

Overview

Fiber Optic SCSI Extender

The 28643A Fiber Optic SCSI Extender overcomes the 6 meter SCSI bus length limitation for a single ended SCSI bus. Using the extender, single ended peripherals can be located up to 112 meters from the host computer.

The 112 meters of length allowed consists of the following:

- Six meters of SCSI cable connecting the host computer to any local peripherals and the local extender, plus
- Up to 100 meters of fiber optic cable connecting the local extender to the remote extender, plus
- Six meters of SCSI cable connecting the remote extender to the remote peripherals.

The extender is designed for transparent operation requiring no changes in hardware or software.

A total of eight SCSI devices and two SCSI extenders (one local and one remote) can be connected to one SCSI bus. In other words, the number of devices connected to the local extender plus the number of devices connected to the remote extender (not including the extenders) must total eight or less. The host computer counts as one SCSI device.

Example allowable configurations include:

- The host computer on the local side and seven peripherals on the remote side.
- The host computer and six peripherals on the local side and one peripheral on the remote side.
- The host computer and three peripherals on the local side and four peripherals on the remote side.

SCSI extender configurations are subject to restrictions placed by the host computer system.

Typical Performance Rates with Fiber Optic SCSI Extenders

Fiber Optic Cable Length	Asynchronous	Synchronous (offset 8)	Synchronous (offset 16)
50 meters	250 KB	4 MB	5 MB
100 meters	200 KB	3.3 MB	5 MB

Brocade Silkworm 2800Fibre Channel Switch (A5624A/AZ)

Documentation	Hewlett Packard A5624AZ Rackmount Installation Guide	A5624-90901
	Brocade Silkworm2800 Hardware Reference Manual	A5624-90902
	Brocade Fabric OS	A5624-90903
	Brocade Zoning Reference Manual	A5624-90904
	Brocade QuickLoop Reference Manual	A5624-90905
	Brocade WebTools User's Guide	A5624-90906
	Hewlett Packard Fibre Channel Manager Product Announcement Sheet	A3724-96010

A5624A/AZ

The Brocade Silkworm 2800, A5624A/AZ is a cascading gigabit fibre channel switch equipped with 16 non blocking universal ports capable of an aggregate of 16 Gbits/sec throughput. Universal ports may be configured as e, f, and fl ports. The Brocade switch includes all 16 universal ports and is ordered with any combination of short wave or long wave GBICs. The A5624A is intended for standalone, field rack mounting, and the A5624AZ is for factory rack mount configurations.

Overview

Features

The Brocade switch features high performance and throughput. Millions of transactions per second and 16 GB per second are attainable extending accessibility of current Fibre Channel SAN solutions. Each of the 16 ports operate at a full duplex rate of 200 MB/s. The Switch comes zoning capable to enable a wider support of configurations. Brocade WebTools is an added feature included in the base package for easy management of the Switch capabilities. Fabric capabilities are enabled in the Brocade 2800 base product to support cascading. The Switch features N+1 redundant power supplies and fans. The fans and power supplies are hot swappable. Since the Brocade switch is supported in MC/ServiceGuard configurations it is highly recommended that dual switches be configured when mission critical high availability is needed in the fibre channel infrastructure.

Benefits

The Brocade Switch enables previously unattainable levels of scalability and performance in the SAN environment, such as the HP F16 Switch, HP Surestore Hub S10, HP Surestore Hub L10, and the HP Surestore Bridge SCSI 4/2.

Investment protection of existing HP UX 10.20 and 11.0 server environments and host bus adapters is ensured with Brocade's fibre channel compatibility option QuickLoop (EPL).

Robust centralized SAN Management is enhanced by the Brocade switch's capabilities of instrumenting the SAN links. The Brocade switch monitors each of the 16 links' "health", providing port and device management and error detection and recovery. The Brocade switch is integrated with the HP's SAN Manager software for device management and configuration.

High availability is ensured at the component level via the Brocade switch redundant power supplies and hot swap fans. At a solution level the Brocade switch is fully certified with MC/ServiceGuard, MC/LockManager and MirrorDisk/UX.

Configuration Overview

The Brocade switch, A5624A/AZ is very straightforward to configure. The necessary configuration options for this product are:

- Base Switch Product A5624A or A5624AZ
- The number and type of GBICs needed; any mix
- The type of cable desired

The Brocade switch is pre configured with 16 universal ports and dual redundant power supplies.

Overview

Initial Order

Product Number	Description
A5624A/AZ	Base Configuration Chassis including 16 Universal ports, power cord, and rack kit Required: Quantity 1
GBICs	
A5225A	Short Wave GBIC: Quantity 1 Quantity 0 to 16
A5226A	Long Wave GBIC: Quantity 1 Quantity 0 to 16
Cables	
A3583A	2 meter cable
A3531A	16 meter cable
A3735A	50 meter cable
A3736A	100 meter cable

Brocade Silkworm 2400 Fibre Channel Switch (A5625A/AZ and A5667A)

Documentation	Hewlett Packard A5624AZ Rackmount Installation Guide	A5624-90901
	Brocade Silkworm2800 Hardware Reference Manual	A5624-90902
	Brocade Fabric OS	A5624-90903
	Brocade Zoning Reference Manual	A5624-90904
	Brocade QuickLoop Reference Manual	A5624-90905
	Brocade WebTools User's Guide	A5624-90906

A5625A/AZ	The Brocade Silkworm 2400, A5625A/AZ are cascading gigabit fibre channel switches equipped with 8 non blocking universal ports capable of an aggregate of 8 Gbits/sec throughput. Universal ports may be configured as E, F, and FL ports. A5625A/AZ are Enterprise products. The Brocade switch includes all 8 universal ports and is ordered with any combination of short wave or long wave GBICs for the Enterprise products and copper or short wave optical GBICs for the Commercial product. The A5625A switch is intended for standalone or field rack mounting, and the A5625AZ is for factory rack mount configurations.
------------------	--

