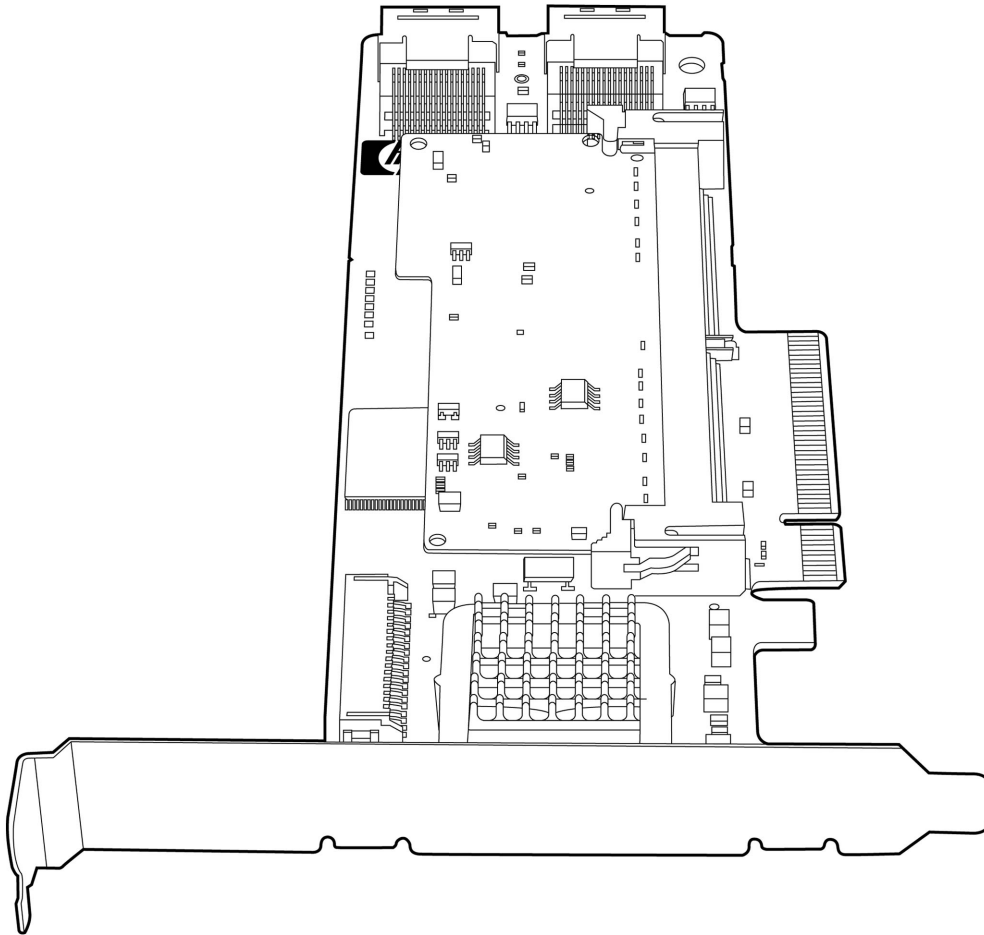# QuickSpecs

Overview

The HP Smart Array P410 is HP's PCI Express (PCIe) 2.0 Serial Attached SCSI (SAS) RAID controller. The low profile, half height card has 8 ports and utilizes DDR2-800 memory. The P410 is ideal for RAID 0, 1, 1+0, 5, 5+0 and can be upgraded with a minimum 256MB cache module, battery kit (for BBWC),and Smart Array Advanced Pack license key for RAID 6 (ADG), & 6+0.

What's New

- 512MB Flash Backed Write Cache (FBWC)
  NOTE: For the Smart Array P410i Controller only.
- 1G Flash Backed Write Cache (FBWC)
  NOTE: For the Smart Array P410i Controller only.

QuickSpecs

Overview

Models

HP Smart Array P410 Controller	HP Smart Array P410/256MB Controller	462862-B21
	HP Smart Array P410/512MB with BBWC	462864-B21

Upgrade Options

Optional Upgrades	512MB BBWC	462967-B21
	Battery Kit upgrade NOTE: To enable BBWC on the 256MB cache.	462969-B21
	512MB Flash Backed Write Cache NOTE: For the Smart Array P410i Controller only.	534916-B21
	1G Flash Backed Write Cache NOTE: For the Smart Array P410i Controller only.	534562-B21
	HP Smart Array Advanced Pack No Media 1-Server license including 1yr 24x7 Technical Support 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: A license key, a minimum of 256MB cache, and battery kit is required to enable features. For more information go to: http://www.hp.com/go/saap	516471-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.

