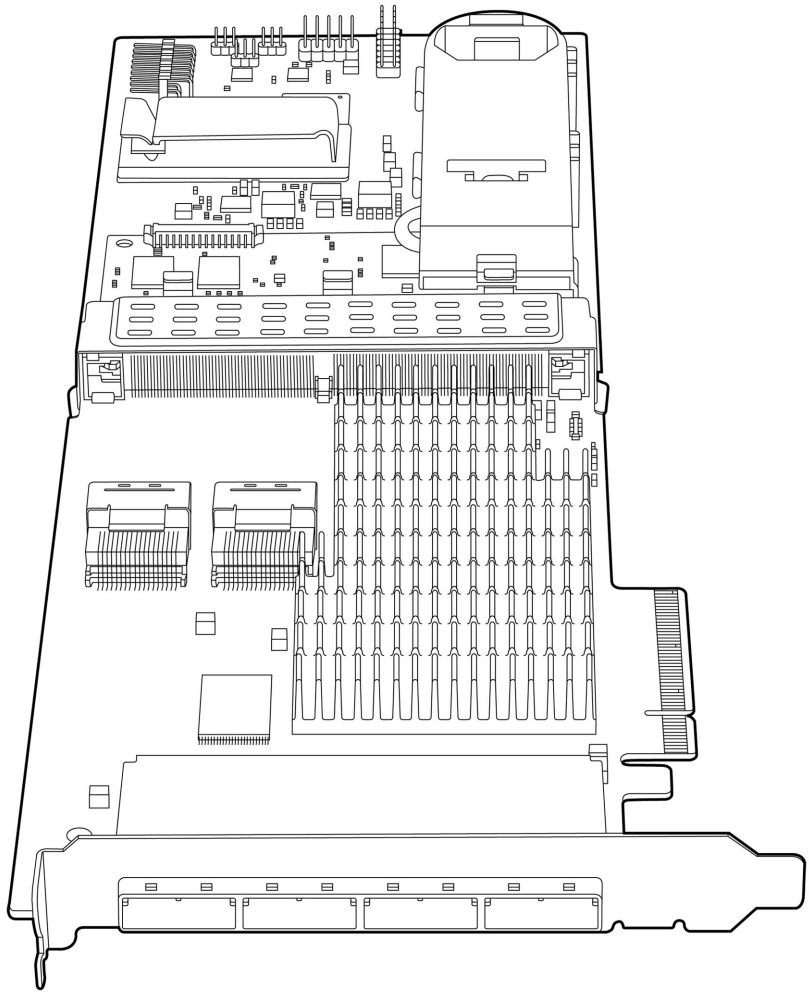
Overview

The HP Smart Array P812 is HP's 24 port Serial Attached SCSI (SAS) RAID controller with PCI Express (PCIe). This high performance SAS RAID controller provides high levels of reliability for HP servers through its support of 6 Gb/s SAS and 3 Gb/s SATA technology, 1 GiB FBWC, and advanced RAID capabilities. This controller ships standard with a Smart Array Advanced Pack license key and supports up to 108 hard drives.



What's New

- Updating supported hard drives.

Models

HP Smart Array P812 Controller	HP Smart Array P812/1G FBWC 2-ports Int/4-ports Ext PCIe x8 SAS Controller	487204-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 Drive form factors (2.5" and 3.5") are used 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

- Seamless upgrades to and from other HP Smart Array controllers.
- Storage interface (SAS/SATA)
  - Two Mini SAS 4i connectors for attachment to internal drive backplanes
  - Four Mini SAS 4x connectors for attachment to JBODs and external tape drives
  - 6 Gb/s SAS technology delivers up to 600 MB/s per physical link.
  - 3 Gb/s SATA technology delivers up to 300 MB/s for directly attached SATA drives.
  - Mix-and-match SAS and SATA drives. Deploy drive technology as needed to fit the computing environment.
  - Support for SAS tape drives, SAS tape autoloaders and SAS tape libraries.
- Host interface (PCI Express)
  - PCI Express 2.0 8x host interface provides up to 4 GB/s in each direction
- RAID controller features
  - 1 GiB flash-backed write cache (not all of which is available for user data)
  - RAID 0, 1, 1+0, 5, 6, 50, and 60
  - Recovery ROM protects against ROM corruption.
- Smart Array Advanced Pack license key included (see below)
- Consistent management software among all Smart Array family products, including Array Configuration Utility (ACU), Systems Insight Manager (SIM), Array Diagnostic Utility (ADU), Online ROM Configuration Utility (ORCA), and SmartStart.
- SAS 2.0 (6 Gb/s, 3 Gb/s, and 1.5 Gb/s). 6 Gb/s bandwidth supports larger numbers of SAS drives in the SAS subsystem and provides better support for future high-bandwidth SSDs.
- SATA 2.6 (3 Gb/s and 1.5 Gb/s).
- 24 SAS/SATA physical links distributed across six Mini SAS connectors
  - Two Mini SAS 4i connectors (8 physical links): for attachment to internal drive backplanes
  - Four Mini SAS 4x connectors (16 physical links): for attachment to JBODs and external tape drives

