Simply Consolidation
My First SAN Solution Guide

4th edition – featuring All-in-One Storage Systems

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 to give your business a competitive edge.

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 focus of this guide will be on entry-level network storage solutions, in particular HP StorageWorks Modular Smart Array Systems (MSA) and the new HP StorageWorks All-in-One Storage Systems (AiO).

Part 1: Storage Consolidation on a SAN (3–9)
In the opening pages, we examine the benefits companies can expect from storage consolidation and present a simple methodology to ensure the best return on investment (ROI). Then we look at what a SAN is, and how the different components of a SAN each contribute to the business benefits of SAN Consolidation.

Part 2: Assessing your options (10–17)
The second part reviews the major technologies available today on the market, HP's approach and unique benefits, and presents an overview of the entry-level SAN arrays portfolio.

Part 3: Choosing your solution (18–25)
This chapter lists a handful of typical storage consolidation solutions based on the disk arrays presented previously. We illustrate the total solution including server environments, data protection and disaster tolerance capabilities.

Part 4: Complete your knowledge (26–31)
Complete your understanding of SAN technology with quick answers to commonly asked questions and simple definitions of key 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 comprehensive information on the complete HP storage portfolio for small and medium-sized businesses. Our other solution guides include:

- **Simply File Services** – everything you need to know about network attached storage (NAS) solutions from HP, built on HP ProLiant storage servers
- **Simply Business Protection** – helping you to achieve the level of data protection that's right for your business

Contact your local HP representative for details, or visit: **www.hp.com/eur/simply**

Part 1: Storage Consolidation on a SAN

A company's most important asset is its data. With the growth of networks and communication, more data is exchanged and it is increasingly complex.

Drivers of storage consolidation

For many years, it's been easy and cost-effective to deploy servers and associated storage resources in a distributed model, as the needs of the business and the size of the company grew. But soon the multiplying "islands" of IT resources create too much complexity, hinder further growth and threaten data security.

At a certain point, it's important to step back and think about finding a solution to this situation: storage consolidation.

The ROI is demonstrated by the following dimensions:

Saving money
- Better asset utilisation
- Higher IT staff productivity
- Higher systems and application uptime

Mitigating risk
- Better management of growth
- Higher data availability and security
- Faster data backup and restore

Enhancing service levels
- Faster capacity deployment
- Better data protection
- More flexibility

Why now?
Storage technology is now accessible at historically low price points and with a level of commoditisation that makes it much less complex to deploy and maintain.

These trends have made storage consolidation accessible to a much wider range of companies, whatever the size or the IT skill available.

Storage Consolidation Enabler: the storage area network (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.

Basically, a storage area network enables storage consolidation by grouping all your storage resources into one single device that will be connected to the servers through a specific network, enabling them to "see" the resources present.

What are the SAN Components?

A storage area network goes beyond the network components and the cables to encompass the total architecture:

1) Disk array

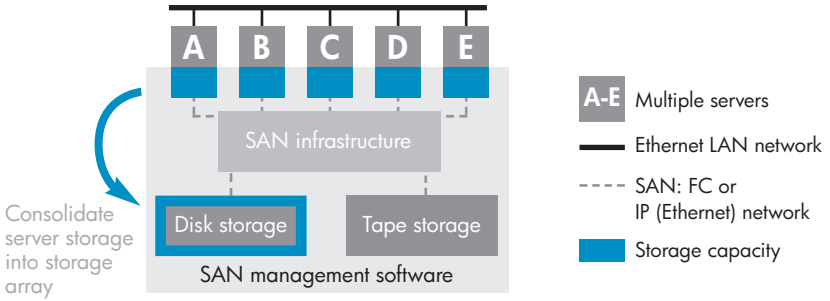
2) Network

3) Management software

4) Nearline storage

5) Servers

Each element brings some benefits and added values listed next:



1st SAN Component: the disk array

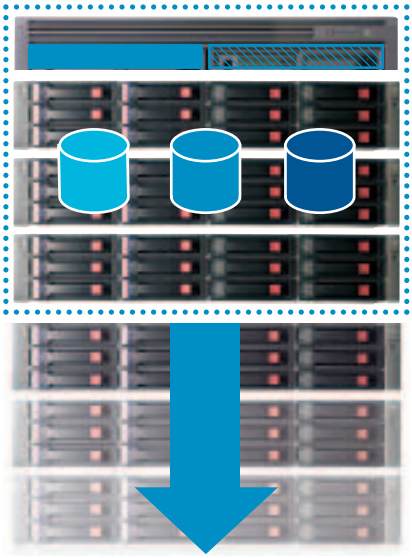
SAN disk arrays can be seen as centralised storage pools for servers. They bring more intelligence and sophistication than internal disk drive cages or external enclosures that can be direct-attached behind a server:

Redundancy: beyond fan and power supply redundancy, redundant controllers ensure servers can access their data, even if one controller or network connection fails.

Scalability: with a modular design, the disk storage allows you to grow capacity as you require.

Performance: SAN arrays allow for a higher number of disk drives, more spindles allow for higher I/O performance, supported by bigger cache memories in the controller than usually seen in servers.

