

hp StorageWorks

Addendum - SAN Support for SAN Fabrics Using Both HP and Compaq Products

Part Number: AA-RS31A-TE

First Edition (July 2002)

This document describes the configuration rules for hp StorageWorks Fibre Channel SANs consisting of a mix of supported HP and Compaq servers, storage, and infrastructure components. It also describes new supported configurations for the StorageWorks core switch 2/64, StorageWorks director 2/64 and StorageWorks edge switch 2/32 and 2/16.

This document is an addendum to the *Heterogeneous Open SAN Design Reference Guide*, 3rd edition (AA-RMPND-TE).

Obtain the latest version of the *Heterogeneous Open SAN Design Reference Guide* through this link:

<http://www.compaq.com/products/storageworks/san/documentation.html>

For the latest version of this addendum and other heterogeneous open SAN documentation, visit the HP storage website at:

<http://thenew.hp.com/country/us/eng/prodserv/storage.html>

Additional information about pre-merger HP SAN support is available to HP field representatives via the HP internal SPOCK website.



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Addendum Contents

This addendum covers the following major topics.

- Features and configurations for hp StorageWorks SANs
- Features and configurations for the hp StorageWorks core switch 2/64
- Features and configurations for the hp StorageWorks director 2/64, hp StorageWorks edge switch 2/32, and hp StorageWorks edge switch 2/16
- Notes, updates, and supplementary information for each chapter in the *Heterogeneous Open SAN Design Reference Guide*

Intended Audience

This document is intended for customers who have an HP or Compaq SAN environment and are interested in merging or modifying the SANs so that they consist of a mixture of components from both previous product lines. Customers who wish to build a new hp StorageWorks SAN using the new HP supported servers, storage, and infrastructure components should also use these configuration rules.

Note About Supported Products and Configurations

This document describes supported products and configurations. If a product or configuration is not listed here or in the *Heterogeneous Open SAN Design Guide*, it is not supported. There is no separate list of unsupported products and configurations.

Design Rules for hp StorageWorks Storage Area Networks

Before the merger of HP and Compaq, each company offered comprehensive SAN solutions backed by extensive engineering, qualification, and support organizations. The supported SAN configurations from each company were comparable but not identical.

This document describes enhanced SAN support that is now available from the new HP. This new support includes these primary features.

- Support of an hp StorageWorks SAN consisting of a mix of certain servers, storage, and infrastructure components supported by pre-merger HP and Compaq. The hp StorageWorks SAN fabric support rules closely match the pre-merger HP SAN fabric support rules, and they can be considered a subset of the pre-merger Compaq SAN fabric rules.
- Support for the new 2 Gbps hp StorageWorks core switch 2/64. This product is compatible with the hp StorageWorks SAN and both pre-merger HP and pre-merger Compaq SAN installations, and has been qualified in hp StorageWorks core switch and hp StorageWorks SAN switch fabric configurations.
- Support for the new 2 Gbps hp StorageWorks director 2/64, the new hp StorageWorks edge switch 2/32, and the new hp StorageWorks edge switch 2/16. These new switches are compatible with the hp StorageWorks SAN and both pre-merger HP and pre-merger Compaq SAN installations. These switches have been qualified in hp StorageWorks director and hp StorageWorks edge switch fabric configurations.

NOTE: An hp StorageWorks SAN is defined as a SAN with one or more fabrics consisting of a mix of pre-merger HP and pre-merger Compaq storage systems, including HP XP and/or VA storage systems in a SAN fabric with Compaq EVA or EMA/ESA/MA/RA or MSA/RA4xxx storage systems.

HP continues to fully support the pre-merger HP and Compaq support limits for SANs consisting of exclusively HP or Compaq supported storage and infrastructure components. HP is working towards a single fully merged set of SAN configuration rules with increased scaling and storage product support, beyond what was previously supported by both pre-merger companies.

Features of hp StorageWorks SANs

The new features enabled by the use of the rules in this document include the following.

- Using certain infrastructure components from both pre-merger HP and pre-merger Compaq SAN product offerings to assemble Fibre Channel fabrics.
- Mixing specific storage systems from both pre-merger HP, and pre-merger Compaq, in a single fabric.
- A wider range of operating system versions and infrastructure components may be used.
- Customers may choose pre-merger HP or pre-merger Compaq management utilities and tools.

NOTE: New versions of switch firmware may be required for hp StorageWorks SAN support.

hp StorageWorks SAN Implementation Overview

The hp StorageWorks SAN configurations are implemented by defining zones that isolate servers and storage running with existing HP products and feature sets, from servers and storage running with Compaq products and features.

