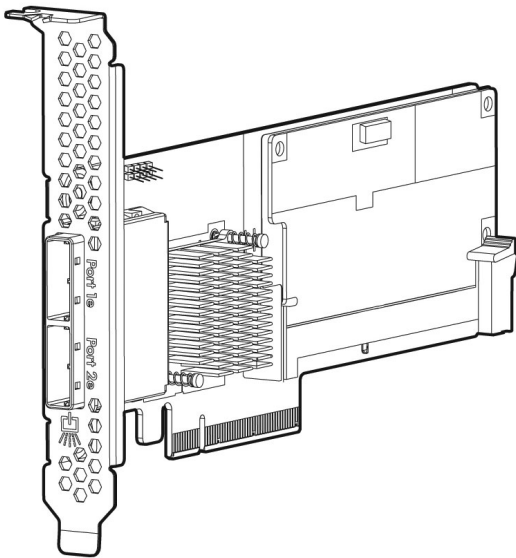


Overview

The HP Smart Array P421 Controller is a low profile, 6 Gb/s, PCIe 3.0, Serial Attached SCSI (SAS) RAID controller that provides enterprise class, second generation storage performance, maximum external scalability, and data protection for select HP ProLiant Gen8 rack servers and tower servers.

It features eight external SAS ports and delivers increased server uptime by providing advanced storage functionality, including online RAID level migration (between any RAID levels) with flash back write cache, global online spare, and pre-failure warning. Data compatibility between HP Smart Array Controllers means customers can easily upgrade to future Smart Array Controllers.

HP Smart Array Advanced Pack 2.0 firmware makes it easier for customers to protect their data with advanced functionality for this next generation of Smart Array controllers, including features such as RAID 1 ADM (Advanced Data Mirroring).



What's New

- Up to 4x better Solid State Disk (SSD) read performance with the SSD Smart Path firmware and driver based feature for Smart Array controllers

Models

HP Smart Array P421 Controller	HP Smart Array P421/1GB FBWC 6Gb 2-ports Ext SAS Controller	631673-B21
	HP Smart Array P421/2GB FBWC 6Gb 2-ports Ext SAS Controller	631674-B21

Standard Features

The Smart Array Advantage

HP's innovative design and integration work of the Smart Array family of products creates customer value that is unmatched in the industry. Use of Smart Array products across multiple applications results in a much lower Total Cost of Ownership (TCO) than any other server storage RAID product. The HP Smart Array family brings an unparalleled return on investment through:

Data Compatibility among all models of Smart Array controllers allows simple and easy upgrades any time needs for higher performance, capacity, and availability increase. Even successive generations of Smart Array controllers understand the data format of other Smart Array Controllers.

Consistent Configuration and Management Tools. All Smart Array products utilize a standard set of management and utility software. These tools minimize Total Cost of Ownership (TCO) by reducing training requirements and technical expertise necessary to install and maintain the HP server storage.

Smart Drive Carrier is for use across multiple HP servers, Universal Hard Drive form factor is for disk enclosures and storage systems. With compatibility across many enterprise platforms, you are free to deploy and re-deploy these drives to quickly deliver increased storage capacity, migrate data between systems, and easily manage spare drives.

Pre-Failure Warranty means HP Insight Manager not only reports when a drive is going to fail but allows replacement of failing drives prior to actual failure. For complete details, consult the HP Support Center or refer to your HP Server documentation.