Standard Features

Storage Interface (SAS/SATA)

- PCI Express 2.0 (5 MT/s and 2.5 MT/s)
- Eight lane mechanical connector
- Electrically supports one, four, and eight lanes

Host Interface (PCI Express)

P812 includes a PMC-Sierra SRC 8x6G SAS RAID-on-chip featuring:

- Eight SAS/SATA physical links, each supporting 6, 3, and 1.5 Gb/s for SAS protocol and 3 and 1.5 Gb/s for SATA protocol
- Eight PCI Express 2.0 lanes each supporting 5 Gb/s
- DDR2-800 memory controller
- High performance MIPS-based multi-processor subsystem
- Hardware XOR and Reed-Solomon Engines for RAID 5 and RAID 6 acceleration
- P812 also includes a PMC-Sierra SXP 36x3GSec 6 Gb/s SAS Expander to support six Mini SAS connectors in one controller card.

RAID Processor and Expander

The P812 1GB array accelerator features a flash-backed cache. If the cache DRAM contains write data when power is lost, the write data is copied into flash memory chips on the cache module, drawing power from attached capacitors. When power is restored, if the flash memory chips contain write data, the data is copied back into the DRAM so it can be flushed to the drives.

Advantages over battery-backed cache architectures include:

- No 72-hour deadline for retrieving the data before the batteries fully discharge
- Capacitors charge faster than batteries; controller disables the write cache for only a few minutes waiting for capacitors to charge rather than a few hours waiting for batteries to charge
- No need for periodic battery replacement
- No special disposal process

Interface Speeds

P812 supports the latest interface speeds.

Interface	Maximum bandwidth*	Notes
PCI Express	4 GB/s (in each direction)	PCI Express 2.0 (8 lanes at 5 MT/s)
SAS/SATA	4.8 GB/s (in each direction)	SAS-2 (8 physical links at 6 Gb/s) The RAID controller has eight 6 Gb/s SAS physical links. Bandwidth is dynamically shared by the 24 physical links used in the 6 Mini SAS connectors.
RAID cache	6.4 GiB/s	DDR2-800 SDRAM (64-bit data and 8-bit ECC).
* Not counting protocol overhead.		

Standard Features

Native Command Queuing (NCQ)

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.

Dual Domain Support

Dual domain SAS 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. This provides increased levels of high availability with redundant paths from the controller to the drives. Dual domain SAS implementations make it possible to tolerate host bus adapter (HBA) or controller failure, external cable failure, expander failure, cable pulls, expander failure and failure in a spanned disk (JBOD) environments.

Number of Drives

P812 supports up to 108 drives. Examples:

- Eight internal drives plus four HP D2700 Disk Enclosures with 25 drives each (108 drives)
- Eight internal drives plus eight HP D2600 Disk Enclosures with 12 drives each (104 drives)
- Eight internal drives plus four HP MSA70 Disk Enclosures with 25 drives each (108 drives)
- Eight internal drives plus eight HP MSA60 Disk Enclosures with 12 drives each (104 drives)

RAID Levels

- **RAID 0 (striping)** provides no extra data protection. Data is striped across all drives in the array to increase performance. RAID 0 requires a minimum of one drive.
- **RAID 1 (mirroring)** protects against failure of one drive. Data is duplicated on a pair of drives. RAID 1 requires a minimum of two drives. Also see the Advanced Pack Mirror Splitting and Combining feature.
- **RAID 1+0 (mirroring and striping)** protects against failure of one drive (and failure of particular multiple drives). RAID 1+0 is a nested RAID method that uses RAID 0 striping across RAID 1 arrays to provide performance and protection. RAID 1+0 requires a minimum of four drives. Also see the Advanced Pack Mirror Splitting and Combining feature.
- **RAID 5 (distributed data guarding)** protects against failure of one drive. Data protection is provided by parity data distributed across all the drives. When a physical drive fails, data that was on the failed drive can be calculated from the remaining parity data and user data on the other drives in the array. This recovered data is usually written to an online spare drive through a process called a rebuild. RAID 5 requires a minimum of three drives.
- **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 50 (RAID 5+0)** protects against failure of one drive (and failure of particular multiple drives). RAID 50 is a nested RAID method that uses RAID 0 striping across RAID 5 arrays. RAID 50 tolerates one drive failure in each spanned array without loss of data. RAID 50 requires less rebuild time than single RAID 5 arrays RAID 50 requires a minimum of six drives.
- **RAID 60 (RAID 6+0)** allows administrators to split the RAID 6 storage across multiple external boxes. RAID 60 requires a minimum of eight drives. RAID 60 is a nested RAID method that uses RAID 0 block-level striping across multiple RAID 6 arrays with dual distributed parity. With the inclusion of

