

Family data sheet



HP Smart Storage for HP ProLiant Gen9

Increased performance, data availability, and storage capacity



September 2014

Achieve new levels of data protection and accessibility

As data—and data storage and accessibility requirements—grows exponentially, your storage solutions need to meet a variety of needs. HP Smart Storage solutions for ProLiant Gen9 improve your storage utilization and performance while delivering the scalability, reliability, and accessibility you require and helping you deal with data privacy challenges.



Modular HP Smart Array and Smart Host Bus Adapter solutions provide 12 Gb/s performance, scalability, choice, and offer significant benefits that can help you make better use of your storage environment.



HP Secure Encryption (supported on the HP Smart Array controller and Smart Host Bus Adapter in simple RAID mode) is a simple, secure, key-based local and remote encryption solution that protects data at rest.

Leverage HP Smart Storage solutions for HP ProLiant Gen9 servers

Making IT a strategic enabler of the business has never been more challenging. Data storage requirements are growing exponentially, along with government regulations for protecting sensitive data. That means your storage solution needs to meet a variety of needs.

To rise to the challenge, you need new technologies and capabilities that deliver compelling business outcomes faster. HP Smart Storage solutions for ProLiant Gen9 servers are built to give you compute for the New Style of IT, where IT is tightly aligned with business requirements to streamline operations, contain costs, accelerate the delivery of new products and services, and optimize application performance. HP Smart Storage solutions improve your storage utilization and performance while delivering the scalability, reliability, and accessibility required to compete.

HP Smart Storage product family

HP Smart Array Controllers

Designed to enhance server uptime and maintain flexibility for future growth, HP Smart Array Controllers blend the reliability of SCSI with the performance advantages of serial architecture. Providing industry-leading performance with unmatched data protection, this is the solution for companies with direct attached SAS storage.

With support for more than 576 TB¹ of total storage, HP Smart Array Controllers can help you meet the requirements of a broad range of applications. Moreover, by giving you extensive choices for server and storage deployment, these controllers provide high levels of flexibility and return on investment.

¹ 576 TB is derived using the HP Smart Array P441 controller on an HP ProLiant Gen9 DL380 Server supporting up to 96 drives with a configuration of 12 LFF drives; multiply by 6 TB HDD in a total of eight D3600 Disk enclosures.

HP Smart Host Bus Adapters

Perfect for environments that require fast access, HP Smart Host Bus Adapters (HBAs) provide cost-effective and reliable high-performance SAS connectivity to direct attached storage, shared storage, and tape drives for HP ProLiant servers running Hadoop, Database Availability Group, and VMware vSAN. Smart Host Bus Adapters are a perfect conduit for deploying software-defined storage as a means to manage the IT storage pool. For greater flexibility, HP Smart Host Bus Adapters are capable of running in either HBA or simple RAID mode.

HP Dynamic Smart Array

HP Dynamic Smart Array provides an embedded SATA RAID solution for HP ProLiant Gen9 servers. The common metadata format on the drives allows disks to migrate from Dynamic Smart Array to Smart Array or Smart Host Bus Adapter (when running in RAID mode) if needed, to achieve higher performance, capacity, and availability. This controller is ideal for supporting boot device and applications that do not require significant I/O workload.

HP Smart Storage Administrator

HP Smart Storage Administrator (HP SSA) is an advanced utility that allows you to perform many complex configuration tasks via a GUI, command line interface, or scripting. The addition of HP SSA can help you configure array controllers, expand an existing array configuration by adding drives, or reconfigure an array by extending volume sizes. You can also make use of enterprise-class features such as online RAID-level migration and online capacity expansion to make alterations to the storage system without disrupting the current workload. HP SSA is also the utility used to manage the HP Smart Host Bus Adapters, such as configuring it to run in either the HBA mode or simple RAID mode. It also deploys and manages HP SmartCache and HP Secure Encryption.