Universal Hard Drive form factor is for use across multiple HP servers, 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-P410 Controller supports up to 24 drives depending on the server implementation. Additional drives can be supported with cache and connection to the HP SAS Expander Card.
- Seamless upgrades from past generations and upgrades to next generation HP high performance and high capacity Serial Attached SCSI Smart Array controllers.
- 6Gb/s SAS technology delivers high performance and data bandwidth and contains full compatibility with 3Gb/s SATA technology.
- x8 PCI Express gen 2 host interface technology delivers high performance and data bandwidth up to 2 GB/s maximum bandwidth.
- Modular, easy-to-upgrade design lets you optimize performance by upgrading from 40-bit 256MB cache to 72-bit 512MB battery-backed write cache (BBWC) or 72-bit 512MB/1G Flash Backed Write Cache (FBWC).
- Addition of the battery or flash backed cache upgrade enables array expansion, logical drive extension, RAID migration, and stripe size migration.
- Additionally, Smart Array Advanced Pack 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).
- Mix-and-match SAS and SATA hard drives, lets you deploy drive technology as needed to fit your computing environment.
- Software consistency among all Smart Array family products: Array Configuration Utility (ACU), Option ROM Configuration for Arrays (ORCA), Systems Insight Manager, Array Diagnostic Utility (ADU) and SmartStart.
- Support for greater than 2TB in a single logical drive.
- 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

Management Features
- Online array expansion (with BBWC/FBWC upgrade)
- Online Advanced Capacity Expansion (with BBWC/FBWC and Smart Array Advanced Pack upgrade)
- Online logical drive extension (with BBWC.FBWC upgrade)
- Online RAID level migration (with BBWC/FBWC upgrade)
- Online strip size migration (with BBWC/FBWC upgrade)
- Offline Mirror splitting and recombining (with BBWC/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 sizes

Ports
- Eight (8) SAS physical links distributed across 2 internal x4 wide port connectors.

Performance

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

- 6Gb/s SAS [(600MB/s bandwidth per physical link)]
- x8 6Gb/s SAS physical links (compatible with 3Gb/s SATA)
- 256 MB 40-bit wide DDR2-800MHz cache upgradeable to 512 MB 72-bit wide DDR2-800MHz battery-backed write cache or 512 MB / 1 G 72-bitwide DDR2 flash backed write cache provides up to 4.2 GB/s maximum bandwidth
- x8 PCI Express gen 2 host interface provides maximum bandwidth
- Gen 2.0
- Read ahead caching
- Write-back caching (with BBWC/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.

NOTE: Please see the SATA Hard Drive QuickSpecs for specific SATA hard drive capacities that support NCQ: http://h18000.www1.hp.com/products/quickspecs/11940_div/11940_div.html

Capacity

Given the increasing need for high performance and rapid capacity expansion, the SA-P410 Controller offers:

- Up to 12TB of total internal storage with 24 x 500GB SFF SATA hard drives
- Up to 7.2TB of total internal storage 300GB SFF SAS hard drives

Standard Features

Availability   Provides increased server uptime by providing advanced storage functionality:

- Online RAID level migration (between any RAID level/with BBWC/FBWC)
- Online stripe size migration
- Online array expansion
- Online logical drive extension
- Online drive firmware upgrade
- Unlimited 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 first developed at HP detects possible hard disk failure before it occurs, allowing replacement of the hard drive before a real 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.

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 either
  - Minimum of 256 MB cache, Battery kit and Smart Array Advanced Pack License key option upgrades
  - Minimum of 512 MB BBWC/FBWC and Smart Array Advanced Pack 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 P410/P410i with a minimum of 256MB 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.
- **RAID 1, 1+0** (Drive Mirroring): 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 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.
- Battery-backed write cache upgrade provides for up to two days of battery power for data cache retention. The data backup duration could be extended anytime the server's auxiliary power is available during system power down.
- 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 StorageWorks Modular Smart Array enclosures

Compatibility

Server Compatibility　For up to date compatibility, please see the following URL for complete Smart Array 1Controller compatibility and support information:
http://h18006.www1.hp.com/products/servers/proliantstorage/arraycontrollers/index.html

Operating Systems　Microsoft Windows 2003 x64 Edition

Microsoft Windows 2003 x84 Edition

Microsoft Windows 2008 Server x64

Microsoft Windows 2008 Server x84

Novell Open Enterprise Server, NetWare 6.5

Red Hat Enterprise Linux 4 & 5 (x64 & x84)

SUSE Linux Enterprise Server 9 (x64 & x84)

SUSE Linux Enterprise Server 10 (x64 & x84)

SUSE Linux Enterprise Server 11 (x64 & x84)