Key Features

- The SA-P421 Controller supports up to 200 drives.
- The SA-P421 Controller supports the HP D2600 Disk Enclosure and HP D2700 Disk Enclosure (up to 8 daisy chained) Seamless upgrades to current or next generation HP high performance and high capacity Serial Attached SCSI Smart Array controllers
- 2nd Generation 6Gb/s SAS technology delivers high performance and data bandwidth and contains full compatibility with 3Gb/s SATA technology.
- x8 PCIe 3.0 host interface technology delivers high performance and data bandwidth up to 8.5 GB/s maximum bandwidth.
- Addition of the flash backed cache upgrade enables array expansion, logical drive extension, RAID migration, and stripe size migration.
- Additionally, Smart Array Advanced Pack 2.0 License key enables RAID 6 (ADG), 6+0, Advanced Capacity Expansion, Mirror Splitting and Recombining in Offline Mode, Drive Erase, Performance Optimization-Degraded Reads and Read Coalescing (VOD), RAID 1 ADM Advanced Data Mirroring, Move/Delete any individual LUNS and Online Mirror Split
- The HP SSD Smart Path feature included in the Smart Array software stack improves SSD read performance by bypassing the Smart Array firmware for the optimal performance path to the SSD.
- The HP SmartCache licensed feature (available as an additional option) is a controller-based read caching solution in a DAS environment that caches the most frequently accessed data ("hot" data) onto lower latency SSDs to dynamically accelerate application workloads
- Mix-and-match SAS and SATA hard drives, lets you deploy drive technology as needed to fit your computing environment
- Support for SAS tape products
- Software consistency among all Smart Array family products: Array Configuration Utility, Systems Insight Manager, Array Diagnostic Utility (ADU) and Intelligent Provisioning.
- 1GB or 2 GB 72-bit wide DDR3 1333 MHz Flash Back Write Cache module standard
- Low-profile PCI Express form factor - ships with a full size bracket for deployment in either a low-profile or full sized slot

Standard Features

Online Management Features

- Online array expansion (with BBWC or FBWC)
- Online Advanced Capacity Expansion (with FBWC and Smart Array Advanced Pack 2.0 upgrade)
- Online logical drive extension (with FBWC)
- Online RAID Level Migration (with FBWC)
- Online Stripe Size Migration (with FBWC)
- Offline Mirror splitting and recombining (with FBWC and Smart Array Advanced Pack upgrade)
- Unlimited global online spare assignment
- User selectable expand and rebuild priority
- User selectable RAID level and stripe size
- User selectable read and write cache size ratio

Ports

- Eight (8) SAS physical links distributed across 2 external x4 miniSAS connectors.

Performance

HP's High Performance Architecture sets new boundaries of industry performance expectations!

- Second Generation 6Gb/s SAS (600MB/s bandwidth per physical link)
- x8 6Gb/s SAS physical links (compatible with 3Gb/s SATA)
- cache upgradeable to 2GB 72-bit wide DDR3-1333MHz flash backed write cache provides up to 4.2 GB/s maximum bandwidth
- Write-back caching (with FBWC)

Native Command Queuing Native Command Queuing (NCQ) is a technology designed to increase performance of SATA hard disk drives by allowing the individual hard disk to internally optimize the order in which received read and write commands are executed. This can reduce the amount of unnecessary going back-and-forth on the drive's heads, resulting in increased performance for workloads where multiple simultaneous read/write requests are outstanding, most often occurring in server or storage-type applications. Without NCQ the drive has to process and complete one command at a time. For NCQ to be enabled, it must be supported and turned on in the controller and in the hard drive itself.

Capacity

Given the increasing need for high performance and rapid capacity expansion, the SA-P421 offers:

- Up to 400TB of external storage per PCI slot with 8x HP D2600 Disk Enclosures and 200 x2 TB 3.5" SAS hard drives
- Up to 600TB of external storage per PCI slot with 8x HP D2600 Disk Enclosures and 96 x 3TB 3.5" SATA MDL hard drives
- Up to 180TB of external storage per PCI slot with 8x HP D2700 Disk Enclosures and 200 x 900GB SFF SAS hard drives
- Up to 200 TB of external storage per PCI slot with 8x HP D2700 Disk Enclosures and 200 x 1TB SFF SATA hard drives

NOTE: Support for greater than 2TB in a single logical drive.