Key benefits

HP Smart Array Controllers and Smart Host Bus Adapters are part of a modular set of HP Smart Storage solutions, and each of these solutions deliver different key benefits for your organization, including:

Benefits	HP Smart Array	HP Smart Host Bus Adapter	HP Dynamic Smart Array
Data protection			
Keeps your data available and the server running while a failed drive is being replaced, as a fault tolerant feature of HP Smart Array Controllers.			
<ul style="list-style-type: none"> Advanced Data Guarding (RAID 6) allocates two sets of parity data across drives. This level of fault tolerance can withstand a double drive failure without downtime or data loss. It requires a minimum of four drives. 	✓		
<ul style="list-style-type: none"> Advanced Data Mirroring (RAID 1) creates redundant copies of the data using three drives. This level of fault tolerance can withstand a double drive failure within a RAID 1 Advanced Data Mirroring (ADM) volume without downtime or data loss. 	✓		
Data security			
Protects sensitive, mission-critical data with encryption.			
<ul style="list-style-type: none"> HP Secure Encryption encrypts the data on the drives so that it cannot be deciphered without access to the data encryption key. 	✓	✓ (Supported only in simple RAID mode)	
Availability			
Delivers increased server uptime by providing advanced storage functionality through the following features:			
<ul style="list-style-type: none"> Dual domain—Creates redundant pathways for external drives from servers to storage devices. The redundant paths created by these configurations reduce or eliminate single points of failure within the storage network. 	✓		
<ul style="list-style-type: none"> Online RAID-level migration (between any RAID level)—Allows you to easily migrate to a new fault-tolerance (RAID) level without disrupting system operation. 	✓		
<ul style="list-style-type: none"> Online stripe-size migration—Enables easily changing the stripe size of an existing logical drive using the HP SSA, without taking the system offline. 	✓		
<ul style="list-style-type: none"> Online capacity expansion—Enables you to seamlessly increase capacity for your array while the server is still online, preserving uptime. 	✓		
<ul style="list-style-type: none"> Logical drive capacity extension with flash-backed write cache (FBWC)—Enables you to increase the size of existing logical drives online. 	✓		
<ul style="list-style-type: none"> Global online spare—Facilitates automatic rebuilds after a drive failure and reduces the risk of data loss. 	✓	✓ (Supported only in simple RAID mode)	✓
<ul style="list-style-type: none"> Pre-failure warranty—HP Systems Insight Manager (SIM) not only reports when a drive is going to fail but also allows for replacement prior to failure. 	✓	✓	✓
<ul style="list-style-type: none"> HP Active Health System (AHS)—Allows for pre-failure monitoring and faster diagnostics of the failure within a server. 	✓	✓	
<ul style="list-style-type: none"> Rapid Rebuild—With drive capacity increasing to 6 TB and more, it takes a longer time to rebuild if a drive fails, thus putting the data on that drive at risk. HP has optimized the Smart Array controller firmware to rebuild larger capacity drives more quickly in order to prevent data loss. 	✓		

Benefits	HP Smart Array	HP Smart Host Bus Adapter	HP Dynamic Smart Array
Flexibility High flexibility can help you reduce the cost and complexity of your storage system. This makes it easier to meet your application requirements for performance and capacity.			
• Choice of P440ar or H240ar on select HP ProLiant Gen9 rack and tower servers and choice of P244br or H244br on select HP ProLiant Gen9 blade servers. (Please check the compatibility matrix for the latest information.)	✓	✓	
• 12 Gb SAS Expander Card—Provides internal storage expansion allowing for consolidation of compute and storage.	✓	✓	
• Mix and match drives—Support for both Serial Attached SCSI (SAS) and Serial ATA (SATA) drives gives you the flexibility to mix and match these drives in the same enclosure.	✓	✓	
• Your choice of brackets—Full-size and low-profile brackets ship with the controller for added flexibility.	✓	✓	
Manageability Designed for ease-of-use, HP controllers come with these features:			
• Remote monitoring and configuration—With HP SSA and SIM, remote monitoring and configuration are easy, giving you greater control over your storage environment.	✓	✓	✓
• Mirror splitting and recombining—Mirror splitting allows you to divide one or more RAID 1 or RAID 10 logical drives into two identical new arrays with RAID 0 logical drives; it now becomes easy to replicate a configuration or build backup before performing a critical operation, as well as making it possible to recombine a split mirrored array.	✓	✓	
Fault prevention The following features offer detection of possible failures before they occur, allowing preventive action:			
• Predictive spare activation—Moves data to an alternate device before failures occur to protect against downtime and safeguard valuable data.	✓	✓ (Supported only in simple RAID mode)	✓
• Self-Monitoring Analysis and Reporting Technology (S.M.A.R.T.)—first developed at HP—Detects possible hard-disk failure, allowing replacement of the component before catastrophic failure occurs.	✓	✓	✓
• Dynamic sector repairing—Continually performs background surface scans on the drives during inactive periods and automatically remaps bad sectors, providing data integrity.	✓	✓	✓