Standard Features

dual parity, RAID 60 will tolerate the failure of two disks in each spanned array without loss of data.

Online Management Features

- Online Capacity Expansion (increase array size feature)
- Advanced Capacity Expansion (shrink array and move array features)
- Online RAID Level Migration (change the fault tolerance level of a configured logical drive)
- Online Stripe Size Migration (change the stripe size of a configured logical drive)
- Online Spares (provide automatic drive replace for a failed drive in RAID levels other than RAID 0)
- User Selectable Expand and Rebuild Priority (select the priority of rebuilding data from a failed drive over current requests from the operating system)
- User Selectable Stripe Size
- User Selectable Read and Write Cache Sizes
- Logical Drive Extension (increase logical drive size without disturbing data)
- User Selectable Surface Scan idle interval (control the background process that scans drives for bad sectors, and verify the consistency of RAID 5 and RAID 6 parity data)
- Physical Drive Write Cache control (enable drive write cache for applications like video editing that that can tolerate data loss, and/or systems that have redundant and uninterruptible power supplies)

Availability

Provides increased server uptime by providing advanced storage functionality:

- Online RAID Level Migration (between any RAID level)
- Online Capacity Expansion
- Logical Drive Capacity Extension
- 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 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.

Standard Features

Fault Recovery

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

- Recovery ROM: This feature provides unique redundancy 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.

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 Modular Smart Array enclosures

Warranty

The warranty for this device is 3 years parts, labor and onsite.

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

Servers

For up to date compatibility, please see the following URL for complete Smart Array P800/512MB 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
Novell Netware
Open Server
UnixWare

For more information on HP's Certified and Supported ProLiant Servers for OS and Virtualization Software and 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 & 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. 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.

HP Systems Insight Manager (SIM)

- Provides the basic management features of system discovery and identification, single-event view, inventory data collection, and reporting
- Monitors over 1200 system wide parameters
- Smart Array performance monitoring
- Smart Array drive fault prediction

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
- Command line interface (ACU-CLI) also available
- Runs offline for all supported operating systems
- Runs online on Windows and linux
- For online configuration on NetWare, use CPQONLIN

CPQONLIN

- Menu-based configuration utility specifically for servers using Novell NetWare

HP Option ROM Configuration for Arrays (ORCA)

- ROM-based utility accessed by pressing F8 during system power up
- View, create, and delete arrays and logical volumes and assign an online spare drive
- Select the boot controller
- For more advanced array configurations, use ACU

HP Array Diagnostic Utility (ADU)

Compatibility

- In depth diagnostic and reporting utility for all Smart Array controllers
- Integrated with ACU
- Runs offline for all supported operating systems
- Runs online for Windows and Linux

HP Smart Array SAS/SATA Event Notification Service (CISSESRV)

- Provides event notification to the Windows Server 2003 and Windows Server 2008 system event log and HP ProLiant integrated management log

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HP Smart Array Advanced Pack (license key included with P812)

