Overview

The HP StorageWorks 1500 cs Modular Smart Array is a 2Gb Fibre Channel SAN attached 2U controller shelf that connects to both enterprise-class SCSI and Serial ATA (SATA) disk enclosures. HP recommends SCSI drives for intensive heavy I/O requirements while SATA drives should only be used in archived, reference, or "near on-line" disk-to-disk backup configurations. This combination provides customers with a low cost, high capacity storage solution.
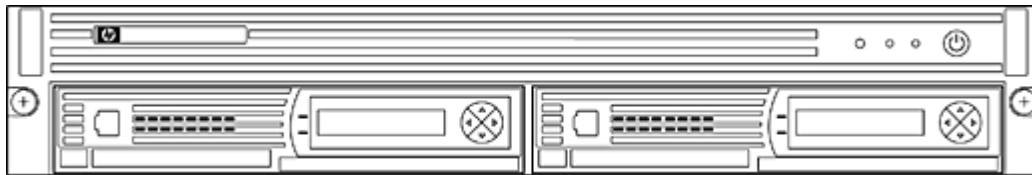**NOTE:** SCSI hard drive options have a three year warranty and SATA hard drives options have a one year warranty. This solution has been designed as a hardware foundation for which future solutions can be designed and implemented for investment protection. The MSA1500 cs with up-to-eight attached SATA enclosures can provide the customer with up to 64 TB* of native capacity. If the business requires SCSI reliability then attach up-to-four SCSI enclosures for a raw capacity of 16.8 TB. The system supports mixing SCSI and SATA enclosures.

The MSA1500 cs provides 2 Gb Fibre Channel to the hosts. By utilizing existing SCSI drive enclosures and MSA1000/1500 controller technology and integrating the use of our lowest cost SATA hard drives and enclosures, the MSA1500 cs lowers the total cost of ownership and extends the customers hardware investments into the future. With lower cost of ownership, customers can now take advantage of tiered storage capabilities matching up data with appropriate levels of performance, availability and cost of data storage. The result is lower overall cost without giving up the needs of business applications.

The MSA1500 cs is a member of the HP StorageWorks Modular Smart Array family, delivering industry-leading technology to meet today's demanding and growing storage needs. These storage solutions offer the best price performance features for direct attach environments and entry-level and mid-range SAN environments. Each solution is designed to maximize transfer rates, reduce management costs, while driving rapid return on investment.

The MSA1500 cs can be remotely managed by using management tools such as HP Insight Manager, Array Configuration Utility and the HP StorageWorks Fabric Switch Management Utility depending on the host's operating system.

*Maximum available storage capacity depends on the RAID level being implemented, and is based on maximum number of LUNs (32) and maximum LUN size (2 TB).

What's New

- Release of the new MSA1500 SAN Starter Kits designed specifically for HP-UX Integrity and PA-RISC server customers.

Models

Overview

HP StorageWorks 1500 cs Modular Smart Array	MSA1500 cs 2U Fibre Channel SAN Attach Controller Shelf	AA986A
	MSA1500 2U Fibre Channel SAN Attach Controller Shelf, with one MSA20 SATA drive enclosure **NOTE:** For Americas, Asia Pacific, and Japan.	AD509A
	MSA1500 2U Fibre Channel SAN Attach Controller Shelf, with one MSA30 SCSI drive enclosure **NOTE:** For Americas, Asia Pacific, and Japan.	AD510A
	MSA1500 SAN SCSI G2 Starter Kit (w/ PCI-E HBAs) (Windows, Linux or NetWare compatible) **NOTE:** Includes (1) MSA1500 (1) MSA30 SB SCSI drive enclosure (1) 4/8 Base SAN Switch (4) 4Gb SFP transceivers (2) FC1142SR 4Gb PCI-E HBAs + cables.	AE327B
	MSA1500 SAN SATA Starter G2 Kit (w/ PCI-E HBAs) (Windows, Linux or NetWare compatible) **NOTE:** Includes (1) MSA1500 (1) MSA20 SATA drive enclosure (1) 4/8 Base SAN Switch (4) 4Gb SFP transceivers (2) FC1142SR 4Gb PCI-E HBAs + cables. NOTE: For Americas, Asia Pacific, and Japan only.	AE326B
	MSA1500 SAN Starter Kit HA G2 Bundle (w/ PCI-E HBAs) for both SCSI and SATA SAN Starter G2 Kits (Windows, Linux, or NetWare compatible) **NOTE:** Includes (1) redundant controller; (1) FC I/O module; (1) 4/8 Base SAN Switch (4) 4Gb SFP transceivers (2) FC1142SR 4Gb PCI-E HBAs + cables. User will need to employ either Secure Path (active/passive configurations), QLogic or Emulex failover, or Windows MPIO for path failover implementation.	AE328B
	MSA1500 HP-UX Dual Controller SCSI SAN Starter Kit **NOTE:** Includes (2) controllers; (1) MSA30 SB SCSI drive enclosure; (1) FC I/O module; (2) C-Series 9124 SAN Switches; (8) 4Gb SFP transceivers; (4) HP PCI-X 2.0 1Port 4Gb HBAs + cables. User will employ PVlinks for path failover implementation.	AG704A *NEW*
	MSA1500 HP-UX Dual Controller SATA SAN Starter Kit **NOTE:** Includes (2) controllers; (1) MSA20 SATA drive enclosure; (1) FC I/O module; (2) C-Series 9124 SAN Switches; (8) 4Gb SFP transceivers; (4) HP PCI-X 2.0 1Port 4Gb HBAs + cables. User will employ PVlinks for path failover implementation. **NOTE:** For Americas, Asia Pacific, and Japan only.	AG705A *NEW*
	MSA1500 HP-UX SCSI SAN Starter Kit (Single Controller) **NOTE:** Includes (1) controller; (1) MSA30 SB SCSI drive enclosure; (1) C-Series 9124 SAN Switch; (4) 4Gb SFP transceivers; (2) HP PCI-X 2.0 1Port 4Gb HBAs + cables. **NOTE:** For Americas, Asia Pacific, and Japan only.	AG706A *NEW*
	MSA1500 HP-UX SATA SAN Starter Kit (Single Controller) **NOTE:** Includes (1) controller; (1) MSA20 SATA drive enclosure; (1) C-Series 9124 SAN Switch; (4) 4Gb SFP transceivers; (2) HP PCI-X 2.0 1Port 4Gb HBAs + cables. **NOTE:** For Americas, Asia Pacific, and Japan only.	AG707A *NEW*
	MSA1500 HP-UX High Availability Kit (only for single controller kits) **NOTE:** Includes (1) redundant controller; (1) FC I/O module; (1) C-Series 9124 SAN Switch; (4) 4Gb SFP transceivers; (2) HP PCI-X 2.0 1Port 4Gb HBAs + cables. User will employ PVlinks for path failover implementation. **NOTE:** For Americas, Asia Pacific, and Japan only.	AG708A *NEW*

Overview

Key Features

- Dual controllers (optional) can both be configured to provide fail-over protection. Controllers are configured as active /passive by default and in this manner support only Windows, Linux and NetWare
- Dual ACTIVE controllers (active/active) can also be supported individually in Windows, HP-UX, Linux, and NetWare environments.
- Ability to mix primary (SCSI) and near-online (SATA) storage behind the same SAN controller for easy to install tiered storage solutions.
- RAID 6 with HP's Advanced Data Guarding technology (RAID ADG)) - Highest level of fault tolerance, 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.
- 2 Gb/1 Gb Fibre connection to host - Supports both 1Gb, 2Gb and 4Gb Fibre Channel fabrics to ensure your investment in 1 Gb infrastructure is protected. Also works with the new 4Gb switches and HBAs at 2Gb speed.
- High performance controller(s) built on DAS to SAN (DtS) architecture.
- Scalable to eight SATA enclosures for a maximum of 64 TB or four SCSI enclosures for 16.8 TB of storage capacity with four dual channel SCSI I/O modules.
- Hot plug expansion and replacement support - Hot plug expansion and replacement of hard drives and redundant controllers, for simple, fast installation and maintenance. Fans and power supplies are also hot plug replaceable. Dependent on individual operating systems.
- Key solution certified for backup and restore, file retention and compliance, replication, write once read many for disk, media and broadcasting, medical, clustering and archiving.

