My First SAN solution guide

3rd edition—now featuring IP SAN solutions

With data doubling in size every year, companies are looking for new ways to manage their growth and control costs. My First SAN offers simple advice on how to implement affordable, reliable and easy networked storage solutions designed to give your business a competitive edge.

hp invent

How can this guide help?

This guide has been designed specifically to help you understand what a SAN does and choose the solution that's right for your business. The main focus will be on the HP StorageWorks Modular Smart Array (MSA) family.

Part 1: Understanding the SAN

(pages 3-9)

In the opening pages, we look at what a SAN is, how it works and what it can do for you.

Part 2: Assessing your options

(pages 10-17)

The second part examines the different SAN options available from HP, and how they work within four different business scenarios.

Part 3: Choosing your solution

(pages 18-21)

In this part, we look at pre-configured solution kits, a selection of specific configurations and an easy decision tree to help you choose what's right for you.

Part 4: Complete your knowledge

(pages 22-27)

Complete your understanding of SAN technology with quick answers to commonly asked questions and simple definitions of the key technology terms. Plus, see how HP Services can complement your solution with compelling service offerings.

Looking for storage information beyond the SAN?

This guide is part of the HP Simply StorageWorks solution initiative, which offers detailed comprehensive information on the complete HP storage portfolio for small and medium-sized businesses. Other HP solution guides include:

- Easy as NAS—everything you need to know about network attached storage (NAS) solutions from HP, built on HP ProLiant storage servers. 5983-0748EN.
- HP ProLiant Storage Servers Configuration Poster 5983-0754ENA1.

  Learn more about Easy at NAS at: **www.hp.com/go/nas**
- Ultimate Business Protection—helping you to achieve the level of data protection that's right for your business.

  Learn more about Ultimate Business Protection at: **www.hp.com/go/ubp**

Part 1: Understanding the SAN

What is a storage area network?

The simplest way of understanding a storage area network is to compare it to an already popular type of IT infrastructure solution—the local area network (LAN), which enables multiple PCs to share key IT resources such as applications, servers, shared files and printers.

SANs provide similar resource sharing, but are specifically designed for servers to share storage devices such as disk arrays or tape libraries.

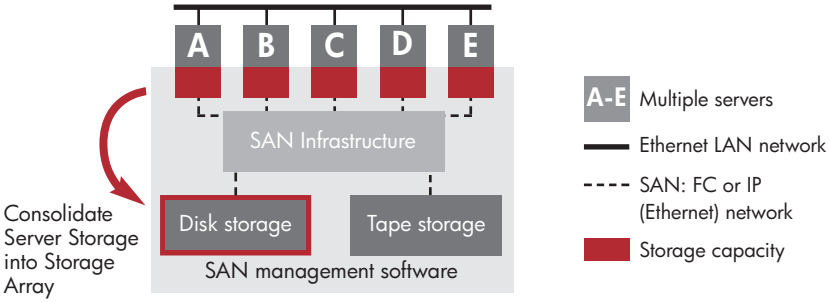
The majority of SANs deployed today are built on the fibre-channel (FC) protocol, which offers high levels of performance and availability for demanding users. However, there are now also IP SAN solutions based on the iSCSI protocol, which enable smaller IT environments to benefit from shared network storage at a particularly favorable price.

What will it do for you?

Whether you choose fibre channel or iSCSI, moving to a SAN will help you to store and manage growing amounts of data more efficiently, while simultaneously cutting operational and management costs.

Benefits include:

- **Online scalability**—so you can add storage with ease to meet changing capacity requirements
- **High levels of availability**—enable your data and applications to be fully accessible at all times, even during backup
- **Simple and centralized management**—saving you vital human resources
- **High utilization of disk capacity**—by creating a central pool of storage, you can double capacity utilization from 40 up to 80 percent, which improves cost efficiency
- **Faster data restoration**—to return your business to full productivity



SAN components

Servers

Multiple servers, from different vendors, running different operating systems can all be connected to a SAN.

Servers with a fibre channel SAN connection require a special FC card called a host bus adapter (HBA) in each connected server. In an IP SAN, you can use a standard Ethernet NIC.

Benefit of a SAN:
Allows multiple servers to share storage for greater efficiency and increased availability.

SAN infrastructure

The SAN infrastructure (also called "fabric") comprises the hardware, cabling and software components that enable data to move into and within the SAN. Principally, these are network cards (fibre channel HBAs or Ethernet NICs) and switches.

Switches can detect failed or congested connections and intelligently reroute data to the appropriate device. When linked together (cascaded), they increase the number of available SAN connections—providing greater performance and resilience against individual connection failures. You can choose a single connection or a dual, redundant connection that performs a failover should one connection break.

Benefit of a SAN:
Creates a high-performance, resilient infrastructure that can easily be modified as your needs change.

Disk storage

A disk array can be seen as a centralized storage pool for servers. Data from multiple servers is stored in dedicated areas called logical unit number (LUNs), and can be protected against data loss in the event of multiple disk failures using RAID protection. Redundant array controllers assures that servers can access their data, even if one controller or network connection fails. In addition, the modular design of disk storage allows you to grow capacity as you require.

Benefit of a SAN:
Provides increased availability and capacity utilization, plus simplified management, by consolidating data in a disk array.

Tape storage

Within a fibre channel SAN, any disk storage (whether it's an external disk array or internal to the server) can be backed up directly to a tape library. This provides a fast and dedicated pathway for data backup, and frees the corporate LAN to perform its primary functions with greater efficiency.

Due to their lower network speed, IP SANs should preferably pass data traffic through a backup server to a direct-attached tape library. Tape-based backup can be combined with disk-based backup—e.g., via a virtual library system (VLS)—to improve recovery processes and optimize slow server backups.

Benefit of a SAN:
Reduces your backup window and simplifies recovery with central management.

Management software

Although it is often overlooked, the management software is perhaps the most important part of any SAN. It helps you configure and enhance individual components for the best setup. It can then monitor the entire SAN area for performance bottlenecks and areas of potential failure.

Storage management software also automates time-consuming tasks such as data backup, and may provide usage statistics that enable consumption-based allocation of IT costs. In addition, virtualization functionality lets you manage all available storage as one virtual pool, regardless of where it's located.

Benefit of a SAN:
Enhances efficiency helping you manage your consolidated storage from one location.

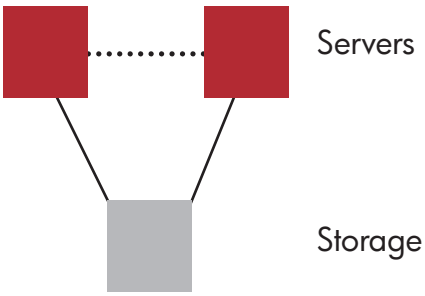
HP Storage Essentials (SE) is the first open, standards-based modular suite of storage products designed to integrate into the HP unified server-storage-management platform, HP Systems Insight Manager (SIM). SE also leverages HP-SIM's integration with HP OpenView software.

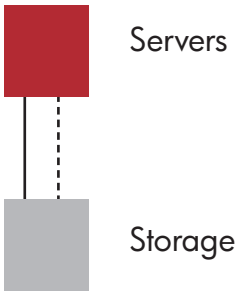
By designing SE in a manner that incorporates tight and seamless integration into HP Systems Insight Manager and HP OpenView products, customers can utilize an essential building block on the path to creating a comprehensive unified infrastructure-management environment that is critical to developing a truly Adaptive Enterprise.

