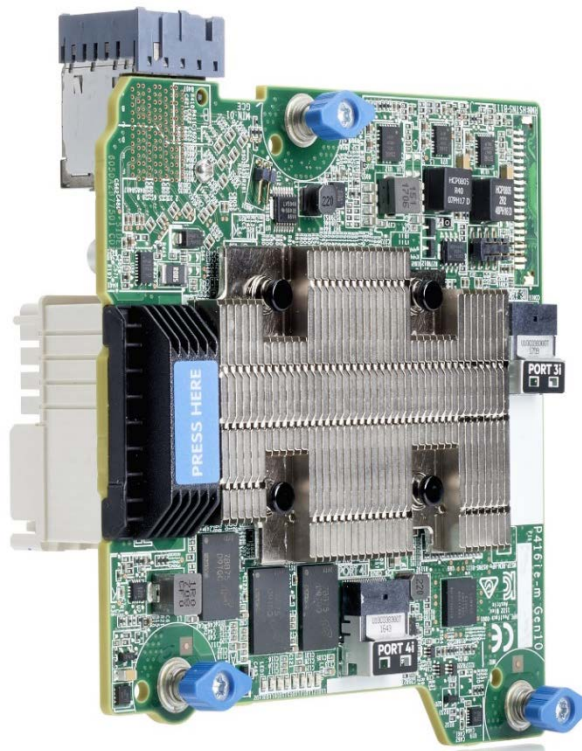


Overview

****For latest information on this product please use [HPE Smart Array Gen10 Controllers for HPE Synergy Compute Modules QuickSpecs](#)****

HPE Smart Array P416ie-m SR Gen10 Controller

The HPE Smart Array P416ie-m SR Gen10 Controller, supporting 12Gb/s SAS and PCIe 3.0 provides enterprise-class storage performance, reliability, security and efficiency needed to address your evolving data storage needs while supporting advanced RAID levels with 2 GB flash-backed write cache (FBWC). This controller operates in Mixed Mode which combines RAID and HBA operations simultaneously and offers enhanced security by encrypting data-at-rest on any drive with HPE Smart Array SR Secure Encryption. It has eight external SAS lanes, allowing connection to SAS or SATA drives in the HPE Synergy D3940, and eight internal SAS lanes, allowing connection to drives inside the HPE Synergy compute modules.



Models

HPE Smart Array P416ie-m SR Gen10 (8 Int 8 Ext Lanes/2GB Cache) 12G SAS Mezzanine Controller 804428-B21

NOTE: Kit contents include P416ie-m controller.

Options Sold Separately

HPE 96W Smart Storage Battery (up to 20 Devices) with 260mm Cable Kit P01367-B21

NOTE: P416ie-m controller requires the HPE Smart Storage Battery, which supports multiple devices.

HPE Smart Array P416ie-m SR Gen10 SAS Cable Kit 871573-B21

NOTE: P416ie-m cable is require to connect to the Synergy Premium Backplane, allowing connection to SAS/SATA drives inside the Synergy compute module.