Customer Benefits

- Capability of building an enterprise-class SAN with SCSI reliability by attaching up to four MSA30 SCSI-drive enclosures for a native capacity of 16.8 TB (using 56 - 300 GB SCSI disks)
- Low cost, high capacity - For less than $.01 per/MB customers can obtain up to 64 TB* of capacity.
- Flexibility - Can choose SATA configuration for secondary storage of data, and/or SCSI configuration for primary storage, mixing of both technologies behind the same controller is supported but require separate SCSI I/O modules.
- Ability to utilize a tiered storage approach as data values decrease, choosing the right disk technology for your data storage.
- Investment Protection - the ability to upgrade from the MSA1000 to the MSA1500 cs. Remove the controllers from the MSA1000 and place them into the controller bays in the MSA1500 cs and upgrade the firmware. (Requires purchase of one MSA1500 FC I/O Module per moved controller)

*Maximum available storage capacity depends on the RAID level being implemented, and is based on maximum number of LUNs (32) and maximum LUN size (2 TB).

Family Comparison

	MSA1500 cs	MSA1000	MSA500
NOTE: *SOME FEATURES AND FUNCTIONALITIES ARE OPERATING SYSTEM DEPENDENT			
Capacity (Maximum)	16.8 TB SCSI/64 TB SATA	12.6 TB SCSI	4.2 TB SCSI
SCSI Interface	Ultra 3, Ultra 320	Ultra 2, Ultra 3, Ultra 320	Ultra 2, Ultra 3, Ultra 320
2nd controller option	Active/Passive or Active/Active*	Active/Passive	Active/Passive
Controller Cache (per controller)	256 MB standard upgradeable to 512 MB	256 MB standard upgradeable to 512 MB	256 MB standard upgradeable to 512 MB
Direct or SAN	Direct or SAN Attach - Fibre*	Direct or SAN Attach - Fibre	Direct Attach - SCSI
Maximum Drives	56 SCSI, 96 SATA or mixed	42 SCSI	14 SCSI
MTBF (drives)	1.5M w/ SCSI @ 100% 500,000 w/ SATA @ 20%	1.5M w/ SCSI @ 100%	1.5M w/ SCSI @ 100%
Integrated Interconnect Options	No	Yes, optional 8-port Switch or 3-port Hub (some restrictions)	No
Use for Storage	Primary Storage with SCSI, Secondary with SATA	Primary Storage with SCSI	Primary Storage with SCSI

QuickSpecs

Product Highlights

Product Technology

Modular Chassis - The modular design of the MSA1500 controller shelf can support up to 4 single channel or 2 dual channel SCSI enclosures, 8 SATA enclosures on 4 dual channel SCSI I/O cards, redundant controllers, 2 Gb Fibre Channel I/O modules, fans and power supplies.

Scalability - up to 16.8 TB storage capacity utilizing 56 SCSI hard drives and four MSA30 SCSI enclosures or up to 64 TB* storage capacity utilizing SATA hard drives and eight MSA20 SATA enclosures. Larger drives are under investigation for possible future use.
NOTE: maximum available storage capacity depends on the RAID level being implemented, and is based on maximum number of LUNs (32) and maximum LUN size (2 TB)

Performance - The MSA1500 cs and its components have been designed using the latest in standard 2 Gb interconnects and Fibre Channel technology. Performance is rated at a transmission rate of up to 30,000 IOPs from cache and bandwidth of up to 200 MB per second. Performance can be substantially impacted by number of users and type of application. With dual controller active/active configurations, performance increase to >41,000 IOP/s from cache and 350MB/s throughput.

Fault Tolerance - RAID 6 with HP's Advanced Data Guarding technology (RAID ADG). 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.

DtS Architecture - DtS (Direct Attach to SAN) architecture is an exclusive MSA1000 and MSA1500 cs feature that provides a quick and easy way to migrate stored data on SCSI disks protected by most Smart Array controllers to a MSA1000 or MSA1500 storage system.

Pre-Failure Warranty - Specific enclosures and hard drives attached to an MSA1500 and monitored under Insight Manager are supported by a Pre-Failure (replacement) Warranty.
NOTE: Pre-Failure Warranty allows for the replacement of designated SCSI drives in an HP StorageWorks disk enclosure before they actually fail when using Insight Manger. Some operating systems may not support all of these features.

Integrated Configuration and Management Tools - The MSA1500 utilizes a standard, integrated set of management and utility software. Not available with all operating systems.

Hot Plug Expansion and Replacement Support - The MSA1500 cs supports hot plug expansion and replacement of redundant controllers, fans, power supplies, Serial ATA and SCSI disk enclosures, and I/O cards for simple, fast installation and maintenance.

Software Components

Overview	The MSA1500 utilizes a set of utility software for storage and RAID management, setup, configuration and troubleshooting. This reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your HP storage solution. Not all operating systems allow use of all of tools.

Array Configuration Utility
(OS dependent)

- Provides a graphical view of HP drive array configurations
- Easy to use Wizards for configuration
- ACU supports on-line configuration
- Web Based ACU supports On-Line, Remote Web Based and Off-line configuration
- ACU/CLI available for HP-UX customers

Selective Storage Presentation (SSP)

- Built-in to the controller firmware and controlled via ACU
- Allows setting of access rights to the MSA1500 storage by hosts
- Access control can be set up to a logical volume level using the Array Controller Utility

Insight Manager

- Powerful storage server and server option management tool
- Monitor storage from a remote central location
- Browser based, provides full access from anywhere on the Intranet, eliminating the need for a dedicated Insight Manager management console
- Availability dependent on operating system
- HP StorageWorks Modular Smart Array SMI-S Provider for Windows 2000/Windows Server 2003

Compatibility

HP's extensive compatibility testing program assures that your HP StorageWorks MSA1500 works with leading servers, operating systems, and backup applications - and not just those sold by HP. The MSA1500 works seamlessly in many environments, making them especially suitable if you have a mixed system environment. For the latest list of servers, workstations, operating systems, and backup software that supports the MSA1500, check the Modular Smart Array compatibility pages on our web site at: http://www.hp.com/go/MSA1500cs.

HP Server Compatibility The HP StorageWorks MSA1500 cs supported on the following servers, depending on the various operating systems:

All ProLiant x86 and x86_64 servers fully supported unless noted below. **NOTE:** New models are in test

ProLiant x86 servers
BL20p G2, BL30p, BL40p, DL140 G2, DL360, DL360 G2, DL360 G3, DL380, DL380 G2, DL380 G3, DL560, DL580, DL580 G2, DL740, DL760, DL760 G2, ML370, ML370 G2, ML370 G3, ML530, ML530 G2, ML570, ML570 G2, ML750

ProLiant AMD Opteron servers
BL25p, BL25p (Dual Core), BL35p, BL35p (Dual Core), BL45p, BL45p (Dual Core), DL145, DL145 G2 (Dual Core), DL385, DL385 (Dual Core), DL585, DL585 G2 (Dual Core) (DL145-G1 not supported in Boot-From-SAN environment

ProLiant INTEL EM64T servers
BL20p G3, BL20p G4, BL460c, BL480c, DL360 G4p, DL360 G4, DL360 G5, DL380 G4, DL380 G5, DL580 G3, DL580 G4, ML350 G4p, ML350 G5, ML370 G4, ML370 G5, ML570 G3, ML570 G4

Integrity IA64 (Itanium) servers
rx1600 rx1620 rx2600 rx2620 rx4610 rx36xx rx4640 rx5670 rx66xx, rx7620 rx8620 rx8800 rx9610 zx2000 zx6000 Integrity Superdome
NOTE: BL60P (FC Mezzanine Card, FC passthru or internal McData/Brocade FC 4Gb Switch Cube)

PA-RISC servers:
rp24xx, rp34x0, rp4440, rp54xx, rp740x, rp7410, rp7420, rp8400, rp8420, SD16000, SD32-128A, SD32/64000, C3xxx, B2000, J5xxx, J6000, J7xxx, K-class

Supported Alpha servers
DS10, DS15, DS20, DS20E, DS25, ES40, ES45, ES47 (PCI-X), ES80 (PCI-X), GS60, GS60E, GS80, GS140,GS160, GS320, GS1280 (PCI-X)
NOTE: Certification of new ProLiant & Integrity server models is ongoing. Not all OSes are supported on all models. Supports most multi-vendor industry standard 32-bit Intel-based (x86) and Opteron servers.