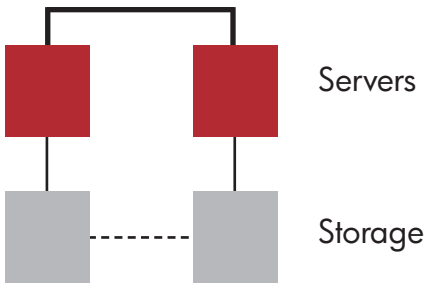
Integration with System Insight Manager greatly simplifies and enhances a customer's HP Storage Essentials' usability. The integration results in a single-sign-on mechanism for server and storage management, thus greatly reducing the effort around the task of security management. Since the integration is at the architecture level, the customer only manages a single server for hosting Storage Essentials and SIM.

Benefit of a SAN:
HP Storage Essentials delivers integrated heterogeneous functionality for network (DAS, SAN, NAS) management, storage resource management, provisioning and application infrastructure monitoring. The suite consists of HP Storage Essentials Enterprise Edition and a portfolio of value added plug-ins. The architecture and interfaces are built on industry standards.

A SAN makes it easy to increase availability
Today's IT environments require increasingly high levels of availability at all times. SANs can offer 24x7 availability thanks to a fully redundant architecture. The following elements are building blocks for increased SAN availability.







Server clustering
Configuring two or more servers in a cluster provides the following advantages: a cluster distributes processing requests evenly between servers in the cluster (load balancing), and allows a recovery server to take over the operations of a primary server should a failure occur. Clustered servers need access to the same data, which requires an external storage system. A SAN is recommended as it provides multiple storage connections and scalability to meet changing needs.

Multi-pathing
The connection between server and networked storage solution has several components—HBA/NIC, switch, cables, array controller. If one breaks, your connection will fail. Multi-pathing guards against this. With redundant components, traffic can be swapped from one component to the other should a failure occur. Multi-pathing software like HP StorageWorks Secure Path, Microsoft® MPIO or QLogic failover detects failed connections and initiates automatic failover.

Data replication
Data replication enables access to data—even if your entire storage system fails—by continuously copying it to a remote secondary array (e.g., at a second remote location).

While higher-end environments perform this directly between two disk arrays, smaller environments are more suited to replication between servers connected to a SAN over an IP network. This enables one-to-one, one-to-many and many-to-many replication, and data is synchronized in incremental blocks to reduce network traffic.

Choose the right SAN infrastructure

Fibre channel SANs: for larger, more demanding environments

SANs have traditionally been built on a fibre channel infrastructure. Because the fibre channel protocol is specifically designed for storage networks, it provides a high level of performance and reliability between servers and storage devices.

For environments where high performance and the highest level of availability counts (i.e., in data centers), but also when fully integrated SAN backup is required, fibre channel SANs will remain the ideal choice over the coming years.

Benefit of a SAN:
- Improved availability of mission-critical applications
  - Reduce scheduled and unscheduled downtime
  - Increase application disaster tolerance
- Improved storage utilization
  - Increase efficiency of valuable IT assets
  - Gain economies of scale
- Improved availability of enterprise information
  - Increase efficiency of IT systems
  - Enable more efficient business processes
- More effective storage management
  - Increase CONTROL of storage environment
  - Enables enterprise wide management
- Foundation for disaster tolerance
  - A SAN enables "always on" infrastructure

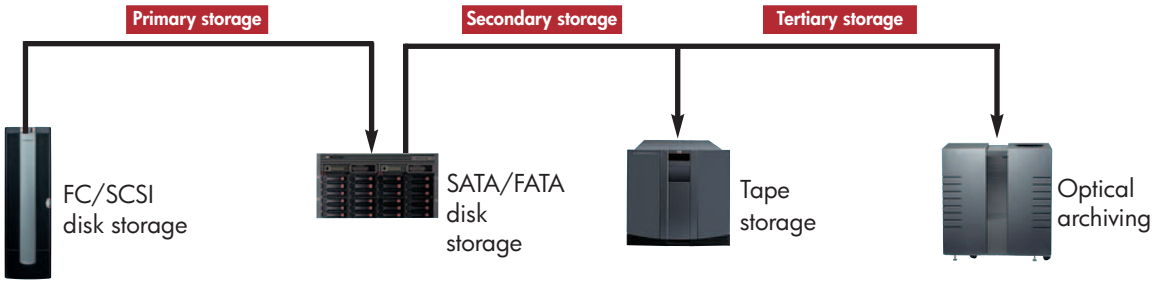
IP SANs: the technology for smaller businesses

For smaller IT environments looking for an affordable and simple SAN solution, IP SANs are ideal. They allow you to share stored data over a low cost Ethernet infrastructure using a protocol called iSCSI.

A 1 Gb/s Ethernet network will provide sufficient bandwidth to connect several servers to a SAN storage device (using either standard network interface cards or optional TOE cards that offload network tasks from servers with high CPU loads).

To enable data security and performance, it is recommended that your IP SAN and LAN are kept separate. In a typical small IT environment, this requires just a single unmanaged switch—or you could even connect your servers to the storage device directly.

Advantages of an IP SAN
- Get the benefits of shared storage for less. IP SANs have vastly reduced infrastructure costs compared to fibre channel SANs, so you can save up to 50 percent on the total solution
- IP SANs allow you to extend the benefits of shared storage to smaller departments and remote locations



Choose the appropriate disk technology for your environment

Serial ATA versus SCSI and fibre channel disks

SCSI disk technology is the right choice for entry-level networked storage, as it offers the same advantages that fibre channel disks provide to large enterprise disk arrays. In addition, it offers a simple migration path from storage directly attached to servers (DAS) to a storage area network (SAN)—a key HP offering explained on the following page.

