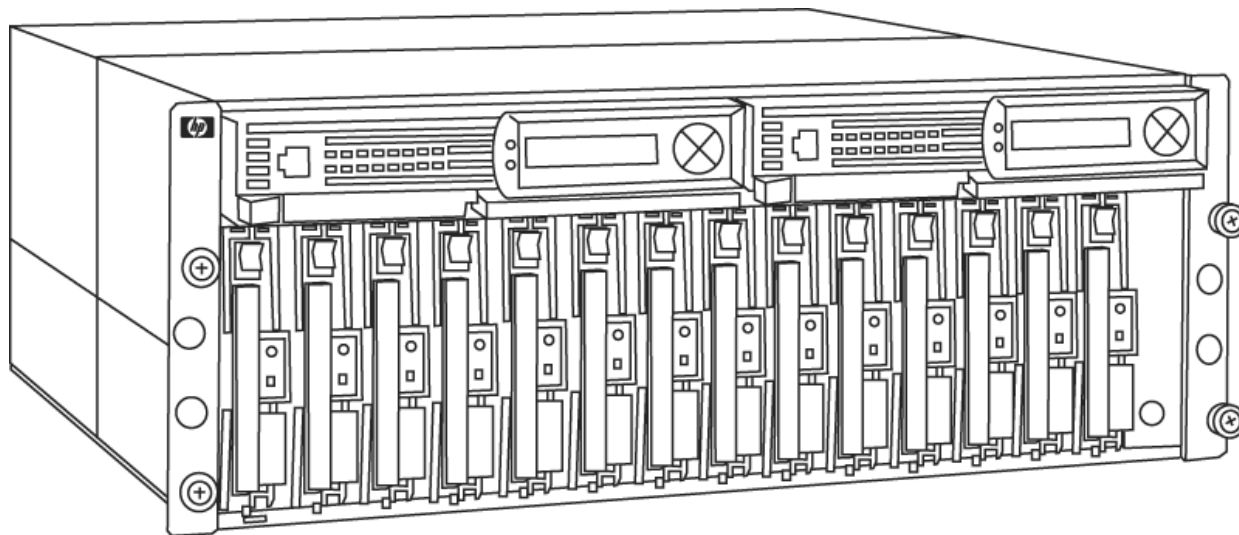# QuickSpecs

Overview

HP StorageWorks Modular Smart Array 1000 Small Business SAN G2 Kit is specific for Microsoft ®, and Linux® environments

The HP StorageWorks Modular Smart Array 1000 (MSA1000) Small Business SAN G2 Kit is a 2 Gb Fibre Channel storage solution designed for our Small to Medium size business customers. The storage solutions includes the MSA1000, a new 4/10q Fibre Channel Switch, two new HP StorageWorks QLE220 Fibre Channel HBAs for Windows® and Linux , cables, optics, easy to use SAN installation software, management CD and documentation.

This Small Business SAN G2 Kit is designed to reduce the complexity, expense, and risk of SAN deployment. The MSA1000 is a scaleable, high performance storage system built with investment protection in mind. The modular design of the MSA1000 allows the user to easily add storage capacity as needed. With the addition of two HP StorageWorks MSA30 disk enclosures with space for forty-two enterprise-class drives, maximum storage capacity grows to 12.6 TB. With additional host bus adapters, a customer can support up to 9 hosts with access to a single MSA1000 for storage consolidation. All necessary configuration & management programs are included and there are no unexpected charges for extra licenses as your capacity needs grow or as you attach more servers.

The MSA1000 Small Business SAN G2 Kit 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, small clusters, small-to-medium business, 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 Small Business SAN G2 Kit is for Microsoft Windows 2003 Enterprise and Standard Editions, Red Hat and SuSE Linux editions operating systems.

Overview

What's New

- MSA1000 Small Business SAN G2 Kit ships with two new HP QLE220 FC 4/2Gb HBAs, a new 10-port 4/10q Fibre Channel Switch, and updated management and installation software for lower cost of entry into a Storage Area Network environment. Part Number: AG525A
- MSA1000 Small Business SAN HA G2 Kit is for those customers who desire high availability support with redundancy and failover capabilities. Includes additional HBAs, cables, a second controller and switch. Part Number: AG526A
- HP QLE220 42 Gb PCI-e SMB-only HBA for those requiring more HBAs than the two that come in the base G2 Kit and the two additional cards in the HA Upgrade G2 Kit. AG527A. This HBA has support for being included in a HP factory integrated option with ProLiant servers with the sku AG527A#0D1.