VMWare

NOTE: For more Linux OS support & certification information, please visit our the ProLiant & BladeSystem Server Linux matrix: http://h18004.www1.hp.com/products/servers/linux/hplinuxcert.html

Software Suite　All Smart Array products share a common set of configuration, management and diagnostic tools, including Array Configuration Utility, Array Diagnostic Utility (ADU), and Systems Insight Manager. This software consistency of tools reduces the cost of training for each successive generation of product and takes 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 offline for all supported Operating Systems and runs online for Windows and Linux. For online configuration of NetWare, use CPQONLIN

HP Option ROM Configuration for Arrays (ORCA)

- A simple method for managing logical drives during system power up by pressing F8 during POST
- Allows the ability to create arrays, logical drives, and assign an online spare drive
- Allows the ability to view and delete logical drives
- Allows the ability to select the boot controller
- For advanced array configurations use ACU

HP Array Diagnostic Utility (ADU)

- In depth diagnostic and reporting utility for all Smart Array controllers
- Runs offline for all supported Operating Systems, and runs online for Windows and Linux

Service and Support, HP Care Pack, and Warranty Information

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.
Software Product Services	Standalone telephone support
	Rights to new license version
	Media and documentation updates
Hardware Product Services	Installation services
	On-site maintenance (includes warranty support)
	Response time upgrades during the warranty period
	Post-warranty coverage
	NOTE: For additional hardware installation and maintenance information, please refer to the URL: http://www.hp.com/hps/hardware/
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.
HP Care Pack Information	HP Care Pack is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage. Care Packs for this option is sold at the system level this option attaches too.
	HP Care Pack is not available for less than the product's warranty duration.
	HP Care Pack is available for sale anytime during the warranty period for most products, but the commencement date will be the same as the Warranty Start Date (delivery date to end user customer). Proof of purchase may be required.
	HP Care Pack services are prepaid.
	NOTE: For additional HP Care Pack (hardware & software) information, as well as orderable part numbers, please refer to the URL: http://www.hp.com/hps/carepack/

Related Options

Hard Drives

NOTE: The components of a storage subsystem (e.g. the drive, the HBA/controller, firmware, and the server backplane) should operate at the same data transfer rate or the system bandwidth will be negotiated down to an acceptable level for all components.
NOTE: Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

SAS Hot Plug SFF Enterprise (ENT) Drives

HP 300GB 6G SAS 10K SFF DP ENT HDD	507127-B21
HP 300GB 3G SAS 10K SFF DP ENT HDD	492620-B21
HP 146GB 6G SAS 15K SFF DP ENT HDD	512547-B21
HP 146GB 3G SAS 15K SFF DP ENT HDD	504062-B21
HP 146GB 6G SAS 10K SFF DP ENT HDD	507125-B21
HP 146GB 3G SAS 10K SFF DP ENT HDD	418367-B21
HP 72GB 6G SAS 15K SFF DP ENT HDD	512545-B21
HP 72GB 3G SAS 15K SFF DP ENT HDD	418371-B21

SAS Hot Plug 3.5" Enterprise (ENT) Drives

HP 600GB 6G SAS 15K 3.5" DP ENT HDD	516828-B21
HP 450GB 6G SAS 15K 3.5" DP ENT HDD	516816-B21
HP 450GB 3G SAS 15K 3.5" DP ENT HDD	454232-B21
HP 400GB 3G SAS 10K 3.5" DP ENT HDD	459508-B21
HP 300GB 6G SAS 15K 3.5" DP ENT HDD	516814-B21
HP 300GB 3G SAS 15K 3.5" DP ENT HDD	416127-B21
HP 146GB 3G SAS 15K 3.5" DP ENT HDD	384854-B21
HP 72GB 3G SAS 15K 3.5" DP ENT HDD	384852-B21

SAS Non-Hot Plug 3.5" Enterprise (ENT) Drives

HP 600GB 3G SAS 15K NHP 3.5" DP ENT HDD	516830-B21
HP 450GB 6G SAS 15K NHP 3.5" DP ENT HDD	516826-B21
HP 450GB 3G SAS 15K NHP 3.5" DP ENT HDD	454234-B21
HP 400GB 3G SAS 10K NHP 3.5" DP ENT HDD	508232-B21
HP 300GB 6G SAS 15K NHP 3.5" DP ENT HDD	516824-B21
HP 300GB 3G SAS 15K NHP 3.5" DP ENT HDD	417950-B21
HP 146GB 3G SAS 15K NHP 3.5" DP ENT HDD	417855-B21