Benefits	HP Smart Array	HP Smart Host Bus Adapter	HP Dynamic Smart Array
Fault recovery The HP Smart Array controllers that feature RAID options and Advanced Data Mirroring (ADM) reduce downtime, reconstruct data, and facilitate a quick recovery from drive failure.			
<ul style="list-style-type: none"> • Online spares—Any number of spare drives can be installed prior to drive failure; if a failure does occur, recovery begins with an online spare and data is reconstructed automatically, reducing the risk of additional drive failures, which could result in data loss. 	✓		
Power efficiency Every watt of power costs money, so HP is attaching a power efficiency element to HP Smart Array and HP Smart Host Bus Adapter products to help you minimize operating expenses. Managed through HP SSA, you can control/adjust the power level of the controller to meet the workload. The different power levels are: <ul style="list-style-type: none"> • Performance-optimized—Maximum performance without any power savings • Balanced between power and performance—Controller will dynamically balance between performance and power • Power savings—Save maximum power where performance is not critical, e.g., for boot devices or cold storage 			
	✓	✓	
Simplicity Now you can manage multiple storage devices with a central battery backup system. HP Smart Storage Battery provides a simple way to add additional controllers. Wired once, you can add up to 24 devices in a ML/DL Gen9 server and 3 devices in a BL460c Gen9 server with no need to route multiple cables.			
	✓		
Consistency and upgradeability Utilizing the same configuration, diagnostic, and management tools—including HP SSA and HP Insight Manager—for storage and RAID management provide these benefits:			
<ul style="list-style-type: none"> • Simplified storage management—Facilitated by GUI-based configuration, management, and diagnostic software tools. 	✓	✓	✓
<ul style="list-style-type: none"> • Investment protection for your HP storage solution—Provided by a common data format between generations of Smart Array products. 	✓		
<ul style="list-style-type: none"> • The simplicity needed in a mixed environment—Provided by common driver updates for both the HP Smart Array and Smart Host Bus Adapter products. 	✓	✓	
<ul style="list-style-type: none"> • Easy upgrades—Data compatibility between models of HP Smart Array controllers allows you to easily upgrade from an existing “just a bunch of disks” (JBOD) to future HP Smart Array SAS products for higher performance, capacity, and availability. 	✓	✓	
<ul style="list-style-type: none"> • Easy deployment of new servers for a better HP ProLiant server experience—Made possible by software and firmware that are integrated into the HP server tool, like HP Support ProLiant Pack (SPP) and HP Intelligent Provisioning. 	✓	✓	✓

Introducing the HP Smart Storage Battery

The growing number of required storage devices, along with the capacity needed for backup, led us to redesign the backup battery capabilities for HP ProLiant Gen9 servers. HP Smart Storage Battery is a central battery backup unit that supports up to 24 devices.