- RAID 6 (Advanced Data Guarding) protects against failure of any two drives. RAID 6 requires a minimum of four drives. ADG can tolerate multiple simultaneous drive failures without downtime or data loss and is ideal for applications requiring large logical volumes, because it can safely protect a single volume of up to 56 disk drives. RAID 6 also offers lower implementation costs and greater usable capacity per U than RAID 1.
- RAID 60 (RAID 6+0) allows administrators to split the RAID 6 storage across multiple external boxes. RAID 60 requires a minimum of eight drives. RAID 60 is a nested RAID method that uses RAID 0 block-level striping across multiple RAID 6 arrays with dual distributed parity. With the inclusion of dual parity, RAID 60 will tolerate the failure of two disks in each spanned array without loss of data.
- Advanced Capacity Expansion automates higher capacity migration using capacity transformation to remove logical drives by shrinking and then expanding them online. Standard drive migration and expansion remain unchanged.
- Mirror Splitting and Recombining. Mirror splitting is a task that splits an array with one or more RAID 1 or RAID 1+0 logical drives into two identical new arrays with RAID 0 logical drives. This is useful for administrators who want to replicate a configuration or need to build a backup before performing a risky operation. Using the ACU, administrators can also recombine a split mirrored array.
- Drive Erase completely erases physical disks or logical volumes. This capability is useful when decommissioning, redeploying, or returning hard drives. Provides three patterns:
  - One pass erase: Write zeros
  - Two pass erase: Write random data, then zeros
  - Three pass erase: Write random data, random data, then zeros
- Video On Demand Performance Optimization optimizes performance of video on demand and improves latency during video streaming. Provides controls for:
  - RAID 6/60 Alternate Inconsistency Repair Policy
  - RAID 5/6/50/60 Degraded Mode Performance Optimization
  - Physical Drive Request Elevator Sort
  - Monitor and Performance Analysis Delay
  - Maximum Drive Request Queue Depth

Service and Support

HP Care Pack Services: Packaged server and storage services for increased uptime, productivity and ROI

When you buy HP server and storage products and solutions, it's also a good time to think about what levels of support you may need. Our portfolio of service options reduce deployment and management worries while helping you get the most out of your server and storage investments. We take a holistic approach to your environment, bridging servers, blades, storage, software and network infrastructures with our packaged HP Care Pack Services for servers and storage.

Protect your business beyond warranty

When it comes to robustness and reliability, standard computing equipment warranties have matured along with technology. Good news that can also create problems stemming from depending on standard warranties designed to only protect against product defects and some downtime causes. Using a standard approach to warranty uplifts, such as HP Care Pack Services, helps reduce downtime risks and provides operational consistency for mission-critical and standard business computing.

HP Care Pack Services: Upgrading or extending standard server and storage warranties cost effectively

HP Care Pack Services offer a standard reactive hardware and software support services suite sold separately, or combined with our Support Plus and Support Plus 24 services. The portfolio also provides a combination of integrated proactive and reactive services, such as Proactive 24 Service and Critical Service. In addition with HP Proactive Select, you can acquire the specific proactive constancy and technical services. HP Proactive Select menu offers a broad set of service options that you can mix and match depending on your specific requirements. Proactive service options include offers for server, storage, network, SAN device, software, environment and education services.

HP server and storage lifecycle support services offers a full spectrum of customer care-from technology support to complex migrations to complete managed services. HP Factory Express provides customization, integration and deployment services for turnkey solutions. HP Education Services offer flexible, comprehensive training on to help your IT staff get the most out of your server and storage investments. HP Financial solutions extend innovative financing and cost-effective asset management programs-from purchase to equipment retirement.

Learn more: www.hp.com/services/servers and www.hp.com/services/storage

NOTE: Care Pack Services availability may vary by product and country.

HP Care Pack Services are sold by HP and HP Authorized Service Partners:

- Services for customers purchasing from HP or an enterprise reseller are quoted using HP order configuration tools.
- Customers purchasing from a commercial reseller can find HP Care Pack Services at http://www.hp.com/go/lookuptool

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

Recommended Services

Hardware Options Support

HP Care Packs provide support for all HP-branded hardware options qualified for inclusion in your server or storage solution. Any additional HP-qualified options installed within the server are covered at the same service level and for the same period as the server and no additional cost.

- Help improve or maintain system uptime
- Convenient onsite support
- Committed response time

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

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

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.

This service provides a trained HP service specialist to perform an installation that meets HP quality standards, for:

- Help improve or maintain system uptime
- Convenient onsite support
- Committed response time

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

HP Installation and Startup of HP ProLiant Servers

Provides for the installation of your new HP ProLiant server and operating system to assist you in bringing your new HP ProLiant server and operating system into operation in a timely and professional manner.

This service provides a trained HP service specialist to perform an installation that meets HP quality standards, for:

- Delivery of the service at a mutually scheduled time convenient to your organization
- Availability of an HP service specialist to answer basic questions during the onsite delivery of this service
- Custom installation as detailed in "Delivery specifications" or in a Statement of Work (SOW)
- Verification prior to installation that all service prerequisites are met

http://h20195.www2.hp.com/V2/GetPDF.aspx/5982?7572ENN

Optional HP Care Pack Services that will enhance your HP product experience

Optional Services

3-Year HP Hardware Support Onsite Call-to-Repair (CTR) Service, 6- or 24-hour
As an alternative to our recommended support level, for customers who need committed call-to-repair for server hardware.