Features	The Brocade switch features high performance and throughput. Millions of transactions per second and 8 GB per second are attainable extending accessibility of current Fibre Channel SAN solutions. Each of the 8 ports operate at a full duplex rate of 200 MB/s. The Switch comes zoning capable to enable a wider support of configurations. Brocade WebTools is an added feature included in the base package for easy management of the Switch capabilities. Fabric capabilities are enabled in the Brocade 2400 base product to support cascading. The Switch features N+1 redundant fans and the option of purchasing a redundant power supply. The fans and power supplies are hot swappable. Since the Brocade switch is supported in MC/ServiceGuard configurations it is highly recommended that dual switches be configured when mission critical high availability is needed in the fibre channel infrastructure.
-----------------	--

Overview

- Benefits**
- The Brocade Switch enables previously unattainable levels of scalability and performance in the SAN environment, such as the HP F16 Switch, HP Surestore Hub S10, HP Surestore Hub L10, and the HP Surestore Bridge SCSI 4/2.
 - Investment protection of existing HP UX 10.20 and 11.0 server environments and host bus adapters is ensured with Brocade's fibre channel compatibility option QuickLoop (EPL).
 - Robust centralized SAN Management is enhanced by the Brocade switch's capabilities of instrumenting the SAN links. The Brocade switch monitors each of the 8 links' "health", providing port and device management and error detection and recovery. The Brocade switch is integrated with the HP's SAN Manager software for device management and configuration.
 - High availability is ensured at the component level via the Brocade switch redundant power supplies and hot swap fans. At a solution level the Brocade switch is fully certified with MC/ServiceGuard, MC/LockManager and MirrorDisk/UX.

Configuration Overview The Brocade 2400 switches are very straightforward to configure. The necessary configuration options for this product are:

- Base Switch Product A5625A or A5625AZ
- The number and type of GBICs needed; any mix
- The type of cable desired

Initial Order-A5625A/AZ

Product Number	Description
A5625A/AZ	Base Configuration 8 Universal ports, power cord, and rack kit Required: Quantity 1
Power Supply	
A5671A	Second power supply for redundancy Quantity 1
GBICs	
A5225A	Short Wave GBIC: Quantity 1 Quantity 0 to 8
A5226A	Long Wave GBIC: Quantity 1 Quantity 0 to 8
Cables	
A3583A	2 meter cable
A3531A	16 meter cable
A3735A	50 meter cable
A3736A	100 meter cable
GBICs/Cable Kits	
D6980A	2 Optical SW GBICs with one 50 meter optical cable Quantity 0 to 8
D6981A	2 Optical SW GBICs with one 100 meter optical cable Quantity 0 to 8
D6978A	2 Copper GBICs with one 3 meter copper cable Quantity 0 to 8
D6979A	2 Copper GBICs with one 5 meter copper cable Quantity 0 to 8
D7080A	2 Copper GBICs with one 10 meter copper cable Quantity 0 to 8

Configuration

Solution Level Configurations of the Brocade Silkworm 2800 Switch Solution level configurations using the Brocade switch combined with HP 9000 servers, HP SureSpan Fibre Channel products and HP SureGear Storage Platforms are outside the scope of this document. For more information contact the Technical Response team, TRT at Telnet 447 7070 or refer to the following document.

Solution Level Configurations of the Brocade Silkworm 2400 Switch Solution level configurations using the Brocade switch combined with HP 9000 servers, HP SureSpan Fibre Channel products and HP SureGear Storage Platforms are outside the scope of this document. For more information contact the Technical Response team, TRT at Telnet 447 7070 or refer to the following document.

ESBU Mass Storage Configuration Reference For online reference of the solution level configurations for all of ESBU's products used with HP 9000 and other servers please refer to the following URL: http://essd.boi.hp.com/essdatc/config_matrix.htm

Please refer to this document for up to date support information as you configure storage solutions.

Support Options

Description	Part Number
License/Next Day System Support 1st Year	A5624A 0S0
License/4 hour System Support 1st Year	A5624A 0S1
Telephone/Next Day System Support 1st Year	A5624A 0S2
4 hour System Support 1st Year	A5624A 0S3
24x7 System Support 1st Year	A5624A 0S5
24x7 System Support 1st Year	A5624A 0S6
Critical Systems Support	A5624A 0T1
Critical Systems Support with Implementation Assistance	A5624A 0T2
Critical Systems Support for additional Systems	A5624A 0T3
Critical Systems Support for SAP	A5624A 0V1
Critical Systems Support for SAP w/additional maintenance	A5624A 0V2
Critical Systems Support for SAP, additional systems	A5624A 0V3
LTU/Next Day System Support 3 Year	A5624A 3Y0
LTU/4 hour System Support 3 Year	A5624A 3Y1
Telephone/Next Day System Support 3 Year	A5624A 3Y2
Telephone/4 hour System Support 3 Year	A5624A 3Y3
SW LTU; Warranty 24x7; System Support 3 Year	A5624A 3Y5
SW Tel; Hardware Warranty 24x7; System Support 3 Year	A5624A 3Y6

Hubs, Multiplexers and Bridges

Fibre Channel Hub

The Fibre Channel hub has 10 fiber optic ports and supports multiple connects to systems and storage devices. Two hubs may be connected together to provide "cascading". Hub cascading (more than one hub per loop) allows greater connectivity and distance. Adding and removing devices by plugging or unplugging from a hub port will not impact the operation of other existing nodes (devices).

In general, cables must be purchased (as options or as standalone products) with peripheral devices. Therefore, cables are not shipped with a system (host) bus adapter card. When ordering a Fibre Channel hub, you should order the number of fibre channel cables needed to attach to host adapter cards. For example, if the hub is connected to two hosts with one adapter card each, you would order two fibre channel cables with the hub. When ordering a Fibre Channel disk array, order the number and length of cables necessary to attach to either the host adapter cards (direct connect) or the hub, whichever the array is going to be attached to.