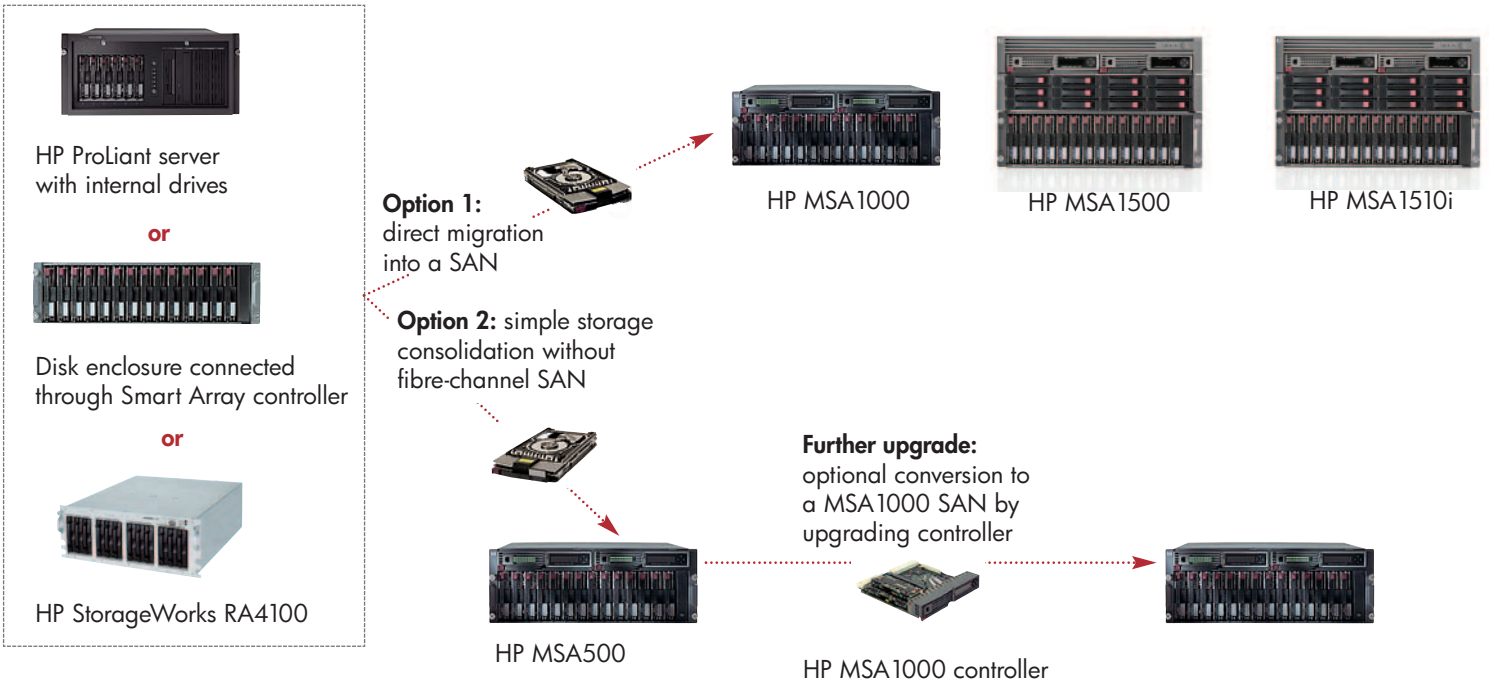
Serial ATA (SATA) disks available for HP StorageWorks MSA arrays provide a much lower cost per megabyte than SCSI or fibre channel disks. Serial Attached SCSI (SAS) is the next-generation storage solution for your enterprise environment. SAS integrates two established technologies, combining proven utility, reliability and performance attributes of the SCSI protocol with the performance advantages of serial architecture. Serial Attached SCSI allows the customer ultimate configuration flexibility and simplicity in their storage environments. SAS solutions accommodate both low cost bulk storage (ATA) or performance and reliability in mission critical applications (SCSI). This reduces customer investment while at the same time increases customer choice and ease of deployment. Ultimately, customers can buy one server or storage solution and customize the technology to fit their unique needs.

SATA is not intended as a replacement technology. SCSI or fibre channel disks remain a better choice for reliable, high performance storage. However, if you want cost-effective storage for infrequently accessed data—such as data repositories or reference information—then SATA is perfect.

Tiered storage environments

In a tiered storage environment, you can match your data to storage that has an appropriate level of performance and availability—giving you a lower cost of ownership, without any negative impact on your business. Here's how it could work in a typical disk-to-disk-to-tape environment:

- Data with the highest availability and performance requirements is stored in tier one on SCSI or fibre channel disks
- The second tier stores infrequently accessed data (e.g., disk-to-disk backup copies) on SATA disks
- Tier three comprises tape-based backup copies, or even archived data on optical storage



HP makes it easy to migrate data to a SAN

DAS-to-SAN migration

With HP's unique DAS-to-SAN migration, you can move HP ProLiant server-based (direct attached) storage to an HP StorageWorks MSA device quickly and easily. The same HP Smart Array technology used in your ProLiant server is used by the MSA to automatically recognize the configuration of your data—including RAID level—thus reducing downtime during migration. No other solution on the market today makes it this simple to consolidate your storage.

- **Investment protection**—Re-use existing SCSI universal disk drives in your new MSA array*
- **Simplicity**—Smart Array technology is designed to make it quick and easy to access your data from its new location
- **Flexibility**—Migrate at your own speed with the MSA family—start with simple external storage (MSA500), then move to a full SAN when you're ready**
- **Familiarity**—The MSA family uses the same management tools as existing ProLiant systems, helping to reduce training costs

* HP always recommends a full backup prior to any kind of migration. For detailed process information on how to perform DAS-to-SAN migration, plus hardware requirements, please visit: www.hp.com/go/myfirstsan

** Simple upgrade/conversion: exchange the controller, then connect the array (e.g., with the embedded switch) and the servers (via fibre channel HBA) to the network.

Part 2: Assessing your options

HP StorageWorks storage array systems

The seamless portfolio for storage consolidation

	HP StorageWorks MSA1510i	HP StorageWorks MSA1500	HP StorageWorks MSA1000
Description	Flexible, scalable iSCSI SAN solution	Flexible, scalable fibre channel SAN solution	Affordable fibre channel SAN solution
Drive count/maximum	0/96	0/96	14/42
Maximum storage	48 TB	48 TB	12 TB
Expansion options	MSA30, MSA20	MSA30, MSA20	MSA30
Host interface	1 GB iSCSI	2 GB/1 GB fibre channel	2 GB/1 GB fibre channel
Drive interface	SCSI/SATA	SCSI/SATA	SCSI
Form factor/height	2U, 3.5"	2U, 3.5"	4U, 3.5"
OS support	Windows	Windows, Linux, NetWare, HP-UX, SCO	Windows, Linux, NetWare, HP-UX, SCO, Tru64, OVMS
Warranty	3-1-1	3-1-1	3-1-1
Other support features	SAN backup, OpenView Storage Mirroring (OVSM), Systems Insight Manager	Clustering, SAN backup, OVSM, Systems Insight Manager	Clustering, SAN backup, OVSM, Systems Insight Manager

	HP StorageWorks MSA500 G2	HP StorageWorks MSA50	HP StorageWorks MSA30	HP StorageWorks MSA20
Description	Affordable shared storage solution	SAS drive enclosure	SCSI drive enclosure	SATA drive enclosure
Drive count/maximum	14	10/20	14	12
Maximum storage	4.2 TB	720 GB/1.4 TB	2 TB	3 TB
Expansion options	N/A	MSA50	N/A	N/A
Host interface	U320 SCSI	3G SAS	U320 SCSI	U320 SCSI
Drive interface	SCSI	3G SAS/SATA	SCSI	SATA
Form factor/height	4U, 7"	1U, 1.75"	3U, 5.25"	2U, 3.5"
OS support	Windows, Linux, NetWare	Windows, Linux, NetWare	Windows, Linux, NetWare, HP-UX, OVMS	Windows, Linux, NetWare
Warranty	3-3-3	3-0-0	3-0-0	3-0-0
Other support features	Clustering, OVSM, Systems Insight Manager	OVSM, Systems Insight Manager	Clustering (HP-UX only), OVSM, Systems Insight Manager	OVSM, Systems Insight Manager

For more information

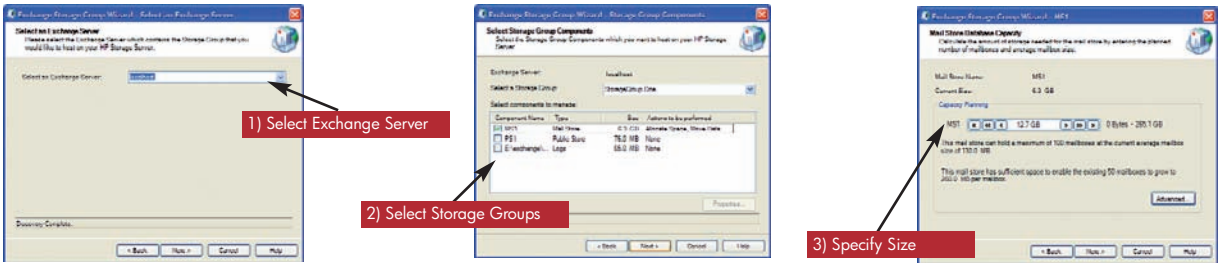
For latest product details of the MSA family, including operating systems support, view the QuickSpecs at:
www.hp.com/go/msa