Compatibility

OS Support for Single controller or dual controller configurations with active/passive firmware	- Microsoft Windows Enterprise Edition 2003 (32 & 64-bit) R2 - Microsoft Windows Standard Edition 2003 (32 & 64-bit) R2 - Microsoft Windows 2000 Server Edition (32 & 64-bit) - Microsoft Windows 2000 Advanced Server (sp4) (32 & 64-bit) - HP-UX 11.11 and 11.23 (single controller in homogeneous environments only. For dual controller heterogeneous support refer to the next section) - Red Hat Linux Enterprise Advanced Server 2.1 and Enterprise Linux 3.0 (32 & 64-bit) & 4.0 (32-bit & 64-bit)SuSE Linux SLES8 and SLES9 (32 & 64-bit)Netware v5.1 and 6.5. - SCO OpenServer 6.0.0, SCO UnixWare 7.1.3 and UnixWare 7.1.4 (single controller in 2-node homogeneous environments only). Please refer to compatibility matrix at http://www.hp.com/go/msa1500cs for complete configuration support.

OS Support for Dual controller active/active firmware v7.x (requires 2nd controller and free firmware download)	Optional controller firmware is available for downloading at no cost from the HP MSA1500 Web Site that enables both controllers to operate in an active/active mode. The following are the only operating systems that have been tested and are supported with active/active functionality in a homogeneous configuration only. All dual active (active/active) controller support is homogeneous. - Microsoft Windows Standard and Enterprise Editions 2003 (32 & 64-bit) R2 - Microsoft Windows 2000 Server and Advanced Server (SP4) Editions (32 & 64-bit) - HP-UX 11.11, and 11.23 **NOTE**: all MSA1500 HP-UX starter kits ship with active/active firmware pre-installed - Red Hat Linux Enterprise Linux 3.0 (32-bit & 64-bit) No Red Hat 4 support at this time - SuSE Linux SLES8, SLES9 (32 & 64-bit) - SCO **NOTE:** HP Secure Path is not supported on active/active controller configurations. Industry standard failover methodology is employed.

HP-UX support (specific guidelines)	The MSA1500 for HP-UX supports dual active/active controller or single controller configurations (Active/passive configurations are not supported). HP-UX single controller support is enabled with the standard firmware that ships with the MSA1500HP-UX implemented with dual active controllers requires use of firmware available through a free download off the MSA1500 web site. **NOTE:** all MSA1500 HP-UX starter kits ship with active/active firmware pre-installed, which supports both single controller or active/active controller configurations. - ACU/CLI (Command Line Interface) is used for configuration and Event Monitoring Service (EMS) for monitoring. - Root/Boot/Dump/Swap/Install is also supported. - PVlinks is supported for multi (HBA) path / single controller (2 HBAs) and dual/active controller configurations. - Fabric and direct connect are supported - HP-UX 11.11 & 11.23, PA-RISC and Itanium

Compatibility

Solution Offerings/Software Certifications	Clustering	• Microsoft Cluster Server • Service Guard for HP-UX and Linux • SteelEye LifeKeeper for Linux Certification • Netware Clustering • Polyserve - Matrix Server for Windows
	Backup and Restore	• HP Data Protector • VERITAS Backup Exec and NetBackup • Legato NetWorker for Windows • Computer Associates BrightStor Enterprise Backup
	Medical Imaging Management	• Bycast StorageGRID
	Replication	• HP Storage Mirroring for Windows • HP Virtual Replicator for Windows.
	Other	• Microsoft Virtual Server • VMware

Optional Software

HP StorageWorks Storage Mirroring

OpenView Storage Mirroring is designed to take small-medium enterprises beyond periodic backup to provide continuous data protection with minimal data loss and immediate recovery from any disaster or system outage. Natural and man-made disasters can occur when you least expect it - serving as a reminders that with less than a moment's notice, volumes of data loss can be lost. To prevent data loss from failure, error, or disaster, HP StorageWorks Storage Mirroring software provides replication of your valuable Windows data, Exchange data, and SQL Data to another server. Proactive replication is a key strategy that can be coupled with tape backup and snapshot technology for continuous data protection and point-in-time copies of data. Having replicated data co-located, customers can recover their static and transactional data in seconds without loss of productivity. Storage Mirroring can also be utilized for disaster recovery, centralized backup, data distribution/mining, and server/storage migration..

- Supports Microsoft Windows 2000/NT/2003servers
- One-to-one failover/fail back solution for MS-Exchange, MS-SQL and Oracle providing automatic failover and near instantaneous access to replicated data or use replicated data or rebuild your local server.
- Server Groups - enables the "grouping" of servers on the management console (GUI) allowing focus on only those servers under your span of control
- Continuous, asynchronous byte-level replication with intelligent data compression captures changes as they occur, ensures sequence of data mirrored on target, and provides user-configurable compression levels to ensure efficient usage of network resources.
- One-to-many and many-to-one host configurations allowing multiple production servers to use the same target server

For more information visit http://h18006.www1.hp.com/products/storage/software/sm/index.html

Compatibility

MSA1500 utilization of Industry Standard fail-over solutions	HP supports additional high availability multi-pathing capabilities within various operating systems and through third-party vendors, providing continuous data access from HP's RAID MSA1500 to host servers. Options are available for servers running the Windows, Linux and HP-UX operating systems. More information and the explanation of restrictions are available at http://h18006.www1.hp.com/products/sanworks/multipathoptions/index.html

- Microsoft Windows 2000 and 2003 (32 bit EE and 64 bit EE only)can utilize the HP MPIO Basic Failover v1.3 for MSA Arrays, a DSM available for free download at the above site.
- Linux (and SCO) industry standard failover for the MSA1500 is available at no charge within the HBA device driver from QLogic or Emulex.
- HP-UX utilizes PVLinks

NetWare, OpenVMS, Tru64 UNIX utilize native OS_based failover software

HP StorageWorks Secure Path (optional, only used with active/passive controller configurations if not deploying MPIO)	HP StorageWorks Secure Path is a family of high availability multi-pathing software products providing continuous data access from the HP RAID Array to host servers running the Windows Server 2003, Windows 2000, and Linux operating systems.

Redundant hardware, advanced RAID technology and Secure Path's automated failover capability are used to enhance fault tolerance and availability. Secure Path effectively eliminates controllers, disk drives, interconnect hardware and host bus adapters as single points of failure in the storage subsystem.

The attachment of non-Secure Path (single HBA) servers to a MSA1500 cs with dual controllers that has servers with Secure Path (dual HBA) attached is supported where the operating system is Windows or Netware. Users must realize that in event of a controller fail-over (failure of active controller) the single path servers will lose access to their data on the MSA1500 cs.

NOTE: If Secure Path for Linux is used on any node attached to an MSA1500 cs, all nodes must also have Secure Path installed, regardless of operating systems.
NOTE: refer to http://www.hp.com/go/securepath for the latest Secure Path parameters.

Key Features	• Maintains connections to storage • Monitors I/O paths and alerts on significant events • Used in Stand alone Configurations, Cluster Configurations, and SAN configurations

MSA1500 Clustering	**Single controller support**	**Active/passive controllers support**	**Active/active controllers support**
	Windows, , Linux, NetWare Heterogeneous HP-UX, SCO (homogeneous only)	Windows, Linux, NetWare (heterogeneous)	Windows, HP-UX, Linux, (heterogeneous) Netware, SCO, Open VMS and Tru64 Unix (homogeneous)

Compatibility

In a single controller configuration or when dual controllers are configured as active/passive (standby), mixing clusters with single nodes is supported. For example you may mix three Microsoft (Windows Server 2003 or Windows 2000) clusters and other individual servers, even doing so in a heterogeneous server operating system environment. Windows Server 2003 allows a single cluster of up to eight nodes.

To see Cluster Configuration Support Matrices that support the listings on the Microsoft Windows Server Catalog, refer to:
http://h18004.www1.hp.com/solutions/enterprise/highavailability/answercenter/configuration-all.html

Single-path (single controller, non-Secure Path) NetWare clustering has been successfully tested up to a 12-node cluster. NetWare clusters employing Secure Path (dual controller, dual HBAs) are limited to six nodes. Multiple NetWare clusters (and single servers) may have concurrent access with no limitation inherent to the MSA1500 cs.

Up to a 16-node Linux cluster (single controller, non-Secure Path) utilizing SteelEye LifeKeeper for Linux clustering software has been tested and is supported. Refer to http://www.hp.com/go/securepath for any restriction with Secure Path.