Key Features

The MSA1000 offers the following key features:

- High performance controller(s) built on DAS to SAN {DtS} architecture for maximum investment protection
- Supports dual active (active/active) controllers with optional second controller and v7.0 or higher firmware
- 4U rackmount only design combining both the controller and disk shelf
- 2 Gb Fibre Channel host connections
- Support for enterprise class HP Ultra2, Ultra3, and Ultra320 SCSI Universal 1" Drives
- Scaleable from 2 to 42 drives via HP StorageWorks drive enclosures for up to12.6 TB of storage

The HP 4/2 Gb, 32-Bit/133 MHz PCI-e Fibre Channel SMB Host Bus Adapters key features:
NOTE: Tested and qualified only with the MSA1000 Small Business G2 Kit

- 4/2 Gb/s Fibre Channel
- 133 MHz 32-bit PCI-e support
- Enhanced ease of use
- Windows and Linux support
- Low cost PCI-e fibre channel HBA to address the SMB market

The 4/10q Fibre Channel Switch (External) key features:

- 10-port 4/2 Gb Fibre Channel Switch
- Only 2lbs and 6" deep, the switch requires only half a rack "U"; two units occupy only 1U - maximum
- Base Small Business G2 Kit comes with rack shelf that accommodates two switches
- Non-Disruptive Code Load and Activation
- Ships standard with 4 hot pluggable, industry-standard Small Form-Factor Pluggable (SFP)

HP Small Business SAN Installation Wizard

- Point-and-click wizard exclusively for the MSA Small Business SAN G2 Kit
- Simple device management
- CD and instructions included at no extra charge
- Ability to manage the FC Switch and HBA in Windows and Linux from one console.

NOTE: Use MSA1000 Small Business-specific CD shipped with product and not the standard MSA1000 CD.

Overview

Recent Enhancements

- The new MSA1000 Small Business SAN G2 Kit and HA G2 Kit provide an easy and inexpensive way to build a Storage Area Network. The SAN G2 Kit includes the MSA1000 along with two HP QLE220 FC HBAs (PN AG527A) and a 4/10q 10-port FC Switch for Windows or Linux servers, (4) SFPs, cabling and documentation. The Small Business SAN G2 Kit comes complete with configuration and management tools, mounting rails for Rack Only Configurations, all at no extra charge.
- Complementing the MSA1000 Small Business SAN G2 Kit is a High Availability G2 Kit for Windows and Linux environments. This option gives you a second MSA1000 controller, a second 4/10q FC switch, two more HBAs (PN AG527A), SFPs, cabling, and a CD with native failover drivers for Windows and Linux. It's an easy and cost efficient option that brings the user the redundancy protection many users desire.
- Protecting and archiving the data on the MSA1000 is accomplished by choosing an optional HP StorageWorks MSL6000 Ultrium tape library. This library is fully tested and qualified with the MSA1000 Small Business SAN and can connect directly to the 4/10q FC Switch, providing a shared library to the servers on the Storage Area Network. This solution is supported by HP OpenView Storage Data Protector for Windows and Linux and other leading backup and restore applications.

Small Business SAN Kit Highlights

High Levels of
Performance, Scalability,
and Functionality

- **Performance** - The MSA1000 and its components have been designed work with the latest industry standard interconnects and Fibre Channel technology. By utilizing the dual active controller firmware, performance tests indicate a data transmission rate of over 41,000 IOPs (out of cache) and bandwidth of up to 367 MB per second (dual MSA1000 controllers).
- **Modular Chassis** - The modular design of the MSA1000 cabinet supports up to fourteen 1" Universal U320 SCSI hard drives, redundant controllers, fans and power supplies in a 4U rackmount cabinet. The 4/10q Fibre Channel Switch supports up to 9 hosts.
- **Scalability** - The MSA1000 is easily expanded. The MSA1000 cabinet scales to 4.2 TB using fourteen 300 GB Ultra320 SCSI 1" HP Universal hard drives. By simply adding additional StorageWorks disk Enclosures (two enclosures max), the MSA1000 scales to 12.6 TB using forty-two 300 GB Ultra320 1" HP Universal hard drives - all within 10U of rack space.
- **Hot Plug Expansion and Replacement Support** - The MSA1000 supports hot plug expansion and replacement of hard drives, redundant controllers, and redundant power and fans for simple, fast installation and maintenance.
- **RAID 6 (RAID ADG) Fault Tolerance** - 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.
- **Failover (with optional HA G2 Kit)** - supported on Linux with QLogic native drivers and the HP MPIO Basic Failover for Windows.

DtS Architecture
(Direct Attach to SAN)
Data Migration

DtS (Direct Attach to SAN) architecture is an exclusive MSA1000 feature that provides a quick and easy way to migrate stored data protected by most U320 Smart Array controllers to a MSA1000 storage system.

Data that is currently stored on 1" U320 SCSI Universal disk drives using most legacy HP Smart Array controllers can easily be migrated to the MSA1000. Simply remove the drives from the older systems and insert them into the MSA1000. All configuration information and data will be preserved allowing migration to be completed in minutes, not hours or days. Refer to the MSA1000 DtS Data Migration White Paper for a list of compatible U320 Smart Array controllers and further details.

Broad Server, Operating
System and FC
Interconnect support

The modular and scalable design of the MSA1000 provides an extremely flexible platform. You can buy what you need today and purchase additional capacity and performance as your data storage needs grow, instead of making a large up-front investment. Additional drives, controllers, cache, SMB Host Bus Adapters, and storage enclosures can easily be added as your storage needs change.