Ideal environment

HP Smart Array Controllers are well-suited for SAS-based server and storage enclosures where high performance is critical. Typical uses include:

- File or print
- Domain controller
- Application servers
mail, database, Web, and the cloud

HP Smart Array Controller family

HP Smart Array P244br Controller—Advanced RAID functionality with standard 1 GB FBWC. The HP Smart Array P244br is a 12 Gb/s Flexible Smart Array controller that connects internal drives to the HP ProLiant BL460c Gen9.

Key features

- Two Internal connectors
- 1 GB FBWC (up to 10.6 GB/s maximum cache bandwidth)
- RAID 0, 1
- Heal Array
- Advanced capacity expansion
- Offline/online mirror split
- Video on demand (VOD) performance optimization
- Move or delete individual logical unit numbers (LUNs)
- UEFI or legacy
- HP SSD Smart Path

Upgrade options

- HP Secure Encryption
- HP SmartCache

HP Smart Array P440 and P440ar Controller—Advanced RAID functionality for uncompromising reliability, scalability, and a rich feature set to meet your specific storage needs.

HP Smart Array P440 Controller comes in a PCIe 3.0 low-profile, half-height form factor, and the P440ar comes in a Flexible Smart Array form factor SAS RAID controller with internal ports.

Key features

- Internal port (P440): 1 x 8 Mini-SAS double-wide (eight total SAS 12 Gb/s capable physical links)
- Internal port (P440ar): 2 x 4 Mini-SAS (eight total SAS 12 Gb/s capable physical links)
- Slot type (P440): x8 PCIe 3.0
- Slot type (P440ar): Flexible Smart Array and Smart Host Bus Adapter slot
- FBWC (P440): 4 GB FBWC (up to 14.9 GB/s maximum cache bandwidth)
- FBWC (P440ar): 2 GB FBWC (up to 14.9 GB/s maximum cache bandwidth)
- RAID 0, 1, 10, 5, 50, 6, 60, and RAID 1 ADM
- Heal Array
- Advanced capacity expansion
- Offline/online mirror split
- VOD performance optimization
- Move or delete individual LUNs
- UEFI or legacy
- HP SSD Smart Path

Upgrade options

- HP Secure Encryption
- HP SmartCache
- HP 12 Gb SAS Expander Card

HP Smart Array P441 Controllers—External connect cards that deliver mission-critical reliability in an easy-to-use RAID solution

The HP Smart Array P441 Controller is a PCIe 3.0 low-profile, half-height, SAS RAID controller with external ports. This controller can also support tape drives.

Key features

- External ports: 2 x 4 mini-SAS HD (eight total SAS 12 Gb/s capable physical links)
- x8 PCIe 3.0
- 4 GB FBWC (up to 14.9 GB/s maximum cache bandwidth)
- RAID 0, 1, 10, 5, 50, 6, 60, and RAID 1 ADM
- Dual domain
- Heal Array
- Advanced capacity expansion
- Offline/online mirror split
- VOD performance optimization
- Move or delete individual LUNs
- UEFI or legacy
- HP SSD Smart Path

Upgrade options

- HP Secure Encryption
- HP SmartCache

HP Smart Array P840 Controller—A scalable SAS RAID controller for connecting a total of 16 internal drives spanning two separate drive cages

The HP Smart Array P840 Controller is a full-height, half-length, 12 Gb/s SAS capable, PCIe 3.0 RAID controller. It features 16 physical SAS/SATA lanes each supporting 12 Gb/s SAS or SATA protocol. Advanced storage functionality, such as Advanced Data Mirroring and Advanced Data Guarding makes it easier to protect the data.