Operating systems, host bus adapters, and storage systems from both HP and Compaq are now supported in the hp StorageWorks SAN fabric environment, including products from the EVA, XP/VA, EMA/ESA/MA/RA, and MSA/RA4xxx families of RAID storage systems. Common server or common host bus adapter access to these storage systems is not supported at this time.

The rules regarding isolation requirements will gradually be relaxed as the various product families are brought into synchronization. The current method is shown in Figure 1 for the StorageWorks core switch and SAN switch fabric family, and in Figure 2 for the StorageWorks director and edge switch fabric family.

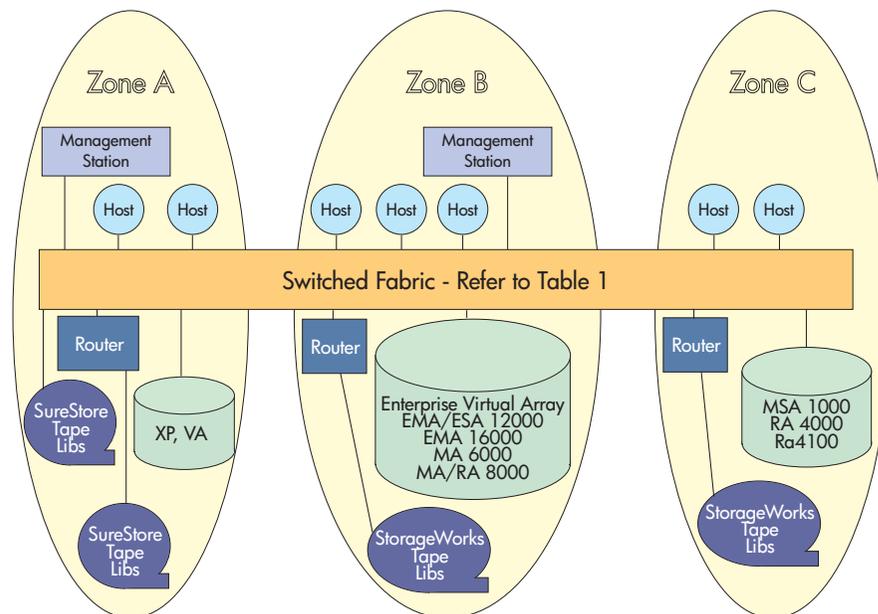


Figure 1: hp StorageWorks SAN using hp StorageWorks core switches and SAN switches with server and storage components from HP and Compaq

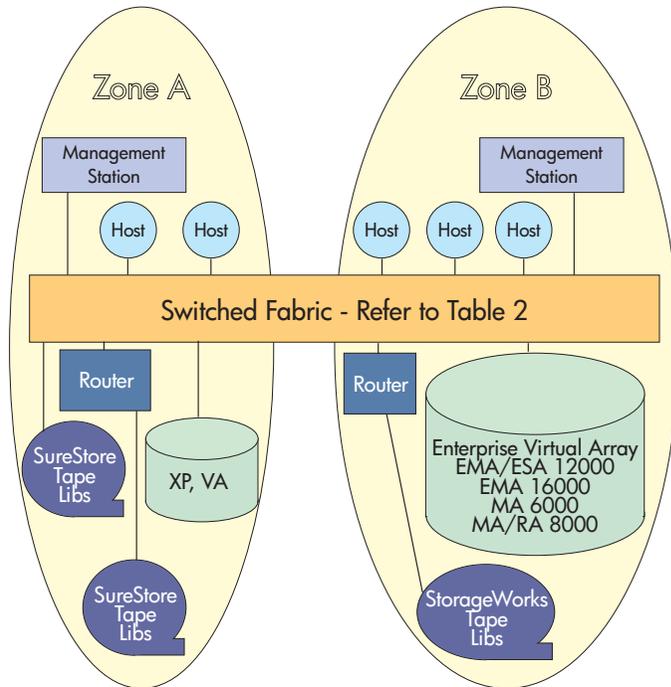


Figure 2: hp StorageWorks SAN using hp StorageWorks directors and edge switches with server and storage components from HP and Compaq

Common Infrastructure Products

This document describes how hp StorageWorks SANs may be constructed using a set of rules that reflect the overlap or common denominator of the two prior sets of supported configurations. A future document will describe SAN configuration rules that allow configurations that exceed the previous limits of both companies.

Before the merger, each company supported two families of infrastructure components. Pre-merger HP SANs could be built using the Brocade family of Fibre Channel switches or they could be built using the McDATA family of Fibre Channel switches. The Brocade family included the Surestore FC Switches 6164, 1Gb/2Gb Entry Switch 8B, 1Gb/2Gb Switch 8B, 1Gb/2Gb Switch 16B, and the Brocade Silkorm 2400, 2800, and 12000 switches. The McDATA family included the Surestore FC64 and the McDATA ES-3016, and ES-3032.