- Fabric Support Infrastructure - The MSA1000, HP QLE220 FC HBA (PN AG527A)) and 4/10q FC Switch supports 2 or 4Gb Fibre Channel fabrics.
- Universal Hard Drive - Since the MSA1000 supports HP Universal 1" Ultra2, Ultra3 and Ultra320 SCSI drives, your investment in SCSI technology is protected and cost is minimized as you add new drives. Redeploying universal U320 SCSI drives between your legacy servers and storage can significantly reduce needs for hardware and spare inventory, and offer overall reduction in storage management and business costs.
- Pre-Failure Warranty - Drives installed in an MSA1000 and monitored under Insight Manager are supported by a Pre-Failure (replacement) Warranty.
  NOTE: Some operating systems may not support all of these features.
- Multi-platform Server Support - The MSA1000, HP QLE220 FC HBA (PN AG527A) and 4/10q FC Switch offers Multi-platform server support to allow a broad range of servers to take advantage of the Small Business SAN G2 Kit components scalability, flexibility and connectivity, and supports ACU and Insight Manager.
- Integrated Configuration and Management Tools - The Small Business SAN components utilize a standard, integrated set of management and utility software. These tools consistently lower the cost of ownership by reducing training and technical expertise necessary to install and maintain the kit

Small Business SAN Kit Highlights

components.

The Small Business SAN G2 Kit comes with/supports the following configuration and management tools depending on what operating system:

Configuration
(solution chosen as appropriate for operating system)

- Array configuration with San Surfer Express for Windows 2003
- Array Configuration Utility (ACU). ACU is a browser-based disk configuration utility that lets you view, set up, and configure the array controllers and storage systems.
- Command Line Interface (CLI)

Management/Health
(solution chosen as appropriate for operating system)

- **System Insight Manager** (SIM)
- **Array Diagnostics Utility** (ADU) This utility collects information about the array controllers in the system and generates a list of potential problems it has identified. It produces a report that can be saved to a diskette and analyzed by support technicians to aid in problem resolution.

ACU/ADU Bootable Utility
(solution chosen as appropriate for operating system)

- **The HP Small Business SAN Installation CD** is a bootable media that enables a server to boot from the CD to launch ACU or ADU without requiring a pre-installed operating system or drivers to configure the MSA1000 storage or generate report.

SAN Management Software

- The **HP Small Business SAN Installation Wizard** is a wizard-based installation utility designed to lead a customer through the install of their SAN. This operation is a single-step) install of their switch and host adapter. Volume management configurations are supported through the same consol for Windows 2003 users.

Compatibility   **Servers**   Certification of new ProLiant 32- and 64-bit models is ongoing. Servers must have an available PCI-e slot. Bladeservers are not supported

Models

HP StorageWorks Modular Smart Array 1000	256-MB Battery-Back Cache Module	254786-B21
	HP StorageWorks MSA1000 Small Business SAN G2 Kit (Windows and Linux compatible) NOTE: Includes (1) MSA1000; (1) 4/10q FC Switch; (4) SFP transceivers; (2) HP QLE220 FC HBAs (PN AG527A) + cables. NOTE: Factory Racking and Configure-to-Order is not available for this kit.	AG525A
	HP StorageWorks MSA1000 Small Business HA Upgrade G2 Kit for Windows and Linux NOTE: Includes (1) redundant controller; (1) Fibre Channel I/O Module (1) 4/10q FC Switch; (2) HP QLE220 FC HBAs (PN AG527A); (4) SFP transceivers and cables. NOTE: Factory Racking and Configure-to-Order is not available for this kit.	AG526A
	HP QLE220 4/2 Gb, 32-Bit/133 MHz PCI-e Fibre Channel Host Bus Adapter NOTE: This is a single channel HBA for Windows 2003 and Linux, ONLY for use with the MSA1000 Small Business SAN G2 Kit	AG527A
	HP QLE220 4/2 Gb, 32-Bit/133 MHz PCI-e Fibre Channel Host Bus Adapter NOTE: This sku is only used when being included in an HP factory integrated order including ProLiant servers. Windows 2003 and Linux ONLY.	AG527A#0D1
	4/2 Gb SFP SW Transceiver Kit for 4/10q FC Switch	A7446B
	HP StorageWorks Modular Smart Array 30 SB NOTE: Rack-mountable 14 drive enclosure with single bus, redundant power supplies	302969-B21
	HP StorageWorks Modular Smart Array 30 DB NOTE: Rack-mountable 14 drive enclosure with dual bus, redundant power supplies	302970-B21

MSA1000 Components

With the following components, your storage capacity and performance can be scaled to new levels:

HP StorageWorks Modular Smart Array 1000

The 4U cabinet houses up to fourteen 1" Universal hot pluggable Ultra2, Ultra3, and/or Ultra320 SCSI drives. Each MSA1000 includes the following standard components: (1) MSA1000 Controller, (1) MSA Fibre Channel I/O Module with a single SFP, dual hot pluggable fans/power supplies and power cables, documentation and a Small Business SAN Installation and Documentation CD.

The modular design of the MSA1000 makes it possible to add redundant controllers, redundant single port Fibre Channel I/O Modules, and storage expansion enclosures. Additional storage enclosures may be added without power cycling the MSA1000.