Key features

- 2 x 8 double-wide internal ports (16 total SAS 12 Gb/s capable physical links)
- x8 PCIe 3.0
- 4 GB FBWC (up to 14.9 GB/s maximum cache bandwidth)
- RAID 0, 1, 10, 5, 50, 6, 60, and RAID 1 ADM
- Recovery ROM protects against ROM corruption
- Heal Array
- Advanced capacity expansion
- Offline/online mirror split
- VOD performance optimization
- Move or delete individual LUNs
- UEFI or legacy
- HP SSD Smart Path
- HP SmartCache

Upgrade options

- HP Secure Encryption
- HP 12 Gb SAS Expander Card



Ideal environment

HP Smart Host Bus Adapters are well-suited for workloads that require reliable high performance and scalability for direct attached storage with basic RAID functionality and shared storage support at a lower cost. Typical uses include:

- OS boot
- Hadoop
- Database availability group (DAG)

HP Smart Host Bus Adapters

HP H240 and H240ar Smart Host Bus Adapter—Reliable, high-performance SAS connectivity to internal drives

The HP H240 Smart Host Bus Adapter comes in a low profile PCIe form factor or as a Flexible Smart SAS Host Bus Adapter form factor. They support 12 Gb/s SAS and 6 Gb/s SATA performance and are capable of running in either HBA mode or simple RAID mode. Simple RAID allows you to configure the controller to support RAID 0, RAID 1, RAID 10, or RAID 5. H240 and H240ar do not offer any acceleration or support cache modules. You can now choose to use the H240ar or the P440ar without having to use a PCIe slot to match the unique requirements of the workload.

Key features

- Internal ports (H240): two internal x 4 mini-SAS connectors
- Internal ports (H240ar): two internal x 4 mini-SAS connectors
- Slot type (H240): x8 PCIe 3.0
- Slot type (H240ar): Flexible Smart Array and Smart Host Bus Adapter slot
- Simple RAID 0, 1, 10, and 5
- UEFI or legacy
- HP SSD Smart Path (in simple RAID mode)

Upgrade options

- HP Secure Encryption (in simple RAID mode)
- HP 12 Gb SAS Expander Card

HP H241 Smart Host Adapter—Reliable, high-performance SAS connectivity to external drives.

The HP H241 Smart Host Bus Adapter comes in a low profile PCIe form factor. The H241 will run in 12 Gb/s performance in a 12 Gb/s external storage, and it is capable of running in either HBA mode or simple RAID mode. Simple RAID simply allows you to configure the controller to support RAID 0, RAID 1, RAID 10, or RAID 5. H241 does not offer any acceleration or support cache modules. It is also ideal for data backup to an external tape drive.

Key features

- Two external x4 Mini-SAS HD connectors
- x8 PCIe 3.0
- Simple RAID 0, 1, 10, and 5
- UEFI or legacy
- HP SSD Smart Path (in simple RAID mode)

Upgrade options

- HP Secure Encryption (in simple RAID mode)

HP H244br Smart Host Adapter—Reliable high performance SAS connectivity to internal drives in an HP ProLiant BL460c Gen9 Server

The HP H244br comes in a Flexible Smart SAS Host Adapter form factor. It is capable of running at 12 Gb/s performance and operate either as an HBA or as a simple RAID mode. H244br does not offer any acceleration or support cache modules. You can choose to use the H244br now and then upgrade to a P244br without having to use a mezzanine slot.

Key features

- 2 internal Mini-SAS connectors
- Simple RAID 0 and 1
- UEFI or legacy
- HP SSD Smart Path (in simple RAID mode)

Upgrade options

- HP Secure Encryption (in simple RAID mode)

HP Dynamic Smart Array B140i

The HP Dynamic Smart Array B140i provides an embedded 6 Gb/s SATA RAID solution for HP ProLiant Gen9 servers. It uses the chipset in the server and HP software to provide a low total cost solution while still maintaining comparable RAID protection and full compatibility with HP Smart Array disk format, configuration utilities, and management software. This allows you to upgrade/move data from a B140i to the HP Smart Array controller without having to do a backup and restore or reinstall the operating system. B140i is embedded across the HP ProLiant Gen9 servers. It provides an entry-level storage connection and is suitable for less intensive I/O workloads.

Key features

- 10 internal SATA connectors
- RAID 0, 1, 10, and 5
- SATA protocol
- UEFI



HP 12 Gb SAS Expander card

The HP 12 Gb SAS Expander Card provides servers with internal storage scalability by allowing support for more than eight internal hard disk drives when connected to a Gen9 supported Smart Array or Smart Host Bus Adapter controller.