HP StorageWorks storage array systems (continued)

						
	HP StorageWorks MSA500 with packaged cluster	**HP StorageWorks MSA1000 with packaged cluster**	**HP StorageWorks MSA1000 SMB bundle**	**HP StorageWorks MSA1000 starter kit**	**HP StorageWorks MSA1500 mini-bundles**	**HP StorageWorks MSA1500 starter kit**
Description	2 ProLiant server cluster with shared storage	2 ProLiant server cluster with SAN connectivity	Simple SAN solution	Affordable fibre channel SAN solution	Flexible, scalable fibre channel storage enclosures	Flexible, scalable fibre channel SAN bundled components
Best use	Remote or branch office 2 node cluster	Remote or branch office SAN	First time SAN customer	Entry level SAN—disk and tape backup	High-capacity and tiered storage	Compliance and regulatory storage
Servers included	Yes	Yes	No	No	No	No
Kit contents	(2) ProLiant DL380 G4 servers (3.6 GHz or 3.4 GHz), (1) MSA500 G2, (2) SmartArray RAID controllers, (1) cabinet: 8U fixture or 14U rack	(2) ProLiant DL380 G4 servers (3.6 GHz or 3.4 GHz), (1) MSA1000, (2) fibre channel Host Bus adapters, (1) MSA SAN Switch 2/8, (1) cabinet: 8U fixture	(1) MSA1000, (1) 2/8q fibre channel switch, (4) SFP transceivers, (2) fibre channel Q200 HBA's + cables	(1) MSA1000, (1) MSA SAN Switch 2/8, (4) SFP transceivers, (2) FCA2214 HBAs + cables	(1) MSA1000, (1) drive enclosure: MSA30 SCSI or MSA20 SATA	(1) MSA1500, (1) drive enclosure: MSA30 SCSI or MSA20 SATA, (1) HP 8-port SAN Switch, (4) SFP transceivers, (2) FCA2214 HBAs + cables
High availability kit available	Yes	Yes	Yes	Yes	Yes	Yes
Disk drives	Not included	Not included	Not included	Not included	Not included	Not included
OS support	Microsoft Windows, Linux, NetWare	Microsoft Windows, Linux, NetWare	Microsoft Windows, Linux	Microsoft Windows, Linux, NetWare	Microsoft Windows, Linux, NetWare, HP-UX	Microsoft Windows, Linux, NetWare
Shelf height	8U or 14U	8U or 14U	5U	4U	4U or 5U	5U or 6U

			
	HP StorageWorks EVA4000	**HP StorageWorks EVA6000**	**HP StorageWorks EVA8000**
High-end consolidation	High-performance and high-availability virtualized array solution	High-performance and high-availability virtualized array solution	High-performance and high-availability virtualized array solution
Disk technology	Fibre channel or FATA	Fibre channel or FATA	Fibre channel or FATA
Scalability	Scale up to 17 TB	Scale up to 34 TB	Scale up to 72 TB
Consolidation	Easy manageability and virtualization allows consolidation of multiple storage devices	Easy manageability and virtualization allows consolidation of multiple storage devices	Easy manageability and virtualization allows consolidation of multiple storage devices
Redundancy	Redundant architecture and broad choice of software including remote replication	Redundant architecture and broad choice of software including remote replication	Redundant architecture and broad choice of software including remote replication
Operating system support	Windows, Linux, HP-UX, Tru64, OpenVMS, Solaris, AIX	Windows, Linux, HP-UX, Tru64, OpenVMS, Solaris, AIX	Windows, Linux, HP-UX, Tru64, OpenVMS, Solaris, AIX
Other features	Virtually instantaneous snapclones for backup and restore. Remote replication. HP Pay per use for storage capacity and software	Virtually instantaneous snapclones for backup and restore. Remote replication. HP Pay per use for storage capacity and software	Virtually instantaneous snapclones for backup and restore. Remote replication. HP Pay per use for storage capacity and software

Setting up a Microsoft Exchange data store is easy with HP Application Storage Manager



Server-based solutions for storing data

Storage arrays are usually perceived as devices that store the data of application servers. Network attached storage is seen as a solution for sharing files with end-user clients. The two are traditionally separate concepts.

But now, with the availability of Ethernet based IP storage networks, HP has developed a storage consolidation solution based on a standard server platform.

iSCSI NAS: the affordable SAN option

By running optional iSCSI Feature Pack software on an HP ProLiant Storage Server, you can use it as both a file server and a data storage device for application servers. And because it is based on Ethernet, you don't need a fibre channel SAN infrastructure.

This affordable storage technology uses industry-standard hardware and software on the common Ethernet infrastructure—making it ideal for smaller environments that require easy scalability, centralized backup and even replication or snapshot functionality, but have fewer performance and availability requirements.

Plus, it comes with HP Application Storage Manager, which is designed to reduce process steps, training needs and knowledge requirements to monitor e-mail, database and other application stores. It does so by automating many complex storage allocation and monitoring tasks, and provides that best practices are always applied.

NAS gateway: the perfect SAN extension

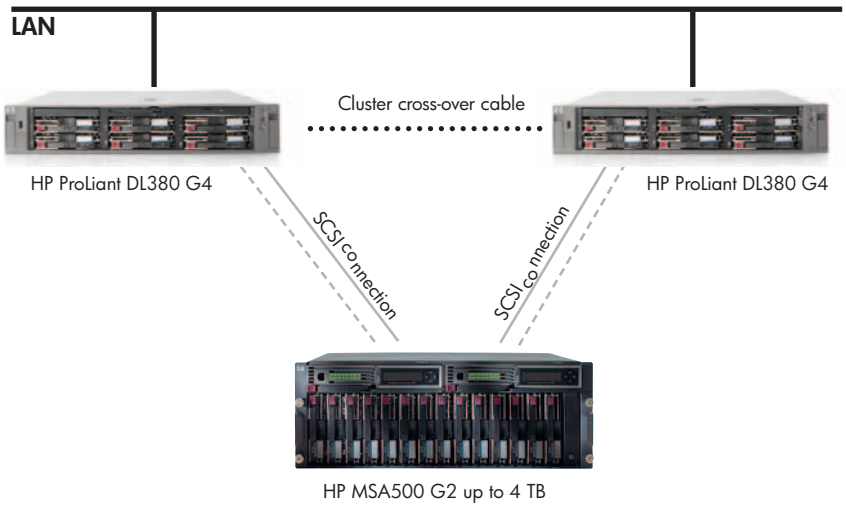
If you do decide to invest in an array-based fibre channel SAN environment, you can still make use of storage servers for file serving via NAS/SAN fusion. HP ProLiant Storage Servers can also function as a SAN gateway to provide your small servers with consolidated storage of a fibre channel SAN over an Ethernet connection. This is a useful function, as you avoid the cost of equipping your smaller servers with fibre channel HBAs—and you can even deploy them in a redundant configuration.

For more details on consolidating your storage with HP ProLiant Storage Servers, please refer to the Easy as NAS solution initiative at **www.hp.com/go/nas**.