Data security: data from multiple servers is stored in dedicated areas called LUNs and can be protected using RAID protection. A controller feature called Selective Storage Presentation enforces data security by preventing corruption of other servers' data.



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

2nd SAN Component: the network or "fabric"

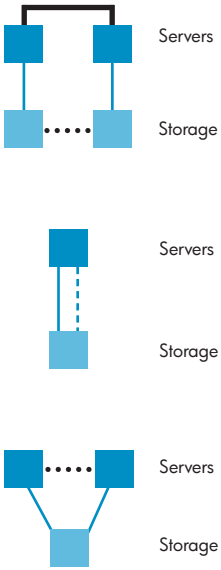
The SAN infrastructure comprises the hardware, cabling and software components that enable data to move into and within the SAN. Principally, these are network cards (FC HBAs or Ethernet NICs) and switches:

Distance: the first benefit of the storage network is the ability to separate devices by up to several kilometres. Adding data replication mechanisms makes it possible to build failover sites and disaster recovery plans.

Fault tolerance: multi-path connection between server and networked storage array is possible, enabling redundant paths to data.

High availability: a SAN is the ideal and recommended architecture for server clustering. Two or more server nodes in the cluster share the same storage capacity.

Flexibility: for non-clustered application, a SAN also enables "cold standby" architectures with the ability to boot from the SAN without having any hard disk drives within the server. In case of server failure, another similar server can quickly take over.



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

3rd SAN Component: the management software

Although it is often overlooked, the management software is perhaps the most important part of any SAN. Whether as various bricks or integrated under one layer, the management software provides the following benefits:

Efficiency: it helps you configure and optimise individual components for the best setup. It monitors the entire SAN for performance bottlenecks and areas of potential failure, then appropriately broadcasts errors and alerts or provides usage statistics that enable consumption-based allocation of IT costs. It brings a logically unified vision of distinct hardware components, including servers. Additionally, virtualisation functionality lets you manage all available storage as one virtual pool, regardless of where it's located.

Disaster recovery: it leverages the network infrastructure to maintain online copies of your data on a distant device (ideally identical). In case of a major failure it ensures maximum consistency and data availability and fast return to normal production state. With certain applications, it can even maintain the service for minimal disruption.

Data protection: data protection software automates time-consuming tasks such as data backup and enables fast restore. Snapshots (local, instant copies of data) are also possible for instant recovery, or to simplify IT operations, such as upgrades, making them less disruptive.

Benefit of a SAN: enhances efficiency by managing your consolidated storage from one logical location. Enables value-added capabilities, leveraging the infrastructure.

4th SAN Component: nearline storage

Within a 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 optimise slow server backups.

Learn more about Ultimate Business Protection at: **www.hp.com/eur/simply**

Benefit of a SAN: reduces your backup window and simplifies recovery with central management. Allows more sophisticated data protection strategies, including disk and tape media to enhance levels of service.

5th SAN Component: the servers

Multiple servers, from different vendors, running different operating systems, can all be connected to a SAN. Servers with a fibre-channel (FC) SAN connection require a special FC card called a host bus adaptor (HBA) in each connected server. In an IP SAN, you can use a standard Ethernet NIC. FC HBAs are usually more expensive than standard Ethernet NICs because as they embark more processing power, they have no impact on the server CPU(s).

Benefit of a SAN: allows server and storage resources to evolve at their own pace without jeopardising the IT investment. Heterogeneous servers share the storage pool.

Planning for storage consolidation and SAN deployment

To make sure the project will be a success and will fulfill your business and IT objectives:

- Make sure the right service levels are met (performance, availability)
- Make sure it fits in the budget

A review of audit of the current infrastructure is recommended.

It's important to clearly define the servers eligible to network storage. As an example, connecting typical "infrastructure" servers such as DNS, DHCP, directory to the SAN brings little value.

The chart below is for you to copy and fill with all the necessary information and criteria to judge a server's eligibility to the SAN:

Storage capacity: calculate your storage capacity per server, the expected future and the annual growth rate.

Service requirements: in case of failure, how much downtime can you tolerate? Is your application already clustered?

The maintenance level on your server(s) is an indication of what you expect in terms of downtime for this application. This is a sensitive point because you will probably have to subscribe your highest level of maintenance on the total system. It has to be taken into account in your investment budget.

Data value: in case of data loss, how much would it cost you to recreate it from scratch?

Storage workload: helps you define what disk drives you need. They exist in two major types:

- **Transactional:** many parallel exchanges of small data chunks; key requirement is the number of drives ("spindles") and the rotational speed
- **Sequential:** exchange of large chunks of streamed data; key requirement is the size and number of disk drives

Typical application/storage workloads:

- **File service:** Sequential (S)
- **Database:** Transactional (T)
- **Messaging:** Mixed (S/T)

	Storage Capacity			Service Requirement		Data Value	Storage Workload
	Current	**Future**	**Growth Rate**	**Maintenance level**	**Cluster (Y/N)**		
Server/application 1							
Server/application 2							
…							
Server/application N							
Total	GB	GB	%	Highest level		$	

Part 2:
Assessing your options
Choosing the appropriate technology for your environment

Disk drive technologies: Serial ATA versus SCSI and FC disks

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

Serial ATA (SATA) disks available for MSA arrays provide a much lower cost per megabyte than SCSI or FC disks. However, because they are derived from desktop PCs, SATA disks use cheaper components that are not designed for the same level of performance and reliability as SCSI or FC disk drives. That said, SATA is not intended as a replacement technology. SCSI or FC 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.