Pre-merger Compaq StorageWorks SAN switch based fabric SANs could be built using the SAN Switch 8, 8-EL, 16, 16-EL, SAN Switch Integrated 32 or 64, SAN Switch 2/8-EL, 2/16, and the 2/16-EL. Compaq StorageWorks Director fabric SANs could be built using the StorageWorks SAN Director 64, and the McDATA ED-5000, ES-3016, and 3032.

HP now also fully supports the new hp StorageWorks core switch 2/64, the hp StorageWorks director 2/64, the hp StorageWorks edge switch 2/32 and the hp StorageWorks edge switch 2/16 in the respective switch fabric families, and in the new hp StorageWorks SAN, providing expanded configuration support.

The relationship between pre-merger HP and pre-merger Compaq Fibre Channel switch product names is shown in Table 1 and Table 2.

hp Switch Name	Compaq StorageWorks Switch Name	hp StorageWorks SAN	Number of Ports
Brocade 2400	SAN Switch 8	Yes	8
N/A	SAN Switch 8-EL	Yes	8
Brocade 2800	SAN Switch 16	Yes	16
N/A	SAN Switch 16-EL	Yes	16
De-populated Surestore FC Switch 6164	SAN Switch Integrated/32	Yes	32 (counts as six switches when applying configuration rules)
Surestore FC Switch 6164	SAN Switch Integrated/64	Yes	64 (counts as six switches when applying configuration rules)
Surestore FC 1Gb/2Gb Entry Switch 8B	N/A	Yes	8
N/A	SAN Switch 2/8-EL	Yes	8
N/A	SAN Switch 2/16-EL	Yes	16
Surestore FC 1Gb/2Gb Switch 8B	N/A	Yes	8
Surestore FC 1Gb/2Gb Switch 16B	SAN Switch 2/16	Yes	16
hp StorageWorks core switch 2/64		Yes	64 (two switches per chassis, for a total of 128 ports per chassis)

Table 1: hp StorageWorks SAN Fibre Channel switches for core and SAN switch fabrics

hp Switch Name	Compaq Switch Name	hp StorageWorks SAN	Number of Ports
McDATA ES-3016		Yes	16
McDATA ES-3032		Yes	32
McDATA ED-5000		No	32
Surestore FC64	StorageWorks SAN Director 64	Yes	64
StorageWorks Director 2/64		Yes	64
hp StorageWorks Edge Switch 2/16		Yes	16
hp StorageWorks Edge Switch 2/32		Yes	32

Table 2: hp StorageWorks SAN Fibre Channel switches for director and edge switch fabrics

Features of the hp StorageWorks core switch 2/64

The hp StorageWorks core switch 2/64 consists of a pair of 2 Gbps 64-port switches in a 14U rackmount enclosure. This unit is designed for environments where a large number of ports are needed in a highly available package. It is compatible with the hp StorageWorks SAN switch line of products.

The core switch 2/64 may be used as a stand-alone switch or may be used in combination with several SAN switches in a “core switch plus SAN switch” configuration. Depending on the performance requirements for the SAN, HP supports Fibre Channel fabrics using core switch plus SAN switch configurations with up to a total of 448 ports.

The core switch 2/64 includes the following features.

- Dual-redundant control processors
- Redundant, hot-swappable components
- Redundant power and cooling subsystems
- Four-way ISL trunking providing a single logical ISL running at up to 8 Gbps
- Hardware-enforced zoning based on World Wide Name or switch port
- Architecture is designed for future technology support such as iSCSI and FCIP
- Design is extendable to future 10 Gbps technologies
- End-to-end performance analysis tools

The core switches and SAN switches are also compatible with the HP branded and HP sold Brocade switches and the Compaq StorageWorks SAN Switches. When used in mixed configurations, ISLs between 1 Gbps and 2 Gbps switches will only operate at 1 Gbps, since the switches will auto-negotiate to the lowest common denominator speed.

HP does not support fabrics with a mixture of core switches or SAN switches and director or edge switches for the configurations listed in this document.

Features of the hp StorageWorks director 2/64 and edge switch 2/16 and 2/32

Three new switches are now supported for use in director and edge switch environments.

Features of the hp StorageWorks director 2/64

The hp StorageWorks director 2/64 is a 2 Gbps 64-port switch in a 9U rackmount enclosure. This switch is designed for environments where a large number of ports are needed in a highly available package. It is compatible with the hp StorageWorks director and edge switch line of products.