Standard Features

Key Features	<p>Storage interface (SAS/SATA)</p> <p>16 SAS lanes including 8 internal SAS lanes and 8 external SAS lanes</p> <p>12Gb/s SAS, 6Gb/s SATA technology</p> <p>Mix-and-match SAS and SATA drives to the same controller</p> <p>Support for SAS tape drives</p> <p>2 GB Flash-Backed Write Cache (FBWC)</p> <p>PCI Express 3.0 x8 link</p> <p>RAID 0, 1, 5, 6, 10, 50, 60, 1 ADM, 10 ADM (Advanced Data Mirroring)</p> <p>Mixed Mode (RAID logic drives and HBA physical drives simultaneously)</p> <p>VMware Virtual SAN certified</p> <p>Legacy and UEFI boot operation</p> <p>UEFI System Utilities (storage configuration)</p> <p>Up to 238 physical drives</p> <p>Up to 64 logical drives</p> <p>HPE Smart Array SR SmartCache (optional license)</p> <p>HPE Smart Array SR Secure Encryption (optional license)</p> <p>HPE SSD Smart Path</p> <p>Rapid Parity Initialization (RPI)</p> <p>Rapid rebuild</p> <p>Drive Sanitize</p> <p>Performance Optimization-Degraded Reads and Read Coalescing</p> <p>Power efficiency</p> <p>Seamless upgrades from HPE Smart Array S-class and E-class controllers</p> <p>FIPS 140-2 Level 1 Implementation Under Test (expected validation complete in 2018)</p>
Ports	<p>Internal: 8 SAS/SATA lanes across 2 x4 Slim SAS ports</p> <p>External: 8 SAS/SATA lanes across an external SAS port</p>
Form Factor	Mezzanine Controller
Performance	<p>12Gb/s SAS (1200 MB/s theoretical bandwidth per SAS lane)</p> <p>6Gb/s SATA (600 MB/s theoretical bandwidth per SAS lane)</p> <p>PCI Express 3.0 x8 link width</p> <p>2 GB 72-bit wide DDR4-2100 Flash-Backed Write Cache provides up to 16.8 GB/s maximum cache bandwidth</p> <p>Read ahead caching</p> <p>Write-back caching</p>
Array Configuration Features	<p>Expand Array</p> <p>Heal Array</p> <p>Move Drives</p> <p>Re-Mirror Array</p> <p>Shrink Array</p> <p>Spare Management</p> <p>Split Mirrored Array</p>
Logical Drive Configuration Features	<p>Extend Logical Drive</p> <p>Instant Secure Erase</p>

Standard Features

Migrate RAID/Stripe Size
 Modifying Cache Write Policy
 Move Logical Drive
 Re-enable Failed Logical Drive

Fault Prevention

The following features offer detection of possible failures before they occur, allowing preventive action to be taken:
 Predictive drive failure detects possible drive failure before it occurs, allowing replacement of the component before failure occurs.
 Background surface scan checks drives during inactive periods and automatically remaps bad sectors, ensuring data integrity.
 HPE SmartSSD Wear Gauge reports the amount of lifetime remaining on your SSDs.

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.

HPE SSD Smart Path

The HPE SSD Smart Path feature included in the Smart Array software stack improves Solid State Disk (SSD) read performance by up to 4x. HPE SSD Smart Path chooses the optimum path to the SSD and accelerates reads for all RAID levels and RAID 0 writes.

HPE Smart Array SR SmartCache (optional license)

The HPE Smart Array SR SmartCache feature is a controller-based read and write caching solution in a DAS environment that caches the most frequently accessed data ("hot" data) onto lower latency SSDs to dynamically accelerate application workloads. The SmartCache architecture is flexible and supports any HPE ProLiant Gen10 HDD for bulk storage and SSD as an accelerator. SmartCache is deployed and managed using the HPE Smart Storage Administrator (HPE SSA). SmartCache requires an optional license (see Related Options section below for more information on the license).
 For additional information please visit: <http://www.hpe.com/servers/smartcache>.

HPE Smart Array SR Secure Encryption (optional license)

HPE Smart Array SR Secure Encryption is a Smart Array controller-based data encryption solution that protects sensitive, mission critical data. This is an enterprise-class encryption solution for data-at-rest on any drives attached to the HPE Smart Array controllers including data on the controller cache. Secure Encryption requires an optional license per server (see Related Options for more information on the license).
 The solution is available for both local and remote key management mode deployments. Local Key Management Mode is focused on single server deployment where there is one Master key per controller that is managed by the user. Remote Key Management Mode is for enterprise wide deployments from just a few servers to thousands of servers.
 For more information on please visit: <http://www.hpe.com/servers/secureencryption>

FIPS 140-2 Cryptographic Module Validation

FIPS provides a security assurance level validation for cryptographic modules. This HPE Smart Array SR Gen10 Controller is a cryptographic module that is currently on the Validation Program FIPS 140-2 Implementation Under Test List. The National Institute of Standards and Technology (NIST) issue the FIPS 140-2 requirements and standards for cryptography modules that include both hardware and software components.

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.