Up to a 4-node HP-UX cluster (dual controller, non-Secure Path) utilizing HP-UX Service Guard clustering software has been tested and is supported. Refer to http://www.hp.com/go/MSA1500cs, the Compatibility Guide under technical documents under the support section.

The MSA1500 has the ability to be configured with up to thirty-two LUNs. A configuration of twenty attached servers has been tested and is supported. More commonly, users have had an average of four to eight nodes. This can be any combination of hosts or clusters with different operating systems (while holding fast to the guidelines and limits described in the above paragraphs. Performance within these guidelines is heavily dependent on the actual number of end users and types of applications being employed.

For more information, click on the link:
http://h18004.www1.hp.com/products/storageworks/msa1500cs/index.html

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HP ProLiant Cluster HA/F200 for Entry Level SAN

The ProLiant Cluster F200 for the Entry Level SAN is designed to assist in simplifying the configuration of cluster solutions that provide high levels of data and applications availability in the Microsoft Windows Operating System environment through clustering to provide no-single-point-of-failure. The ProLiant Cluster F200 for the Entry Level SAN supports a two-node cluster based on Microsoft Windows 2000 Advanced Server and two to eight-nodes cluster based on Microsoft Windows Server 2003 Enterprise Edition operating system, the StorageWorks 1000 Modular Smart Array (MSA1000) and MSA1500 cs, or Raid Array RA4100 and ProLiant Servers. This solution also supports StorageWorks Secure Path management software.

ProLiant Cluster HA/F200 for the Entry Level SAN	364026-B22
ProLiant Cluster HA/F200 for the Entry Level SAN (Japan)	364026-292

Compatibility

HP ProLiant Cluster Starter Kit	The ProLiant Cluster Starter Kit is a ProLiant cluster "How-to-Guide" that includes documentation for ProLiant Clusters that use StorageWorks MSA1000, MSA1500 cs, EVA 3000, 4000,5000, 6000 and 8000. The kit provides documentation to set-up a Windows Full-Features MPIO Cluster. The kit also includes multimedia with animation to illustrate the actual components required to build a Fibre Channel Cluster and two 30-day trial licenses of OpenView Storage Mirroring.

NOTE: This kit does not include Secure Path Software.

HP ProLiant Cluster Starter Kit   364023-B21

HP ProLiant Clusters for NetWare	HP supports a broad range of solutions for NetWare Cluster services including configurations featuring the MSA1500 cs and optionally with HP StorageWorks Secure Path. These solutions provide high availability and maximum resource utilization for NetWare environments from small file sharing implementations to enterprise business computing. Single-path (single controller, non-Secure Path) NetWare clusters of up to 12-nodes have been successfully tested. Presently 2-node NetWare clusters with Secure Path have been tested and approved with larger NetWare cluster testing planned. Multiple NetWare clusters are allowed.

NOTE: SCSI Disk Technology Only.
NOTE: Refer to http://www.hp.com/go/securepath for the latest Secure Path for NetWare parameters.

Configure to Order Program Information

HP introduces the Configure to Order program on a limited basis. It is not yet available in all areas. The MSA1500 and its options may or may not be factory installed in a rack with add-on controllers, switches, hubs, MSA20 enclosures, MSA30 enclosures, and hard drives. The MSA1500 cs may be integrated with 64-bit Integrity and PA-RISC servers or ProLiant or as standalone storage.

Configure to Order	Products Approved for CTO	Part Number
	1500 cs Modular Smart Array	AA986A
	NOTE: 0D1 will appear after this part number on your sales order when factory integration is indicated.	
	HP MSA1000 Controller 256 cache ALL	218231-B22
	NOTE: 0D1 will appear after this part number on your sales order when factory integration is indicated.	
	256 MB Cache Upgrade	254786-B21
	NOTE: 0D1 will appear after this part number on your sales order when factory integration is indicated.	
	MSA1500 cs Fibre Channel I/O Module	AA987A
	NOTE: 0D1 will appear after this part number on your sales order when factory integration is indicated.	
	MSA1500 cs Dual Channel SCSI I/O Module	AA988A
	NOTE: 0D1 will appear after this part number on your sales order when factory integration is indicated.	

NO CTO Available (No Kits or Bundles)		
	MSA1500 HP-UX Dual Controller SCSI SAN Starter Kit	AG704A
	MSA1500 HP-UX Dual Controller SATA SAN Starter Kit	AG705A
	MSA1500 HP-UX SCSI SAN Starter Kit (Single Controller)	AG706A
	MSA1500 HP-UX SATA SAN Starter Kit (Single Controller)	AG707A
	MSA1500 HP-UX High Availability Kit (only for single controller kits)	AG708A
	MSA1500 SAN SCSI G2 Starter Kit (NEW)	AE327B
	MSA1500 SAN SATA Starter G2 Kit (NEW)	AE326B
	MSA1500 SAN Starter Kit HA G2 Bundle (NEW)	AE328B
	MSA1500cs 2U Fibre Channel SAN Attach Controller Shelf, with SATA	AD509A
	MSA1500cs 2U Fibre Channel SAN Attach Controller Shelf, with SCSI	AD510A
	MSA1500 cs upgrade shelf	AD511A

Service and Support, HP Care Pack, and Warranty Information

Warranty	• Three-year Limited Warranty for MSA1500, Fibre Channel Cables and SFP Transceivers • 3 years parts exchange • 1 year labor • 1 year on-site • Next business day response

Options for the MSA1500 carry their own warranty. Refer to HP's Limited Warranty Statement for more information.

The MSA1500 has been designed with customer self repairable parts to minimize repair time and provide greater flexibility in performing defective parts replacement. Please refer to HP's Limited Warranty Statement for further details:
http://h18006.www1.hp.com/products/storageworks/warranty.html

Products included in various Kits carry their own individual warranties.

NOTE: The warranty of the hard drive options purchased with the MSA1500 cs product is different for SCSI hard drives versus SATA hard drives. SCSI hard drive options have a three year warranty and SATA hard drives options have a one year warranty.
Reference HP's communication for further details: http://www.hp.com go to search, enter CN0089W

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

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. • 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: Refer to Step 6 "Choose HP Care Pack Services" in the Configuration Information section below for all Service, Warranty Plans, Installation and Startup Services available for the MSA1500

For additional information on Product Services and HP Care Pack, as well as orderable part numbers, please refer to the URL: http://www.hp.com/hps/carepack/.
If you have specific questions about availability or how to obtain services contact your local HP representative. Contact information for your local area can be found at:
http://welcome.hp.com/country/us/en/contact_us.html

HP Care Pack Services	HP Care Pack Services offer upgraded service levels to extend and expand your standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your storage investments. http://www.hp.com/hps/storage/ns_san.html#services

Service and Support, HP Care Pack, and Warranty Information

Software Product Services

Product support provides the customer access to HP's experienced technical support resources, as well as access to HP's Information Services database for support on a variety of multi-vendor/multiplatform software products. Product support includes escalation and problem coordination with the appropriate engineering group. HP Services offer a variety of options to allow you to tailor your product service to meet the needs of your organization. Basic warranty on products can be uplifted from day one to ensure you receive the service you need when you need it.

Warranty and Support

HP warrants only that the software media will be free of physical defects for a period of ninety (90) days from delivery.
The following services are offered as HP Care Pack Services at the time of software product order:

- Software Technical Support 24 x 7 (1 and 3 years) is available 24 hours per day, Monday through Sunday, including holidays (includes phone-in software technical support 24 x 7 and software product and documentation updates).
- Installation Service (software installation) and Installation and Startup Service (software installation, configuration, startup testing and knowledge transfer).
- HP Care Pack services must be ordered with the product and are prepaid.
- For tailored support contracts based on personalized statement of work contact your local support center via http://www.HP.com/support.

Secure Path Software Services

- Software product services included with Secure Path: One year of Software Technical Support 24 x 7 HP Care Pack Services (includes phone-in software technical support 24 x 7 and software product and documentation updates).
- HP Care Pack services are available to upgrade the one year of Software Technical Support 24 x 7 included with the Secure Path product to 3 full years.
- Installation service (software installation).