The director 2/64 may be used as a stand-alone switch or may be used in combination with several edge switches in a “director plus edge switch” configuration. Depending on the performance requirements for the SAN, HP supports Fibre Channel fabrics using director plus edge switch configurations with up to a total of 1024 ports.

The director 2/64 includes the following features.

- Hot-plug redundant power supplies
- Hot-plug redundant fans
- Hot-plug optics
- Hot-plug processors
- Hot-plug switch modules
- Hot-plug port modules
- On-line diagnostics
- On-line, non-disruptive firmware load and activation
- Fault isolation tools for network-wide activity
- High level of unit availability
- Planned support for emerging 10 Gbps technologies
- Designed for future technology support such as iSCSI and FCIP
- Modular expandability using eight 8-port blades
- Call home Proactive Services support

The director 2/64 is a member of a family of Fibre Channel switches that also includes the hp StorageWorks edge switch 2/32 and hp StorageWorks edge switch 2/16. These switches all use the same ASIC (Application Specific Integrated Circuit) switching elements and the same switching firmware. This allows HP to support a wide range of fabric topologies using flexible mixtures of directors and edge switches.

The director and edge switches are also compatible with the HP branded and sold McDATA switches and the Compaq StorageWorks SAN Director 64, and the McDATA Enterprise Director ED-5000. When used in these mixed configurations, the ISLs between the 1 Gbps and 2 Gbps switches will only operate at 1 Gbps, since the switches will auto-negotiate to the lowest common denominator speed. HP does not support fabrics with a mixture of director or edge switches and core switches or SAN switches for the configurations listed in this document.

Features of the hp StorageWorks edge switch 2/32

The hp StorageWorks edge switch 2/32 is a 2 Gbps 32-port switch in a 1.5U rackmount enclosure. This switch is particularly useful in SANs designed with a “director plus edge switch” philosophy, where the fabric topology is based on a high performance, highly available, high port-count director surrounded by several less expensive edge switches. Fabrics of this type are usually tree topologies, as described in the first two chapters of the SAN Design Guide.

The edge switch includes the following features.

- 2 Gb/s non-blocking connectivity
- Intelligent auto-sensing link speed capability
- Hot-plug redundant power and cooling
- Hot plug optics
- On-line, non-disruptive firmware load and activation
- On-line diagnostic and fault isolation tools for network-wide activity
- Call home Proactive Services support

This switch may be used in Fibre Channel fabrics with the director 2/64, the edge switch 2/16, the Compaq StorageWorks SAN Director 64, and the McDATA Ed-5000. The 2 Gbps switches in this family of products may be freely mixed in a wide variety of topologies, because they share the same ASIC hardware and the same firmware.

Features of the hp StorageWorks edge switch 2/16

The hp StorageWorks edge switch 2/16 is a 2 Gbps 16-port switch in a 1U rackmount enclosure. This switch is a smaller version of the edge switch 2/32, and may be used in the same “director plus edge switch” topologies as the larger edge switch. It offers the same features as the edge switch 2/32, including hot swappable hardware, on-line firmware upgrades, and interoperability with other members of the director and edge switch families. The ASIC and firmware are shared with the other 2 Gbps members of the family.

“director plus edge switch” and “Core Switch plus SAN switch” Configurations

The following two illustrations show examples of supported hp StorageWorks SAN configurations. Refer to the Chapter 1 of the SAN Design Guide for additional discussion.

Figure 3 shows a “director plus edge switch” tree design using two hp StorageWorks directors and 14 hp StorageWorks edge switches.

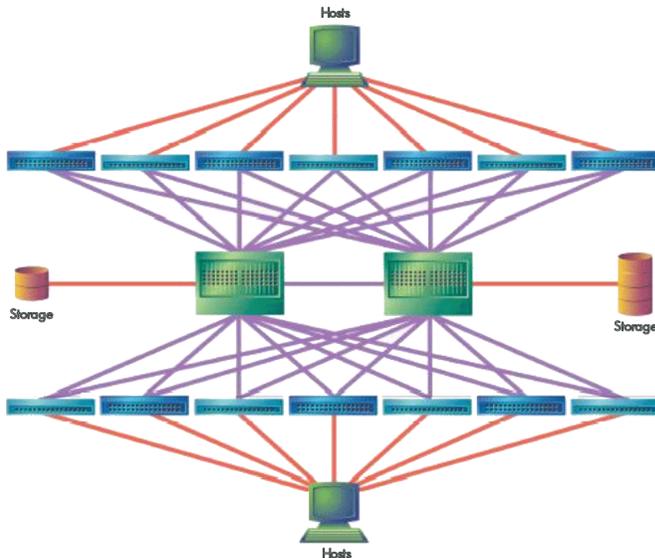


Figure 3: Director plus edge switch hp StorageWorks SAN

Figure 4 shows a “core switch plus SAN switch” design. The fabric uses 2 hp StorageWorks core switches (one chassis holds two core switches) and 14 hp StorageWorks SAN switches. A 4x12 configuration consisting of 4 hp StorageWorks core switches is also supported.

