view, create, and manage storage configurations.

- **Monitoring and Configuring:** MR Storage Administrator enables you to monitor the controllers and configure the drives on the controller. It displays the status of the controller cards, logical drives, and drives on the controller. The device status icons are displayed on their respective pages to notify you in case of drive failures and other events that require your immediate attention. Real-time email notifications on the status of the server are sent based on your alert settings. The system errors and events are recorded and displayed in an event log file. Additionally, you can also import or clear foreign configurations.
- **Maintaining:** Using MR Storage Administrator, you can perform system maintenance tasks, such as updating the controller firmware
- **Troubleshooting:** MR Storage Administrator displays information related to drive failures, device failures, and so on. It also provides recommendations and displays contextual links, helping you to easily locate the drives/devices that have issues and troubleshoot them. You can also download a complete report of the all the devices and their configurations, properties, and settings and send it to the Support Teams for further troubleshooting.

Please refer to the <https://www.hpe.com/support/MRSA> for more detailed information.

**Notes:** The HPE MR storage controller is managed through the HPE MR Storage Administrator only.

#### CLI Management Tool

The Storage Command Line Interface (StorCLI) tool is the command line management software designed for the MegaRAID product line. The StorCLI tool is a command line interface that is designed to be easy to use, consistent, and easy to script. This chapter provides information on how to install and use the StorCLI tool and explains the various features of the StorCLI tool.

Please refer to the [StorCLI User Guide](#) for more detailed information.

<https://www.hpe.com/support/StorCLI>

#### Know your choices when it comes to HPE ProLiant and data storage

	HPE MR Gen11 Storage Controllers	HPE SR Gen11 Storage Controllers
<b>Type</b>	MegaRAID	SmartRAID
<b>GUI Management Tool</b>	✓ MR Storage Administrator	✓ Smart Storage Administrator
<b>CLI Management Tool</b>	✓ StorCLI	✓ SSACLI

### Standard Features

#### Key Features

- High performance including up to 13,700 MB's of bandwidth, 3M Random Read IOPs, and 240K RAID5 Random Write IOPs
- Tri-Mode Storage Interface that supports NVMe4/SAS3/SATA
  - 2x8 SlimSAS
  - 16Gb/s PCIe 12Gb/s SAS, 6Gb/s SATA technology
  - Mix-and-match SAS, SATA, and NVMe drives to the same controller
- OCP form-factors create two modular slots that supports two storage controllers or two network adapters.
- Open standard DMTF SPDM supports certificate-based authentication and measurements to prevent malicious option cards from functioning in a Gen11 server.
- HW based Root of Trust for Firmware Authentication
- Self-Encrypting Drives to ensure protection for data at rest and the prevention of malware.
- Support for all major OS's including but not limited to Windows, Linux, and VMWare. Full tool suite including Command Line Interface, Web Based Management, and Out of Band Management support.
- Mixed Mode (RAID volumes and HBA physical drives simultaneously)
- UEFI System Utilities (storage configuration)
- Up to 240 physical drives
- Up to 16 NVMe devices
- FASTPATH(R) (SSD acceleration)
- Online firmware updates

**Notes:** HPE MR Gen11 Storage Controllers do not support the same software or features as the HPE SR Gen11 Storage Controllers such as HPE SSA and SR Secure Encryption.

Description	HPE MR416i-p Gen11 16 Internal Lanes/8GB Cache SPDM PCI Plug-in Storage Controller	HPE MR416i-o Gen11 16 Internal Lanes/8GB Cache SPDM OCP Storage Controller	HPE MR216i-p Gen11 16 Internal Lanes/No Cache SPDM PCI Plug-in Storage Controller	HPE MR216i-o Gen11 16 Internal Lanes/No Cache SPDM OCP Storage Controller	HPE MR408i-o Gen11 8 Intern Lanes/4GB Cache SPDM OCP Storage Controller
<b>SKU</b>	<b>P47777-B21</b>	<b>P47781-B21</b>	<b>P47785-B21</b>	<b>P47789-B21</b>	<b>P58335-B21</b>
<b>Ports</b>	1x8 SlimSAS	2x8 LP SlimSAS	1x8 SlimSAS	2x8 LP SlimSAS	1x8 LP SlimSAS
Internal SAS lanes	x16				X8
RAID on Chip Controller	SAS3916 - Broadcom(R) Aero				
<b>Form Factor</b>					
OCP		✓		✓	✓
PCIe plug-in Controller	✓		✓		
<b>Host Interface</b>	PCIe Gen4 x8 host				
<b>Performance</b>					
Cache Size (FBWC)	8GB	8GB	N/A	N/A	4GB
Read Ahead Caching	✓	✓	✓	✓	✓