Short wave Hub

Each port on the short wave hub (A3724A and A3724AZ) supports a 1 Gigabit short wave interconnect. This means the maximum distance from any single port to host or device can be 500 meters. In general there is a trade off between performance, number of devices (systems and storage devices) and total distance around the loop for each I/O interface card. We call this the "link budget", the total distance around each Fibre Channel loop, from interface card back to interface card. For links of less than 100 meters, there is no appreciable performance impact from distance; the only consideration is the number of devices connected to the interface card. If you configure a solution with greater than 100 meters, we recommend you minimize the link budget (distance) to just what is necessary.

"Fair" arbitration prevents starvation of low priority devices, allowing reliable operation of much larger configurations than SCSI permits.

Since the hub is an electronic device and is subject to failure, for high availability, redundant loops using separate hubs are needed.

Long wave Hub

The long wave hub (A4839A and A4839AZ) supports 9 short wave fibre channel connections with the same configuration rules as above, and one long wave fibre channel connection. The long wave connection is only supported between long wave ports on two separate long wave hubs. Long wave hubs currently permit a maximum of 3 kilometers separation between hubs. In August, an announcement will explain how to extend this separation to 10 kilometers.

Hubs, Multiplexers and Bridges

Racking Guidelines

When configuring Fibre Channel Arbitrated Loop (FC AL), we recommend that you design the configuration to minimize the number of long cables. For example, if you want 100 meter separation between a server and disk array storage, cross the 100 meter distance with a cable connecting the server to a hub. Then rack the hub together with the arrays, utilizing the minimum cable length required for racking.

When configuring a cross campus high availability solution, use the hub to hub long wave interconnect solution. We recommend cabling host 1 to hub 1, which would connect to, and be racked with the local arrays (keep this distance relatively short, less than 100 meters). Hub 1 would then connect via long wave port to hub 2 at the second site. Hub 2 would be racked and connected locally to the secondary arrays and host system. Keep this secondary configuration distance relatively short as well.

Rail kits acquired prior to August 1998 were designed for the previous model 19 inch racks. In order for the hubs with the older rail kits to fit into the new racks, a spacer kit is required. After August 1998, the rail kits shipped with the hubs will contain the necessary parts to fit both the new racks and the old racks.

Rack Model	Description	Hub Spacer Kit (for hubs shipped before August 1998)
A4902A/J1500	1.96 meter rack	J1516A
A4901A/J1501	1.6 meter rack	J1516A
A4900A/J1502	1.25 meter rack	J1516A

Racking Restrictions

Due to thermal considerations, the following rack installations rules must be followed:

HP Rack System	Quantity of 5 FC AL hubs or fewer	Quantity of 6 to 18 FC AL hubs
A1896A 1.1 meter standard 19 inch EIA Rack A1897A 1.6 meter standard 19 inch EIA rack A3656A 2 meter vertical rack for EPSA4900A HP 9000 Standard Rack System E25	Any back to back racking must be above hubs	Install all hubs and fan pack starting from the top Back to back racking is prohibited
A49001A HP 9000 Standard Rack System E33 A49002A HP 9000 Standard Rack System E41 A5541AZ 1.2 meter RB2 D Rack w/ rear door A5541AZ 1.6 meter RB2 D Rack w/ rear door A5541AZ 2 meter RB2 D Rack w/ rear door	Any back to back racking must be above hubs and the Extractor Fan Pack (E7687A) must be installed	Cannot be supported

NOTE: All configurations assume controlled computer room temperature environments (reference temperature = 25°C).

Hubs, Multiplexers and Bridges

Performance

Selecting the appropriate Fibre Channel configuration for a particular customer and a particular workload is different, but no more complex, than designing with SCSI. Just as SCSI configurations of up to two host systems and four disk arrays are straightforward, Fibre Channel configurations of up to four host systems and nine disk arrays require no special attention.

SCSI and Fibre Channel Comparison

	F/W SCSI	Fibre Channel Arbitrated Loop
Spec performance	20 MB/s	100 MB/s half duplex, 200 MB/s full duplex
Connectivity per I/O card	15 devices	17 devices ¹ (with cascaded hubs)
Connectivity per I/O card to ensure good performance	1-4 Model 20 Arrays	5-9 Model 30/FC Arrays

¹NOTE: The FC AL standard permits 126 devices on a loop. However, hubs are required in order to achieve the required loop resiliency, performance and distance.

Fibre Channel to SCSI Multiplexer

The FC-SCSI Multiplexer (A3308A, A3511A/AZ) connects SCSI devices to HP 9000 servers via short wave Fibre Channel interconnects. Its high throughput design provides exceptional scalability of both performance and capacity for on line storage subsystems. In addition, the distancing capabilities inherent in Fibre Channel provide campus wide availability for On-line and Off-line SCSI devices.

The multiplexer is available as a stand-alone product (A3308A) and as a racked product for field racking (A3511A) and factory racking (A3511AZ). The multiplexer can be configured with one or two Fibre Channel cards for system connect and up to four FWD SCSI cards for connecting to disk or tape devices.

Additional FWD SCSI adapter cards for the multiplexer (A3509A) and short wave Fibre Channel (1 GB) adapter cards for the multiplexer (A3512A) can be purchased as add on or as options when ordering the FC SCSI multiplexer product. These additional cards can be ordered and installed in the customer environment by either HP or by customers.

Fibre Channel cables can be ordered with the multiplexer or as separate items. Fibre Channel cables are not generally supplied with the system host bus adapter. SCSI cables are generally supplied with the attached peripheral but may also be ordered separately (see SCSI cable listing in Configuration Guide).

Operation

The FC-SCSI multiplexer is self configuring in direct connect topologies and has an easy to use LCD front panel and an RS-232 serial console port for status reporting and troubleshooting.