Provides your IT manager with a team of support specialists who will quickly begin troubleshooting the system to help return the hardware to operating condition within 6 or 24 hours of the initial service request to the HP Global Solution Center.

http://h20195.www2.hp.com/V2/GetPDF.aspx/5982-6547EN.pdf

3-Year HP Support Plus 24
As an alternative to our recommended support level, for customers who need access to responsive 24x7 hardware and software support plus software updates on HP and selected third party products:

For a higher return on your server and storage technology, our 3-year combined reactive support service delivers integrated onsite hardware/software support services available 24x7x365, including access to HP technical resources, 4-hour response onsite hardware support and software updates.

http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EEE

HP Proactive Select Service
Customer needs on demand access to consulting, technical proactive services and education courses

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

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eSupport

HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal
The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.

Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Collaboration with other business and IT professionals
- Download of patches and drivers
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support portal, visit: http://www.hp.com/support

HP Insight Remote Support software delivers secure remote support for your HP Servers and Storage, 24 X

Service and Support

	7, so you can spend less time solving problems and more time focused on your business. You can have your systems remotely monitored for hardware failure using secure technology that's been proven at thousands of companies around the world. In many cases, you can avoid problems before they occur.
Customer Technical Training	In today's cost-conscious business environment, IT professionals, developers, consultants and users face an interesting challenge: how to keep up with the latest technologies and expand important skills while delivering profitable results on current projects. To help address this challenge, HP offers innovative training solutions that help keep you up-to-date on virtualization, server, storage, Insight Control, Citrix, Microsoft® and open source/Linux-related topics-while spending less time away from business-critical activities.
HP Services Awards	HP Technology Services continues to be recognized for service and support excellence by customers, partners, industry organizations and publications around the world. Recent honors and award reflect our services team's dedications, technical expertise, professionalism and uncompromising commitment to customer satisfaction.
Additional Services Information	To learn more on HP ProLiant servers, HP BladeSystem servers and HP storage products, please contact your HP sales representative or HP Authorized Channel Partner. Or visit: www.hp.com/services/proliant or www.hp.com/services/bladesystem or http://www.hp.com/services/storage

Related Options

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

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.

HP SAS Hot Plug Drives

NOTE: These drives are not supported by Gen8 servers.

SAS Hot Plug SFF (2.5-inch) Enterprise (ENT) Drives

HP 900GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	619291-B21
HP 600GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581286-B21
HP 450GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581284-B21
HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	507127-B21
HP 300GB 6G SAS 15K rpm SFF (2.5-inch) Hot Plug Enterprise 3 yr Warranty Hard Drive	627117-B21
HP 300GB 3G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	492620-B21
HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512547-B21
HP 146GB 3G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	504062-B21
HP 146GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	507125-B21
HP 146GB 3G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	418367-B21
HP 72GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512545-B21
HP 72GB 3G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	418371-B21

SAS Hot Plug LFF (3.5-inch) Enterprise (ENT) Drives

HP 600GB 6G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	516828-B21
HP 450GB 6G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	516816-B21
HP 450GB 3G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	454232-B21
HP 300GB 6G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	516814-B21
HP 300GB 3G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	416127-B21
HP 146GB 3G SAS 15K rpm LFF (3.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	384854-B21

SAS Hot Plug SFF (2.5-inch) Midline (MDL) Drives

HP 1TB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	605835-B21
HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	507610-B21

SAS Hot Plug LFF (3.5-inch) Midline (MDL) Drives

HP 3TB 6G SAS 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	625031-B21
HP 2TB 6G SAS 7.2K rpm LFF (3.5-inch) Dual Port Midline 1yr Warranty Hard Drive	507616-B21
HP 1TB 6G SAS 7.2K rpm LFF (3.5-inch) Dual Port Midline 1yr Warranty Hard Drive	507614-B21
HP 1TB 3G SAS 7.2K rpm LFF (3.5-inch) Dual Port Midline 1yr Warranty Hard Drive	461137-B21
HP 750GB 3G SAS 7.2K rpm LFF (3.5-inch) Dual Port Midline 1yr Warranty Hard Drive	461135-B21

HP SAS Non-Hot Plug Drives

NOTE: These drives are not supported by Gen8 servers.