MSA1000 Controller

The MSA1000 Controller is an integrated RAID controller with an LCD/LED status display and 256 MB read/write battery-backed cache (expandable to 512 MB per controller). One MSA1000 Controller is included with the MSA1000; a redundant MSA1000 Controller is an option.

Key Features
- Redundant controller support with mirrored cache
- Fabric, Private Loop & Public Loop Support
- Auto Negotiated F, FL & L Port Login
- RAID 0, 1+0, 5 and 6 (ADG)
- 4/2 Gb Frequency Agile
- Primary & Secondary Inter-Controller Link (ICL)
- Small Business G2 Kit can utilize an exceptionally easy to use Installation Wizard
- Host based configuration via ACU (OS dependent)
- Optionally configurable with Command Line Interface (CLI)
- Remote configuration and monitoring via ACU (offline and remote) & SIM (OS dependent)

MSA1000 Controller Management Features
- **Selective Storage Presentation**: allows multiple hosts to access a single MSA1000 storage system. Host access can be defined all the way down to a logical volume level.
- **Online RAID Level Migration**: allows for online post-configuration change to RAID level without destroying data or volume information.
- **Online Capacity Expansion**: lets you add storage to an operational MSA1000-reducing expensive server downtime.
- **Global Online Spare**: reduces the risk of data loss by facilitating automatic rebuilds after a drive failure.

Fault Tolerance

Several fault tolerant configurations which keep data available and servers running while drives are being replaced are supported including:

- RAID 6 (RAID ADG): Allocates the equivalent of two parity drives across multiple drives and allows simultaneous write operations.
- RAID 5 Distributed Data Guarding: Allocates parity data across multiple drives and allows simultaneous write operations.
- Drive Mirroring (RAID 1+0 Striped Mirroring): Allocates half of the drive array to data and the other half to mirrored data, providing two copies of every file.

MSA1000 Components

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

- Online Spares: If a failure occurs, recovery begins with an online spare and data is reconstructed automatically. Multiple online spares can be assigned per array and used across multiple arrays. It is also possible to assign different online spares across different arrays.
- Array Accelerator: Onboard, battery-backed cache memory protects data in the event of a power failure. In the unlikely event of a controller failure, the battery-backed cache will save critical user data for up to three days.

MSA Fibre Channel I/O Module

Provides a single 2 Gb Fibre Channel connection per controller from the host side into the MSA1000. The MSA Fibre Channel I/O Module includes one 2 Gb Short Wave Small Form-Factor pluggable Transceiver (SFP). A second MSA Fibre Channel I/O Module must be installed when a redundant controller is also installed for redundancy.

4/2 Gb Small Form Factor pluggable (SFP) SW Transceiver Kit

4/2 Gb Small Form-Factor Pluggable (SFP) SW Transceivers are industry standard connection devices, which hot plug into 2 or 4Gb infrastructure components such as 2 Gb Fabric Switches. HP StorageWorks 4/2 Gb SFP SW Transceivers support distances up to 300 meters at 2 Gb using multi-mode fiber optic cable.

Multi-Mode Fibre Channel Cables

Multi-Mode Fibre Channel cables provide a thin, flexible cabling solution that is immune to electromagnetic interference. HP offers cables to connect the MSA1000 to 2 Gb Fibre Channel infrastructures. LC-to-LC cables are used when connecting the MSA1000 to other 2 or 4 Gb Fibre Channel components such as the 4/10q FC Switch and HP QLE220 FC HBAs (PN AG527A).

Software Components

The MSA1000 utilizes a single, consistent set of utility software for storage and RAID management, setup, configuration and troubleshooting. This consistency reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your HP storage solution.

Array Configuration Utility
- 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
- Runs online on Microsoft Windows 2000, Windows 2003, and supported distributions of Linux

HP Small Business SAN Software CD
- Automatic install of the HBA and Switch
- User Friendly Graphical User Interface
- Installation Wizard
- Verification of install when completed
- Ability to choose ACU or San Surfer Express to configure the MSA1000 storage array
- Management utilities for HBA and Switch

Selective Storage Presentation (SSP)
- Built-in to MSA1000 Controller firmware and controlled via ACU
- Allows setting of access rights to the MSA1000 storage by hosts
- Access control can be set up to a logical volume level using the Array Configuration Utility

Insight Manager
- Powerful storage, server and server option management tool
- Monitor storage from a remote central location
- Browser based SIM provides full access from anywhere on the Intranet, eliminating the need for a dedicated Insight Manager management console

OS Support
- Microsoft Windows 2003 Enterprise Edition
- Microsoft Windows 2003 Standard Edition
- Red Hat Enterprise Linux 3.0 & 4
- SuSE Linux Enterprise Server 9 & 10
- 32- and 64-bit support

Software Certifications
- Microsoft Cluster Server Certification
- HP Serviceguard for Linux
- Steeleye LifeKeeper Clustering for Linux
- HP StorageWorks Storage Mirroring

Optional Software

MSA1000 clustering	Clustering is rapidly gaining in popularity as users desire a high level of data availability. Many of the old cluster restrictions that were the product of both hardware and operating systems have been overcome. While there still remain configuration limits, the result is a new high degree of flexibility both in number of clusters, mixing clusters with single nodes, and the integration of dissimilar operating systems. For example you may mix three Microsoft (Windows Server 2003) clusters and other individual servers, even doing so in a heterogeneous server operating system environment.