Each multiplexer Fibre Channel port can access all the devices on all the installed SCSI buses. The multiplexer takes requests from the FC ports and forwards them to the appropriate SCSI device. In multi host configurations, it is up to the hosts to allocate shared devices to prevent conflicts. Only hosts are allowed on the FC side, and only storage subsystem devices are allowed on the SCSI side of the FC-SCSI Multiplexer.

Hubs, Multiplexers and Bridges

Configuration

The FC-SCSI multiplexer supports both On-line and Off-line mass storage solutions. On-line support for the Multiplexer include the HP AutoRAID Array Model 12H (A3700A/AZ), the HP HA Storage Systems (A3311A, A3312A/AZ) and legacy EMC Symmetrix (3100, 3130, 3200, 3230, 3500). Refer to standard SCSI guideline to configure disk devices behind the multiplexer's SCSI port. Keep in mind, however, that there are trade offs between capacity and performance.

Off-line support for the multiplexer includes the HP A48xxA DLT Libraries, STK Timberline 9490 ACS, and STK Redwood SD-3 ACS. As with shared SCSI, you may have only one active path to a tape drive to prevent multiple processes from writing to the same tape and causing loss of data integrity. Therefore, for tape support, only one host is allowed on the FC side and only tape devices and tape libraries are allowed on the SCSI side of the multiplexer. It is recommended that disk devices not be connected to the same multiplexer as tape devices. Under high load conditions in a mixed disk/tape environment, the disk devices could easily consume enough bandwidth to cause data starvation on the tape devices.

NOTE: 100 MB per second half duplex (200 MB per second full duplex) is the maximum bandwidth supported by the channel. However, actual performance will vary with each configuration and application, and will rarely actually achieve the maximum. Always consult a technical resource to ensure that proper expectations are set.

The FC-SCSI multiplexer can be configured with one or two Fibre Channel ports, each operating at 1063 Mbits/sec through short wave optics. These links permit a maximum distance of 500m. For additional scalability and distance, the multiplexer's FC side can be connected to the long wave (A4839A/AZ) and/or short wave (A3724A/AZ) hub.

On the SCSI side of the multiplexer, one to four SCSI ports can be configured, each supporting up to 15 Fast/Wide/Differential SCSI devices over a maximum distance of 25 meters. Devices are connected to the SCSI bus on the multiplexer just as they would be connected to a system host bus adapter.

Configurations Supported by the Multiplexer

Storage Device	Supported Connections	Supported OS	Supported Servers	Non HA Support	HA Software Support
Model 12H [A3700A/AD/AZ] This SCSI product connects to FC via the FC-SCSI Multiplexer. (Refer to the Disk Array section in this chapter for additional information.)	Multiplexer only [A3308A, A3511A/AZ] with direct connect to the server (no hubs)	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250; (V Class only supported on 11.0)	Yes	MirrorDisk/UX. MC/ServiceGuard, two node only. MC/LockManager, two-node only. [Limited to two nodes because this configuration has no hubs.]
	Multiplexer [A3308A, A3511A/AZ] plus Short wave [A3724A/AZ] or Long wave [A4839A/AZ] hub(s). Two hubs per loop max.	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250; (V Class only supported on 11.0). Up to 4 servers per loop.	Yes	MirrorDisk/UX. MC/ServiceGuard. MC/LockManager.

Hubs, Multiplexers and Bridges

HA Storage Systems [A3311A, A3312A/AZ] This SCSI product connects to FC via the FC-SCSI Multiplexer. (Refer to the Mass Storage section in this chapter)	Multiplexer only [A3308A, A3511A/AZ] with direct connect to the server (no hubs).	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250; (V Class only supported on 11.0).	Yes. Single server only.	MirrorDisk/UX. MC/ServiceGuard, two-node only (August 1998). MC/LockManager support is not planned.
	Multiplexer [A3308A, A3511A/AZ] plus Short wave [A3724A/AZ] or Long wave [A4839A/AZ] hub(s). Two hubs per loop max.	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250; (V Class only supported on 11.0). Up to 4 servers per loop.	Yes	MirrorDisk/UX (August 1998). MC/ServiceGuard (August 1998). MC/LockManager support is not planned.
Legacy EMC Symmetrix (3100, 3130, 3200, 3230, 3500) This SCSI product connects to FC via the FC-SCSI Multiplexer.	Multiplexer only [A3308A, A3511A/AZ] with direct connect to the server. No plans for hub support.	10.20 TFC only. 11.0 not yet supported.	D Class, K Class, T600. Single server connection per multiplexer.	Yes	MirrorDisk/UX. MC/ServiceGuard support is not planned. MC/LockManager support is not planned.
Tape Libraries (HP A5597B and A5617A Libraries; STK Timberline 9490 ACS, and STK Redwood SD-3 ACS; and C6374A, C6375A HP SMART Storage Fast Wide Differential SCSI DLT tape mechanisms)	Multiplexer [A3308A, A3511A/AZ]. Only one FC adapter card from a single host, direct connect to Multiplexer, 500 meters maximum length. Tapes are not supported on hubs.	10.20 TFC, 11.0	D Class, K Class, N Class, L Class, T600, V2200, V2250; (V Class only supported on 11.0). Single server connection per multiplexer.	Yes	No

NOTE: For additional information, refer to the [HP AutoRAID Array and HP HA Storage System sections in this chapter.](#)

Performance Configurations may be limited by performance considerations, including device bandwidth, bus bandwidth and aggregate multiplexer limits. System I/O bus limitations may also be a factor. Referring to specific device requirements, typical system configurations may restrict high performance devices to one or two per SCSI port in order to ensure sufficient bandwidth.

Recommended Firmware Roll and patches Check with your Hewlett Packard service representative to ensure that you have the required firmware and patches.