The Expander Card is ideal for users who want to RAID more than eight internal hard disk drives or add an additional internal drive cage and RAID across all the internal drives. The drives attached behind the Expander Card are managed by the supported Smart Array Controller or Smart HBA. The Expander Card dynamically optimizes the bandwidth of existing 6 Gb/s drives to match the 12 Gb/s speed in a mixed environment of 6 Gb/s and 12 Gb/s drives.

A server-specific Expander Card kit will be available for ProLiant DL380, ML350, and DL180 servers.

Key features

- Nine x4 Mini SAS connectors
- Scalable to total of 26 SFF drives internally
- x8 PCIe 3.0
- 12 Gb/s SAS performance
- Optimizes 6 Gb/s drive speed to 12 Gb/s
- Provides DL380, ML350, and DL180 with internal storage scalability



HP Secure Encryption

HP Secure Encryption is a Smart Array Controller-based data encryption solution for HP ProLiant Gen9 servers, which protects sensitive, mission-critical data. This is an enterprise-class encryption solution for data at rest on any bulk storage (with the exception of tape or external arrays such as P2000 and MSA 2040) attached to the supported HP Smart Array Px4x family of controllers. The solution is available for both local and remote deployments. Many companies under government regulations require that sensitive data be secured and not compromised. HP Secure Encryption provides encryption for data at rest—an important component for complying with government regulations like HIPAA and Sarbanes-Oxley, both of which have data privacy requirements.

Benefits

- Data on the cache module of the HP Smart Array Px4x controllers, as well as the attached bulk storage is encrypted.
- Any HDD or SSD in the Smart Drive portfolio for ProLiant Gen9 servers is supported.
- Easily scales with your business data growth. Local Key Management Mode provides a simple key management solution, using just HP SSA and HP Smart Array Px4x controllers. Remote Key Management mode allows for the central management and secure key storage for all HP Secure Encryption related keys. The HP Enterprise Secure Key Manager 3.1 scales to more than 25,000 attached servers and millions of associated keys.
- Single interface of the HP Smart Storage Administrator also manages the cryptographic features of HP Secure Encryption.
- No activation key to activate the feature is required, but a HP Secure Encryption license per drive is required. HP SSA configures the cryptographic features of HP Secure Encryption.

HP Secure Encryption orderable part numbers:

HP Secure Encryption No Media Server-E-LTU D8S85AAE

HP Secure Encryption No Media Flexible License D8S84A

For more information, please visit: hp.com/go/hpsecureencryption

HP Smart Storage Administrator

HP Smart Storage Administrator gives you a single interface for quickly setting up, configuring, and managing HP Smart Arrays, HP Smart Host Bus Adapters, and other storage devices, such as SAS switches. HP SSA is designed to enhance the HP ProLiant server storage experience, and will expose new features and functionality for various HP Smart Storage initiatives as they come online. For more information, please visit: hp.com/go/hpssa.

HP SmartCache

HP SmartCache is a Smart Array Controller-based read and write caching solution for HP ProLiant Gen9 servers in a direct attach storage (DAS) environment. It caches the most frequently accessed data (“hot” data) onto lower latency SSDs to dynamically accelerate application workloads. HP SmartCache operates transparently to host applications, which means you do not have to change the application, but can still realize better performance with a minimal number of SSDs in your configuration.

HP SmartCache supports two write policies:

- The write-through policy is designed to accelerate read-intensive workloads. Writes of hot data may go to the accelerator, but writes always go to bulk storage. There is no data loss if the accelerator fails.