As they begin to appear in server-based solutions and external JBOD enclosures (MSA50, MSA60), SAS drives bear the promise of more I/O performance and lower power consumption. Today they fulfill the needs for denser internal storage with rack servers and they provide a great fit for blade servers.

Small Form Factor SAS drives (2,5") today offer great density – thus more spindles per enclosure – but smaller capacity than Large Form Factor (3,5") SAS drives that cover bigger capacities (up to 300 GB) for better cost/GB ratio.

The promise of SAS is also the ability to mix SATA and SAS drives in the same enclosure, allowing much more flexibility.

SAN Infrastructure:

A storage network needs to sustain high levels of throughput performance with low latency. This requires specific protocols dedicated for storage interconnect. Historically, SANs have used fibre-channel protocol on a dedicated fiber-optic network. The development of the iSCSI protocol has made possible the use of existing Ethernet infrastructure as its level of performance became sufficient (Gigabit Ethernet). Nevertheless, sustaining the level of I/O performance requires dedication (physical or virtual) in this network.

FC SANs: for larger, more demanding environments

Because the low-latency FC 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 centres), but also when fully integrated SAN backup is required, FC SANs will remain the choice over the coming years.

IP SANs: the new 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 your existing Ethernet infrastructure using a new protocol called iSCSI. An existing 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 ensure 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.

"HP has been a partner who has invested the time to understand our business goals and needs. They provide the best solutions that make the most sense for us; we know that we can trust their word and their solutions."
Peter Gilbert, Director of the Information Technology Services Group, London Health Sciences Centre

HP's approach and unique benefits

Providing a choice

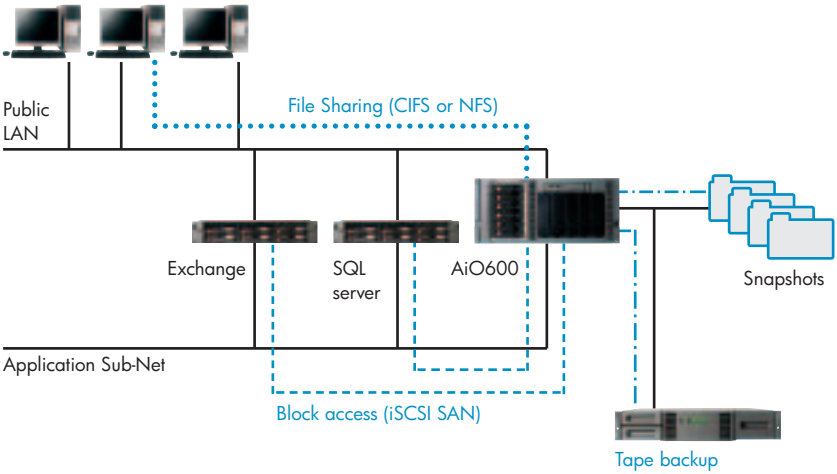
According to the needs, the size of their environments or the IT intensity of their business, HP gives small and medium-sized companies the choice between an integrated "turnkey" solution and a tailored network solution grouping several bricks.

The **HP StorageWorks All-in-One Storage Systems** family of products are complete storage solutions within one product. They combine affordable, integrated file services, application data and data protection functions under a single management umbrella.

An All-in-One is perfect for cost-effective, entry-level SAN consolidation without the need for storage expertise.

The **HP StorageWorks Modular Smart Array Systems** family of products enable the construction of a complete storage consolidation solution out of several modular bricks that seamlessly integrate together. An MSA solution thus requires a little more planning but offers maximum flexibility, availability and performance.

Both types of solutions go through extensive testing and heavy qualification in HP labs – so whatever your choice is, it will carry the HP stamp to ensure uncompromising quality.



HP's unique value-adds

Ease-of-use of the All-in-One

Reducing complexity with integrated functionality, the intuitive HP All-in-One Storage Manager was designed for IT generalists, not storage experts. This tool handles all underlying storage tasks and presents capacity in application-centric terms, giving administrators new-found levels of control and hiding the complexities traditionally associated with storage.

Managing everything through a single screen

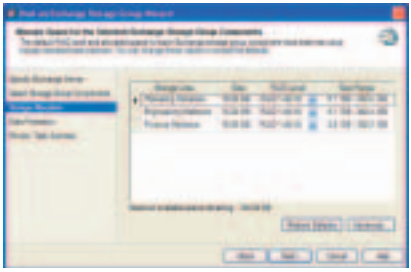
Administrators can quickly and easily set up or expand data areas, migrate data from capacity constrained servers, implement disk and tape backup policies, set up end-user file shares and more.

Application "Best Practices"

All-in-One provides data migration tools for Microsoft Exchange and SQL Server that include "best practice" recommendations leveraging HP's knowledge and experience. Other setup tools for "user defined" data types, such as Oracle® or Lotus, enable flexible deployment in many different environments.