Typical solutions for storage consolidation

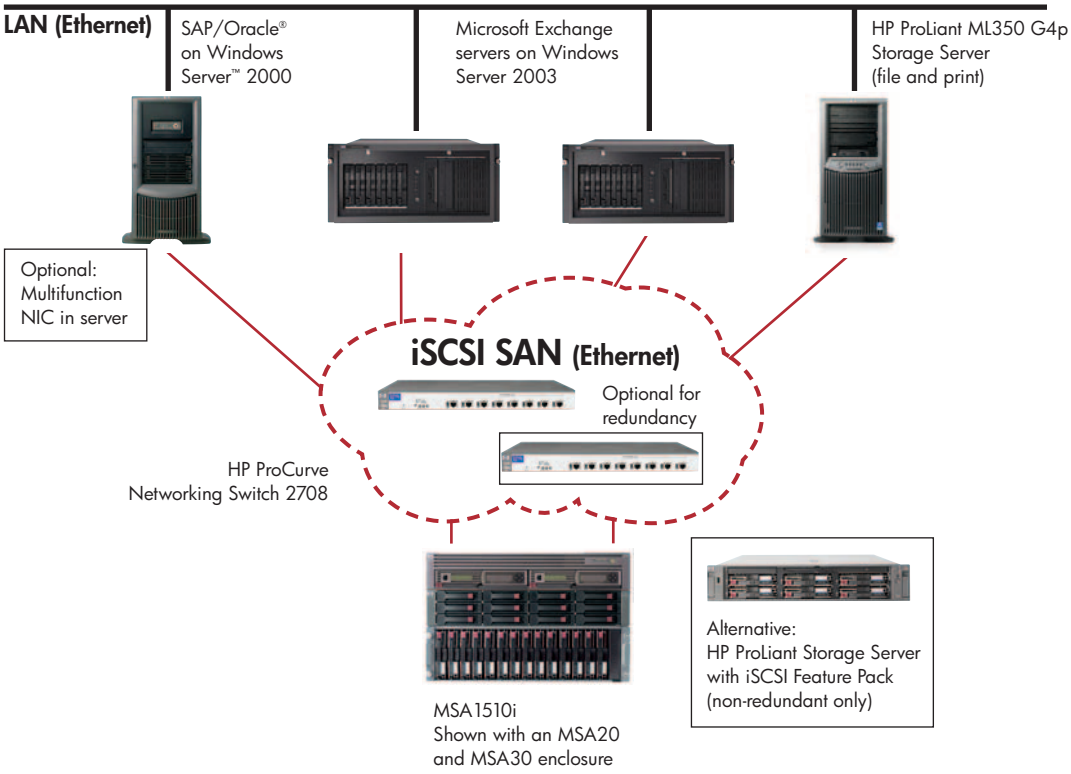
These examples show how customers have used storage solutions based on HP StorageWorks Modular Smart Arrays to solve their specific business challenges.

Two-node cluster with MSA500 G2



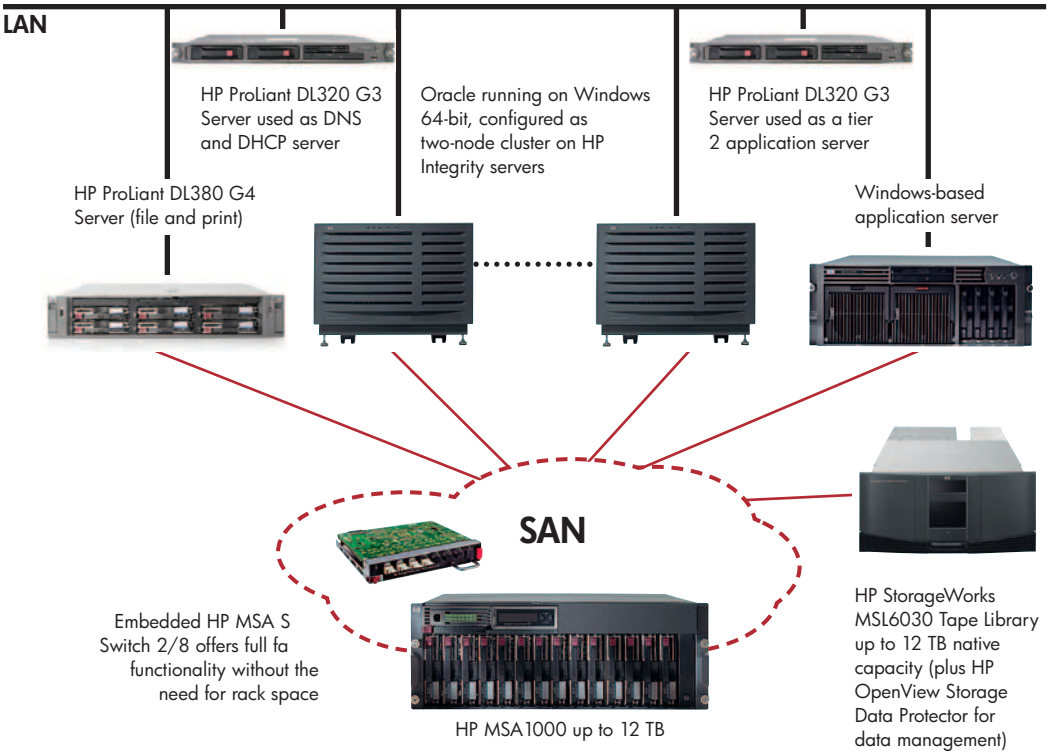
The HP MSA500 G2 enables external storage to be configured within a four-node cluster, without having to invest in a fibre-channel network. In this scenario, two servers are connected redundantly via SCSI cables to the storage array, and act as fallback or recovery servers to each other. The cross-over connection is used as a heartbeat listening connection for the two servers.

Consolidation into an IP SAN



For small environments and cost-conscious customers, networked storage through an IP SAN offers a great balance between efficiency and affordability. This can be achieved either array based using the MSA1510i, or server-based using the HP ProLiant Storage Server with iSCSI Feature Pack. While it is possible to share the same network, HP recommends separating the storage network from the public LAN for performance reasons. When using an MSA1510i, you may design a redundant infrastructure using two switches.

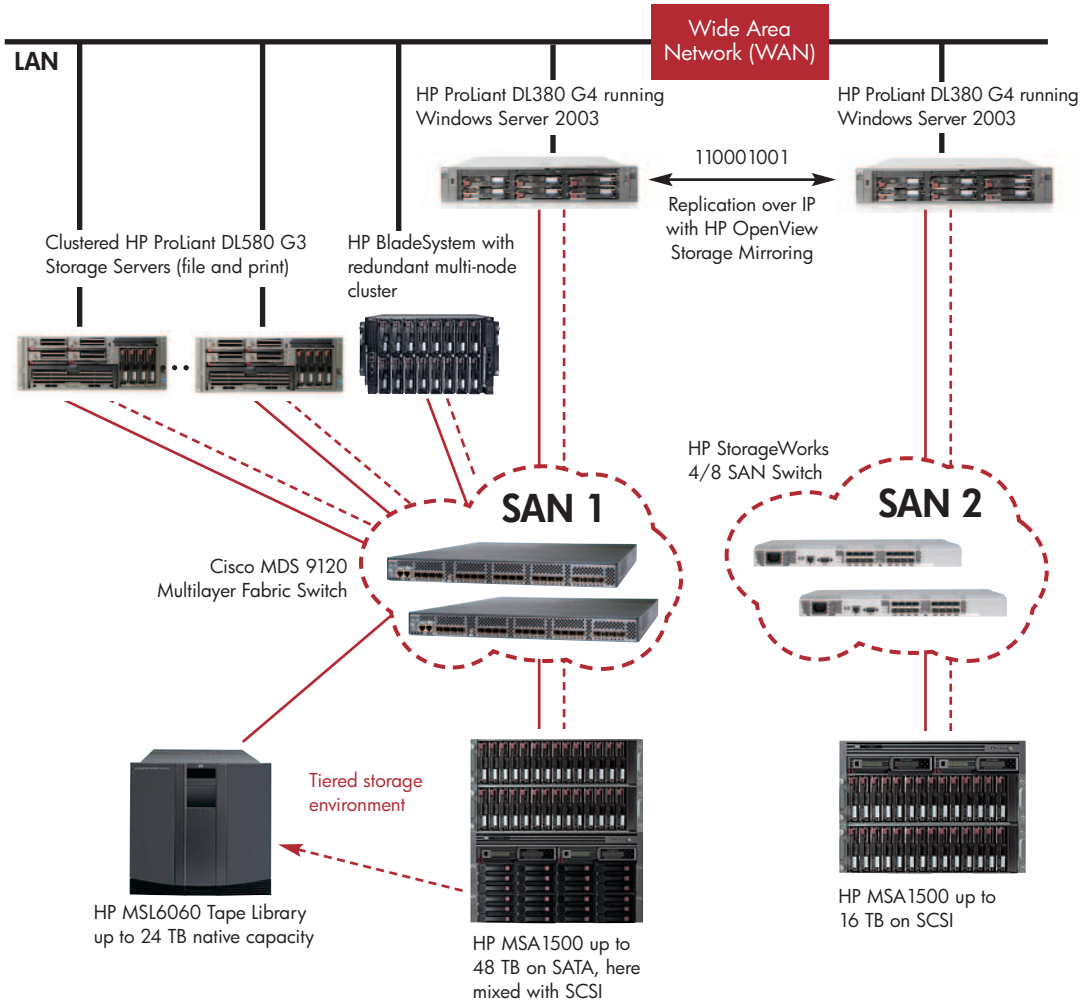
Starter fibre channel SAN with the MSA1000