For additional software product services information for HP Care Pack services, as well as orderable part numbers, please refer to the URLs listed below:
All storage services: http://www.hp.com/hps/storage/.
All HP Care Pack Services: http://www.hp.com/hps/carepack/storage/cp_networked.html.
Software Support HP Care Pack Services:
http://www.hp.com/hps/carepack/software/cp_storage.html.
Installation and Startup Services: http://www.hp.com/hps/storage/ns_implementation.html.
If you have specific service questions contact your local HP representative. Contact information for your local area can be found at: http://welcome.hp.com/country/us/en/contact_us.html
Maintenance releases, bug fixes and software patches are available at:
http://welcome.hp.com/country/us/en/support.html.

Service and Support, HP Care Pack, and Warranty Information

Hardware Product Services

- Installation services that include basic installation and Array Installation and Startup
- On-site maintenance (includes warranty support)
- Response time upgrades during the warranty period
- Post-warranty coverage or warranty extension
- RAID setup and performance consulting via statement of work
- Migration service consulting via statement of work
- Environmental, Mission Critical Services

For product services information for HP Care Pack services, as well as orderable part numbers, please refer to the URLs listed below:
All storage services: http://www.hp.com/hps/storage/.
All HP Care Pack Services: http://www.hp.com/hps/carepack/storage/cp_networked.html.
Installation and Startup Services: http://www.hp.com/hps/storage/ns_implementation.html.
If you have specific service questions contact your local HP representative. Contact information for your local area can be found at: http://welcome.hp.com/country/us/en/contact_us.html

Array Installation and Startup Services

The HP Installation and startup for HP StorageWorks Disk Arrays service package provides installation and configuration of HP StorageWorks Disk Array products. Service highlights include: Installation and Startup provides, installation, LUN Disk Design and configuration of the MSA 1500 which includes

- Service Planning
- Service Deployment
- Installation Verification Testing (IVT) required for this service
- Customer Orientation session
- Service Deployment includes the deployment of the MSA disc array into a new or pre-existing SAN which may consist of switch, hub or SCSI bridge technology. Installation includes the customization of up to four host servers, eight host bus adapters (HBAs) and up to four high availability software licenses.

SAN Solution Service

SAN Solution Service covers your entry-level disk array solution with:

- Comprehensive SAN implementation strategy and planning
- Hardware and software installation and configuration
- Integration of the installed disk array in your SAN environment
- Firmware verification
- SAN testing
- Solution handover to your staff

The Array Installation and Startup service is a pre-requisite for the SAN Solution Service.

For more information about he SAN solution service, please visit:
http://www.hp.com/hps/storage/ns_san.html

Kit Contents

Model Name	Contents' Description	Part Number
MSA1500 cs	MSA1500 controller shelf, 1-controller, 1- FC module, 1- SFP transceiver, 1- dual channel SCSI I/O card, 2- power cables, redundant fans, redundant power supplies, universal rack-mounting kit, MSA1500 support CD and documentation, serial cable. **NOTE:** Fibre Channel cables, disk enclosures and hard drives are ordered separately.	AA986A
MSA1500 cs with one SATA drive enclosure	1- MSA1500 controller shelf base configuration, and 1-MSA20 SATA disk enclosure base configuration. **NOTE:** For Americas, Asia Pacific, and Japan.	AD509A
MSA1500 cs with one SCSI drive enclosure	1- MSA1500 controller shelf base configuration, and 1-MSA30 single-channel SCSI disk enclosure base configuration. **NOTE:** For Americas, Asia Pacific, and Japan.	AD510A
MSA1500 SAN SCSI G2 Starter Kit (NEW) (w/ PCI-E HBAs)	(Windows or Linux compatible) **NOTE:** Includes (1) MSA1500 (1) MSA30 SCSI drive enclosure (1) 4/8 Base SAN Switch (4) 4Gb SFP transceivers (2) FC1142SR 4Gb PCI-E HBAs + cables.	AE327B
MSA1500 SAN SATA Starter G2 Kit (NEW) (w/ PCI-E HBAs)	(Windows or Linux compatible) **NOTE:** Includes (1) MSA1500 (1) MSA20 SATA drive enclosure (1) 4/8 Base SAN Switch (4) 4Gb SFP transceivers (2) FC1142SR 4Gb PCI-E HBAs + cables. **NOTE:** For Americas, Asia Pacific, and Japan only.	AE326B
MSA1500 SAN Starter Kit HA G2 Bundle (NEW) (w/ PCI-E HBAs) for both SCSI and SATA SAN Starter G2 Kits	(Windows or Linux compatible) **NOTE:** Includes (1) redundant controller; (1) FC I/O module; (1) 4/8 Base SAN Switch (4) 4Gb SFP transceivers (2) FC1142SR 4Gb PCI-E HBAs + cables. User will need to employ either Secure Path (active/passive configurations), QLogic failover, or Windows MPIO for path failover implementation.	AE328B
MSA1500cs HP-UX Dual Controller SCSI SAN Starter Kit	(HP-UX compatible) **NOTE:** Includes (2) controllers; (1) MSA30 SB SCSI drive enclosure; (1) FC I/O module; (2) 9124 SAN Switch (8) 4Gb SFP transceivers (4) HP PCI-X 2.0 1Port 4Gb HBAs + cables. User will employ PVlinks for path failover implementation.	AG704A *NEW*
MSA1500cs HP-UX Dual Controller SATA SAN Starter Kit	(HP-UX compatible) **NOTE:** Includes (2) controllers; (1) MSA20 SATA drive enclosure; (1) FC I/O module; (2) 9124 SAN Switch (8) 4Gb SFP transceivers (4) HP PCI-X 2.0 1Port 4Gb HBAs + cables. User will employ PVlinks for path failover implementation. **NOTE:** For Americas, Asia Pacific, and Japan.	AG705A *NEW*
MSA1500cs HP-UX SCSI SAN Starter Kit	(HP-UX compatible) **NOTE:** Includes (1) controller; (1) MSA30 SCSI drive enclosure; (1) 9124 SAN Switch (4) 4Gb SFP transceivers (2) HP PCI-X 2.0 1Port 4Gb HBAs + cables. **NOTE:** For Americas, Asia Pacific, and Japan.	AG706A *NEW*
MSA1500cs HP-UX SATA SAN Starter Kit	(HP-UX compatible) **NOTE:** Includes (1) controller; (1) MSA20 SATA drive enclosure; (1) 9124 SAN Switch (4) 4Gb SFP transceivers (2) HP PCI-X 2.0 1Port 4Gb HBAs + cables. **NOTE:** For Americas, Asia Pacific, and Japan.	AG707A *NEW*
MSA1500cs HP-UX High Availability Kit	(HP-UX compatible) **NOTE:** Includes (1) redundant controller; (1) FC I/O module; (1) 9124 SAN Switch (4) 4Gb SFP transceivers (2) HP PCI-X 2.0 1Port 4Gb HBAs + cables. User will employ PVlinks for path failover implementation. **NOTE:** For Americas, Asia Pacific, and Japan.	AG708A *NEW*

Kit Contents

MSA1500 cs upgrade shelf	MSA1500 controller shelf, 1- dual channel SCSI I/O card, 2- power cables, redundant fans, redundant power supplies, universal rack-mounting kit, MSA1500 support CD and documentation, serial cable.	AD511A
	NOTE: This MSA1500 cs upgrade shelf does not include a controller or a Fibre Channel I/O Module. It is intended for those customers who wish to upgrade from their MSA1000 to the MSA1500 cs. For each controller added to this shelf, one Fibre Channel I/O module (PN AA987A) is required.	
	NOTE: When upgrading to the MSA1500 cs, there is no space for the MSA1000 embedded switch or hub.	
MSA Controller management cable	One ships standard. Orderable through HP Store or Service if original is lost	316131-001

QuickSpecs

Configuration Information

Step 1 - Base Configuration

Select one:

Model Name	Model Description:	Part Number
MSA1500 cs	MSA1500 controller shelf, 1-controller, 1- FC module, 1- SFP transceiver, 1- dual channel SCSI I/O card, 2- power cables, redundant fans, redundant power supplies, universal rack-mounting kit, MSA1500 cs support CD and documentation, serial cable.	AA986A

Step 2 - Required Options (Choose Serial ATA or SCSI)

Select each required option with quantities specified. ***NOTE:** SATA drives are designed for archival or reference data. They should not be used in a heavy or intense I/O environment. Those situations require the use of enterprise-class SCSI drives.