SAS Hot Plug SFF Midline (MDL) Drives

HP 500GB 6G SAS 7.2K SFF DP MDL HDD	507610-B21

SAS Hot Plug 3.5" Midline (MDL) Drives

HP 1TB 3G SAS 7.2K 3.5" DP MDL HDD	461137-B21
HP 750GB 3G SAS 7.2K 3.5" DP MDL HDD	461135-B21

SATA Hot Plug SFF Midline (MDL) Drives

HP 500GB 3G SATA 7.2K 2.5in MDL HDD	507750-B21
HP 160GB 3G SATA 7.2K 2.5in MDL HDD	530888-B21

Related Options

SATA Non-Hot Plug SFF Midline (MDL) Drives

HP 500GB 3G SATA 7.2K 2.5in NHP MDL HDD	507753-B21
HP 160GB 3G SATA 7.2K 2.5in NHP MDL HDD	530891-B21

SATA Hot Plug SFF Entry (ETY) Drives

HP 250GB 3G SATA 5.4K SFF ETY HDD	460355-B21
HP 120GB 1.5G SATA 5.4K SFF ETY HDD	458924-B21

SATA Non-Hot Plug SFF Entry (ETY) Drives

HP 250GB 3G SATA 5.4K NHP SFF ETY HDD	460357-B21
HP 120GB 1.5G SATA 5.4K NHP SFF ETY HDD	459357-B21

SATA Hot Plug 3.5" Midline (MDL) Drives

HP 1TB 3G SATA 7.2K 3.5" MDL HDD	454146-B21
HP 750GB 3G SATA 7.2K 3.5" MDL HDD	458930-B21
HP 500GB 3G SATA 7.2K 3.5" MDL HDD	458928-B21
HP 250GB 3G SATA 7.2K 3.5" MDL HDD	458926-B21

SATA Hot Plug 3.5" Entry (ETY) Drives

HP 160GB 3G SATA 7.2K 3.5" ETY HDD	458945-B21

SATA Non-Hot Plug 3.5" Midline (MDL) Drives

HP 750GB 3G SATA 7.2K NHP 3.5" MDL HDD	462595-B21
HP 500GB 3G SATA 7.2K NHP 3.5" MDL HDD	458941-B21
HP 250GB 3G SATA 7.2K NHP 3.5" MDL HDD	458939-B21

SATA Non-Hot Plug 3.5" Entry (ETY) Drives

HP 160GB 3G SATA 7.2K NHP 3.5" ETY HDD	458947-B21

NOTE: Go to the HP Hard Drive Compatibility table for complete drive compatibility information (http://www.hp.com/products/harddiskdrives). Using hard drives in unsupported configurations will result in voiding the warranty and could result in damage to the drive and/or loss of data.

Tape Solutions

SAS Tape Drives

HP StorageWorks DAT 160 SAS Internal Tape Drive	Q1587A
HP StorageWorks DAT 160 SAS External Tape Drive	Q1588A
HP StorageWorks LTO-2 Ultrium 448 SAS Internal Tape Drive	DW085A
HP StorageWorks LTO-2 Ultrium 448 SAS External Tape Drive	DW086A
HP StorageWorks LTO-3 Ultrium 920 SAS Internal Tape Drive	EH847A
HP StorageWorks LTO-3 Ultrium 920 SAS External Tape Drive	EH848A
HP StorageWorks LTO-4 Ultrium 1760 SAS Internal Tape Drive	EH919A
HP StorageWorks LTO-4 Ultrium 1760 SAS External Tape Drive	EH920A
HP StorageWorks 1U SAS Rack-mount kit with one LTO-4 Ultrium 1760	EH946A
HP StorageWorks LTO-4 Ultrium 1840 SAS Internal Tape Drive	EH860A
HP StorageWorks LTO-4 Ultrium 1840 SAS External Tape Drive	EH861A

Rack-mount Tape Drive Enclosures

Related Options

HP StorageWorks 1U SAS Rack-Mount Kit	AE459A

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

HP StorageWorks 3U SAS Rack-mount Kit	AG576A

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, LTO-2 Ultrium 448 SAS, LTO-3 Ultrium 920 SAS, LTO-4 Ultrium 1760 SAS and LTO-4 Ultrium 1840 SAS tape drives.