Standard Features

Availability

Provides increased server uptime by providing advanced storage functionality:

- Online RAID Level Migration (between any RAID level/with FBWC)
- Online Capacity Expansion (with FBWC)
- Online Advanced Capacity Expansion (with Smart Array Advanced Pack 2.0 upgrade)
- Logical Drive Capacity Extension (with FBWC)
- Global Online Spare
- Pre-Failure Warranty

Fault Prevention

The following features offer detection of possible failures before they occur, allowing preventive action to be taken:

- S.M.A.R.T. (Self Monitoring Analysis and Reporting Technology) was first developed by HP which detects possible hard disk failure before it occurs, allowing replacement of the component before failure occurs.
- Drive Parameter Tracking monitors drive operational parameters, predicting failure and notifying the administrator.
- Dynamic Sector Repairing continually performs background surface scans on the hard disk drives during inactive periods and automatically remaps bad sectors, ensuring data integrity.
- Smart Array Cache Tracking monitors integrity of controller cache, allowing pre-failure preventative maintenance.
- Environment Tracking for External Storage System: Monitors fan speed and cabinet temperature of Modular Smart Array Enclosures and HP Disk Enclosures.

Fault Tolerance

Keeps data available and server running while a failed drive is being replaced; several fault tolerance configurations are supported including:

- **RAID 6 with ADG** (Advanced Data Guarding): This is the highest level of fault tolerance. It allocates two sets of parity data across drives and allows simultaneous write operations. This level of fault tolerance can withstand two simultaneous drive failures without downtime or data loss.
- **RAID 6+0**: Supported with min of 8 drives, but would have 4 available. Target benefit is to split RAID across the external boxes
NOTE: RAID 6, 6+0 can be enabled with a minimum of 512 MB FBWC and Smart Array Advanced Pack 2.0 License key option upgrades.
- **RAID 5** (Distributed Data Guarding): This allocates one set of parity data across drives and allows simultaneous write operations. This level of fault tolerance can withstand a single drive failure without downtime or data loss.
 - RAID5 is available on the SA P421 with a minimum of 1GB cache
- **RAID 5+0**: This is a RAID 0 array striped across 5 elements. Combines the straight block-level striping of RAID 0 with the distributed parity of RAID 5.
- **Drive Mirroring** (RAID 1, 1+0): This allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file. It is a high-performance RAID.

Standard Features

Fault Recovery

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

- **Recovery ROM:** This new feature provides a unique redundancy feature that protects from a ROM image corruption. A new version of firmware can be flashed to the ROM while the controller maintains the last known working version of firmware. If the firmware becomes corrupt, the controller will revert back to the previous version of firmware and continue operating. This reduces the risk of flashing firmware to the controller.
- **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** corrects against single bit data and address corruption.
- **Flash Backed Write Cache** upgrade provides indefinite data retention.

Ease of Use

Consistency and Upgradeability make the Smart Array family unique in the industry:

- GUI based configuration, management and diagnostic software tools
- Common data format between generations of products
- Data migration between servers and external HP Modular Smart Array enclosures and HP Disk Enclosures

HP SSD SmartPath

The HP SSD Smart Path feature included in the Smart Array software stack improves Solid State Disk (SSD) read performance. The Smart Array driver chooses the optimum path to access each SSD. With up to 4x 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 Requires updated firmware, drivers, and configurable utility available here: www.hp.com/go/HPSSDSmartPath. 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 2008 Server
 - Microsoft Windows 2008 R2 Server
 - Microsoft Windows 2012 Server
-

Standard Features

HP SmartCache

The HP SmartCache licensed feature is a controller-based read caching solution in a DAS environment that caches the most frequently accessed data ("hot" data) onto lower latency SSDs to dynamically accelerate application workloads. HP SmartCache is supported on HP ProLiant Gen8 servers with one of the following controllers: P420i, P420, P421, P822 and P721m. HP SmartCache is an included feature on the P822 and P721m/2G FBWC. The HP SmartCache architecture is flexible and supports any HP ProLiant Gen8 supported HDD for bulk storage and any HP ProLiant Gen8 supported SSD as an accelerator.