SAS Non-Hot Plug SFF (2.5-inch) Enterprise (ENT) Drives

HP 600GB 6G SAS 10K rpm SFF (2.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive	590698-B21
HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive	537809-B21

Related Options

HP 146GB 6G SAS 10K rpm SFF (2.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive	537807-B21
HP 72GB 6G SAS 15K rpm SFF (2.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive	537805-B21
SAS Non-Hot Plug LFF (3.5-inch) Enterprise (ENT) Drives	
HP 600GB 6G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive	516830-B21
HP 450GB 6G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive	516826-B21
HP 450GB 3G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive	454234-B21
HP 300GB 6G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive	516824-B21
HP 300GB 3G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive	417950-B21
HP 146GB 3G SAS 15K rpm LFF (3.5-inch) Non-hot Plug Dual Port Enterprise 3yr Warranty Hard Drive	417855-B21
NOTE: Please see the QuickSpecs for Technical Specifications and additional information: http://h18000.www1.hp.com/products/quickspecs/12244_div/12244_div.html (Worldwide)	
HP SATA Hot Plug Hard Drives	
NOTE: These drives are not supported by Gen8 servers.	
SATA Hot Plug SFF (2.5-inch) Midline (MDL) Drives	
HP 1TB 3G SATA 7.2K rpm SFF (2.5-inch) Hot Plug Midline 1yr Warranty Hard Drive	625609-B21
HP 500GB 3G SATA 7.2K rpm SFF (2.5-inch) Midline 1yr Warranty Hard Drive	507750-B21
HP 250GB 3G SATA 7.2K rpm SFF (2.5-inch) Hot plug Midline 1yr Warranty Hard Drive	625607-B21
HP 160GB 3G SATA 7.2K rpm SFF (2.5-inch) Midline 1yr Warranty Hard Drive	530888-B21
SATA Hot Plug LFF (3.5-inch) Midline (MDL) Drives	
HP 3TB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	628059-B21
HP 2TB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	507632-B21
HP 1TB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	454146-B21
HP 750GB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	458930-B21
HP 500GB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	458928-B21
HP 250GB 3G SATA 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	458926-B21
SATA Hot Plug SFF (2.5-inch) Entry (ETY) Drives	
HP 250GB 3G SATA 5.4K rpm SFF (2.5-inch) Entry 1yr Warranty Hard Drive	460355-B21
HP 120GB 1.5G SATA 5.4K rpm SFF (2.5-inch) Entry 1yr Warranty Hard Drive	458924-B21
SATA Hot Plug LFF (3.5-inch) Entry (ETY) Drives	
HP 250GB 3G SATA 7.2K rpm LFF (3.5-inch) Entry 1yr Warranty Hard Drive	571230-B21
HP 160GB 3G SATA 7.2K rpm LFF (3.5-inch) Entry 1yr Warranty Hard Drive	458945-B21
HP SATA Non-Hot Plug Hard Drives	
NOTE: These drives are not supported by Gen8 servers.	
SATA Non-Hot Plug SFF (2.5-inch) Entry (ETY) Drives	
HP 500GB 3G SATA 7.2K rpm SFF (2.5-inch) Non-hot plug Entry 1yr Warranty Hard Drive	628033-B21
HP 250GB 3G SATA 5.4K rpm SFF (2.5-inch) Non-hot Plug Entry 1yr Warranty Hard Drive	460357-B21