All-in-One Storage Manager

A single interface to manage storage and data protection from an application-centric point of view.



Setup and migration tools

IT generalists can quickly and easily setup storage and migrate data using "best practice" wizards.

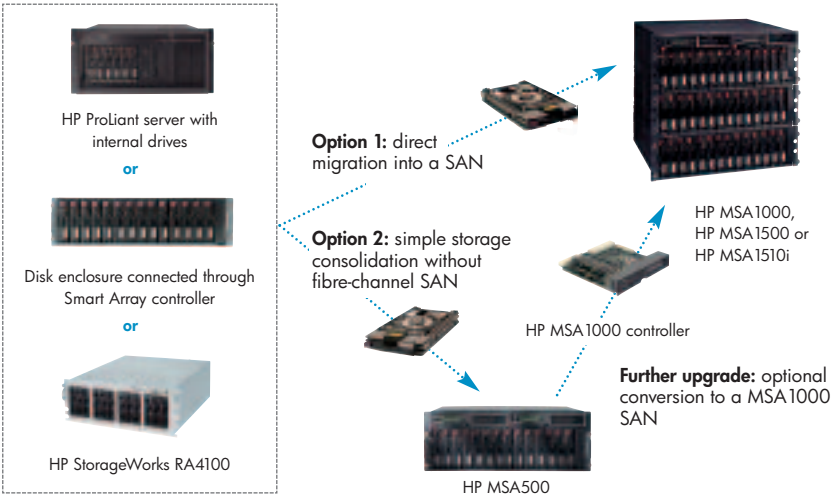
HP's approach and unique benefits

Modularity of the MSA

The modularity is achieved through common components that fit together and help build your storage solution. The benefits are the following:

- Unique DtS (DAS to SAN) migration technology allows customers to move HP ProLiant universal disk drives into a SAN*
- Flexibility to start small and migrate drives and enclosures into larger configurations: Start with simple external storage (MSA30 or MSA20), or clustered storage (MSA500G2) to a full SAN when you're ready
- Common configuration and management tools between MSAs and ProLiant servers, using Smart Array technology

DAS-to-SAN migration with HP Smart Array technology



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

HP's Portfolio of Products Part 1

HP StorageWorks All-in-One Storage Systems

	Entry-level consolidation	Entry-level consolidation	
	MSA500 G2 Affordable shared storage solution	**AiO400** Fixed server-based IP SAN solution	**AiO600** Expandable server-based IP SAN solution
Disk-technology	SCSI	SATA	SATA or SAS
Scalability	Scale up to 4 TB	4 x SATA disk slots	Scale up to 3 TB
Consolidation	Consolidate storage of up to 4 servers and/or one cluster	Consolidate multiple servers in an IP SAN	
Redundancy	Full redundancy with up to 2 array controllers	1 controller in the server enables RAID management	
Operating system support	Windows® Linux® NetWare	Windows Linux AIX Solaris	
Other features	Enables host-based snapshots and virtualisation[1] and replication over IP in Windows environments[2]	Replication, snapshots, direct backup, clustering (possible at both host and All-in-One)	