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

- **Bulk storage:** The first element is the bulk storage device, which is any supported HDD attached to the HP Smart Array controller.
- **Accelerator:** The second element, the accelerator, is a faster/lower latency SSD device that caches data.
- **Metadata:** The final element is metadata, information held in a relatively small storage area that maps the location of information residing on the accelerator and bulk storage devices.

HP SmartCache is deployed and managed through the same management tool for HP Smart Array - the HP Array Configuration Utility (ACU). For more information please visit www.hp.com/go/smartcache

Warranty

The warranty for this device is 3 years parts only.

Pre-Failure Warranty: Drives attached to the Smart Array Controller and monitored under Insight Manager are supported by a Pre-Failure (replacement) Warranty. For complete details, consult the HP Support Center or refer to your HP Server Documentation.

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 Care Packs, which are sold at the HP System level this product attaches too

Compatibility

Server Support

For up to date compatibility, please see the following URL for complete Smart Array P421 Controller compatibility and support information:

<http://h18006.www1.hp.com/products/servers/proliantstorage/arraycontrollers/index.html>

Operating Systems

Microsoft Windows Server

Microsoft Windows Server Hyper-V

Red Hat Enterprise Linux (RHEL)

SUSE Linux Enterprise Server (SLES)

VMware

NOTE: For more information on HP's Certified and Supported ProLiant Servers for OS and Virtualization Software and the latest listing of software drivers available for your server and Smart Array RAID controller, please visit our Support Matrix at: <http://www.hp.com/go/ossupport>

NOTE: For more Linux OS support and certification information, please visit:

<http://h18004.www1.hp.com/products/servers/linux/>

Software Suite

All Smart Array products share a common set of configuration, management and diagnostic tools, including Array Configuration Utility (ACU), Array Diagnostic Utility (ADU), and Systems Insight Manager. These software tools reduce the cost of training for each successive generation of product and take much of the guesswork out of troubleshooting field problems. These tools lower the total cost of ownership by reducing training and technical expertise necessary to install and maintain HP server storage.

Systems Insight Manager

- Powerful server and server options/storage manager tool
- Monitors over 1200 system wide parameters
- Configuration/Diagnostic Utilities

HP Array Configuration Utility (ACU)

- Powerful Web based configuration utility for all Smart Array controllers
- Provides a graphical view of HP drive array configurations
- Allows for management of multiple arrays over a secure internet connection from anywhere in the world
- Easy to use Wizards for configuration
- Runs online on Windows

HP Option ROM Configuration for Arrays (ORCA)

- An alternative method for easily viewing, creating, and deleting multiple arrays and logical volumes during system power up.
- For advanced array configurations use ACU

NOTE: For advanced array configurations use ACU.

HP Array Diagnostic Utility (ADU)

- In depth diagnostic and reporting utility for all Smart Array controllers

Service and Support

Service and Support

HP Technology Services

HP Technology Services offers you consultants and support experts to solve your most complex infrastructure problems. We help keep your business running, boost availability, and avoid downtime.

Protect your business beyond warranty with HP Care Pack Services

When you buy HP Options, it's also a good time to think about what level of service you may need. HP Care Pack services provide total care and support expertise with committed response choices designed to meet your IT and business need.

HP Foundation Care services deliver scalable support-packages for HP industry-standard servers and software. You can choose the type and level of service that is most suitable for your business needs. New to this portfolio is HP Collaborative Support. If you are running business critical environments, HP offers Proactive Care or Critical Advantage. These services help you deliver high levels of application availability through proactive service management and advanced technical response.

Here is the support service recommendation from the Foundation Care and Proactive Care portfolio. For customized support service solution, HP can work with you to tailor a service solution for your unique support requirements using broader services portfolio of Foundation Care and Proactive Care.