Description with Parts Shipped:	Quantity	Part Number
Dual Channel SCSI I/O Module (1 ships with base unit, 3 more can be added)	Up to 4	AA988A
MSA20 - Serial ATA enclosure, SCSI cable, redundant fans and power supplies, power cable	Up to 8	335921-B21
HP 250GB 1.5G SATA 7.2K 3.5" HDD	Up to 12 per MSA20 enclosure	349239-B21
HP 500GB 1.5G SATA 7.2K 3.5" HDD	Up to 12 per MSA20 enclosure	395473-B21
HP 750GB 1.5G SATA 7.2K 3.5" HDD	Up to 12 per MSA20 enclosure	432341-B21
MSA30 - Dual Channel SCSI enclosure, SCSI cable, redundant fans and power supplies, power cable	Up to 2	302970-B21
MSA30 - Single Channel SCSI enclosure, SCSI cable, redundant fans and power supplies, power cable	Up to 4	302969-B21
HP 72GB U320 10K Universal HDD	Up to 14 per MSA30 enclosure	286714-B22
HP 146GB U320 10K Universal HDD	Up to 14 per MSA30 enclosure	286716-B22
HP 300GB U320 10K Universal HDD	Up to 14 per MSA30 enclosure	350964-B22
HP 36GB U320 15K Universal HDD	Up to 14 per MSA30 enclosure	286776-B22
HP 72GB U320 15K Universal HDD	Up to 14 per MSA30 enclosure	286778-B22
HP 146GB U320 15K Universal HDD	Up to 14 per MSA30 enclosure	347708-B22

Configuration Information

HP 300GB U320 15K Universal HDD	Up to 14 per MSA30 enclosure	411089-B22

NOTE: Larger SATA hard drives are currently in qualification but are not presently supported.
NOTE: Two SATA disk enclosures can be attached to one SCSI I/O module. Only one SCSI disk enclosure can be attached to a SCSI I/O module.
NOTE: It is recommended that the same hard drive capacity (ex. All 250 GB SATA in SATA enclosure or all 146 GB SCSI in SCSI enclosure) be installed in a RAID-set.
NOTE: All Ultra320 Universal Hard Drives are backward compatible to U2 or U3 speeds.
NOTE: For complete compatibility information, refer to the Compatibility table located at http://www.hp.com/go/msa1500cs

Must choose optional Power Cord for Non-U.S. Configurations	Quantity	Part Number
Power Cord, 110/220 VAC, US/Canada/Mexico	2	227099-001
NOTE: Shipped standard with all units.		
Power Cord, 220/240 VAC, (US/Canada/Mexico)	2	227099-002
Power Cord, (Australia/China/New Zealand)	2	227098-011
Power Cord, (Central Europe)	2	157215-021
Power Cord, (United Kingdom/Hong Kong)	2	157216-031
Power Cord, (Switzerland)	2	157219-111
Power Cord, (Italy)	2	157217-061
Power Cord, (Denmark)	2	157218-081
Power Cord, (Japan)	2	139867-006
Power Cord, (South East Asia/India)	2	157220-AR1

NOTE: Redundant configurations require two Host Bus Adapters per server, an additional controller and fibre channel I/O module, and Secure Path or industry standard MPIO failover software for each server.

Step 3 – Choose Redundant MSA1500 System Options

Description	Quantity	Part Number
MSA Controller	1	218231-B22
NOTE: The MSA1500 utilizes the MSA1000 controller with specific firmware		
256 MB Cache Modules for Controller (one additional for each controller)	2	254786-B21
NOTE: The MSA1500 and MSA1000 utilize the same Cache Modules		
MSA1500 Fibre Channel I/O module	1	AA987A
HP StorageWorks Secure Path (available for active/passive configurations only) or an industry standard path failover solution such as Windows MPIO or QLogic Failover for Linux (appropriate for the operating system)		

NOTE: Redundant configurations require two Host Bus Adapters per server, an additional controller and fibre channel I/O module, redundant switches and cables, and Secure Path (active passive configuration) software or Industry Standard failover depending on the operating system for each server.

Configuration Information

Step 4 – Choose Supported Infrastructure Options

Select each required option with quantities specified.

	Description with Parts Shipped:	**Part Number**
4 Gb Fibre Channel Fabric "B-Series" family of switches	4 Gb SFP SW Transceiver Kit	A7446B
	HP StorageWorks 4/8 Base SAN Switch 8 port 4Gb/s switch with zero e-ports	A7984A
	HP StorageWorks 4/8 SAN Switch 4Gb/s with full fabric	A8000A
	HP StorageWorks 4/16 SAN Switch	A7985A
	HP StorageWorks 4/16 SAN Switch Power Pack	A7987A
	HP StorageWorks 4/32 SAN Switch Power Pack	A7394A
	HP StorageWorks 4/32 Full SAN Switch	A7393A
	HP StorageWorks 4/32 Base SAN Switch	A7537A
	HP StorageWorks 4/8 4 port upgrade license	T4260A
	4/64 SAN Switch Power Pack 4/64 SAN Switch with 32 active ports	AE496A
	4/64 SAN Switch with 64 active ports	AG457A
	HP StorageWorks Full Fabric license	T4261A
	HP StorageWorks B-Series 8-31 port Power Pack License	T3573A
	4/64 SAN Switch with 32 active ports	AE495A
	16 port upgrade license for 4/64 SAN Switch (base model) and Power Pack model	T4411A
	StorageWorks 4/256 SAN Director	A7988A
	StorageWorks 4/256 SAN Director Power Pack	A7989A
	HP StorageWorks SAN Director 4/16 Blade	A7990A
	HP StorageWorks SAN Director 4/32 Blade	A7991A
	HP StorageWorks B-Series MP Router Blade	AG461A
	Power Pack Software Upgrade Bundle	330882-B21
	StorageWorks SAN Director Blade	AD504A
	HP StorageWorks SAN Director 4/16 Blade	A7990A
	Brocade 4Gb SAN Switch for HP p-Class BladeSystem, Base	A7533A
	Brocade 4Gb SAN Switch for HP p-Class BladeSystem, Full Fabric	A7534A
	Brocade 4Gb SAN Switch for HP p-Class BladeSystem, Power Pack	A7535A
	Brocade 4/12 SAN Switch (1) 4Gb SAN Switch; 12 ports enabled for any combination (internal and external); two (2) short wave 4Gb SFPs;	AE370A
	Brocade 4/24 SAN Switch (1) 4Gb SAN Switch; 24 ports enabled (16 internal, 8 external); four (4) short wave 4Gb SFPs;	AE372A
	Brocade 4/24 SAN Switch Power Pack (1) 4Gb SAN Switch; 24 ports enabled (16 internal, 8 external); four (4) short wave 4Gb SFPs;	AE371A

Configuration Information

2 & 4Gb Fibre Channel Fabric "C-Series" family of switches	Cisco MDS 9124e 12-port Fabric Switch	AG641A
	Cisco MDS 9124e 24-port Fabric Switch	AG642A
	Cisco MDS 9120 2Gb Fabric Switch w/0 SFPs	A7426A
	Cisco MDS 9140 2Gb Fabric Switch w/0 SFPs	A7427A
	Cisco MDS 9124 8-ports Active Fabric Switch w/0 SFPs	AG646A
	Cisco MDS 9124 16-ports Active Fabric Switch w/0 SFPs	AG647A
	Cisco MDS 9124 24-ports Active Fabric Switch w/0 SFPs	AG648A
	Cisco MDS 9513 4Gb Director	AE376A
	Cisco MDS 9506 4Gb Director w/Supervisor 2	AE388A
	Cisco MDS 9020 4Gb Fabric Switch w/0 SFPs	AE377A
	Cisco MDS 9216i w/0 1Gb Ethernet SFPs	AE390A
	Cisco MDS 9509 Director w/Supervisor 2	AE389A