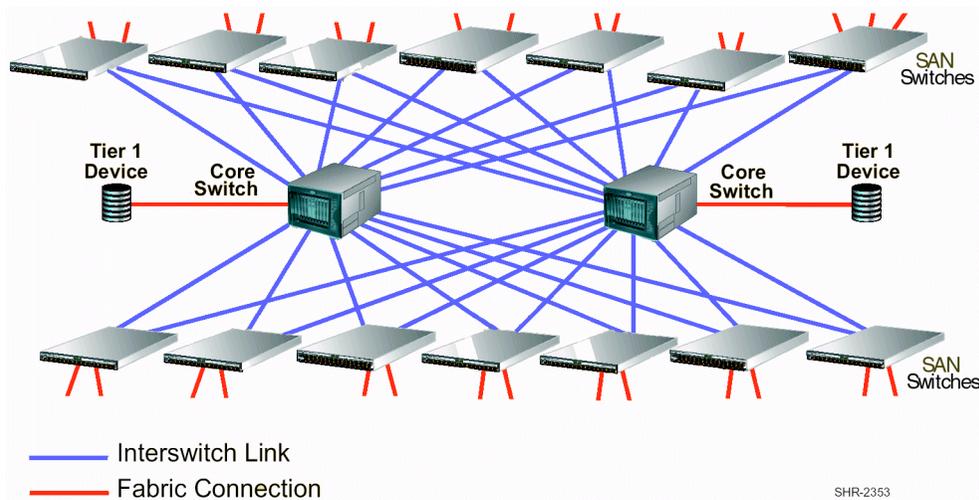


Figure 4: Core switch plus SAN switch hp StorageWorks SAN (2x14 version)

SAN Core and SAN Switch Addressing Mode

When using products from the hp StorageWorks core switch or SAN switch family of products, or the pre-merger HP or pre-merger Compaq products from Brocade, for the switch firmware versions listed in this document two different addressing modes are available. As SAN configurations grow to include more switches, we recommend that the “Core Switch” addressing mode should be used. This is obtained by setting the Core Switch PID configuration parameter bit.

All previous switches supplied by hp and Compaq were shipped with the Core Switch PID configuration bit cleared. When the switches are operated in this mode, certain restrictions apply regarding the maximum number of switches in a fabric and the maximum number of ports on a switch. If a StorageWorks core switch 2/64 is used anywhere in a fabric, then all the switches in the fabric must

have the Core Switch PID configuration bit set. Because hp believes that the use of large port count switches will only become more common as time goes on, all switches will be shipped with the bit set from now on.

SAN managers with existing fabrics must decide whether to change the Core Switch PID bit now or later. The trade-offs are as follows.

- All the switches in a fabric must have the same Core Switch PID bit setting, whether it is set or cleared, otherwise the fabric will segment. It must be set on all switches if a StorageWorks Core switch 2/64 is part of the fabric.
- If you have two fabrics, you can change the Core Switch PID on one fabric at a time, so the SAN storage system can continue to operate during the changeover.
- HP-UX and IBM systems use the address bits to identify logical units, so when the addressing bits are changed the logical unit definitions must also be changed. This requires a reboot of the servers, and it cannot be done without taking down the entire SAN storage system in a planned maintenance scenario.
- If you wait to make this change later, any new switches (other than 64-port switches) must have their Core Switch PID bit cleared before they will interoperate with older switches.

HP recommends that this change be done now, to avoid potential problems in the future. Additional information on the Core Switch PID is available on the HP SAN storage website.

Updates to the Heterogeneous Open SAN Design Reference Guide

The *Heterogeneous Open SAN Design Reference Guide* contains a wide range of information about SAN design and implementation, including discussions of fabric configurations, recommended implementation practices, methods for SAN management, and related topics. The design guide information is generally applicable to SANs made up of mixtures of HP and Compaq components, but some restrictions and modifications must be taken into consideration in these cases.

For pre-merger HP SAN fabrics configured exclusively with HP supported servers, storage, and Fibre Channel switch products, the existing NSAS SAN Support and SAN Rules and Guideline documents apply. These references are available to HP field representatives via the HP internal SPOCK website.