Recommended HP Care Pack Services for optimal satisfaction with your HP product

Recommended Services

3-Year HP 24x7 4 hour Response, Hardware Support Onsite Service

Provides you with rapid remote support and if required an HP authorized representative who will arrive on site any time and day of the year to begin hardware maintenance service within 4 hours of the service request being logged.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5982-6547EEE.pdf>

OR

3-Year HP 24x7 4 hour Response, HP Collaborative Support

Offers customers a single point of contact for server problem diagnosis, hardware problem resolution, and basic software problem diagnosis, fault isolation, and resolution if available to HP. If the problem is with HP HW, the representative will arrive on site any time and day of the year to begin hardware maintenance service within 4 hours of the service request being logged. In case, the issue is with HP or supported third-party software product and cannot be resolved by applying known fixes, HP will contact the third-party vendor and create a problem incident on your behalf.

HP ProLiant Server Hardware Installation

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

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-9356EN.pdf>

Service and Support

Related HP Care Pack Services to enhance your HP product experience

Related Services

3-Year HP 24x7 4 hour Response, Proactive Care or Critical Advantage

Helps optimize your systems and delivers high levels of application availability through proactive service management and advanced technical response. A skilled Technical Manager will own your query or issue end to end until resolved, delivering a single point of contact for you

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA3-2140ENW.pdf>

OR

3-Year HP 6-hour Onsite Call-to-Repair, HP Collaborative Support

Offers customers a single point of contact for server problem diagnosis, hardware problem resolution to return the hardware in operating condition within 6 hours of the initial service request to the HP Global Solution Center, and basic software problem diagnosis, fault isolation, and resolution if available to HP. In case, the issue is with HP or supported third-party software product and cannot be resolved by applying known fixes, HP will contact the third-party vendor and create a problem incident on your behalf.

HP Proactive Select Service

Provides a flexible way to purchase HP best-in-class consultancy and technical services. You can buy Proactive Select Service Credits when you purchase your hardware and then use the credits over the next 12 months. <http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-3842ENN.pdf>

Insight Remote Support

Provides 24 X 7 remote monitoring, proactive notifications, and problem resolution. Learn more

<http://www.hp.com/go/insightremotesupport>

HP Support Center

Personalized online support portal with access to information, tools and experts to support HP business products. Submit support cases online, chat with HP experts, access support resources or collaborate with peers. Learn more <http://www.hp.com/go/hpsc>

HP'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.

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

**HP' Support Center Mobile App is subject to local availability*

Parts and materials

HP will provide HP-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. Supplies and consumable parts will not be provided as part of this service; standard warranty terms and conditions apply. Parts and components that have exceeded their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual or the technical product data sheet will not be provided, repaired or replaced as part of this service.

Service and Support

Warranty / Service Coverage

For ProLiant servers and storage systems, this service covers HP-branded hardware options qualified for the server, purchased at the same time or afterward, internal to the enclosure, as well as external monitors up to 22" and tower UPS products; these items will be covered at the same service level and for the same coverage period as the server unless the maximum supported lifetime and/or the maximum usage limitation has been exceeded. Coverage of the UPS battery is not included; standard warranty terms and conditions apply.

The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by HP due to malfunction. It does not apply to any exchange of Disk or SSD/Flash Drives that have not failed. SSD/Flash Drives that are specified by HP as consumable parts and/or that have exceeded maximum supported lifetime and/or the maximum usage limit as set forth in the manufacturer's operating manual or the technical data sheet are not eligible for the defective media retention service feature option.

For more information

To learn more on services for HP ESSN Options, please contact your HP sales representative or HP Authorized Channel Partner. Or visit: <http://www.hp.com/services/proliant> or www.hp.com/services/bladesystem

Related Options

NOTE: This is a list of supported options. Some may be discontinued.

HP Optional Upgrades	HP 2GB P-series Smart Array Flash Backed Write Cache	631681-B21
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HP Disk Storage Systems Disk Enclosures

HP D2600 Disk Enclosure	AJ940A
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NOTE: Supports 12 LFF drives, and SAS 6 Gb/s and SATA 3 Gb/s.