The MSA1000 has the ability to be configured with thirty-two LUNs. Individual LUN size is limited to 2TB. Best practices would dictate generally no more than ten (9 with the Small Business G2 Kit) servers accessing a single MSA1000. 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 clustering information, click on the link:
http://h18026.www1.hp.com/solutions/enterprise/highavailability/index.html |

HP StorageWorks Storage Mirroring	HP StorageWorks Storage Mirroring (SM) is cost effective host-based software product for remote storage replication over IP networks. Storage Mirroring provides near real-time full application or file recovery up to the last byte replication. SM is an excellent choice for low bandwidth; low storage volume changes and meets business recovery goals within minutes or hours. The immediate return on investment is realized in the reduced management cost associated with branch or small offices networks.

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

HP Serviceguard for Linux	HP Serviceguard for Linux is a high availability solution that leverages the strength of HP's experience in the HA business. The cluster kit includes high availability software that provides critical applications the high availability that enterprise customers require for 24x7 business operations. It is designed to protect applications from a wide variety of software and hardware failures, monitoring the health of each server (node) and quickly responding to failures including system processes, system memory, LAN media and adapters, and application processes.

Please refer to the HP High Availability web site under Linux clustering for ProLiant for the latest information: http://hp.com/go/serviceguard |

Service and Support, HP Care Pack, and Warranty Information

Warranty	Three-year Limited Warranty for MSA1000, Fibre Channel Cables and SFP Transceivers and 4/10q Fibre Channel Switch and SMB HBA; 3 years parts exchange; 1 year labor; 1 year on-site; next business day response that is assigned & applied to the purchased SMB kit. Refer to HP's Limited Warranty Statement for further details

Warranty Upgrade Options

Warranty upgrades will need to be applied to the lower level products within the kit.

- 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 up to 5 years

Storage Service Packages

In order to provide ease of installation and maximize uptime and ROI, HP provides a range of upgradeable service options.

- 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.

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://www.hp.com/services.

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.

Service and Support, HP Care Pack, and Warranty Information

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.

EXCLUSIVE REMEDY: The entire liability of HP and its suppliers and your exclusive remedy for Software that does not conform to this Limited Warranty shall be the repair or replacement of the defective media. This warranty and remedy are subject to your returning the defective media during the warranty period to HP in the country in which you obtained the Software.

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.

For additional software product services information for North American 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.

Maintenance releases, bug fixes and software patches are available at:

http://hp.com/go/msa1000

Hardware Product Services

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

For additional hardware installation and maintenance information, please refer to the URL listed below:

http://www.hp.com/hps/storage/

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:

- Service planning
- Installation and Startup provides installation, Virtual Disk Design and configuration of the MSA1000. This includes:
  - Service planning
  - Service deployment
  - Customer orientation session
- Please contact your local HP reseller for further details or go to: Installation and Startup Services: http://www.hp.com/hps/storage/ns_implementation.html.

Hardware Product   9x5, Next Business Day, On-Site Coverage, 3 years   FM-FCXHW-36

Service and Support, HP Care Pack, and Warranty Information

Services   103840-002

9x5, 4-Hour Response, On-Site Coverage, 3 years	FM-FC4HR-36
	402165-002
24x7, 4-Hour Response, On-Site Coverage, 3 years	FM-FC724-36
	402164-002
9x5, Next Business Day, On-Site Coverage, 5 years	FM-FCXHW-60
	170183-002
9x5, 4-Hour Response, On-Site Coverage, 5 years	FM-FC4HR-60
	170185-002
24x7, 4-Hour Response, On-Site Coverage, 5 years	FM-FC724-60
	170187-002
Hardware Installation	FM-FCINS-IN
	402162-002

Fixed Price Care Pack Part Numbers:

3 Yr next Day/Onsite	U6355A
3 Yr next Day/Onsite, Electronic	U6355E
3 Yr Same Day/Onsite	U6356A
3 Yr Same Day/Onsite, Electronic	U6356E
3 Yr 7x24/Onsite	U6357A
3 Yr 7x24/Onsite, Electronic	U6357E
3 Yr 6 hr CTR	U9934A
3 Yr 6 hr CTR, Electronic	U9934E
5 Yr Same Day/Onsite	U9340A
5 Yr Same Day/Onsite, Electronic	U9340E
5 Yr 7x24/Onsite	U93401A
5 Yr 7x24/Onsite, Electronic	U93401E
Hardware Installation	U4368A
Hardware Installation, Electronic	U4368E

Flexible Care Pack Part Numbers:

Support – MSA1000, 1 Yr ND Hardware	HA101A1-6FG
Support – MSA1000, 3 Yr ND Hardware	HA101A3-6FG
Support – MSA1000, 1 Yr 4h 13x5 Hardware	HA103A1-6FG
Support – MSA1000, 3 Yr 4h 13x5 Hardware	HA103A3-6FG
Support – MSA1000, 1 Yr 4h 2x7 Hardware	HA104A1-6FG
Support – MSA1000, 3 Yr 4h 24x7 Hardware	HA104A3-6FG
Support - MSA1000, 1 Yr 6 hr CTR	HA105A1-6FG
Support - MSA1000, 3 Yr 6 hr CTR	HA105A3-6FG
Support – MSA1000, 1 Yr Support Plus	HA109A1-6FG
Support – MSA1000, 3 Yr Support Plus	HA109A3-6FG
Support – MSA1000, 1 Yr Support Plus 24	HA110A1-6FG
Support – MSA1000, 3 Yr Support Plus 24	HA110A3-6FG
Support – MSA1000, 1 Yr Proactive 24	HA111A1-6FG
Support – MSA1000, 3 Yr Proactive 24	HA111A3-6FG
Support - MSA1000, 1 Yr Critical Service	HA112A1-6FG

Service and Support, HP Care Pack, and Warranty Information

Support - MSA1000, 3 Yr Critical Service   HA112A3-6FG

Configuration Information

Step 1 – Order Required Items

MSA SAN G2 Kit   HP StorageWorks Modular Smart Array 1000 Small Business SAN G2 Kit   AG525A

Includes:

(1) MSA1000 Controller with 256 MB cache

(1) MSA Fibre Channel I/O Module with 2 Gb SFP SW Transceiver

Redundant Hot Pluggable Power Supply/blower assemblies

(2) HP QLE220 FC HBA (only supported with Small Business G2 Kit)

(1) 4/10q FC 10 Port Switch w/4 - SFP SW Transceivers

(1) Rack shelf for installation of 4/10 switch

Universal Rack-mounting Kit for MSA1000

MSA1000 Support CD & Documentation

Serial cable

(2) Power cables

(3) 5m Fibre Channel cables

Small Business SAN Installation CD and documentation

Step 2 – High Availability MSA1000 Redundancy Options

High Availability G2 Kit   HP StorageWorks Modular Smart Array 1000 Small Business HA Upgrade G2 Kit   AG526A

Includes:

(1) MSA1000 Controller with 256MB Cache

(2) HP QLE220 FC HBAs (PN AG527A)

(1) 4/10q FC 10-Port Switch w/4 SFP SW Transceivers

(3) 5m Fibre Channel cables

(1) MSA Fibre Channel I/O Module

NOTE: Redundant configurations require two Host Adapters per server, an additional
controller and switch and FC I/O module. Additional SMB HBAs (AG527A) are
available separately

Step 3 - Choose Optional Option for MSA1000 Controllers

256 MB Cache Modules for Controller (one additional for each controller)   254786-B21

Step 4 – Choose Supported Options

**Fibre Channel Transceiver
(SFP)**   SFP SW Transceiver   A7446B

Configuration Information

4/2Gb Fibre Channel SMB HBA	HP QLE220 FC Host Bus Adapter (Windows and Linux OS) (Only supported with Small Business SAN G2 Kit)	AG527A

Fibre Channel Cables for 2/4 Gb Infrastructure	NOTE: Use 2 Gb Fibre Channel cables when connecting the MSA Fibre Channel I/O Module or the 4/10q FC Switch to HP QLE220 FC HBA	
	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

Step 5 – Choose Hard Drives & StorageWorks Enclosures

U320 SCSI Hard Drives	300-GB 10,000 rpm U320 Universal Hard Drive (1")	350964-B22
	146.8-GB 10,000 rpm U320 Universal Hard Drive (1")	286716-B22
	72.8-GB 10,000 rpm U320 Universal Hard Drive (1")	286714-B22
	300-GB 15,000 rpm U320 Universal Hard Drive (1")	411089-B22
	146.8-GB 15,000 rpm U320 Universal Hard Drive (1")	347708-B22
	72.8-GB 15,000 rpm U320 Universal Hard Drive (1")	286778-B22
	36.4-GB 15,000 rpm U320 Universal Hard Drive (1")	286776-B22

StorageWorks Enclosures	The MSA1000 cabinet holds fourteen 1" SCSI Universal Drives. Add one StorageWorks Enclosure to increase capacity up to 28 drives. Add two HP StorageWorks Enclosures to increase capacity up to the maximum of 42 drives.	
	HP StorageWorks Modular Smart Array 30 SB NOTE: Maximum of two can be connected to the MSA1000.	302969-B21
	HP StorageWorks Modular Smart Array 30 DB NOTE: Maximum of one can be connected to the MSA1000.	302970-B21

Step 6 – Choose Rack Options

	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 - Crated	245163-B23
	Rail Kit for mounting in a M-Series rack	313877-B21

Configuration Information

Step 7 – Choose a Integrated Tape Library

The HP StorageWorks MSL6000 Ultrium tape library family provides performance and investment protection. Designed to maximize the performance of the Ultrium 460 drive, the MSL also provides unparalleled flexibility. The MSL6000 series tape library can be scaled with other MSL libraries using a pass-through mechanism for up to 16 drives and 240 slots, allowing a single library to grow and change with capacity and technology needs. In addition, the MSL6000 libraries are easily managed through an intuitive GUI control panel and integrated remote Web management. The MSL is fully supported with a range of backup and restore applications that have been tested and qualified with the HP MSA Small Business SAN G2 Kit. For a list of applications the MSL6000 Tape Libraries support under Direct Attach SCSI (DAS), Direct Attach Fibre, and Storage Area Networks (SAN), and for the most up-to-date information on Server and ISV/OS support, please visit the Enterprise Backup Solution web site at: http://www.hp.com/go/ebs.