For pre-merger Compaq SAN fabrics configured exclusively with Compaq supported servers, storage, and Fibre Channel switch products, the existing SAN design rules as documented in the latest *Heterogeneous Open SAN Design Reference Guide* apply.

Both pre-merger HP and pre-merger Compaq SAN fabrics also support the new hp StorageWorks core switch 2/64 and the hp StorageWorks director 2/64 and hp StorageWorks edge switch 2/16 and 2/32.

For hp StorageWorks SAN fabrics with a mixture of HP and Compaq supported servers, storage, and Fibre Channel switch products, the hp StorageWorks SAN rules listed in the following sections apply.

SAN Topologies

This section references chapters 1 and 2 in the SAN Design Guide. These two chapters contain tutorial overview information that is generally applicable to Fibre Channel storage area networks.

As described in Chapter 1, Compaq, and now, HP provides three approaches to SAN design and implementation. You can design and implement your SAN using an HP standard topology design, create a variation of an HP design, or create a custom design by following the hp StorageWorks SAN design rules. These three approaches may be applied to any set of application requirements.

The SAN Design Guide describes four supported fabric topologies:

- Cascaded Fabric
- Meshed Fabric
- Ring Fabric
- Backbone SAN Fabrics

NOTE: Backbone SAN Fabrics that use core switches or directors may be described generically as “core switch to SAN switch” or “director to edge switch” fabric designs.

While all four of these topologies continue to be supported, HP recommends that the emphasis be moved away from Ring and Cascade Fabrics and towards Backbone Fabrics or core switch to SAN switch or director to edge switch SAN fabrics. These topologies support larger and higher performance systems, and are more suitable for general-purpose applications. As storage systems continue to grow in capability, the SAN infrastructure must grow to support the requirements for component interconnectivity. Large Fibre Channel fabric networks take on some of the characteristics of telecommunication and data networks, which are generally based on these topologies.

Refer to Table 2-1 (page 2-12) in the SAN Design Guide for additional comments on the comparative characteristics of the various topologies.

When designing a fabric using the 8-port and 16-port SAN switches, all ports may be used as ISLs. This feature is used in the SAN Switch Integrated/32 and SAN Switch Integrated/64 configurations, which are made up of multiple 16-port switches in an integrated mechanical package. However, there are restrictions in the use of ISLs on some Fibre Channel switch models, as shown in Table 3, below.

hp Switch Product Name	Compaq Switch Name	Total Number of Ports	Number of Ports That May Be Used as ISLs
De-populated Surestore FC Switch 6164	SAN Switch Integrated/32	32	32
Surestore FC Switch 6164	SAN Switch Integrated/64	64	64
Brocade 12000 FC Switch	StorageWorks Core Switch 2/64	64	32
hp StorageWorks core switch 2/64		64 per switch, 128 per chassis	32 per switch, 64 per chassis
Surestore FC64	StorageWorks SAN Director 64	64	32
StorageWorks Director 2/64		64	32
StorageWorks Edge Switch 2/16		16	8
StorageWorks Edge Switch 2/32		32	16
McDATA 3016		16	8
McDATA 3032		32	16
McDATA ED-5000		32	4

Table 3: Number of ISLs for Fibre Channel switch products

The topology maximums have been changed from those shown in Table 2-2 (page 2-13), as shown in Table 4, below.

SAN Topology Max Number of Switches	Total Number of Ports		Maximum Number of Device Ports	
	Single Fabric	Two Fabrics	Single Fabric	Two Fabrics
SAN Switch and Core Switch fabrics: 16	448 (4x12 configuration)	896	416 (4x12 configuration with 1 ISL between each switch pair [*])	832
Director fabrics: 8	128	256	114	228

NOTE: ^{*}While this is a valid configuration, it achieves a high device port count by severely limiting the connectivity within the core. A more useful configuration would have four ISLs between the core switches, which would give 392 device ports.

Table 4: Maximum number of ports for various configurations

hp StorageWorks SAN Fabric Design Rules

This section summarizes additions to Chapter 3 of the *Heterogeneous Open SAN Design Reference Guide* that specifies the rules for the hp StorageWorks SAN.

Rules for hp StorageWorks SAN fabrics: Table 1

For an hp StorageWorks SAN consisting of a mix of HP XP or VA and Compaq EVA or EMA/ESA/MA/RA or MSA/RA4xxx storage systems, the fabric configuration rules with switches listed in Table 1 are summarized as follows.