Related Options

HP 120GB 1.5G SATA 5.4K rpm SFF (2.5-inch) Non-hot Plug Entry 1yr Warranty Hard Drive	459357-B21
SATA Non-Hot Plug LFF (3.5-inch) Entry (ETY) Drives	
HP 250GB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Entry 1yr Warranty Hard Drive	571232-B21
HP 160GB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Entry 1yr Warranty Hard Drive	458947-B21
SATA Non-Hot Plug SFF (2.5-inch) Midline (MDL) Drives	
HP 500GB 3G SATA 7.2K rpm SFF (2.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive	507753-B21
HP 160GB 3G SATA 7.2K rpm SFF (2.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive	530891-B21
SATA Non-Hot Plug LFF (3.5-inch) Midline (MDL) Drives	
HP 3TB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot plug Midline 1yr Warranty Hard Drive	628063-B21
HP 2TB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive	507774-B21
HP 1TB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive	507772-B21
HP 750GB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive	462595-B21
HP 500GB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive	458941-B21
HP 250GB 3G SATA 7.2K rpm LFF (3.5-inch) Non-hot Plug Midline 1yr Warranty Hard Drive	458939-B21
NOTE: Please see the QuickSpecs for Technical Specifications and additional information: http://h18000.www1.hp.com/products/quickspecs/13021_div/13021_div.html (Worldwide)	
HP Solid State Drive	
NOTE: These drives are not supported by Gen8 servers.	
3G SATA MLC Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives	
HP 400GB 3G SATA MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	636597-B21
HP 200GB 3G SATA MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	636595-B21
HP 120GB 3G SATA SFF (2.5-inch) Midline 1yr Warranty Solid State Drive	572073-B21
HP 100GB 3G SATA MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	636593-B21
HP 60GB 3G SATA SFF (2.5-inch) Midline 1yr Warranty Solid State Drive	572071-B21
3G SATA MLC Non-hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives	
HP 400GB 3G SATA MLC SFF (2.5-inch) Non-hot plug Enterprise Mainstream 3yr Wty Solid State Drive	636605-B21
HP 200GB 3G SATA MLC SFF (2.5-inch) Non-hot plug Enterprise Mainstream 3yr Wty Solid State Drive	636601-B21
HP 120GB 3G SATA SFF (2.5-inch) Non-hot plug Midline 1yr Wty Solid State Drive	572077-B21
HP 100GB 3G SATA MLC SFF (2.5-inch) Non-hot plug Enterprise Mainstream 3yr Wty Solid State Drive	636599-B21
HP 60GB 3G SATA SFF (2.5-inch) Non-hot plug Midline 1yr Wty Solid State Drive	572075-B21
3G SATA MLC Hot Plug LFF (3.-5inch) Enterprise Mainstream Solid State Drives	
HP 400GB 3G SATA MLC LFF (3.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	636611-B21

Related Options

HP 200GB 3G SATA MLC LFF (3.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	636609-B21
HP 120GB 3G SATA LFF (3.5-inch) Midline 1yr Warranty Solid State Drive	570763-B21
HP 100GB 3G SATA MLC LFF (3.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	636607-B21
HP 60GB 3G SATA LFF (3.5-inch) Midline 1yr Warranty Solid State Drive	570761-B21
6G SAS SLC Hot Plug Enterprise Performance Solid State Drives	
HP 400GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive	632494-B21
HP 200GB 6G SAS SLC SFF (2.5-inch) Enterprise Performance 3yr Warranty Solid State Drive	632492-B21
6G SAS MLC Hot Plug Enterprise Mainstream Solid State Drives	
HP 800GB 6G SAS MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	632506-B21
HP 400GB 6G SAS MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	632504-B21
HP 200GB 6G SAS MLC SFF (2.5-inch) Enterprise Mainstream 3yr Warranty Solid State Drive	632502-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:
http://h18000.www1.hp.com/products/quickspecs/14038_div/14038_div.html (Worldwide)

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.

NOTE: There is a known compatibility issue with some early 3.5" SATA HDD that will make them unable to be used with the SA-P800 controller. Customers should verify that they are not using hard drive part number 332649-002/003 (spare 353042-001), 332650-002/003 (spare 353043-001), or 356536-002/003 (spare 353044-001).

NOTE: The HP SAS and SATA universal hard drive can used across multiple HP ProLiant/Integrity servers and disk enclosures.