2 Gb Fibre Channel HBAs	FCA2214 2Gb Host Adapter (Linux, NetWare, SCO & 32-bit Windows)	281541-B21
	FCA2214DC dual channel 2Gb Host Adapter (Linux, NetWare, SCO & 32-bit Windows)	321835-B21
	Windows 32-bit single channel 2Gb PCI-X (Windows Server 2003, W2K)	A7388A
	Windows 32-bit dual channel 2Gb PCI-X (Windows Server 2003, W2K)	A7387A
	Host Adapter for Windows Server 2003 64-bit, Integrity servers, single channel 2 Gb PCI-X	AB467A
	Host Adapter for Windows Server 2003 64-bit, Integrity servers, dual channel 2 Gb PCI-X	AB466A
	Host adapter Q2300 2Gb 64-bit PCI-X for Linux, Integrity servers	A7538A
	Host adapter 2Gb PCI-X Dual channel for HP-UX and Linux, Integrity servers	A6826A
	HP-UX HBA: PCI 2GB Fibre Channel Adapter	A6795A
	HP PCI-X 2-port 2Gb Fibre Channel and 2-port 1Gb Ethernet	AB465A
	HP-UX HBA: PCI-X 2Gb Fibre Channel/1000Base-T	A9784A
	HP-UX HBA: PCI-X 2Gb Fibre Channel/1000Base-SX	A9782A
	FCA2684 PCI-X Single Channel 2Gb Host Adapter for OpenVMS & Tru64 UNIX AlphaServers	DS-A5132-AA
	FCA2684DC PCI-X Dual Channel 2Gb Host Adapter for OpenVMS & Tru64 UNIX AlphaServers	DS-A5134-AA

Configuration Information

4 Gb Fibre Channel HBAs	HP StorageWorks FC2142SR HBA 4Gb PCI-e for Windows, Linux	A8002A
	HP StorageWorks FC2242SR DC HBA 4Gb PCI-e for Windows, Linux	A8003A
	HP StorageWorks FC1142 4Gb PCI-e HBA for Windows, Linux	AE311A
	HP StorageWorks FC1242 4Gb PCI-e DC HBA for Windows, Linux	AE312A
	HP StorageWorks FC2143 4Gb PCI-X 2.0 HBA for Windows, Linux	AD167A
	HP StorageWorks FC2243 4Gb PCI-X 2.0 DC HBA for Windows, Linux	AD168A
	HP StorageWorks FC1143 4Gb PCI-X 2.0-to-Fibre Channel Host Bus Adapter for x86, x64 and ia64 Windows and Linux.	AB429A
	HP StorageWorks FC1243Dual Channel 4 Gb PCI-X 2.0-to-Fibre Channel Host Bus Adapter for x86, x64 and ia64 Windows and Linux.	AE369A
	HP PCI-X 2.0 1Port 4Gb Fibre Channel HBA	AB378B
	HP PCI-X 2.0 2Port 4Gb Fibre Channel HBA	AB379B
	HP-UX PCI-X single-channel, 4Gb fibre channel adapter	AB378A
	HP-UX PCI-X dual-port, 4Gb fibre channel adapter	AB379A

Fibre Channel cables for 2 Gb Infrastructure	Use 2 Gb Fibre Channel cables when connecting the MSA Fibre Channel I/O Module to FCA2101 HBA(s)	
	2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
	5 m LC-LC Multi-Mode Fibre Channel Cable	221692-B22
	15 m LC-LC Multi-Mode Fibre Channel Cable	221692-B23
	30 m LC-LC Multi-Mode Fibre Channel Cable	221692-B26
	50 m LC-LC Multi-Mode Fibre Channel Cable	221692-B27
	2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
	5 m LC-SC Multi-Mode Fibre Channel Cable	221691-B22
	15 m LC-SC Multi-Mode Fibre Channel Cable	221691-B23
	30 m LC-SC Multi-Mode Fibre Channel Cable	221691-B26
	50 m LC-SC Multi-Mode Fibre Channel Cable	221691-B27

MSA Controller management cable	One ships standard. Orderable through HP Store or Service if original is lost	316131-001

Configuration Information

Step 5 – Choose Rack Options

Select each required option with quantities specified.

10647 (47U) Rack Cabinet - Pallet	245160-B21
10647 (47U) Rack Cabinet - Crated	245160-B23
10622 (22U) Rack Cabinet - Pallet	245163-B21
10622 (22U) Rack Cabinet - Shock Pallet	245163-B22

NOTE: It is mandatory to use a shock pallet in order to ship racks with equipment installed.

10622 (22U) Rack Cabinet - Crated	245163-B23
S10614 (14U) Rack Cabinet - Shock Pallet	292302-B22

NOTE: It is mandatory to use a shock pallet in order to ship racks with equipment installed.

10842 (800 mm wide, 42U) Rack Cabinet - Pallet	257415-B21
10842 (800 mm wide, 42U) Rack Cabinet - Shock Pallet	257415-B22

NOTE: It is mandatory to use a shock pallet in order to ship racks with equipment installed.

Rail Kit for mounting in a M-Series rack	313877-B21
HP Modular Cooling System (WW)	AF098A

NOTE: The purchase of HP Modular Cooling System includes 10642 G2 rack and MCS unit attached.

MSA1500 cs to PDU	2.5m (8.2') 10A, IEC C 13 to IEC C14 PDU Jumper Cable (1 per pack)	142257-002
	3.0m (9.8') 10A, IEC C 13 to IEC C14 PDU Jumper Cable (1 per pack)	142257-003
	1.4m (4.5') 10A, IEC C 13 to IEC C14 PDU Jumper Cable (1 per pack)	142257-006

Step 6– Choose HP Care Pack Services

Support Services via HP Authorized Commercial Resellers - Fixed Care Packs	MSA1500	MSA1500 Kits
Product Skus	**AA986A**	**AD509A** **AD510A** **AE326A** **AE327A**
Support Description	**Care pack Product**	
1 Yr 4hr 24x7/Onsite	UA774A/E	UC762A/E
1 Yr 4hr 13x5/Onsite	UA775A/E	UC777A/E
1 Yr 6 hr CTR	UA776A/E	UC778A/E
3 Yr next Day/Onsite	UB950A/E	UB153A/E
3 Yr 4hr 13x5 /Onsite	UB951A/E	UB154A/E
3 Yr 4hr 24x7 /Onsite	UB952A/E	UB155A/E
3 Yr 6 hr CTR	UB953A/E	UB156A/E
5 Yr 6hr CTR		UC986E
*Hardware Installation	U4368A/E	UB958A/E

Configuration Information

*Installation and Startup	UA868A/E	UA868A/E

Support Services via HP Authorized Resellers and HP Direct -Flexible Care Packs		MSA1500	MSA1500 Kits
Product Skus		**AA986A**	**AD509A** **AD510A** **AE326A** **AE327A**
Support Description	**Care pack Product**	**BAND**	**BAND**
1 Yr 4hr 13x5 Hardware	HA103A1	8PN	8PM
1 Yr 4h 24x7 Hardware	HA104A1	8PN	8PM
1 Yr 6 hr CTR	HA105A1	8PN	8PM
1 Yr Support Plus	HA109A1	8PN	8PM
1 Yr Support Plus 24	HA110A1	8PN	8PM
1 Yr Proactive 24	HA111A1	8PN	8PM
1 Year Critical Services	HA112A1	8PN	8PM
3 yr Next Day	HA101A3	8PN	8PM
3 Yr 4hr 13x5 Hardware	HA103A3	8PN	8PM
3 Yr 4hr 24x7 Hardware	HA104A3	8PN	8PM
3YR 6hr CTR	HA105A3	8PN	8PM
3Yr Support Plus	HA109A3	8PN	8PM
3 Yr Support Plus 24	HA110A3	8PN	8PM
3 Yr Proactive 24	HA111A3	8PN	8PM
3 Year Critical Services	HA112A3	8PN	8PM
4 year Next Day	HA101A4	8PN	8PM
4 Yr 4hr 13x5 Hardware	HA103A4	8PN	8PM
4 Yr 4h 24x7 Hardware	HA104A4	8PN	8PM
4 Yr 6 hr CTR	HA105A4	8PN	8PM
4 Yr Support Plus	HA109A4	8PN	8PM
4 Yr Support Plus	HA110A4	8PN	8PM
4 Yr Proactive 24	HA111A4	8PN	8PM
4 Year Critical Services	HA112A4	8PN	8PM
5 Year 4hr 13x5 Hardware	HA104A5	8PN	8PM
5 Year Support Plus 24	HA110A5	8PN	8PM
Hardware Installation	HA113A1	5J0	5FZ
Installation and Startup	HA114A1	5J0	5FZ

Additional Product Skus with Hardware Installation Services - (break fix services included with main enclosure)		MSA1000 to MSA1500 Upgrade Kit	High Availability Upgrade Kit
Product Skus		**AD511A****	**AE328A****
	Care pack Product	**BAND**	**BAND**
**Hardware Installation	HA113A1	564	

****SERVICES NOTE:** Installation only required when these products are added on after initial sales of main enclosure(s)

Related Options

Secure Path v4.0C (SP1) for Windows Workgroup Edition (including Windows Server 2003/32-bit and 64-bit) Active/passive controller configurations only	Secure Path v4.0C for Windows Workgroup 1 license	213076-B26
	Secure Path v4.0C for Windows Workgroup Edition 5 licenses	231316-B26
	Secure Path v4.0C for Windows Workgroup Edition 10 licenses	231317-B26
	Secure Path v4.0C for Windows Workgroup Edition 25 licenses	231318-B26
	Secure Path v4.0C for Windows Workgroup Edition 50 licenses	231319-B26
	Secure Path v4.0C for Windows Workgroup Edition Upgrade License	261715-B24
	Secure Path v4.0C for Windows Workgroup Edition for ProLiant BL line 8 licenses	325634-B23

NOTE: At present 64-bit Windows with Secure Path can operate in a homogenous configuration of multiple (up to 5) 2-node clusters.