[1] Using HP OpenView Virtual Replicator

[2] Using HP StorageWorks Storage Mirroring

HP's Portfolio of Products Part 2

HP StorageWorks Enterprise Virtual Array family



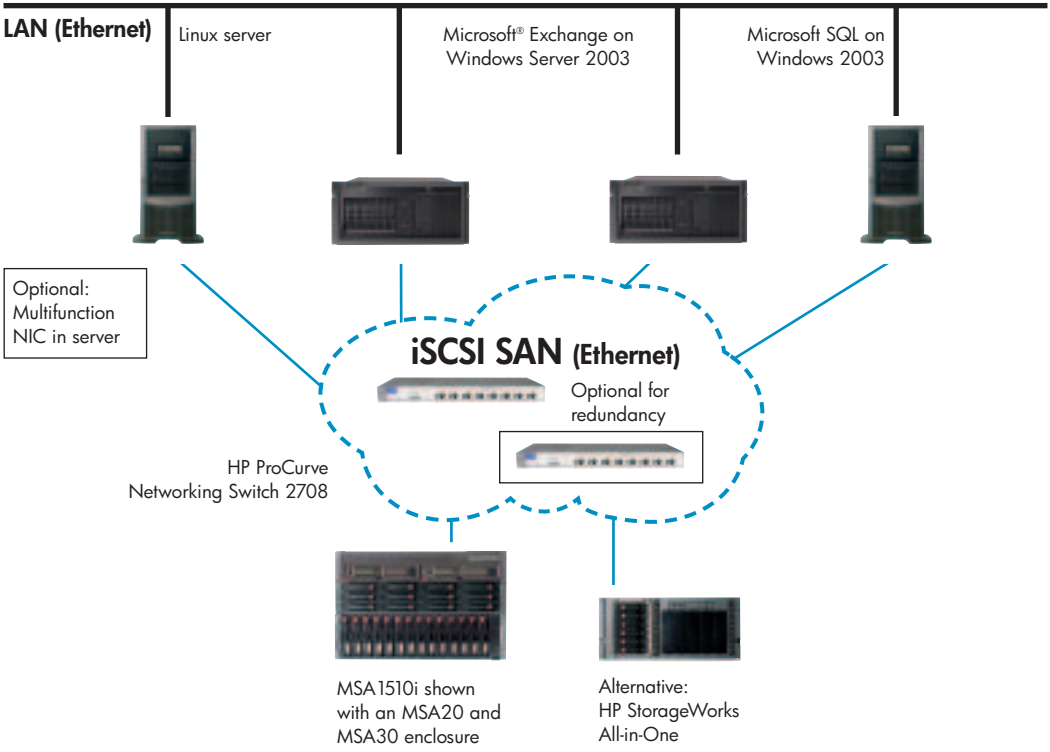

Entry-level consolidation	Mid-range consolidation		High-end consolidation
MSA1510i Flexible IP SAN solution	**MSA1000** Affordable starter FC SAN solution	**MSA1500** Flexible, scalable FC SAN solution	**EVA4000/6000/8000** High-performance and high-availability virtualised array solution
SATA or SCSI	SCSI	SATA and/or SCSI	FC or FATA
Scale up to 64 TB (SATA) or 16 TB (SCSI)	Scale up to 12 TB	Scale up to 64 TB (SATA) or 16 TB (SCSI)	Scale up to 72 TB (EVA8000)
Consolidate multiple servers in an IP SAN	Enhanced storage consolidation in a FC SAN with multi-server clustering		Easy manageability and virtualisation allows consolidation of multiple storage devices
No single point of failure with redundant controllers and redundant SAN			Redundant architecture and broad choice of software including remote replication
Windows	Windows Linux VMware ESX NetWare Tru64, OpenVMS HP-UX	Windows Linux VMware ESX NetWare HP-UX	Windows Linux HP-UX Tru64, OpenVMS Solaris, AIX
Enables replication over IP in Windows environments[2]	Enables host-based snapshots and virtualisation[1] and replication over IP in Windows environments[2]. Embedded switch option	Enables host-based snapshots and virtualisation[1] and replication over IP[2]	Virtually instantaneous snapclones for backup and restore. Remote replication. HP pay-per-use for storage capacity and software

For more advanced, enterprise-level needs...

Part 3:
Choosing your Solution
Consolidation onto an IP SAN
Either MSA1510i or All-In-One

Consolidation onto an IP SAN

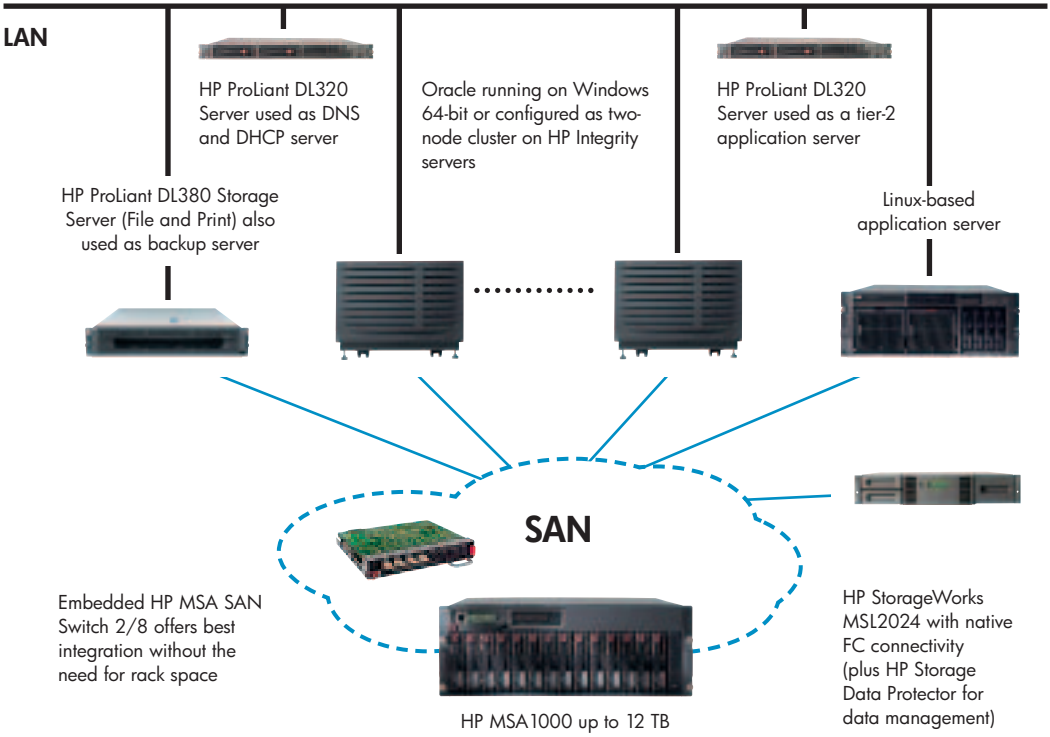
For small environments and cost-conscious customers, networked storage using iSCSI on IP infrastructure offers a great balance between efficiency and affordability. This can be achieved through array-based solutions (using the MSA1510i) or server-based solutions (using the HP StorageWorks All-in-One Storage System). When using an MSA1510i, you may design a redundant infrastructure using two switches.