- The write-back policy is designed to accelerate both read and write workloads. Writes of hot data may go to the accelerator, and be forwarded to bulk storage at a later time. If the accelerator fails before all write data has been forwarded to bulk storage, then there is data loss. HP recommends a RAID 1 accelerator. In certain workloads, all writes may go to the accelerator before being forwarded to bulk storage. As a result, Value Endurance SSDs are generally not a wise choice for the accelerator, for two reasons: Value Endurance SSDs may wear out quickly in a heavy write workload, and Value Endurance SSDs typically provide much less write performance than Mainstream Endurance SSDs or High Endurance SSDs.

The Writeback feature enables write commands to be stored temporarily on the accelerator(s) prior to being written to bulk storage. HP SmartCache is available as an option on the HP Smart Array P440 and P440ar Controllers. HP SmartCache is included and does not require the purchase of a license on the HP Smart Array P840 Controller.

The basic HP SmartCache architecture is comprised of the following three elements:

1. Bulk storage—Any supported storage attached to the HP Smart Array controller
2. Accelerator—A faster/lower latency SSD device that caches data
3. Metadata—Information held in the FBWC that maps the location of information residing on the accelerator and bulk storage devices

The HP SmartCache architecture is flexible and supports any HP ProLiant Gen9 supported HDD for bulk storage and any HP ProLiant Gen9 supported SSD as an accelerator. HP SmartCache is deployed and managed through the same management tool as HP Smart Array—the HP SSA.

HP SmartCache orderable part numbers²

Physical—D7S26A	Electronic—D7S27AAE	Flexible—D7S27A
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For more information, please visit: hp.com/go/smartcache

HP SSD Smart Path

The HP SSD Smart Path feature included in the HP Smart Array software stack improves SSD read performance. The HP Smart Array driver chooses the optimum path to access each SSD. With up to 3.5X better SSD read performance, HP SSD Smart Path chooses the optimum path to the SSD and accelerates reads for all RAID levels and RAID 0 writes. HP SSD Smart Path is ideal for read intensive workloads and is included as a base feature on HP Smart Array P-series controllers. The following operating systems are supported by the HP SSD Smart Path feature:

- Microsoft® Windows® Server 2008
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Red Hat® Enterprise Linux 6.1, 6.2, 6.3, 6.4, 6.5, and 7.0
- SUSE Linux Enterprise Server 11 (SP1, SP2, SP3) and 12
- VMware ESXi 5.0 update 3
- VMware vSphere 5.1 update 2 and vSphere 5.5

For more information, please visit: hp.com/go/hpssa.

²HP SmartCache requires 1 Gb FBWC minimum; HP ProLiant supported HDDs and SSD.

Technical specifications

	HP Smart Array P244br	HP Smart Array P440 HP Smart Array P440ar	HP Smart Array P840	HP Smart Array P441
Part number(s)	749680-B21	726821-B21 (P440) 726736-B21 (P440ar)	726897-B21	726825-B21
Form factor	Flexible Smart Array (supported on BL460c Gen9)	PCI-Express Low Profile (P440) Flexible Smart Array (P440ar)	PCI-Express full-height, half-length	PCI-Express Low Profile
I/O slot type	PCI-Express Gen3	PCI-Express Gen3	PCI-Express Gen3	PCI-Express Gen3
Number of PCI links	4	8	8	8
PCI link rate	8 Gb/s	8 Gb/s	8 Gb/s	8 Gb/s
Storage protocol support	SAS and SATA	SAS and SATA	SAS and SATA	SAS and SATA
SAS/SATA peak data transfer rate	12 Gb/s	12 Gb/s	12 Gb/s	12 Gb/s
Number of SAS/SATA links	2	8	16	8
SAS/SATA connectivity	2 internal ports	1 internal x 8 mini-SAS double-wide (P440) 2 internal x 4 mini-SAS connectors (P440ar)	2 x 8 ports double-wide internal	2 x 4 ports mini-SAS HD external
Expander support	No	Yes*****	Yes*****	Yes (in the JBOD)
Drives supported (max)*	2 internal	48 internal with expander (P440) 26 internal with expander (P440ar)	16 internal	200 external
I/O cache technology	10.6 GB/s	14.9 GB/s (P440) 12.8 GB/s (P440ar)	14.9 GB/s	14.9 GB/s
Cache size	1 GB	4 GB (P440) 2 GB (P440ar)	4 GB	4 GB
Cache data width	40 bit	72 bit	72 bit	72 bit
Online spare support	Yes	Yes	Yes	Yes
RAID support**	0 and 1	0, 1, 10, 5, 50, 6, 60, 1 ADM, and 10 ADM	0, 1, 10, 5, 50, 6, 60, 1 ADM, and 10 ADM	0, 1, 10, 5, 50, 6, 60, 1 ADM, and 10 ADM
Software management***	HP SSA, SMH, and SIM	HP SSA, SMH, and SIM	HP SSA, SMH, and SIM	HP SSA, SMH, and SIM
Warranty	Three years parts only	Three years parts only	Three years parts only	Three years parts only
HP Secure Encryption license	Optional	Optional	Optional	Optional
HP SmartCache License****	Optional	Optional	Standard, license is not required	Optional
HP Smart Storage Administrator	Supported	Supported	Supported	Supported