HP MSL6030 1 Ultrium 460 Drive 2Gb FC Library	AD600B
HP MSL6030 2 Ultrium 460 Drive 2Gb FC Library	AD601B
HP MSL6030 1 Ultrium 960 Drive 4Gb FC Library	AD608B
HP MSL6030 2 Ultrium 960 Drive 4Gb FC Library	AD609B

Backup Software

HP OpenView Storage Data Protector for Windows and Linux

VERITAS Backup Exec for Windows

Computer Associates ARCserve for Windows

Step 8 - Choose Care Pack Options

HP Care Pack Options		
	9x5, Next Business Day, On-Site Coverage, 3 years (6-3)	103840-002
	9x5, Next Business Day, On-Site Coverage, 3 years (2-5-2)	FM-FCXHW-36
	9x5, 4-Hour Response, On-Site Coverage, 3 years (6-3)	402165-002
	9x5, 4-Hour Response, On-Site Coverage, 3 years (2-5-2)	FM-FC4HR-36
	24x7, 4-Hour Response, On-Site Coverage, 3 years (6-3)	402164-002
	24x7, 4-Hour Response, On-Site Coverage, 3 years (2-5-2)	FM-FC724-36
	9x5, Next Business Day, On-Site Coverage, 5 years (6-3)	170183-002
	9x5, Next Business Day, On-Site Coverage, 5 years (2-5-2)	FM-FCXHW-60
	9x5, 4-Hour Response, On-Site Coverage, 5 years (6-3)	170185-002
	9x5, 4-Hour Response, On-Site Coverage, 5 years (2-5-2)	FM-FC4HR-60
	24x7, 4-Hour Response, On-Site Coverage, 5 years (6-3)	170187-002
	24x7, 4-Hour Response, On-Site Coverage, 5 years (2-5-2)	FM-FC724-60
	Hardware Installation (6-3)	402162-002
	Hardware Installation (2-5-5)	FM-FCINS-IN

Related Options

Qlogic Failover Driver for Linux   Provides a single multi-path solution for Linux

- Qlogic driver for Linux supported editions
- Supported on HP QLE220 FC SMB HBA for Linux
- Supports up to 9 nodes

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

Windows MPIO Failover Driver   Provides a single multi-path solution for Windows

- Microsoft Windows Server 2003 operating systems
- DSM driver is required from HP for operation and configuration:
  http://h18006.www1.hp.com/products/sanworks/multipathoptions/index.html

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

Technical Specifications

Modular Smart Array 1000 (MSA1000)	LED Indicators on Front (3)	Power	
		Fault detected in one or more sub-systems	
		Fault in Enclosure Management	
	LED Indicators for Drive Modules (3)	Drive Access (center)	
		Online (left)	
		Drive Failure (right)	
	LED Indicators on Rear Panel (4)	Power Supply/Blower Assembly Fault (1)	
		EMU (3) Power, A bus, B bus	
	Interface	Ultra3 SCSI to Hard Drives	
		2 Gb Fibre Channel to Hosts	
	Maximum Number of Drives	Fourteen, 1-inch HP Ultra2, Ultra3 or Ultra 320 Universal Hard Drives (MSA1000 Cabinet); expandable to 42 using two additional HP StorageWorks 4200/4300 Enclosures	
	Temperature Range	Operating	50° to 95° F (10° to 35° C)
		Shipping	-22° to 122° F (-30° to 50° C)
			NOTE: Derated 1°C per 1,000 feet of elevation to 10,000 ft.
	Relative Humidity	Operating	10% to 90%
		Non-operating	Up to 95%
	Input Power Requirements	Rated Input Voltage	100 to 240 VAC
		Rated Input Frequency	50 to 60 Hz
		Rated Input Current	6 A Max
		Input Power (max)	549 W*
	Heat Dissipation (max)	1876 Btu/hr*	
		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.	
	MSA1000 Cabinet	4U Rack Form Factor	
		Dimensions (H x W x D)	6.9 x 19 x 20.5 in (17.5 x 48.3 x 52.1 cm)
		Weight	Net 55 to 85 lb (24.95 to 38.56 kg)
	Shipping Packaging	Dimensions (L x W x D)	28.5 x 14.81 x 33.13 in (72.4 x 37.6 x 84.1 cm)
		Weight (Gross)	75 to 105 lb (34.02 to 47.63 kg)
	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	4-channel: 2 internal, 2 external	
	Drives Supported	Up to 42 drives	
	Maximum Capacity	12.6 TB (42 drives x 300GB)	
	Logical Drives (LUN)	Up to 32 Logical Drives	
	Maximum Logical Drive size	2.0TB	