Starter FC SAN with 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.

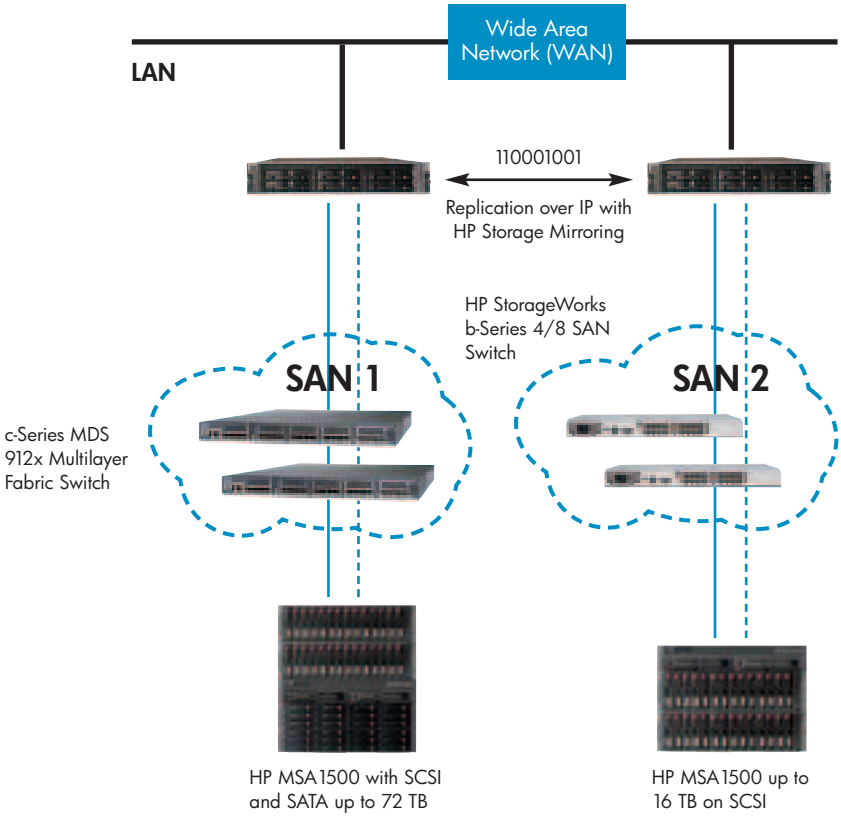
Here we see a non-redundant configuration that's perfect for cost-sensitive customers, although full redundancy can be achieved simply by adding a second controller, switch and HBA. In addition, multiple clusters are also possible. Expanded platform support now enables wider OS and server heterogeneity: x86 servers and HP Integrity can share the same MSA on the SAN.



Cost-effective, disaster-tolerant storage

Consolidating your storage on a SAN also enables the creation of a redundant infrastructure for remote copy of production data. HP provides a very cost-effective solution with HP StorageWorks Storage Mirroring, a host-based software for Windows environments.

Storage Mirroring goes beyond data replication by also providing application failover on file service, Microsoft Exchange messaging and Microsoft SQL databases.



Fully integrated, high-availability SAN

In this implementation, the association of blade servers with the SAN makes the perfect IT building the block, enabling maximum efficiencies on both the computing and storage side.

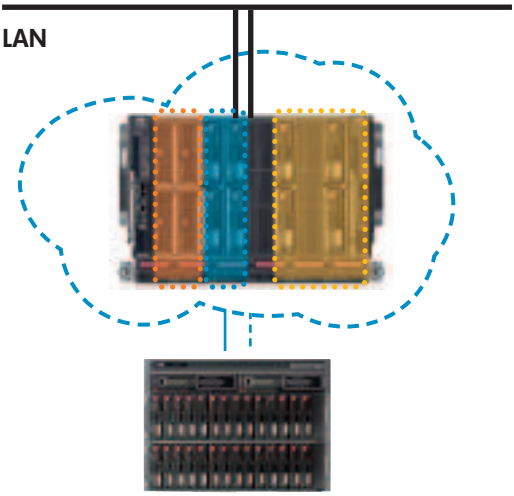
This architecture is ideal for "scale-out" server deployments or n-tier, web-based enterprise applications.

New enhancements in the MSA1500 such as active-active controller capability make this type of deployment possible with:

- Significant improvements in performance
- No single-point-of-failure (SPOF) between servers and storage on HP-UX and Linux
- Heterogeneous OS support with Windows, Linux and HP-UX on the same MSA1500

HP c-Class Servers connected to the SAN through two redundant embedded blade switches

HP MSA1500 (up to 16 TB SCSI) connected to a blade enclosure



In this scheme, the blade servers are organised as follows:

Orange: HP Integrity blade servers running HP-UX for database cluster

Blue: x86 blade servers running Linux or Windows as application servers

Yellow: x86 blade servers deployed as web/load balancing servers

EVA – combine simple management with performance and availability

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

Ultimate management efficiency

With increases in storage capacity and continuous expansion of digital content, storage management is a key issue for organisations 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 the ultimate in management efficiency thanks to built-in virtualisation. This presents your storage capacity as a "virtual" pool, which eliminates 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 virtualisation 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.