Functionality Hewlett Packard is committed to product quality. To assure high quality, extensive testing is required before a Fibre Channel configuration will be released. The following table contains the currently supported Fibre Channel functionality.

Supported FC Storage Device Configurations

NOTE: All future dates are subject to change without notice.

Storage Device	Supported Connections	Supported OS	Supported Servers	Non HA Support	HA Software Support
----------------	-----------------------	--------------	-------------------	----------------	---------------------

Hubs, Multiplexers and Bridges

Model 30/FC [A3661A/AZ]	Direct Connect (500 meters max)	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250 (V Class only supported on 11.0).	Yes	MirrorDisk/UX No plans for MC/ServiceGuard or MC/LockManager support for this configuration
	Hubs: Short wave [A3724A/AZ] (500 meter max length for any connection) and Long wave [A4839A/AZ] (3 kilometer max length between hubs). Two hubs per loop max.	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250 (V Class only supported on 11.0); Up to 4 servers per loop.	Yes	MirrorDisk/UX MC/ServiceGuard MC/LockManager
EMC Symmetrix (3330, 3430, 3700) [S5815A, S5732A, S7474A, S5816A, S5644A, S7515A, S7475A, S5733A]	Direct Connect (500 meters max)	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250 (V Class only supported on 11.0)	Yes	MirrorDisk/UX MC/ServiceGuard MC/LockManager
	Hubs: Short wave [A3724A/AZ] (500 meter max length for any connection) and Long wave [A4839A/AZ] (3 kilometer max length between hubs). Two hubs per loop max.	10.20 TFC only. 11.0 not yet supported.	D Class, K Class, T600; Up to 4 servers per loop.	Yes	MirrorDisk/UX MC/ServiceGuard MC/LockManager (see note)
Model 12H [A3700A/AD/AZ] This SCSI product connects to FC via the FC-SCSI Multiplexer. (Refer to the Disk Arrays section in this chapter for additional information.)	Multiplexer only [A3308A, A3511A/AZ] with direct connect to the server (no hubs).	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250; (V Class only supported on 11.0).	Yes	MirrorDisk/UX MC/ServiceGuard, two node only. MC/LockManager, two node only. [Limited to two nodes because this configuration has no hubs.]
	Multiplexer [A3308A, A3511A/AZ] plus Short wave [A3724A/AZ] or Long wave [A4839A/AZ] hub(s). Two hubs per loop max.	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250; (V Class only supported on 11.0). Up to 4 servers per loop.	Yes	MirrorDisk/UX MC/ServiceGuard MC/LockManager
HA Storage Systems [A3311A, A3312A/AZ] This SCSI product connects to FC via the FC-SCSI Multiplexer. (Refer to the Mass Storage section in this chapter.)	Multiplexer only [A3308A, A3511A/AZ] with direct connect to the server (no hubs).	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250; (V Class only supported on 11.0).	Yes. Single server only.	MirrorDisk/UX MC/ServiceGuard MC/LockManager support is not planned
	Multiplexer [A3308A, A3511A/AZ] plus Short wave [A3724A/AZ] or Long wave [A4839A/AZ] hub(s). Two hubs per loop max.	10.20 TFC, 11.0	D Class, K Class, T600, V2200, V2250; (V Class only supported on 11.0). Up to 4 servers per loop.	Yes	MirrorDisk/UX MC/ServiceGuard support is not planned MC/LockManager support is not planned

Hubs, Multiplexers and Bridges

Legacy EMC Symmetrix (3100, 3130, 3200, 3230, 3500)	Multiplexer only [A3308A, A3511A/AZ] with direct connect to the server. No plans for hub support.	10.20 TFC only. 11.0 not yet supported.	D Class, K Class, T600. Single server connection per multiplexer.	Yes	MirrorDisk/UX MC/ServiceGuard support is not planned MC/LockManager support is not planned
---	---	--	--	-----	--

NOTE: For NetServer support, refer to the Enterprise Storage for NT Ordering and Configuration Guide.

NOTE: For performance reasons, HP recommends that MC/LockManager installations use direct Fibre Channel links to EMC Symmetrix arrays wherever feasible. Where the number of connections to the EMC Symmetrix is a limitation, HP supports the use of Fibre Channel hubs under the following specific conditions:

1. A hub connects to a maximum of two hosts and one Symmetrix FC adapter. No other devices exist on that same loop.
2. The hosts are connected to each hub such that, during normal (that is, non failure) conditions, one host is active and the other is not.
3. Redundant paths to the Symmetrix exist for each host, and failure of a hub does not result in loss of connectivity for a host. (That is, the host can reach the Symmetrix via another connection, possibly through another hub.)

It is important to note that, under failure conditions, I/O throughput may be somewhat degraded if the disk access pattern were such that a single host was using one half or more of the available loop capacity prior to the failure.

Because of HP's commitment to provide broad functionality with Fibre Channel, many more configurations are currently in test, and will be released as they become available. Configurations committed for future release are:

- 10 kilometer separation between long wave hubs.
- EMC Symmetrix (3330, 3430, and 3700) support on the short wave and long wave hubs for HP UX 11.0.
- EMC Symmetrix (3330, 3430, 3700) Fibre Channel connection to D Class for HP UX 11.0.
- Legacy EMC Symmetrix (3100, 3130, 3200, 3230, 3500) support on the multiplexer in a non High Availability environment for HP UX 11.0 (MC/ServiceGuard and MC/LockManager will not support this configuration). There are no plans to support Symmetrix 3330, 3430, or 3700 on the multiplexer.
- Fibre Channel boot support for HP UX 11.0 on D Class and on V Class.

Performance Configurations may be limited by performance considerations, including device bandwidth, bus bandwidth and aggregate FC Bridge limits. System I/O bus limitations may also be a factor.

Recommended Firmware Roll and patches Check with your Hewlett Packard service representative to ensure that you have the required firmware and patches.