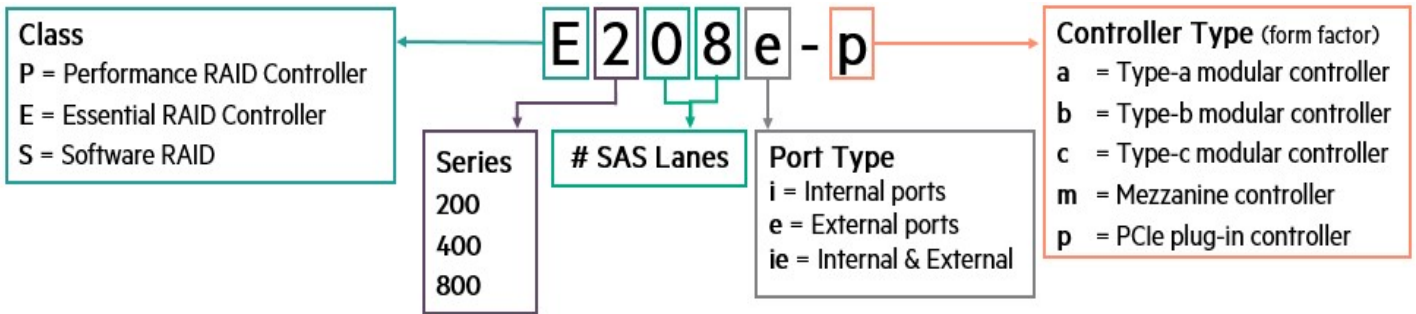
Standard Features

Duration - Select duration of coverage for a period of 1, 3, or 5 years.

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

Naming Framework

The Gen10 controller naming framework has been updated to simplify identification as depicted below. For a more detailed breakout of the available Gen10 Smart Array controllers visit the [HPE Smart Array Gen10 Controllers Data Sheet](#).



Compatibility

Server Support HPE Synergy 480 Gen10
HPE Synergy 660 Gen10

Disk Enclosure Support HPE Synergy D3940 Gen10 Storage Module

Operating Systems Microsoft Windows Server
Microsoft Windows Hyper-V Server
VMware vSphere
Red Hat Enterprise Linux (RHEL)
SUSE Linux Enterprise Server (SLES)
CentOS
Citrix XenServer

NOTE: HPE Smart Array 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 Smart Storage Administrator (SSA) GUI
HPE Smart Storage Administrator (SSA) CLI
HPE Smart Storage Administrator (SSA) Scripting
HPE Intelligent Provisioning
UEFI System Utilities (storage configuration)
UEFI Storage RESTful

NOTE: For additional information see the HPE Smart Array SR Gen10 Configuration Guide at: <http://www.hpe.com/info/SmartArrayGen10-docs>

Service and Support

HPE Support Services **Protect your business beyond warranty with HPE Support Services**

HPE Pointnext provides a comprehensive portfolio including Advisory and Transformational, Professional, and Operational Services to help accelerate your digital transformation. From the onset of your transformation journey, Advisory and Transformational Services focus on designing the transformation and creating a solution roadmap. Professional Services specializes in creative configurations with flawless and on-time implementation, and on-budget execution. Finally, operational services provides innovative new approaches like Flexible Capacity and Datacenter Care, to keep your business at peak performance. HPE is ready to bring together all the pieces of the puzzle for you, with an eye on the future, and make the complex simple.

Recommended Support **HPE Proactive Care* with 24x7 coverage, three year Support Service**

HPE Proactive Care gives customers an enhanced call experience. When your products are connected to HPE, Proactive Care helps prevent problems and maintains IT stability by utilizing personalized proactive reports with recommendations and advice. This Service combines three years proactive reporting and advice with our 24x7 coverage, four hour hardware response time when there is a problem. This service also includes collaborative software support for Independent Software Vendors (ISVs), (Red Hat, VMWare, Microsoft, etc.) running on your HPE servers.

<https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA3-8855ENW.pdf>

HPE Proactive Care* with 6 hour call-to-repair commitment, three year Support Service

HPE Proactive Care gives customers an enhanced call experience. When your products are connected to HPE, Proactive Care helps prevent problems and maintains IT stability by utilizing personalized proactive reports with recommendations and advice. This Service combines three years' proactive reporting and advice with our highest level of hardware support - HPE's 24x7, six hour hardware call-to-repair. HPE is the only leading manufacturer who makes this level of coverage available as a standard service offering for your most valuable servers. This service also includes collaborative software support for Independent Software Vendors (ISVs), (Red Hat, VMWare, Microsoft, etc.) running on your HPE servers.