Technical specifications

	HP H240 Smart Host Bus Adapter HP H240ar Smart Host Bus Adapter	HP H244br Smart Host Bus Adapter	HP H241 Smart Host Bus Adapter	HP Dynamic Smart Array B140i
Part number(s)	726907-B21 (H240) 726757-B21 (H240ar)	726809-B21	726911-B21	N/A (embedded)
Form factor	PCI-Express Low Profile (H240) Flexible Smart SAS Host Bus Adapter (H240ar)	Flexible Smart SAS Host Bus Adapter	PCI-Express Low Profile	N/A
I/O slot type	PCI-Express 3.0	PCI-Express 3.0	PCI-Express 3.0	N/A
Number of PCI links	8	8	8	4
PCI link rate	8 Gb/s	8 Gb/s	8 Gb/s	4 Gb/s
Storage protocol support	SAS and SATA	SAS and SATA	SAS and SATA	SATA
SAS/SATA peak data transfer rate	12 Gb/s	12 Gb/s*****	12 Gb/s	6 Gb/s
Number of SAS/SATA links	8	2	8	10
SAS/SATA connectivity	2 internal x 4 mini-SAS connectors	2 internal ports	2 x 4 ports mini-SAS HD external	2 x 4 connectors; 2 x 1 SATA connectors
Expander support	Yes*****	No	No	No
Drives supported (max)*	60 internal (H240) 48 internal (H240ar)	2 internal	Up to 200	Up to 10 internal
RAID support**	0, 1, 10, and 5 (in RAID mode only)	0, 1, and 5 supported in simple RAID mode	0,1,10, and 5 (in RAID mode only)	0, 1, 10, and 5 SATA
Software management***	HP SSA, SMH, and SIM	HP SSA, SMH, and SIM	HP SSA, SMH, and SIM	HP SSA, SMH, and SIM
Warranty	One year parts only	One year parts only	One year parts only	Server warranty
HP Secure Encryption license	Optional (in RAID mode only)	Optional (in RAID mode only)	Optional (in RAID mode only)	Not supported
HP SmartCache License****	Not supported	Not supported	Not supported	Not supported
HP Smart Storage Administrator	Supported	Supported	Supported	Supported

* The maximum number of drives supported is dependent on the server the controller attaches to or the external storage box it attaches to. Please refer to the server QuickSpecs or to the external storage box to determine the maximum number of drives it can support. P440ar and H240ar are only supported on select servers. Check compatibility matrix.

** RAID 5, 50, 6, and 60 require a minimum of 512 MB FBWC to run.

*** HP Smart Storage Administrator (HP SSA); HP System Management Homepage (SMH), HP Systems Insight Manager (SIM).

**** Requires a minimum of 1 Gb FBWC; HP ProLiant Gen9 supported HDDs and SSDs.

***** Requires 12 Gb/s infrastructure to experience the increased performance.

***** Check server QuickSpecs

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