### Standard Features

Write-back Caching	✓	✓	✓		✓
<b>Storage Protocol</b>	6G SATA, 12G SAS, 16G NVMe				
<b>Key Features</b>					
Maximum Physical Drives (up to)	240	240	240	240	240
Maximum Logical Drives (up to)	64	64	64	64	64
<b>RAID:</b>	0, 1, 5, 6, 10, 50, 60	0, 1, 5, 6, 10, 50, 60	0, 1, 10	0, 1, 10	0, 1, 5, 6, 10, 50, 60
<b>Mixed Mode:</b> (RAID & HBA)	✓	✓	✓	✓	✓

Description	HPE MR416i-p Gen11 16 Internal Lanes/8GB Cache SPDM PCI Plug-in Storage Controller	HPE MR416i-o Gen11 16 Internal Lanes/8GB Cache SPDM OCP Storage Controller	HPE MR216i-p Gen11 16 Internal Lanes/No Cache SPDM PCI Plug-in Storage Controller	HPE MR216i-o Gen11 16 Internal Lanes/No Cache SPDM OCP Storage Controller	HPE MR408i-c Gen11 8 Internal Lanes/4GB Cache SPDM OCP Storage Controller
<b>SKU</b>	P47777-B21	P47781-B21	P47785-B21	P47789-B21	P58335-B21
<b>Boot Mode:</b> Legacy and UEFI	✓	✓	✓	✓	✓
<b>SSD Accelerator</b>	FASTPATH(R)				
<b>Other features:</b>	<ul style="list-style-type: none"> <li>• Online Capacity Expansion (OCE)</li> <li>• Auto resume after loss of system power during array rebuild</li> <li>• Load balancing</li> <li>• Configurable stripe size up to 1 MB</li> <li>• Fast initialization for quick array setup</li> <li>• Check consistency for background data integrity</li> <li>• SSD support with SSD Guard™ technology</li> <li>• Patrol read for media scanning and repairing</li> <li>• DDF compliant Configuration on Disk</li> <li>• S.M.A.R.T. support</li> <li>• Global and dedicated Hot Spare with Revertible Hot Spare support: <ul style="list-style-type: none"> <li>Automatic rebuild</li> <li>Enclosure affinity</li> <li>Emergency SATA hot spare for SAS arrays</li> </ul> </li> <li>• Enclosure management: <ul style="list-style-type: none"> <li>Universal Backplane Management (UBM)</li> </ul> </li> </ul>				

### Standard Features

	<ul style="list-style-type: none"> <li>• Shield state drive diagnostic technology</li> <li>• SED Key Management</li> </ul>
<b>Array Configuration Features</b>	<ul style="list-style-type: none"> <li>• Expand Array</li> <li>• Move Drives</li> <li>• Shrink Array</li> <li>• Spare Management</li> </ul>
<b>Logical Drive Configuration Features</b>	<ul style="list-style-type: none"> <li>• Extend Logical Drive</li> <li>• Instant Secure Erase</li> <li>• Migrate RAID/Stripe Size</li> <li>• Modifying Cache Write Policy</li> <li>• Move Logical Drive</li> <li>• Re-enable Failed Logical Drive</li> </ul>
<b>HPE OneView Support</b>	Monitored Mode
<b>Kit contents</b>	Includes controller, documentation information card, warranty statement, and backup power cable (MR416 only)

### Warranty

The warranty for this device is 3 years parts only.

#### Warranty Upgrade Options

- Response - Upgrade on-site response from next business day to same day 4 hours.
- Coverage - Extend hours of coverage from 9 hours x 5 days to 24 hours x 7 days.
- Duration - Select duration of coverage for a period of 1, 3, or 5 years.

Warranty upgrade options can come in the form of HPE Pointnext operational, which are sold at the HPE System level to which this product attaches.

### Fault Recovery

Minimizes downtime, reconstructs data, and facilitates a quick recovery from drive failure

**Recovery ROM:** This feature protects the user from a firmware image corruption by storing a redundant copy of the firmware image. If the active firmware image becomes corrupt, the controller will use the redundant firmware image and continue operating.

**On-Line Spares:** There is no limit to the number of spare drives that can be installed prior to drive failure. If a failure occurs, recovery begins with an On-Line Spare and data is reconstructed automatically.

DRAM ECC detects and corrects data bit errors.

### Related Options

#### Required Accessories for HPE MR416i-a / MR416i-p Gen11 Storage Controllers

##### Energy pack Options Sold Separately

HPE 96W Smart Storage Lithium-ion Battery with 145mm Cable Kit	P01366-B21
HPE 96W Smart Storage Lithium-ion Battery with 260mm Cable Kit	P01367-B21
HPE Smart Storage Hybrid Capacitor with 145mm Cable Kit	P02377-B21
HPE Smart Storage Hybrid Capacitor with 260mm Cable Kit	P02381-B21

##### Notes:

An HPE Smart Storage energy pack is required when using Cache based storage controllers.

The Smart Storage 96W Battery supports multiple devices. See server QuickSpecs for compatibility.

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### Service and Support

#### HPE Pointnext - Service and Support

**Get the most from your HPE Products.** Get the expertise you need at every step of your IT journey with **HPE Pointnext Services**. We help you lower your risks and overall costs using automation and methodologies that have been tested and refined by HPE experts through thousands of deployments globally. HPE Pointnext **Advisory Services**, focus on your business outcomes and goals, partnering with you to design your transformation and build a roadmap tuned to your unique challenges.