<https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA3-8855ENW.pdf>

NOTE: *HPE Proactive Care and HPE Proactive Care Advanced require that the customer connect their devices to make the most of these services and receive all the deliverables.

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>

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 HPE experts, access support resources or collaborate with peers.

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

HPE's 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.

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

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.

Service and Support

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 quick-specs, 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.

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).

NOTE: The Smart Array controller is covered under the HPE Service Contract applied to the HPE ProLiant Server. No separate HPE support services need to be purchased.

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](#).

For more information

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

Recommended Option

This controller is a Recommended Option. Offering the best combination of performance, value and availability, Recommended Options have been selected by HPE experts to provide the right technology for a range of workloads and market segments.

HPE Smart Array Supporting Documents

For additional support documents, including and configuration guide and user guides, please visit: <http://www.hpe.com/info/SmartArrayGen10-docs>.

Related Options

HPE Smart Storage Battery	HPE 96W Smart Storage Battery (up to 20 Devices) with 260mm Cable Kit	P01367-B21
NOTE: Smart Array Gen10 controllers are supported by the HPE Smart Storage Battery, which supports multiple devices and is sold separately.		
HPE Smart Array SR SmartCache	HPE Smart Array SR SmartCache (Single Key/Single Server) LTU	D7S26A
Single-Server License		
Used to purchase a license for one server. Contains one license per server, a printed license entitlement certificate, end user license agreement, and license key installation card delivered via physical shipment . The license entitlement certificate must be redeemed online or via fax in order to obtain the license activation key(s). Include one year of 24x7 HPE Software Technical Support Services.		
HPE Smart Array SR SmartCache (Single Key/Multiple Servers) LTU		
Flexible-Quantity License		
Used to purchase multiple licenses with a single activation key. Contains license(s) for a customer defined quantity of servers, a license entitlement certificate for the quantity of licenses purchased, end user license agreement, and license key installation card delivered via physical shipment . The license entitlement certificate must be redeemed online or via fax in order to obtain the license activation key(s). Include one year of 24x7 HPE Software Technical Support Services.		
HPE Smart Array SR SmartCache (Single Key/Multiple Servers) E-LTU		
Flexible-Quantity Electronic License		
Used to purchase multiple licenses with a single activation key. Contains license(s) for a customer defined quantity of servers, a license entitlement certificate for the quantity of licenses purchased, end user license agreement, and license key installation information delivered via e-mail . The license entitlement certificate must be redeemed online or via fax in order to obtain the license activation key(s). Include one year of 24x7 HPE Software Technical Support Services.		
NOTE: For more information please visit: http://www.hpe.com/servers/smartcache		
HPE Smart Array SR Secure Encryption	HPE Smart Array SR Secure Encryption (Data at Rest Encryption/per Server Entitlement) E-LTU	Q2F26AAE
NOTE: HPE Smart Array SR Secure Encryption licensing is based on the number of servers requiring encryption for direct attached storage.		
NOTE: For more information visit: http://www.hpe.com/servers/secureencryption		
HPE Smart Storage Battery	HPE Smart Array P416ie-m SR Gen10 SAS Cable Kit	871573-B21
NOTE: P416ie-m cable is require to connect to the Synergy Premium Backplane, allowing connection to SAS/SATA drives inside the Synergy compute module. One cable is required for the HPE Synergy 480 and two cables are required for the HPE Synergy 660.		

Summary of Changes

Date	Version History	Action	Description of Change
15-Oct-2018	Version 6	Changed	Overview and Related Options were updated.
04-Jun-2018	Version 5	Changed	SKU description and Service and Support were updated.
05-Mar-2018	Version 4	Changed	Overview, Standard Features, Related Services were updated.
05-Feb-2018	Version 3	Changed	Replaced Secure Encryption SKU C9A82AAE with Q2F26AAE. Updated Service and Support. Replaced HPE Smart Storage Battery SKU.
25-Sep-2017	Version 2	Changed	Naming framework
11-Jul-2017	Version 1	Added	New QuickSpecs.



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