- Any combination of the Fibre Channel switches identified as supported in the hp StorageWorks SAN, up to a maximum of 16 switches and 3 hops, with a maximum of 2 hp StorageWorks core switch 2/64 chassis.
- Any topology listed in the *Heterogeneous Open SAN Design Reference Guide* may be used.
- Switch firmware versions and switch parameter settings:
 - v2.6.0c for 1 Gbps SAN switches with pre-merger Compaq settings
 - v3.0.2f for 2 Gbps SAN switches with pre-merger Compaq settings
 - v4.0.0c for 2 Gbps 64-port Core switches with the new hp settings
- For 2 Gbps interconnects, up to 300 meters per link, for 1 Gb interconnects. Refer to Chapter 3 in the *Heterogeneous Open SAN Design Reference Guide*.
- Optional switch features may be used on any switch in the fabric if the feature is supported on that switch. For example, in a fabric consisting of four SAN Switch 16s and four SAN Switch 2/16s, the Fabric Watch feature may be used on the SAN Switch 2/16s.
- Where applicable, these rules are superseded by individual switch feature limits as appropriate. For example, the StorageWorks SAN switch 2/8-EL and 2/15-EL are licensed for 4 switch fabrics only. If used in an hp StorageWorks SAN then the maximum fabric size is 4 switches.

Rules for hp StorageWorks SAN fabrics: Table 2

For an hp StorageWorks SAN consisting of a mix of HP XP or VA and Compaq EVA or EMA/ESA/MA/RA or MSA/RA4xxx storage systems, the fabric configuration rules with switches listed in Table 2 are summarized as follows.

- Any combination of the Fibre Channel switches identified as supported in the hp StorageWorks SAN, up to a maximum of 24 switches and 3 hops with a maximum of 8 Directors.

- Any topology listed in the *Heterogeneous Open SAN Design Reference Guide* may be used.
- Switch firmware versions and switch parameter settings for the switch products listed in Table 2:
 - v2.0 firmware with the new hp settings
- For 2 Gbps interconnects, up to 300 meters per link, for 1 Gb interconnects. Refer to Chapter 3 in the *Heterogeneous Open SAN Design Reference Guide*.
- The McDATA ED-6064, ED-5000, ES-3032, and ES-3016 may also be used in these configurations. Refer to the *SAN Design Guide addendum for Director Fabrics* for additional information on these products.
- HP supports both pre-merger HP OVSAM and pre-merger Compaq SDCM implementations.
- For new hp StorageWorks SAN management the High Availability Fabric Manager (HAFM) is supported.
- Where applicable, these rules are superseded by individual switch feature limits as appropriate.

Heterogeneous SAN Platform and Storage System Rules

The rules in Chapter 4 for Compaq supported servers and storage are not changed with the introduction of the new hp StorageWorks core switch 2/64 or the hp StorageWorks director 2/64 and edge switch 2/16 and 2/32.

Additional rules must be observed when designing an hp StorageWorks SAN. Common SAN fabric platform support requires servers accessing HP XP or VA storage to not have access to EVA or EMA/ESA/MA/RA or MSA/RA4xxx storage systems.

Operating System and Platform Rules for pre-merger SANs

For HP SAN fabrics configured exclusively with pre-merger HP supported servers, storage, and Fibre Channel switch products, contact your local HP field representative.

For Compaq SAN fabrics configured exclusively with pre-merger Compaq supported servers, storage, and Fibre Channel switch products, refer to the SAN Support Tables at:

<http://www.compaq.com/products/storageworks/san/documentation.html>

hp StorageWorks SAN Operating System and Platform and Storage System Rules

For hp StorageWorks SAN fabrics with a mixture of HP and Compaq supported servers, storage, and/or Fibre Channel switch products, the hp StorageWorks SAN platform and storage system rules listed below apply. In general, HP storage products are supported in the HP fabric zone; Compaq storage products are supported in the Compaq fabric zone.

- Within the HP fabric zone, refer to the pre-merger HP Operating System/Platform support rules available to HP field representatives through SPOCK.
- Within the Compaq fabric zone, refer to the SAN Design Guide Support Tables at:
 - <http://www.compaq.com/products/storageworks/san/documentation.html>
- Servers accessing HP XP or VA storage systems must be in separate zones from servers accessing EVA or EMA/ESA/MA/RA or MSA/RA4xxx storage systems.
- Servers accessing HP XP or VA storage systems cannot be configured for access to EVA or EMA/ESA/MA/RA or MSA/RA4xxx storage systems.
- Servers accessing HP EVA or EMA/ESA/MA/RA or MSA/RA4xxx storage systems cannot be configured for access to XP or VA storage systems.