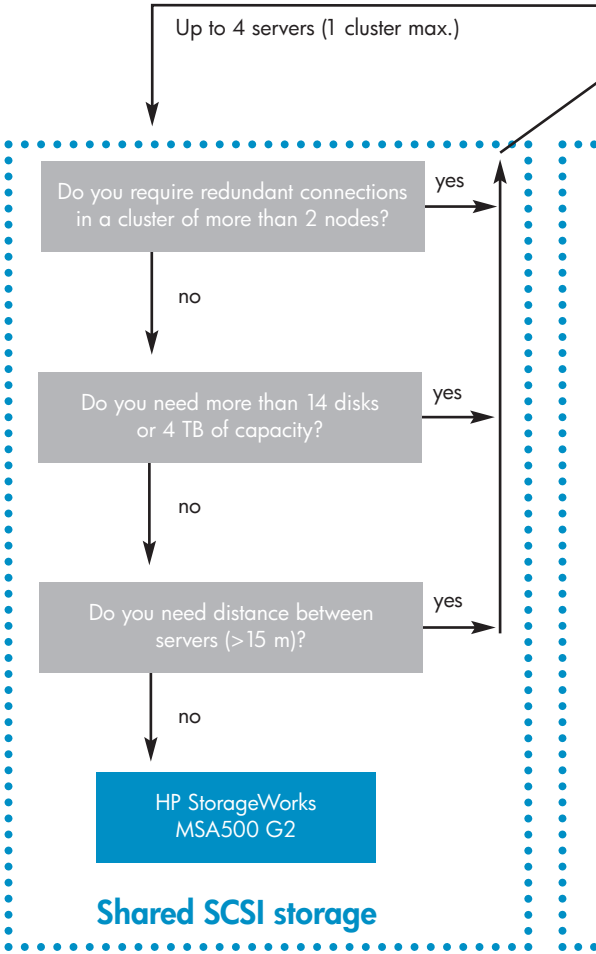
Furthermore, the new EVA family (which now features a broader choice of arrays) offers additional connectivity through the use of industry-popular multipathing software, such as MPIO, and massive scalability that's only limited by the size of today's disk drives.

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.