When consolidating storage from multiple servers (clustered or non-clustered), a SAN solution based on the MSA1000 offers the best efficiency, flexibility and scalability. Here we see a non-redundant configuration that's perfect for cost-sensitive customers, although full redundancy can be achieved simply by adding a second controller, switch and HBA. In addition, multiple clusters are also possible.

This scenario also shows servers which are usually not connected to a SAN.

Fully integrated high-availability SAN



In this scenario, the MSA1500 provides the option of low-cost near-online storage based on SATA disks. A second SAN at a remote site is also shown. Data can be copied from SAN 1 to SAN 2 using IP replication—enabling data to remain available, even if a disaster occurs at the primary site.

If you need increased performance and greater flexibility for demanding mission-critical applications, consider the HP StorageWorks Enterprise Virtual Array (EVA) family.

EVA—combine simple management with performance and availability

Management efficiency

With increases in storage capacity and continuous expansion of digital content, storage management is now a key issue for organizations today. The cost of management represents a huge investment over time—far more than the acquisition of the hardware and software—so efficiency is essential.

The HP StorageWorks Enterprise Virtual Array (EVA) family gives you management efficiency thanks to built-in virtualization. This presents your storage capacity as a "virtual" pool, which reduces the physical boundaries between storage and server. It also allows multiple virtual pools to be presented to the host, which simplifies management and increases the flexibility in building storage pools for application.

With virtualization in the EVA, you can save money by not over-investing in or over provisioning disk capacity. This is because the EVA supports dynamic capacity or LUN expansions without taking the array offline. You can always change the capacity presented to a server or application to what's needed at the time, and then grow this capacity in parallel when required.

Furthermore, the EVA family (which now features a broader choice of arrays than before) offers additional connectivity through the use of industry-popular Multi-pathing software such as MPIO, and massive scalability that's only limited by the size of today's disk drives.

Plus, by adding software such as Business Copy or Continuous Access, your EVA can assist your business protection strategies, workload distribution and data mining—giving you an even stronger foundation for managing and accessing your data efficiently.

Part 3: Choosing your solution

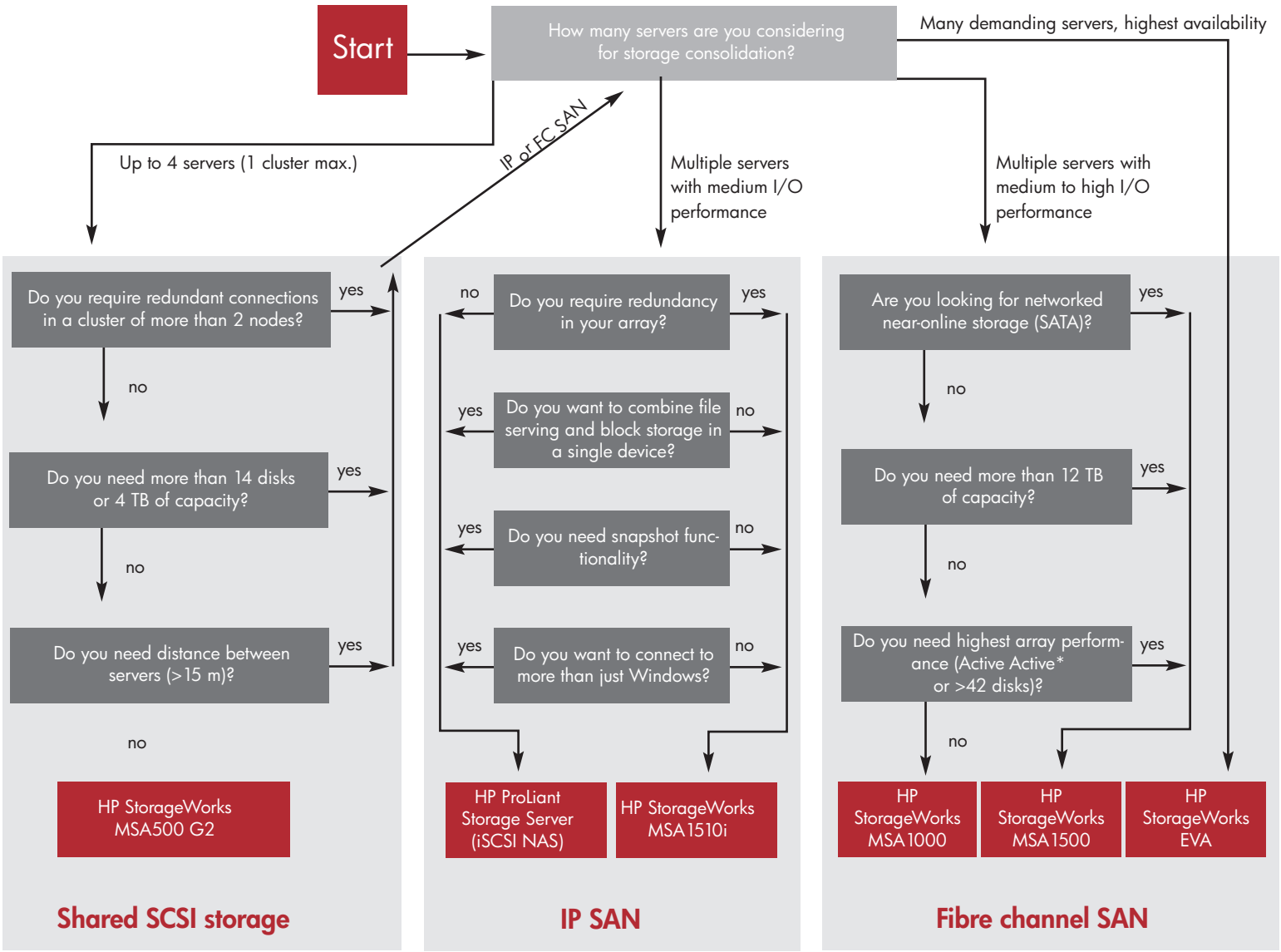
HP StorageWorks storage array systems

The seamless portfolio for storage consolidation

What if my file serving needs are growing rapidly or I need more scalability in my solution?