NOTE: Refer to http://www.hp.com/go/securepath for the latest Secure Path parameters for Windows.

Secure Path v3.0C for Linux Workgroup Edition Active/passive controller configurations only	Secure Path v3.0C for Linux Workgroup Edition 1 license	T3581A
	Secure Path v3.0C for Linux Workgroup Edition 5 licenses	T3582A
	Secure Path v3.0C for Linux Workgroup Edition 10 licenses	T3584A
	Secure Path v3.0C for Linux Workgroup Edition 25 licenses	T3585A
	Secure Path v3.0C for Linux Workgroup Edition 50 licenses	T3586A
	Secure Path v3.0C for Linux Workgroup Edition for ProLiant BL line 8 licenses	T3583A

NOTE: Refer to http://www.hp.com/go/securepath for the latest Secure Path parameters for Linux

HP StorageWorks Secure Path v3.0C for NetWare Workgroup Edition	Secure Path v3.0C for NetWare Workgroup Edition	222411-B22
	Secure Path v3.0C for NetWare Workgroup Edition 5 licenses	231324-B22
	Secure Path v3.0C for NetWare Workgroup Edition 10 licenses	231325-B22
	Secure Path v3.0C for NetWare Workgroup Edition 25 licenses	231326-B22
	Secure Path v3.0C for NetWare Workgroup Edition 50 licenses	231327-B22

QLogic Failover Driver or Emulex MultiPulse for Linux	Provides a no cost multi-path solution for Linux when using specific QLogic or Emulex Host Bus Adapters. Active/passive or active /active controller configurations.

For more information visit
http://h18006.www1.hp.com/products/sanworks/multipathoptions/index.html

Windows MPIO Failover Driver	Provides a no cost multi-path solution for Windows. Active/passive or active /active controller configurations.

- Microsoft Windows 2000 and Windows Server 2003 (32bit and 64bit) operating systems
- DSM driver is required from HP for operation and configuration:

For more information visit
http://h18006.www1.hp.com/products/sanworks/multipathoptions/index.html or
http://www.microsoft.com

Technical Specifications

1500 cs Modular Smart Array	**LED Indicators on Front** (4)	System heartbeat	
		System UID	
		Power On/Standby	
		Fault detected in enclosure	
	LED Indicators on Rear Panel (7)	System UID	
		SCSI Module Power indicator (1 per SCSI I/O module)	
		SCSI Activity (1 per SCSI I/O module)	
		Fibre Channel I/O card status (1 per Fibre I/O module)	
		Fibre channel link status (2 per Fibre I/O module)	
		Power supply status (1 per power supply)	
		Fan Module status (1 per fan module)	
	Interface	Ultra3 SCSI to Hard Drives	
		2 Gb Fibre Channel to Hosts	
	Maximum Number of Drives	96 SATA hard drives in 8 MSA20 SATA enclosure or 56 SCSI hard drives in 4 MSA30 enclosures	
	Temperature Range	**Operating**	50° to 95° F (10° to 35° C) up to 8000'
			-22° to 122° F (-30° to 50° C)
	Relative Humidity	**Operating**	10% to 90%
		Non-operating	Up to 95%
	Input Power Requirements	**Rated Input Voltage**	100 to 240 VAC
		Rated Input Frequency	47 to 63 Hz
		Rated Input Current	6.4A Max, 1A typical
		Input Power (max)	400W Max, 95W typical
		The supply will handle 90Vrms - 254 Vrms (100 - 240 V, +6%, -10%) Frequency is 47 - 63 Hz	
		NOTE: Input Power and Heat Dissipation specifications are maximum values and apply to worst-case conditions at full rated power supply load. The power/heat dissipation for your installation will vary depending on the equipment configuration.	
	MSA1500 Controller Shelf	**2U Rack Form Factor**	**Dimensions** (H x W x D) 3.46 x 19.06 x 24.32
			Weight 55 lbs
		Shipping Packaging	**Dimensions** (L x W x D) 32.50 x 11.25 x 34.06
			Weight (Gross) 68 lbs
	SCSI I/O Module (Positioned in shelf)		**Dimensions** (H x W x D) 3.2 x.92 x 14.62
			Weight 1.01 lbs
		Shipping Packaging	**Dimensions** (H x W x D) 19.88 x 9.06 x 2.76
			Weight (Gross) 1.93 lbs
	Fibre Channel I/O Module (Positioned in shelf)		**Dimensions** (H x W x D) 3.2 x .92 x 14.62
			Weight .96lbs
		Shipping Packaging	**Dimensions** (H x W x D) 19.88 x 9.0 6 x 2.76
			Weight (Gross) 1.87lbs

Technical Specifications

	User Interface	Controller display with Status Indicators (2) and push buttons (4) on front of controller
	Electrical Interface	LVD (Low Voltage Differential)
	Protocol Support	Wide Ultra3 SCSI
	SCSI Ports	2-ports per SCSI I/O card, up to 4 cards total
	Maximum Capacity	64 TB with SATA HDD, or 16.8 TB with SCSI HDD
	Logical Drives (LUN)	Up to 32 Logical Drives
	Maximum Logical Drive size	2.0 TB

Modular SAN Array 1000 Controller	**User Interface**	Controller Display with Status Indicators (2) and Push Buttons (4) Status Indicators on front of Controller (16)
	Electrical Interface	LVD (Low Voltage Differential)
	Protocol Support	Wide Ultra3 SCSI (160 MB/s per channel)
	RAID Support	RAID 6 with HP's Advanced Data Guarding technology (RAID ADG)
		RAID 5 (Distributed Data Guarding)
		RAID 1 + 0 (Mirroring + Stripping)
		RAID 0 (Stripping)
	Cache Memory	Up to 512 MB Read/Write (256 MB modules). If redundant controllers are used they must have equally configured cache
		ECC protection, battery-backed, and removable
		Standard as of November 19, 2002: 256 MB cache memory (single module)
	Cache Batteries	Transportable (battery-backed) and removable for easy replacement
	Upgradeable Firmware	2 MB flashable ROM
	Disk Drive and Enclosure Protocol Support	HP Ultra 320, Ultra3, and Ultra2 SCSI 1-inch Universal drives
	Packaging	**Dimensions** (L x W x D) 15.5 x 12.0 x 3.25
		Weight (Gross) 2.5 lb

Modular SAN Array Fibre Channel I/O Module	**Connector Type**	LC
	Number of Fibre Channel Ports	One 2 Gb Fibre Channel Port using removable Small-Form-Factor-Pluggable Transceiver (SFP)
	Bandwidth	200 MB/s
	Operation Modes	Fibre Channel Class 2 and 3 connectionless service
	Protocols Supported	Fibre Channel
	Packaging	**Dimensions** (L x W x D) 19.88 x 9.06 x 2.76
		Weight (Gross) 1.87 lbs

Technical Specifications

Multi-Mode Fibre Channel Cables Kits (218960-B21)	**Cable Type**	LC-LC (2 Gb to 2 Gb connections) and LC-SC (2 Gb to 1 Gb connections) 50 Micron multi-mode Fiber
	Available Cable Lengths	6.5 ft, 16.4 ft, and 49.2 ft (2 m, 5 m, and 15 m)
	Packaging	**Dimensions** (L x W x D) 11.5 x 9 x 1.5 in (29.2 x 22.8 x 3.8 cm)
		Weight (Gross) 0.75 to 1 lb (0.34 to 0.45 kg)