Our **Professional** and **Operational Services** can be leveraged to speed up time-to-production, boost performance and accelerate your business. HPE Pointnext specializes in flawless and on-time implementation, on-budget execution, and creative configurations that get the most out of software and hardware alike.

#### Consume IT on your terms

**HPE GreenLake** brings the cloud experience directly to your apps and data wherever they are—the edge, colocations, or your data center. It delivers cloud services for on-premises IT infrastructure specifically tailored to your most demanding workloads. With a pay-per-use, scalable, point-and-click self-service experience that is managed for you, HPE GreenLake accelerates digital transformation in a distributed, edge-to-cloud world.

- Get faster time to market
- Save on TCO, align costs to business
- Scale quickly, meet unpredictable demand
- Simplify IT operations across your data centers and clouds

#### Managed services to run your IT operations

**HPE GreenLake Management Services** provides services that monitor, operate, and optimize your infrastructure and applications, delivered consistently and globally to give you unified control and let you focus on innovation.

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### Recommended Services

#### HPE Pointnext Tech Care.

HPE Pointnext Tech Care is the new operational service experience for HPE products. Tech Care goes beyond traditional support by providing access to product specific experts, an AI driven digital experience, and general technical guidance to not only reduce risk but constantly search for ways to do things better. HPE Pointnext Tech Care has been reimagined from the ground up to support a customer-centric, AI driven, and digitally enabled customer experience to move your business forward. HPE Pointnext Tech Care is available in three response levels. Basic, which provides 9x5 business hour availability and a 2 hour response time. Essential which provides a 15 minute response time 24x7 for most enterprise level customers, and Critical which includes a 6 hour repair commitment where available and outage management response for severity 1 incidents.

<https://www.hpe.com/services/techcare>

#### HPE Pointnext Complete Care

HPE Pointnext Complete Care is a modular, edge-to-cloud IT environment service that provides a holistic approach to optimizing your entire IT environment and achieving agreed upon IT outcomes and business goals through a personalized and customer-centric experience. All delivered by an assigned team of HPE Pointnext Services experts. HPE Pointnext Complete Care provides:

- A complete coverage approach -- edge to cloud
- An assigned HPE team
- Modular and fully personalized engagement
- Enhanced Incident Management experience with priority access
- Digitally enabled and AI driven customer experience

### Service and Support

<https://www.hpe.com/services/completecare>

#### HPE Education Services

Keep your IT staff trained making sure they have the right skills to deliver on your business outcomes. Book on a class today and learn how to get the most from your technology investment.

<http://www.hpe.com/ww/learn>

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#### HPE Support Center

The HPE Support Center is a personalized online support portal with access to information, tools and experts to support HPE business products. Submit support cases online, chat with Hewlett Packard Enterprise experts, access support resources or collaborate with peers.

Learn more <http://www.hpe.com/support/hpesc>

The HPE Support Center Mobile App\* allows you to resolve issues yourself or quickly connect to an agent for live support. Now, you can get access to personalized IT support anywhere, anytime.

HPE Insight Remote Support and HPE Support Center are available at no additional cost with a HPE warranty, HPE Support Service or HPE contractual support agreement.

**Notes:** \*HPE Support Center Mobile App is subject to local availability

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#### Parts and Materials

Hewlett Packard Enterprise will provide HPE-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements.

Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product QuickSpecs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by Hewlett Packard Enterprise due to malfunction.

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#### Related Services

##### HPE Server Hardware Installation

Provides for the basic hardware installation of HPE branded servers, storage devices and networking options to assist you in bringing your new hardware into operation in a timely and professional manner

<https://www.hpe.com/h20195/V2/GetPDF.aspx/5981-9356EN.pdf>

HPE Installation and Startup Service provides for the installation and startup of HPE technology including BladeSystems, C-Class enclosure, HPE ProLiant c-Class and Integrity server blades, storage blades, SAN switch blades, HPE Virtual Connect modules (Ethernet and Fibre Channel), Ethernet network interconnects, and InfiniBand, as well as the installation of one supported operating system type (Windows® or Linux).

Warranty and Support Services will extend to include HPE options configured with your server or storage device. The price of support service is not impacted by configuration details. HPE sourced options that are compatible with your product will be covered under your server support at the same level of coverage allowing you to upgrade freely. Installation for HPE options is available as needed. To keep support costs low for everyone, some high value options will require additional support. Additional support is only required on select high value workload accelerators, fibre switches, InfiniBand and UPS batteries over 12KVA. See the specific high value options that require additional support [HERE](#).

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Service and Support

**For more information**

Visit the Hewlett Packard Enterprise Service and Support [website](#).

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Summary of Changes

Date	Version History	Action	Description of Change
10-Nov-2022	Version 1	New	New QuickSpecs

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a50004311enw - 16915 - Worldwide - V1 - 10-November-2022