Fibre Channel Cabling The Fibre Channel standard allows several different types of driver/receiver modules and several different types of cable. "Short wave" 500 meter optics are supported over 50 um multi mode (preferred) and 62.5 um multi mode (older, distance limited) fibre optic cable. "Long wave" 3000 meter optics are supported over 9 um single mode fibre optic cable, only for the connection between two (A4839A/AZ) cascaded hubs.

The cable recommended for short wave laser links is multi mode optical fiber with a 50 um core diameter. All supported optics are "non OFC". The 50 um fiber allows a maximum distance of 500 meters per link. The 62.5 um fiber used for LED links has lower bandwidth and is specified for up to 175 meters per link. All Fibre Channel optical links use a duplex SC connector that is different from connectors used for FDDI implementation. If a customer has 62.5 um fibre cable installed and wishes to use it, they must make sure the connectors are SC (if not, they must change them). Distances over 100 meters will require custom HP or 3rd party cabling and installation. It is recommended that a 9 um cable also be installed if a customer plans on upgrading to higher data rates or expanding the distance over 500 meters in the future.

Hubs, Multiplexers and Bridges

The single mode (9 μm) cable can ONLY be used for long wave attachment (distances up to 3 kilometers) and multi mode (50 μm or 62.5 μm) cable can ONLY be used for short wave attachment.

Fibre Channel Cables

Connectors	SC connector (unique key for transmitter/receiver)		
Data Rate	100 MB per second		
Types of cables	Multi mode	Multi-mode	Single-mode
Fiber core diameter	50 μm (for short-wave attachment)	62.5 μm (short-wave)	9 μm (for long-wave attachment)
Dispersion @1300 nm	N/A	N/A	3.5 ps/(nm*km)
Bandwidth @ 850 nm	500 MHz km	160 MHz km	N/A
Operating range	500 meters	175 meters	3 km
Product numbers	2 meter cable (A3583A)	Not available from HP. Assumes customers already have this type of cable installed.	Not available from HP. Contact your local fiber installer. Recommended for customers who have plans for long distance or high data rates when installing the 50 μm cables.
	16 meter cable (A3531A)		
	50 meter cable (A3735A)		
	100 meter cable (A3736A)		

NOTE:

1. Cables must meet requirements as published in the Fibre Channel standards document Physical and Signaling Interface (FC PH), ANSI publication: ANSI X3.230.1994. The cables specified in Commercial Building Telecommunication Cabling Standards (TIA/EIA 568A) and Information Technology; Generic Cabling for Customer Services (ISO/IEC 11801) meet HP's Fibre Channel requirements.
2. Only AMP connectors are qualified. The following connectors are recommended to maintain EMI certification:
 - AMP # 50465-1 for the multi-mode (short-wave) duplex SC kit connector
 - AMP # 504655-1 for the single-mode (long-wave) duplex SC kit connector

The above cable lengths should allow great flexibility in building customer configurations. The two meter cable is appropriate for connecting within a cabinet (i.e. hub to disk array). The 16 meter cable is appropriate for connecting various racks of arrays together to the hub. The 50 and 100 meter cables provide flexibility for data center configurations.

Optical media introduces a transmission delay of 5 nanoseconds per meter. HP offers four different optic cable lengths for optimal configuration. These cables are available in 2 meter, 16 meter, 50 meter and 100 meter lengths. Any cable length other than these must be custom installed and needs to conform to the specifications outlined above.

The remote (3 km) distance interconnect permitted by cascaded long wave hubs provides users with a cross campus solution for MC/ServiceGuard configurations. For more detail regarding High Availability and Fibre Channel see the GSSL high availability web page (<http://hpgsslhc.cup.hp.com:80/ATC/FC>).

Hubs, Multiplexers and Bridges

Fibre Channel Configuration Rules

The following configuration rules apply to Fibre Channel. Some of these rules may change in the future as new functionality is introduced. While reviewing this list keep in mind that all devices connected to a hub, or to a pair of cascaded hubs, are connected to the same loop.

Cable lengths

- 500 meter maximum individual cable length for connections to servers and to storage devices.
- 500 meter maximum cable length between cascaded short wave hubs (A3724A/AZ).
- 3 kilometer maximum cable length between cascaded long wave hubs (A4839A/AZ). In August, an announcement will explain how to extend this length to 10 kilometers.
- The sum of the lengths of all Fibre Channel cables on a loop may not exceed 5 kilometers. In August, an announcement will explain how to extend this to 13 kilometers.
- Signals propagate at 5 nanoseconds per meter. Therefore, for best performance, minimize total loop length. Make the connection between device and hub as short as possible. Use hub cascading to achieve distance.

Hub connections

(A3724A/AZ,
A4839A/AZ)

- Hubs have 10 Fibre Channel ports.
- Maximum of two hubs per loop (referred to as "cascaded" hubs).
- No more than one Fibre Channel connection between hubs when cascading.
- Maximum of four SPU connections per loop.
- Heterogeneous host connect is permitted (i.e. D Class, K Class, T600, and V Class can be intermixed on a single loop).
- Do not intermix storage device families on a single loop.