HP D2700 Disk Enclosure	AJ941A
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NOTE: Supports 25 SFF drives, and SAS 6 Gb/s and SATA 3 Gb/s.

NOTE: Please see the QuickSpecs for additional information and a list of compatible hard drives:

http://h18000.www1.hp.com/products/quickspecs/13404_div/13404_div.html

HP Tape Backup

NOTE: For the complete range of StorageWorks tape drives, autoloaders, libraries and media see: <http://www.hp.com/go/tape>.

NOTE: The HP Smart Array P411 Controller is for connection to external (desktop) tape drives, tape drives in Rack-Mount Kits, tape autoloaders and tape libraries.

SAS Tape Drives

HP StoreEver DAT 160 SAS Internal Tape Drive	Q1587A
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HP StoreEver DAT 160 SAS External Tape Drive	Q1588A
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HP DAT 320 SAS Internal Tape Drive	AJ830A
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HP DAT 320 SAS External Tape Drive	AJ828A
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HP StoreEver LTO-2 Ultrium 448 SAS External Drive	DW086A
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HP StoreEver LTO-3 Ultrium 920 SAS External Tape Drive	EH848A
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HP StoreEver LTO-4 Ultrium 1760 SAS External Tape Drive	EH920A
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HP LTO-4 Ultrium 1760 SAS (1) in 1U Rack-mount Kit	EH946A
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HP StoreEver LTO-4 Ultrium 1840 SAS External Tape Drive	EH861A
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Rack-mount Tape Drive Enclosures

HP 1U SAS Rack-mount Kit	AE459A
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NOTE: The 1U SAS Rack-Mount Kit can support up to (2) half-height tape drives and is compatible with the DAT 160 SAS (Q1587A), LTO-2 Ultrium 448 SAS (DW085A), LTO-3 Ultrium 920 SAS (EH847A) and LTO-4 Ultrium 1760 (EH919A) tape drives.

HP 3U SAS Rack-mount Kit	AG576A
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NOTE: The 3U Rack-mount Kit can support up to (2) full-height or (4) half-height tape drives and compatible with multiple SAS tape drives including DAT 160 SAS (Q1587A), LTO-2 Ultrium 448 SAS (DW085A), LTO-3 Ultrium 920 SAS (EH847A), LTO-4 Ultrium 1760 SAS (EH919A) and LTO-4 Ultrium 1840 SAS (EH860A) tape drives.

SAS Tape Autoloaders

HP 1/8 G2 LTO-4 Ultrium 1760 SAS Tape Autoloader	AK377A
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HP 1/8 G2 Ultrium 920 SAS Autoloader	AH558A
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SAS Tape Libraries

HP MSL2024 1 LTO-4 Ultrium 1760 SAS Tape Library	AK378A
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Related Options

HP MSL2024 Ultrium 920 SAS Tape Library	AH559A
HP MSL4048 2 LTO-4 Ultrium 1760 SAS Tape Library	AK380A
HP StorageWorks MSL4048 Ultrium 920 SAS Tape Library	AH560A
HP MSL8096 2 LTO-4 Ultrium 1760 SAS Tape Library	AK382A
HP StorageWorks MSL8096 2 Ultrium 920 SAS Tape Library	AH561A
SAS Cables for Tape Drives and Automation	
HP SAS Min-Min 1x-2M Cable Assembly Kit	AE470A
NOTE: Use this cable to connect HP StorageWorks SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors.	
HP SAS MIN-MIN 1X-4M Cable Assembly Kit	AE465A
NOTE: Use this cable to connect HP StorageWorks SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors.	
HP 2m External Mini-SAS to 4x1 Mini-SAS Cable	AN975A
NOTE: One cable is required for every four drives. Use this cable to connect HP StorageWorks MSL SAS Tape Libraries to Mini-SAS (SFF8088) ports.	
HP 4m External Mini-SAS to 4x1 Mini-SAS Cable	AN976A
NOTE: One cable is required for every four drives. Use this cable to connect HP MSL SAS Tape Libraries to Mini-SAS (SFF8088) ports.	