Technical Specifications

Modular SAN Array 1000 Controller (218231-B22)	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)
	SCSI Ports	4-channel: 2 external/2 Internal
	Drives Supported	Up to 42 drives
	Maximum Capacity	12.6 TB (42 drives x 300 GB)
	Logical Drives	Up to 32 logical drives
	RAID Support	RAID ADG (Advanced Data Guarding)
		RAID 5 (Distributed Data Guarding)
		RAID 1+0 (Mirroring + Striping) - 3 drives or greater
		RAID 1 (Mirroring) with 2 drives
		RAID 0 (Striping)
	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	Up to three days of redundant battery life, 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) 17 x 12.5 x 7.75 in (43.2 x 31.75 x 19.7 cm)
		Weight (Gross) 6 lb (2.72 kg)

Modular SAN Array Fibre Channel I/O Module (218960-B21)	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) 17 x 12.5 x 7.75 in (43.2 x 31.75 x 19.7 cm)
		Weight (Gross) 6 lb (2.72 kg)

Technical Specifications

4/10q Fibre Channel Switch	Connector Type	LC	
	Number of Fibre Channel Ports	10 4/2 Gb Fibre Channel Port using removable Small-Form-Factor-Pluggable Transceiver - 4 included	
	Bandwidth	848 MB/s Full Duplex per port	
	Operation Modes	Fibre Channel Class 2 and 3 connectionless service	
	Protocols Supported	Fibre Channel	
	Maximum Frame Size	2148 bytes (2112 byte payload)	
	Media Transmission	Optical Shortwave: 500m (1,640 ft.)	
	User Interface	Led indicators, command console and web-based utilities	
	Dimensions	Width: 190.5 mm (7.5") Height: 41.9 mm (1.65") (1U) Depth: 155.6 mm (6.125")	
	Power Supply and Cooling	External laptop-style power supply Front to back airflow with integrated cooling fan	
	Operating	Temperature	5 to 40 °C (41 to 104°F)
		Humidity	15% to 90% non-condensing
		Altitude	0 to +15,000 feet
		Vibration	IEC 68-2 5-500 Hz random, 0.21 G rms
		Shock	IEC 68-2 4g, 11ms, 20 repetitions
	Non-Operating	Temperature	-40C to +70C (-40 to 158 F)
		Humidity	25% to 93% non-condensing
		Altitude	0 to +50,000 feet
		Vibration	IEC 68-2 5 to 500 Hz, random, 2.09 G rms
		Shock	IEC 68-2 30g, 292 ips, 3 repetitions, 3 axis
	Electrical	Operating Voltage	90 to 265 VAC ; 47 to 63 Hz
		Power Source Loading	20 VA
		Heat Output	25W maximum (with full-optics configuration)
	Regulatory	Safety Standards:	UL 60950 (USA) CSA 22.2 No.60950 (Canada) EN60950 (EC) CB Scheme-IEC 60950
		Emissions Standards	FCC Part 15B Class A (USA) VCCI Class A ITE (Japan) ICES-03 Issue 3 (Canada) EN55022 Level A (EC) CISR 22, Class A

Technical Specifications

HP QLE220 FC Host Bus Adapter	Connector Type	Optic LC
	Number of Fibre Channel Ports	One 4/2 Gb Fibre Channel Port
	Voltage	3.3V and 12VDC supported
	Power	5 watts
	Speed	PCI Express x4 400 MBps maximum at half-duplex, 800 MBps maximum at full-duplex (4-Gbps/2-Gbps autonegotiation only
	Form factor	Low-profile PCI Express card: 11.99 cm×6.44 cm (4.721"×2.536")
	Temperature	Operating: 0°C/32°F to 55°C/131°F. Storage: -20°C/-4°F to 70°C/158°F
	Humidity	Relative (noncondensing): 10% to 90%, Storage: 5% to 95%

Agency Approvals-Product Safety (Preliminary)

US/Canada

- UL, cUL:
    - UL60950-1
    - CSA C22.2 No.60950
    - Class 1 Laser Product per DHHS 21CFR J

Europe 73/23/ECC Low Voltage Directive:

- TUV:
    - EN60950-1: 2001
    - EN60825-1: 1994+A1+A2
    - EN60825-2: 1994 +A1

Agency Approvals-EMI and EMC (Preliminary)

US
FCC Part 15, Class A

Canada:
Industry Canada ICES-003, Class A

Europe:
89/336/EEC EMC Directive CE Mark:
EN55022: 1998 /CISPR22:1997 Class A
EN55024: 1998
EN61000-3-2:2000
EN61000-3-3:2001;A1:2001

Japan:
VCCI, Class A

Taiwan:
CNS 13438 Class A

New Zealand/Australia:
AS/NZS 3548 Class A

Korea:
MIC Class A

Technical Specifications

Multi-Mode Fibre Channel Cables Kits (218960-B21)	Cable Type	LC-LC (2 Gb to 2 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)