Multiplexer connections

(A3308A, A3511A/AZ)

- The multiplexer supports up to four Fast Wide Differential (FWD) SCSI ports and up to two Fibre Channel ports.
- The multiplexer Fibre Channel ports support connection to HP servers or to a hub.
- The multiplexer may only use one Fibre Channel port if the multiplexer is connected to a hub. The other Fibre Channel port must remain unused.
- The multiplexer may use both Fibre Channel ports if the ports are connected directly to one server or to two different servers. This only applies when disk devices are connected to the multiplexer SCSI ports. When tape devices are connected to the SCSI ports, only one Fibre Channel port may be used.
- The multiplexer Fast Wide Differential SCSI ports support connections to HP A48xxA DLT Libraries, HP SMART Storage Fast Wide Differential SCSI DLT tape mechanisms (C6374A, C6375A), StorageTek Timberline 9490 ACS, StorageTek Redwood SD 3 ACS, Legacy EMC Symmetrix (Models 31x0, 32x0, 3500), HP Model 12H AutoRAID disk array (A3700A/AD/AZ), and HP High Availability Storage System (A3311A, A3312A/AZ). For more information regarding a specific storage device configuration, refer to its section in this configuration rules list.
- The multiplexer Fast Wide Differential SCSI ports may not be connected to HP servers.
- Do not connect two multiplexer SCSI buses together, either on the same multiplexer or between two different multiplexers.
- Follow SCSI guidelines for connecting disk storage sub systems (A3700A/AD/AZ, A3311A, A3312A/AZ, and legacy EMC Symmetrix Models 3100, 3130, 3200, 3230, 3500) to the multiplexer SCSI ports. Keep in mind the trade off between capacity and performance.
- Do not connect SCSI disk devices and SCSI tape devices to the same multiplexer.

Hubs, Multiplexers and Bridges

Model 30/FC connections (A3661A/AZ)

- The Model 30/FC has one Fibre Channel port per Storage Processor. There is a maximum of two Storage Processors per Model 30/FC.
- Maximum of nine physical connections to Model 30/FC devices per loop.
- Maximum of four servers can be connected to a single Model 30/FC (hub configuration rule).

EMC Symmetrix (EMC Models: 3330, 3430, and 3700)

- EMC 3700 has 16 Fibre Channel ports.
- EMC 3430 can have up to 12 Fibre Channel ports.
- EMC 3330 has 8 Fibre Channel ports.
- In a non hub, non High Availability environment, as many servers can be connected to a Symmetrix as there is available Fibre Channel ports.
- Maximum of eight Symmetrix ports connected to a single loop.

Legacy EMC Symmetrix (3100, 3130, 3200, 3230, 3500)

- Connected to Fibre Channel via the multiplexer.
- Only a single Fibre Channel connection to the multiplexer is permitted. The second Fibre Channel port must remain unused.
- The multiplexer must be directly connected via Fibre Channel to a single server. Hubs are not supported with Legacy EMC Symmetrix.
- The multiplexer configuration with Legacy Symmetrix is not supported by MC/ServiceGuard or MC/LockManager.

HP Libraries (A5597B, A5617A, A46xxA, A558xA, A468xA, A63xxA), HP SMART Storage Fast Wide Differential SCSI DLT tape mechanisms, StorageTek Timberline 9490 ACS and StorageTek Redwood SD 3 ACS

- Connected to Fibre Channel via the multiplexer.
- Only a single Fibre Channel connection to the multiplexer is permitted. The second multiplexer Fibre Channel port must remain unused.
- The multiplexer must be directly connected via Fibre Channel to a single server. Hubs are not supported with tape device configurations.
- Each multiplexer Fast Wide Differential (FWD) SCSI bus can connect to a maximum of one DLT 7000 or DLT 8000 tape drive mechanism or to a maximum of two DLT 4000 tape drive mechanisms. For example, A5586A DLT 8000 4/40 Library has four tape drive mechanism FWD SCSI ports. Each of the four FWD SCSI ports on the multiplexer attaches to one of the four FWD SCSI tape drive mechanism ports. Therefore, one DLT 8000 4/40 Library can be supported per multiplexer.
- The library robotic control port must be FWD SCSI to connect to the multiplexer FWD SCSI bus. The FWD SCSI robotic control port can be daisy chained to one tape drive mechanism FWD SCSI bus.
- The A4666A and A558xA libraries can be ordered with a multiplexer built in. The following Ultrium LVDS libraries can also be ordered with a multiplexer built in: A6311A, A6313A, A6315A, A6317A, A6319A, and A6321A.

Model 12H connections (A3700A/AD/AZ)

- Connected to Fibre Channel via the multiplexer.

HA Storage Systems (A3311A, A3312A/AZ)

- Connected to Fibre Channel via the multiplexer

Hubs, Multiplexers and Bridges

High Availability cluster configuration rules (MC/ServiceGuard, MC/LockManager)

- 8 node clusters are supported under 10.20 TFC and 11.0.
- Because of OPS connectivity limitations, LockManager is limited to 4 nodes when used with Fibre Channel hubs.
- Pairs of independent loops are required (for path redundancy).
- Fibre Channel and SCSI bus types can be mixed within a single cluster.

DTCs

Description

The DTC solution consists of a family of LAN based communication and terminal servers as well as a scalable family of network management products. It is HP's solution for providing asynchronous connectivity to HP and non HP systems for local and remote devices (terminals or PCs in terminal emulation mode, printers, and modems).

The DTC 16TN is a high performance Telnet Terminal Server for HP 9000 systems and any system running the standard Telnet-TCP/IP protocols.

The DTC 16RX is a high performance communications server for the HP 9000 Enterprise Servers and for multi vendor environments, including HP 3000/900s, (RAFCP supported) or any system running the Telnet-TCP/IP protocol. It is managed by the DTC 16RX Manager on HP 9000 Enterprise Servers or workstations and provides routable data path and rackable management. Each DTC 16RX Manager can support many DTC 16RXs.

The DTC 72MX is a modular high performance communication server for HP 9000 Enterprise Servers and for multi vendor environments, including HP 3000/900 or any system running the Telnet TCP/IP protocol. The DTC 72MX offers X.25 and Telnet access card. This functionality is managed by the HP OpenView DTC Manager.

Each HP 9000 system can support multiple DTCs on the LAN. The number of active connections supported will be determined by the application load on the system.

Configuration

Three types of software are available to configure and manage DTCs according to the level of functionality that is required and the network management needs.