HP has a complete product line to meet your needs from SMB to Enterprise level file serving. The HP Enterprise File Services Clustered Gateway product scales your file serving needs from two to 16 nodes, with a linear increase in file serving performance. Utilizing a clustering technology that is built upon a fully symmetrical file system, this product is designed to provide scalability, high availability and an industry leading price/performance value. The Clustered Gateway is based upon either Linux (SLES9) or Windows (WSS2003) as a base operating system. For more information please visit http://h18006.www1.hp.com/storage/nas.html

Which networked storage solution is right for you?
Here's a quick way of choosing the best solution for your specific storage needs.



* Active-Active controllers will be available soon. See the QuickSpecs at www.hp.com/go/msa for latest product details

HP makes it simple to purchase a SAN

Choose a pre-configured starter SAN solution
With an MSA starter kit, you get a SAN solution at an excellent value, without the hassle of configuring it from scratch. The MSA SAN Starter Kit includes all the storage components you need for an entry-level SAN, while the Packaged Cluster gives you all this, plus two clusterable HP ProLiant DL380 servers. All you need to complete your solution is to add your choice of disk drives.

Step 1: Choose your starter solution

MSA SAN Starter Kit
- HP StorageWorks MSA including first disk enclosure, switch and 2 x fibre channel HBA

HP ProLiant DL380 Packaged Cluster (MSA500 or MSA1000)
- MSA SAN Starter Kit
- 2 x HP ProLiant DL380 servers

Step 2: Upgrade for full redundancy MSA High Availability Upgrade Kit

- **Second array controller**
- Switch
- 2 x fibre channel HBA

Upgrade for more availability
Because both the MSA SAN Starter Kit and Packaged Cluster are built on a modular architecture, you can easily upgrade them as your needs dictate. For example, by adding the MSA High Availability Upgrade Kit, you'll achieve end-to-end redundancy to ensure your data is always available.

Even more simplicity
MSA1000 Small Business SAN Kit
The MSA1000 Small Business SAN Kit is designed to reduce the complexity, expense and risk of SAN deployment for small and medium-sized businesses.

Like the starter kits above, it comes with a fibre channel switch and cost-reduced FC HBAs, but also includes SANsurfer Express management software that allows you to install and administrate all components—including array, switch and HBAs—from a single console, and perform management functions quickly using powerful, easy-to-use wizards.

In cost-conscious environments that need no more than seven Windows or Linux host connections, this is the ideal solution.

Choose your configuration

This example shows how easy it is to configure a SAN using the MSA starter kits.

For the equivalent MSA1500 configuration, choose the alternative MSA1500 SAN starter kit.

MSA1000 SAN Starter Kit with High Availability Upgrade Kit and 2.5 TB capacity for 2 servers

Part number	Product name	Description
A7450A	**HP StorageWorks MSA1000 Small Business SAN kit includes:**	(1) MSA1000 controller with 256 MB cache, (1) MSA FC I/O module with 2 GB SFP SW transceiver redundant hot pluggable power supply/blower assemblies, (2) HP Q200 FC HBA, (1) 2/8q FC 8-port switch with 4 - 2 GB SFP SW transceivers universal rack-mounting kit MSA1000 support CD and documentation serial cable, (2) power cables, (3) 5m FC cables small business SAN installation CD and documentation
A7452A	**HP StorageWorks MSA1000 Small Business HA upgrade kit includes:**	(1) MSA1000 controller with 256 MB cache, (2) HP Q200 FC HBAs (PN A7523A), (1) 2/8q FC 8-port switch with 4 - 2 GB SFP SW transceivers, (3) 5m FC cables, (1) MSA FC I/O Module
353803-B22	**MSA1000 SAN Starter kit includes**	1 x MSA1000 with 14 drive bays, 1 x embedded MSA SAN Switch 2/8, 2 x FCA2214 2 GB FC HBA, 2 x 5m FC cable
397079-B21	**MSA1000 High Availability Upgrade kit includes:**	1 x MSA1000 Controller, 1 x MSA SAN Switch 2/8, 2 x FCA2214 FC HBA, 2 x 5m FC cable
302969-B21		MSA30 disk enclosure (SCSI), single bus
347708-B22		Seventeen (17) 146 GB 15k SCSI hard disk drive

MSA1500 redundant SAN with 1 TB online and 3 TB near-online storage for 2 HP-UX servers

Part number	Product name	
	Starter Kit and HA kits	
AE327A	**MSA1500 SAN SCSI Starter kit (Windows, NetWare or Linux compatible) includes:**	(1) MSA1500, (1) MSA30 SCSI drive enclosure, (1) 4/8 base SAN switch, (4) 4 GB SFP transceivers, (2) FCA2214 HBAs + cables
AE326A	**MSA1500 SAN SATA Starter kit (Windows, NetWare or Linux compatible) includes:**	**(**1) MSA1500, (1) MSA20 SATA drive enclosure, (1) 4/8 base SAN switch, (4) 4 GB SFP transceivers, (2) FCA2214 HBAs + cables. *NOTE: For Americas, Asia Pacific, and Japan.*
	MSA1500 SAN Starter Kit HA Bundle for Windows, NetWare or Linux (for SAN Starter Kits) includes:	(1) redundant controller, (1) FC I/O module, (1) 4/8 base SAN switch,(4) 4 GB SFP transceivers, (2) FCA2214 HBAs + cables.
	Disk array	
AA986A	MSA1500cs (no drive bays)	
218231-B22	Redundant MSA fibre channel controller	
AA987A	MSA1500 fibre channel I/O Module	
AA988A	MSA1500 SCSI Dual I/O Module	
302969-B21	MSA30 disk enclosure (SCSI), single bus	
286778-B22	Fourteen (14) 73 GB 15k SCSI hard disk drive	
335921-B21	MSA20 disk enclosure (SATA)	
349239-B21	Twelve (12) 250 GB SATA hard disk drive	
Options		
Backup and restore solution	HP StorageWorks MSL Tape Library*; HP OpenView Data Protector*	
Software components (for Windows)		
364023-B21	ProLiant Cluster Starter Kit	
T2558AA	HP OpenView Storage Mirroring (media kit)	
T3591A	HP OpenView Virtual Replicator (media kit)	

*For more information, visit: www.hp.com/go/ubp

Part 4: Complete your knowledge

HP Services

When business needs change over time, you may have different requirements for your SAN. HP Services provides a range of services to suit your IT environment and its life cycle, including design, integration, data migration and support.

HP Care Pack Services

HP offers support for the hardware and software components of your SAN solution with a full range of Care Packs. These easy-to-buy, easy-to-use support packages can:

- Save you time by speeding up the installation process of your solution
- Extend your standard warranty to protect your investments for longer
- Enhance your service level (e.g., from next-business-day response to 6-hour call-to-repair)
- Provide phone assistance and license updates on your software components
- Improve the availability of your HP products
- Reduce costly downtime and improve employee productivity

Mission Critical Services

The following offerings combine reactive technical assistance with proactive account services for selected distributions of Windows and Linux, storage and/or storage area networks:

- HP Proactive Essentials (PE) Service is an entry-level, mission critical package that increases system performance, expedites problem resolution and decreases downtime due to software defects
- HP Proactive 24 and HP Critical Services are the high-end, mission critical package for demanding support requirements, where data loss or downtime would put your business at risk

Advanced services

HP Services also offers a range of advanced services that can assist you in the design, integration and maintenance of your storage environment and SAN infrastructure:

SAN Solution Service

This encompasses all the activities required for fast, efficient and successful implementation of your SAN infrastructure devices, with reduced disruption to your operations. We help you get peace of mind and a rapid return on your SAN investment, as well as offering assistance in critical areas such as SAN management, data protection and recovery.