HP Smart Array Advanced Pack 2.0

HP Smart Array Advanced Pack 2.0 No Media 1 Server 1yr 24x7 Support Software	BC377A
NOTE: This part number can be used to purchase a single license or to order multiple licenses with a unique activation key per server. Customer will receive a printed license entitlement certificate 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 HP Software Technical Support.	
HP Smart Array Advanced Pack 2.0 No Media Electronic Lic 1yr 24x7 Support Software	BC390AAE
NOTE: This part number can be used to purchase a single license or to order multiple licenses with a single activation key. Customers will receive a license entitlement certificate 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 HP Software Technical Support Services.	
HP Smart Array Advanced Pack 2.0 No Media Flexible Qty 1yr 24x7 Support Software	BC390A
NOTE: This part number can be used to purchase multiple licenses with a single activation key. Customer will receive a printed license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24x7 HP Software Technical Support Services.	

HP SmartCache

HP SmartCache No Media 24x7 Technical Support 1 Svr License	D7S26A
NOTE: This part number can be used to purchase a single license or to order multiple licenses with a unique activation key per server. Customer will receive a printed license entitlement certificate 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 HP Software Technical Support Services.	
HP SmartCache No Media 24x7 Technical Support Electronic License	D7S27AAE
NOTE: This part number can be used to purchase multiple licenses with a single	



Related Options

activation key. Customer will receive a printed license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24x7 HP Software Technical Support Services.

HP SmartCache No Media 24x7 Technical Support Flexible License

D7S27A

NOTE: This part number can be used to purchase a single license or to order multiple licenses with a single activation key. Customers will receive a license entitlement certificate 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 HP Software Technical Support Services.

NOTE: HP SmartCache requires the following: Min 1 or 2 GB FBWC module along with HP ProLiant Gen8 supported HDD(s) and SSD(s) for more information visit:
www.hp.com/go/smartcache

Technical Specifications

Dimensions (excluding bracket)	Low Profile PCIe Form Factor 19.05 cm x 24.13 cm x 5.72 cm (7.5 in x 9.5 in x 2.25 in)
Disk Drive and Enclosure Protocol Support - Transfer rate	6Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial AT Attachment)
SAS Connectors	2 external (Mini SAS) x8 wide port connectors
Data Transfer Method	x8 5G PCIe 3.0 (4 GB/s maximum bandwidth)
Cache Memory Speed	DDR3-1333800 MHz with 72-bit wide bus provides up to 4.2 GB/s maximum bandwidth
Simultaneous Drive Transfer Ports	2 x4 Wide SAS Ports
SAS Port Link Rate	24 Gb/s per x4 wide port connector (4 x 6 Gb/s)
Software upgradeable Firmware	Yes
Cache Memory	72-bit (1GB or 2GB FBWC module upgrades available)
Logical Drives Supported	Up to 64 logical drives
Maximum Capacity	288TB (96 x 3TB)
Memory Addressing	64-bit, supporting servers memory space greater than 4 GB
RAID Support	RAID 6, 6+0 (Advanced Data Guarding) NOTE: RAID 6, 6+0 can be enabled with a minimum of 1GB FBWC with supercap and Smart Array Advanced Pack 2.0 License key option upgrades. RAID 5, 5+0 (Distributed Data Guarding) NOTE: A minimum of 1GB cache with supercap is required to enable RAID 5, 5+0 support of the Smart Array P411. RAID 1+0 (Striping & Mirroring) RAID 0 (Striping)
Upgradeable Firmware	Upgradeable Firmware with Recovery ROM feature

Environment-friendly Products and Approach	End-of-life Management and Recycling	Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: http://www.hp.com/go/green . To recycle your product, please go to: http://www.hp.com/go/green or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.
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The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <http://www.hp.com/go/green>. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

Technical Specifications

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For hard drives, 1GB = 1 billion bytes. Actual formatted capacity is less.