- XP or VA storage systems must be in separate zones from EVA or EMA/ESA/MA/RA or MSA/RA4xxx storage systems.
- Compaq Secure Path supports EVA/EMA/ESA/MA/RA or MSA/RA4xxx storage systems exclusively.
- hp AutoPath supports XP and VA storage systems exclusively.
- All other existing heterogeneous operating system/platform zoning rules apply, refer to the *Heterogeneous Open SAN Design Reference Guide, Chapter 4*
<http://ftp.compaq.com/pub/products/storageworks/techdoc/director64/AA-RMPND-TE.pdf#page=54>

Online (Disk) Storage

The following primary online (disk) systems are supported in the XP/VA fabric zone.

- hp Surestore disk array xp series, including xp1024, xp512, xp128, and xp48
- hp Surestore virtual array 7400 and 7100

The following primary online (disk) systems are supported in the EVA and EMA/ESA/MA/RA.

- hp StorageWorks enterprise virtual array EVA version 2
- hp StorageWorks enterprise modular array, including all HSG80- and HSG60-based products
- hp StorageWorks SAN appliance

The following primary online (disk) systems are supported in the MSA/RA4xxx fabric zone.

- hp StorageWorks MSA modular storage array
- hp StorageWorks RA4100 and RA4000 Storage Arrays

Near-Line (Tape) Storage

Tapes supported with EVA, EMA/ESA, MA/RA arrays include the following.

- StorageWorks ESL9326 Enterprise Tape Library
- StorageWorks ESL9198 Enterprise Tape Library
- StorageWorks MSL5026 DLT Library
- StorageWorks TL895 DLT Library
- StorageWorks TL891 DLT MiniLibrary System
- StorageWorks SSL2020 AIT Library

NOTE: Any DLX or SSL2020 Library requires an MDR (modular data router) or NSR (Network Storage Router) with LVD SCSI modules

For more information about supported Tape storage in the Compaq fabric zone, refer to the *Heterogeneous Open SAN Design Reference Guide, Chapter 5*.

Tapes supported with XP and VA arrays include the following.

- Ultrium (LTO): 2/20, 4/40, 6/60, 8/80, 10/100, 6/140
- Ultrium (LTO) with 2/1 LV FC/SCSI (CrossRoads 4450) Bridge: 10/180, 20/700
- 10/180 and 20/700 libraries may also connect to SAN via Surestore Interface Manager
- DLT8000: 2/20, 4/40, 6/60, 8/80, 10/100, 6/140
- DLT7000, DLT8000, HP9840 with 4/1 HV or 4/2 (UX only; 1Gb switches only) FC/SCSI Bridge: 10/180, 10/588, 20/700

The following configuration rules must be followed.

- Overlapping hp Surestore tape zones supported for XP and VA arrays.
- Backup solutions must be managed manually.

Backup Solutions

Chapter 5 of the SAN Design Guide covers the pre-merger Compaq Enterprise Backup Solution. EBS is an integration of Independent Software Vendor (ISV) backup and restore application software with Compaq StorageWorks SAN storage systems.

EBS may be used in an hp StorageWorks SAN, but coverage is restricted to the pre-merger Compaq configuration rules and supported devices.

SAN Management

Chapter 6 in the current edition of the SAN Design Guide describes the Compaq SAN management tools and methods. These features are applicable to the zones in an hp StorageWorks SAN that support pre-merger Compaq equipment. Additional management options based on pre-merger HP OpenView products may be used in the zones that support pre-merger HP equipment.

Compaq zones in an hp StorageWorks SAN

Refer to Chapter 6 of the SAN Design Guide.

HP zones in an hp StorageWorks SAN

HP OpenView management tools and methods are supported in the hp data zone of a mixed environment. These include the following.

- OpenView Storage Area Manager (OV SAM)
- Command View XP for XP
- Command View SDM for VA

The existing NSAS SAN Support and SAN Rules and Guideline documents apply when using these tools. Appropriate references are available to HP field representatives via the HP internal SPOCK website.

SAN Security

SAN security issues are discussed in Chapter 7 of the SAN Design Guide. The approach to SAN management and security described in these chapters is supported in the hp StorageWorks SAN.

In addition, the specific recommendations in Chapter 7 for equipment management in a secure SAN environment apply to the zones in the SAN that contain pre-merger Compaq equipment.

Expanded recommendations for maximizing security in the pre-merger HP zones will be announced soon.

Business Considerations and Best Practices

Chapters 8 and 9 of the SAN Design Guide discuss business considerations and suggest best practices for SAN installation and operation. The issues covered in these chapters apply to both HP and Compaq SANs, and to the hp StorageWorks SAN environment. The next revision of the SAN Design Guide will include rewritten versions of these chapters, but the information will remain largely the same.