Tape Autoloaders

HP StorageWorks 1/8 G2 LTO-4 Ultrium 1760 SAS Autoloader	AK377A
HP StorageWorks 1/8 G2 LTO-3 Ultrium 920 SAS Autoloader	AH558A

Tape Libraries

HP StorageWorks MSL2024 1 LTO-4 Ultrium 1760 SAS Drive Library	AK378A
HP StorageWorks MSL2024 1 LTO-3 Ultrium 920 SAS Drive Library	AH559A
HP StorageWorks MSL4048 1 LTO-4 Ultrium 1760 SAS Drive Library	AK380A
HP StorageWorks MSL4048 1 LTO-3 Ultrium 920 SAS Drive Library	AH560A
HP StorageWorks MSL8096 2 LTO-4 Ultrium 1760 SAS Drive Library	AK382A
HP StorageWorks MSL8096 2 LTO-3 Ultrium 920 SAS Drive Library	AH561A

SAS Cables for Tape Drives

4M External Mini SAS to Mini SAS (SFF8088) 3x/1x External Split SAS Cable	AE464A

NOTE: This split cable connects internally to SAS Hard Drive Cage (3x) and externally to the HP Storage Works 1U SAS Rack-Mount Kit (1x) with other connector going to internal SAS Controller port inside the server. Requires additional PCI slot on server for threading 1x split cable to SAS tape.

2M External Mini-SAS (SFF8088) to Mini-SAS (SFF8088) 1x SAS Cable	AE470A

NOTE: Use this cable to connect HP StorageWorks SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors.

4M External Mini-SAS (SFF8088) to Mini-SAS (SFF8088) 1x SAS Cable	AE465A

NOTE: Use this cable to connect HP StorageWorks SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors.

4M External Mini-SAS (SFF8088) to Internal Mini-SAS (SFF8087) 3x/1x Split SAS Cable	AG452A

NOTE: This split cable connects internally to SAS Hard Drive Cage (3x) and externally to the tape device (1x) with other connector attaching to the Smart Array P400i controller inside a DL360 G5 or DL365 G5 server. The 1x cable occupies additional PCI slot on the server.

2M External Mini-SAS (SFF8088) 1x to Mini-SAS (SFF8088) 4x fanout SAS Cable	AN975A

NOTE: Use this cable to connect HP StorageWorks MSL SAS Tape Libraries to Mini-SAS (SFF8088) ports.

4M External Mini-SAS (SFF8088) 1x to Mini-SAS (SFF8088) 4x fanout SAS Cable	AN976A

NOTE: Use this cable to connect HP StorageWorks MSL SAS Tape Libraries to Mini-SAS (SFF8088) ports.

HP StorageWorks Mini-SAS Cable for LTO Internal Tape Drive	AP746A
HP StorageWorks Mini-SAS Cable for DAT Internal Tape Drive	AP747A

Related Options

SAS to Mini SAS Cables	Mini-SAS to Mini-SAS, 25.50" & 28.00"	496013-B21
	Mini-SAS to Mini-SAS, 33.00"	496014-B21
	Mini-SAS to SFF8484, 18.00"	496015-B21
	Mini-SAS to SFF8484, 24.00"	496015-B21
	Mini-SAS to SFF8484, 32.00"	496016-B21
	Mini-SAS to SFF8484, 35.00"	496016-B21

Additional Cables	HP 15 POS 24in SFP Battery Cable Assy	496029-B21

Technical Specifications

Dimensions (not including bracket)	Low Profile PCIe Form Factor 7.5 in x 9.5 in x 2.25 in (19.05 cm x 24.13 cm x 5.72 cm)
Disk Drive and Enclosure Interface - Transfer rate	6Gb/s SAS (Serial Attached SCSI) 3Gb/s SATA (Serial ATA)
SAS Connectors	2 internal (Mini-SAS) x8 wide port connectors
Cache Memory Speed	DDR2-800MHz with 40 or 72-bit wide bus provides up to 4.2 GB/s maximum bandwidth.
Server Interface	x8 5G PCIe 2.0 provides 4GB/s maximum bandwidth
SAS Speed	x8 6Gb/s SAS provides 4.8GB/s maximum bandwidth
Cache Memory	40-bit 256MB ECC protected cache (72-bit 512MB BBWC or 72-bit 512MB and 1G FBWC module upgrades available); transportable with battery-backed or flash upgrade
Logical Drives Supported	Up to 64 logical drives
Maximum Logical Drive Capacity	Greater than 2TB
Host Memory Addressing	64-bit, supporting greater than 4GB server memory space
RAID Support	RAID 6, 6+0 (Advanced Data Guarding) NOTE: RAID 6, 6+0 can be enabled with either • Minimum of 256 MB cache, Battery kit and Smart Array Advanced Pack License key option upgrades • Minimum of 512 MB BBWC/FBWC and Smart Array Advanced Pack License key option upgrades RAID 5, 5+0 (Distributed Data Guarding) NOTE: The 256 MB cache is required to enable RAID 5, 5+0 support of the Smart Array P410i 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. 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.