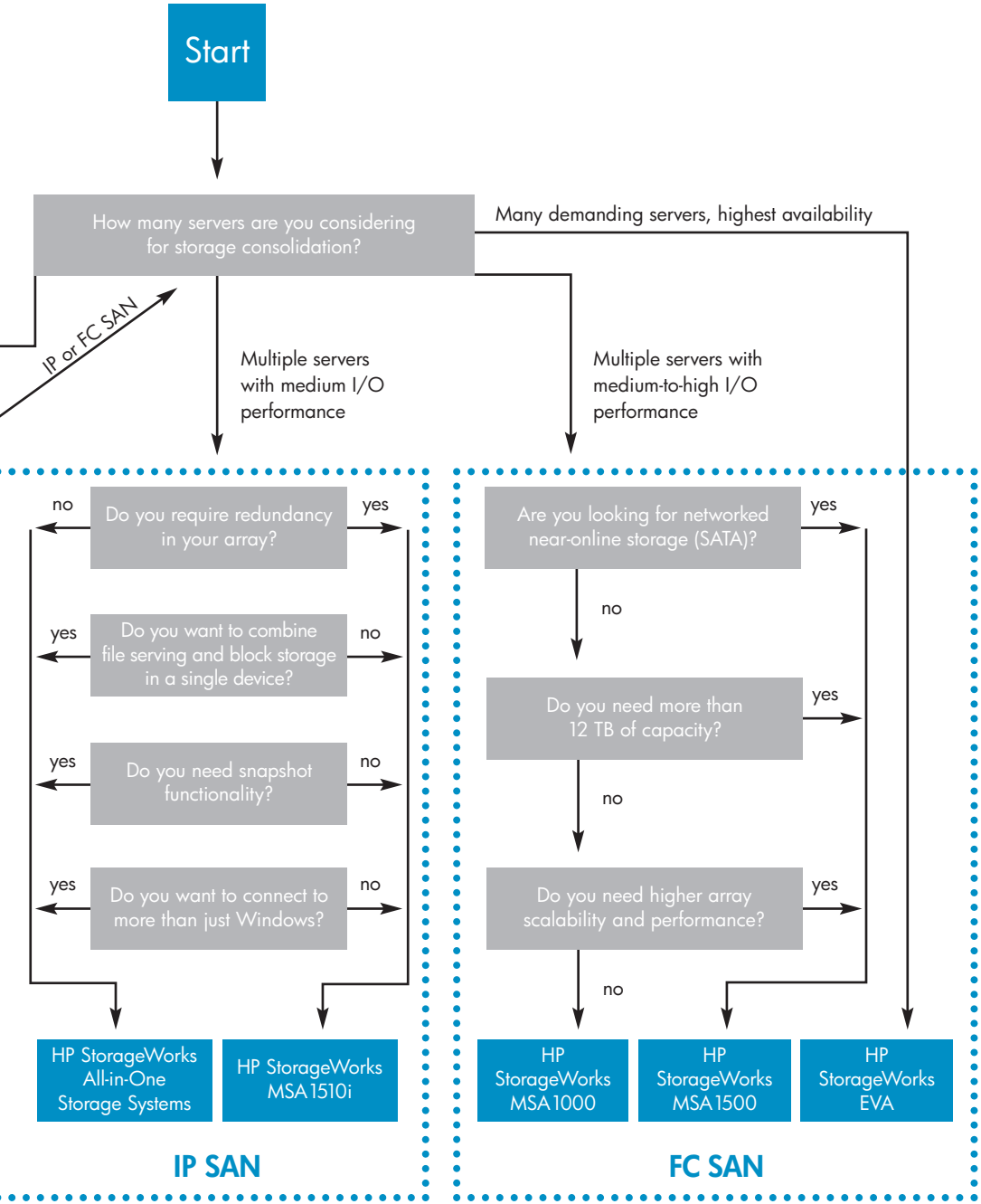
Decision tree

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


Start
How many servers are you considering for storage consolidation?
Many demanding servers, highest availability
IP or FC SAN
Multiple servers with medium I/O performance
Multiple servers with medium-to-high I/O performance
no
Do you require redundancy in your array?
yes
yes
Do you want to combine file serving and block storage in a single device?
no
yes
Do you need snapshot functionality?
no
yes
Do you want to connect to more than just Windows?
no
HP StorageWorks All-in-One Storage Systems
HP StorageWorks MSA1510i
IP SAN
Are you looking for networked near-online storage (SATA)?
yes
no
Do you need more than 12 TB of capacity?
yes
no
Do you need higher array scalability and performance?
yes
no
HP StorageWorks MSA1000
HP StorageWorks MSA1500
HP StorageWorks EVA
FC SAN

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 for every aspect of your IT environment and at every point of the IT lifecycle, 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 HP 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 six-hour call-to-repair)
- Provide phone assistance and licence updates on your software components
- Optimise the availability of your HP products
- Reduce costly downtime and improve employee productivity

Mission-Critical Services

The following 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 minimal disruption to your operations. We help you get maximum 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 customised technical and operational guidance.

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

"I hadn't had an experience with a SAN before this. But thanks to the HP StorageWorks MSA1000 SAN Kit, it was so easy to install that it took us longer to unpack the SAN from the box than it took to actually install it."
Michael Magaldi, Director of Technology, St Mary's School

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.

The HP StorageWorks All-in-One Storage System can offer similar server connectivity as the MSA1510i according to the model chosen. Smaller All-in-One 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 licences you currently require, but still have the flexibility to scale up when needed.

For more information about backup, please visit: **www.hp.com/eur/simply**

How can I grow FC connections in my SAN?
If the number of servers exceeds the number of FC ports, you can simply add another FC 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.

Which FC switch is the best fit for my storage consolidation solution?
The 4 GB/s eight-to-16-port B-series SAN switches deliver high-speed performance to dramatically accelerate data backups and reduce storage management time and effort. Plus, they offer multiple high-speed data paths to increase data availability, cost-effective scalability so you can grow in line with changing business needs and easy-to-use features for increased administrator productivity.

The Cisco MDS 912x fabric switch from HP is easy to use, has scalable management tools (including the embedded Fabric Manager) and can be integrated into most commonly used management software.

The 4/10Q Switch, part of the MSA1000 Small Business SAN Kit, is ideal for small environments with few servers, where low cost and simplified management is important.

How does HP StorageWorks Storage Mirroring increase the availability of data?
HP StorageWorks Storage Mirroring 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
- Centralised backup – eliminating the need to work with live production data and dependency on a backup window
- Automatic or manual failover capabilities – ensuring 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 14).

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 adaptor 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 FC protocol, but uses standard Ethernet-based IP (Internet protocol) networks. iSCSI is especially interesting for small environments with lower performance requirements.

LUN
A LUN is a Logical Unit Number, which is really a logical volume. The operating systems and the software on them operate against a logical volume and view it as a linear address space of fixed-size blocks. A physical disk can be set up to be one large LUN or carved up into multiple LUNs.

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.

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 FC 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 centres – to achieve highest availability in case of failure of one data centre. 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 workstations and servers to storage devices in a SAN. The SAN infrastructure enables any-server-to-any-storage-device connectivity through FC switching.

SAS (serial attached SCSI interface)
A next-generation SCSI interface that uses serial technology.

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 eight-hours and 10–30% duty cycle) compared to SCSI (and fibre-channel) HDDs, which are more advanced, offering a 24x7 and 80–100% 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.

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

VLAN
If you plan to leverage your existing IP infrastructure as storage network using the iSCSI protocol, it is recommended to either deploy a dedicated network or virtually dedicate a part of it through VLAN.

Simply StorageWorks – Storage is easy when you choose HP.

For information on Simply StorageWorks solutions visit:
www.hp.com/eur/simply

4AA0-7822EEE. February 2007