Related Options

Modular Storage Array	**MSA SAN Storage Arrays**	
	HP MSA60 Array **NOTE:** Supports 12 SFF drives, and SAS 3 Gb/s and SATA 1.5 Gb/s.	418408-B21
	HP MSA70 Array **NOTE:** Supports 25 SFF drives, and SAS 3 Gb/s and SATA 1.5 Gb/s.	418800-B21
	NOTE: Please see the QuickSpecs for additional information including configuration steps and additional options needed for a complete solution at: http://h18000.www1.hp.com/products/quickspecs/12627_div/12627_div.html (MSA60) http://h18000.www1.hp.com/products/quickspecs/12652_div/12652_div.html (MSA70)	
	Disk Enclosures	
	HP D2600 Disk Enclosure **NOTE:** Supports 12 LFF drives, and SAS 6 Gb/s and SATA 3 Gb/s.	AJ940A
	HP D2700 Disk Enclosure **NOTE:** Supports 25 SFF drives, and SAS 6 Gb/s and SATA 3 Gb/s.	AJ941A
	NOTE: Please see the QuickSpecs for additional information including configuration steps and additional options needed for a complete solution at: http://h18000.www1.hp.com/products/quickspecs/13404_div/13404_div.html (Worldwide)	
Tape Storage	**SAS Tape Drives**	
	HP DAT 160 SAS Internal Tape Drive	Q1587A
	HP DAT 160 SAS External Tape Drive	Q1588A
	HP DAT 320 SAS Internal Tape Drive	AJ830A
	HP DAT 320 SAS External Tape Drive	AJ828A
	HP Ultrium 448 SAS Internal Drive	DW085A
	HP Ultrium 448 SAS External Drive	DW086A
	HP Ultrium 920 SAS Internal Tape Drive	EH847A
	HP Ultrium 920 SAS External Tape Drive	EH848A
	HP LTO-4 Ultrium 1760 SAS Internal WW Tape Drive	EH919A
	HP LTO-4 Ultrium 1760 SAS External Tape Drive	EH920A
	HP LTO-4 Ultrium 1760 SAS (1) in 1U Rack-mount Kit	EH946A
	HP LTO-4 Ultrium 1760 SAS (1) in 1U Rack-mount Kit	EH946A
	HP LTO-5 Ultrium 3000 SAS Internal Tape Drive	EH957A
	HP LTO-5 Ultrium 3000 SAS Tape Drive in 1U Rackmount	EJ014A
	HP LTO-5 Ultrium 3280 SAS Internal Tape Drive	EH899A
	HP LTO-5 Ultrium 3280 SAS Tape Drive in 3U Rackmount	EJ013A
	HP LTO-5 Ultrium 3000 SAS External Tape Drive	EH958A
	HP LTO-5 Ultrium 3280 SAS External Tape Drive	EH900A
	HP 1/8 G2 LTO-5 Ultrium 3000 SAS Tape Autoloader	BL536A
	HP MSL2024 1 LTO-5 Ultrium 3000 SAS Tape Library	BL537A
	HP MSL4048 2 LTO-5 Ultrium 3000 SAS Tape Library	BL538A
	HP MSL8096 2 LTO-4 Ultrium 1760 SAS Tape Library	AK382A
	HP MSL8096 2 LTO-5 Ultrium 3000 SAS Tape Library	BL539A
	SAS Rack-mount Tape Drive Enclosures	

Related Options

	HP 1U SAS Rack-mount Kit **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.	AE459A
	HP 3U SAS Rack-mount Kit **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.	AG576A
	SAS Cables for Tape Drives, Tape Autoloaders and Tape Libraries	
	HP SAS Min-Min 1x-2M Cable Assembly Kit **NOTE:** Use this cable to connect HP SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors.	AE470A
Mini SAS to Mini SAS Cables	**NOTE:** Cables for use connecting the P812 with D2600, D2700, MSA60, and MSA70.	
	HP External Mini SAS 2m Cable	407339-B21
	HP External Mini SAS 4m Cable	432238-B21
	HP External Mini SAS 6m Cable	432239-B21

Technical Specifications

Dimensions (excluding bracket)	12.3 in x 4.4 in x 0.5 in (31.1 cm x 11.1 cm x 1.2 cm)
PCI Card Size	Full-height, full-length PCI Express
PCI Label	PCIe2 x8 (i.e., x8 mechanical, up to x8 electrical)
PCI Link Rate	x8 5 GT/s PCI Express (4 GB/s maximum bandwidth in each direction)
SAS/SATA Connectivity	2 Mini SAS 4i connectors 4 Mini SAS 4x connectors
SAS/SATA Link Rate	SAS protocol: 6 Gb/s, 3 Gb/s, or 1.5 Gb/s SATA protocol: 3 Gb/s or 1.5 Gb/s
SAS/SATA Performance	Controller supports a maximum of 4.8 GB/s maximum bandwidth in each direction (allocated across all the connectors)
RAID Cache	1 GiB capacity (not all of which is available for user data) 64-bit data width with 8-bit error correcting code (ECC) Flash-backed on power loss Tether to capacitor pack Removable
RAID Cache Bus Speed	DDR2-800 (6.4 GiB/s maximum bandwidth)
Software upgradeable Firmware	Yes
Maximum Drive Count	108 drives (e.g., 108 TB with 108 x 1 TB SATA 3.5" MDL HDD)
System Memory Addressing	64-bit, supporting servers memory space greater than 4 GiB
RAID Support	RAID 6 (Advanced Data Guarding) RAID 60 RAID 5 (Distributed Data Guarding) RAID 50 RAID 1+0 (Striping & Mirroring) RAID 1 (Mirroring) RAID 0 (Striping)
Upgradeable Firmware	Flashable ROM with redundant firmware images

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

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