High Availability Assessment Service for SANs

If you are employing high-availability technology on HP storage subsystems and the interconnecting SAN infrastructure, this assessment service offers you customized technical and operational guidance.

For more information, contact your HP sales representative or visit: **www.hp.com/go/storageservices**

For more information

Learn more about Ultimate Business Protection at: **www.hp.com/go/ubp**

To learn more about HP Storage Servers visit: **www.hp.com/go/nas**

For more information on SAN infrastructure visit: **www.hp.com/go/myfirstsan**

Your questions answered

What happens if I need to add more storage capacity?
HP StorageWorks MSA systems are modular, so you can add capacity as your needs grow, internally or externally, with additional disk enclosures.

- Scale up to 4 TB on the MSA500 G2 (without external expansion)
- Scale up to 12 TB on the MSA1000 (with 2 x MSA30)
- Scale up to 48 TB on the MSA1500 (with 8 x MSA20) or up to 16 TB (with 4 x MSA30)

If you need even more capacity, simply add more MSA systems to your SAN!

How many servers can I add?
The MSA1000 and MSA1500 disk arrays are tested to support up to 20 servers. For connections to more than 20 hosts, we recommend that you deploy an additional disk array and split the workload across the two.

The MSA1510i also supports up to 20 servers, but due to the limited network performance of the IP SAN, the I/O requirements of the servers will determine whether you can achieve satisfactory performance.

A fully equipped HP ProLiant DL380 Storage Server with iSCSI Feature Pack software can offer similar server connectivity as the MSA1510i; smaller ProLiant Storage Server models are designed for smaller or fewer server connections.

How do I adjust my backup strategy to match storage consolidation in my MSA array?
Just like your storage arrays, HP StorageWorks tape libraries are modular so you can increase performance and capacity simply by adding additional drives or tape libraries.

HP OpenView Data Protector also follows this concept, so you only pay for the licenses you currently require, but still have the flexibility to scale up when needed.

For more information about backup, please visit:
www.hp.com/go/ubp

How can I grow fibre channel connections in my SAN?
If the number of servers exceeds the number of fibre channel ports, you can simply add another fibre channel switch to your infrastructure—a process called cascading (see specifications on how your switch supports cascading). For extensive configurations, we recommend that you work with your preferred HP storage partner.

What if my file serving needs are growing rapidly or I need more scalability in my solution?
HP has a complete product line to meet your needs from SMB to Enterprise level file serving. The Enterprise File Services Clustered Gateway product scales your file serving needs from 2 to 16 nodes with a linear increase in file serving performance. Utilizing a clustering technology that is built upon a fully symmetrical file system this product provides scalability, high availability and an industry leading price/performance value. The CGW is based upon either Linux (SLES9) or Windows (WSS2003) as a base OS. For further information see **http://h18006.www1.hp.com/products/storageworks/efs/index.html**

Which fibre channel switch is the best fit for my storage consolidation solution?
Contact your local HP or Partner sales representative or visit the SAN visibility tool at, **http://h18006.www1.hp.com/storage/saninfrastructure.html** for more information.

How does HP OpenView Storage Mirroring (OVSM) increase the availability of data?
OVSM is a cost-effective software solution that replicates data at a file/byte level and continuously monitors data to replicate only the file changes. It gives you:

- An effective disaster-recovery strategy—replicating data from multiple servers off-site
- Centralized backup—reducing the need to work with live production data and dependency on a backup window
- Automatic or manual failover capabilities—enabling business continuity and data availability in the event of a disaster
- A means of integrating dissimilar servers and storage arrays

Jargon buster

Cascading
The ability to connect switches to one another to create a larger SAN fabric.

DAS (Direct Attached Storage)
A deployment of dedicated storage devices for each server, usually using SCSI connections. Can be an inefficient use of storage.

DAS-to-SAN migration
An exclusive HP feature that provides a quick and easy way to migrate disks and stored data running on Smart Array or RA4100 storage solutions to an HP StorageWorks MSA disk array (see page 8).

FC (Fibre Channel)
A protocol designed for high-speed storage networks requiring high availability. SANs use fibre-optic cabling to connect different devices.

HBA (Host Bus Adaptor)
A PCI adapter that connects a server to the SAN fabric. Each HBA installed is referred to as a host.

IP and iSCSI protocol
iSCSI is a new networking protocol similar to the fibre channel protocol, but uses standard Ethernet-based IP (internet protocol) networks. iSCSI is especially interesting for small environments with lower performance requirements.

MSA (Modular Smart Array)
HP's family of entry-level storage arrays, spanning from SATA and SCSI disk enclosures up to shared storage and SAN arrays.

NAS
Scalable, high performance network acceleration, file serving and data sharing solutions for data centers, remote offices or small and medium businesses.

- HP StorageWorks EFS WAN Accelerator
- HP StorageWorks EFS Clustered Gateway
- HP ProLiant Data Protection Storage Servers
- HP ProLiant Storage Server

Near-online
Technology that uses disk-based storage devices to store infrequently accessed data. This includes tiered storage environments or disk-to-disk-to-tape backup. Near-online is often implemented with low-cost disk drives. However, their ability to match requirements needs to be verified.

NIC (Network Interface Card)
Network cards used in servers usually to connect them to an Ethernet network. Performs the same function as an HBA for fibre channel connections.

RAID (Redundant Array of Independent Disks)
A method of writing data simultaneously over multiple disk drives used in disk arrays for increased data protection and/or increased performance.

Replication
Mirroring data between two arrays—usually located in separate data centers—to achieve highest availability in case of failure of one data center. This can be achieved via host/IP-based replication or—for enterprise arrays such as EVA or XP—via SAN-based replication directly between two arrays.

SAN fabric
The hardware that connects servers to storage devices in a SAN. The SAN infrastructure enables any-server-to-any-storage-device connectivity through fibre channel switching.

SAS (Serial Attached SCSI)
A next-generation SCSI interface that uses serial technology. It is the first generation of disks with a small form factor (currently only available for the MSA50).

SATA (Serial Advanced Technology Attachment)
Interface technology for disk drives, providing the lowest cost per MB—ideal for storing low-usage reference information (an increasing regulatory requirement). SATA provides basic reliability and performance (based on an 8-hour and 10–30 percent duty cycle) compared to SCSI (and fibre-channel) HDDs, which are more advanced, offering a 24x7 and 80–100 percent active duty cycle (read/write).

SCSI (Small Computer System Interface)
A protocol used to communicate with SCSI devices. Also used by fibre-channel technology to communicate with disk drives.

SAN (storage area network)
High-speed, special-purpose network connecting different data storage devices to servers. May extend to multiple or remote locations for backup and archival storage.

TOE card (TCP/IP Offload Engine)
Network cards that offload network protocol tasks from the standard server CPUs.

Virtualization
Technologies that help remove physical storage boundaries by treating all available storage, regardless of its location, as one 'virtual' pool.

HP StorageWorks—Putting information to work.
To learn more on My First SAN—and Simply StorageWorks solutions—visit: www.hp.com/go/myfirstsan

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