1. **HP DTC Manager/UX (J2120B)**
With the DTC host based management, a simple terminal connected locally or remotely to an HP 9000 system is used to manage DTCs. It provides a means to configure DTCs in HP 9000 standalone or multi system Telnet TCP/IP environments.
2. **DTC 16RX Manager (J2496B)**
The DTC 16RX Manager is similar to the DTC Manager/UX, but manages only DTC 16RXs. It provides routable management and routable data path, HP 9000 and HP 3000 access, and back to back configuration.
3. **PC running HP OpenView DTC Manager Software (D2355B)**
Note: DTC Manager 14.3 requires OpenView DOS/Windows® version 7.2. Therefore, you must either already have an OpenView product running on version 7.2 or purchase OpenView Runtime version 7.2 (32048E).
The HP OpenView (PC based) DTC Manager software provides an easy to use graphical user interface to manage DTCs.

HP DTC Manager provides a means to configure DTCs for use to connect to HP 3000 Series 900 or HP 9000 systems and to other systems in multi vendor environments. It provides powerful network management features for complex network topologies.

In the case of the DTC 16RX, only the DTC configuration is downloaded from the DTC 16MX Manager. The code is resident in the DTC 16RX.

In both host based and PC based environments, the DTC software is downloaded from the management platform, allowing easy distribution and control of the DTC software.

For a detailed management features list, refer to the DTC Management Datasheet located in the Networking Communications Specification Guide (5091 3821E).

DTCs

Local and Remote End User Access

Local and remote (from X.25/PADs) end users can access systems through:

- Direct access on the LAN. This is true for the HP 9000 Series 700, 300, 400, and servers, HP 1000, and for other non HP Telnet/TCP/IP systems.
- Back to Back. Any system with asynchronous (RS 232) links can be connected to the asynchronous ports of the DTC. Terminal users hooked to the DTC can access systems connected to the same DTC (local switching) or to any other DTC (extended switching).

PAD support is provided through the use of an X.25 Network Access Card. As stated above, this functionality requires a configured PC with HP OpenView DTC Manager software.

DTC Product and DTC Management Platform Selection

NOTE: All future dates are subject to change without notice.

An "X" in the table indicates that the DTC product or Management Platform can be chosen for the environment listed.	DTC 16TN	DTC 16MX	DTC 16RX (J2064A) with DTC 16RX Manager (J2496B)	DTC 72MX	HP DTC ManagerUX	HP OpenView PC based
	J2060A	J2063A		J2070A	J2120B	D2355B
Need access to system(s)						
Single HP 9000 Enterprise Servers	X	X	X	X	X	X
Systems without LAN or Telnet-TCP/IP (back to back)	X	In PC based only	X	In PC based only	-	X
Multiple systems running Telnet-TCP/IP (Includes HP 9000 systems: servers, 300, 400, 700, HP 1000, and non HP systems)	X	X	X	X	X	X
Multiple systems (Includes HP systems: servers, 300, 400, 700, HP 1000, HP 3000, and non-HP systems running Telnet-TCP/IP)	X*	X	X	X	X	X
X.25 PAD Support to multiple systems (HP or non HP running Telnet-TCP/IP)	-			In PC based only	-	
Specific capabilities						
Maximum line speed	38.4 Kb/s	38.4 Kb/s	38.4 Kb/s	38.4 Kb/s		
RJ 45 connectors (direct-connect only)	X	X	X	X		
Hardware handshake on direct ports	X	X	X	X		
Long distance cabling	RS-423	RS-423	RS-423	RS-423		
Full modem support	X	X	X	X		
X.25 board	-		-	256 VC/board, 19.2/64 KB/s		
Binary mode transfer	X		X	X		
Telnet access board for HP 3000 Series 900	-		-	X	-	X
SNMP agent	X		X	X	-	X

DTCs

* **NOTE:** Requires the HP 3000 Telnet Access Board in one DTC 72MX for the HP 3000 Series 900 access. For specific management features, refer to the DTC management datasheet.

Configuring the DTC 16TN and DTC 16RX

The DTC 16TN and DTC 16RX use a compact standard 19 inch chassis identical to other HP products such as HP Ethertwist products, and are very easy to install in tabletop, wall mounted or rack mounted configurations.

They come with a compact RJ 45 breakout box for use with simple and low cost cabling. The RJ 45 pin out is ATT356 compliant to allow future migration from asynchronous devices to 10Base T LAN devices without change of cabling. For more details and configuration examples, refer to the DTC racking and cabling guide available with the DTC 16TN installation guide (5959 4986). The racking and cabling guide can be ordered separately as well (5961 0373).

Configuring the DTC 72MX

The DTC 72MX has a 4 slot chassis that is compliant with the industry standard EIA 19 inch form factor (3 EIA height units). One slot is always used for the LAN interface. The three other slots are available for installing a combination of asynchronous, X.25 (up to three) and a Telnet Access (one only) board for communication with an HP 3000 system.

The following picture shows a DTC 72MX configured with one asynchronous processor board (24 ports), one X.25 board, and the HP 3000 Telnet access card.

Racking the DTC 16TN, 64 Port Bundle, and DTC 72MX The DTC 16TN, 64 port bundle, and DTC 72MX are rackable in EIA standard 19 inch computer racks.

DTCs Supported in 1.1 Meter and 1.6 Meter Computer Racks

Product Number	Option Number	Description	EIA Units	Current Consumption (VAC)	
				120	208 240
J2060AZ	UG5	XDTC 16TN (RJ 45) Replace 8 RJ 45 direct ports with 8 DB 25 modem ports	2 **	0.5A	0.25A
J2070AZ	001 002 003 UG5 UG6	DTC 72MX 24 RS 232 direct ports with RJ 45 connections 48 RS 232 direct ports with RJ 45 connections 72 RS 232 direct ports with RJ 45 connections Replace 8 direct ports with 8 modem ports (maximum 2) Replace 24 direct ports with 24 modem ports (maximum 3)	3 1 2 3 ** **	1.8A	0.9A
A2957AZ	UG5	DTC 64 port bundle (RJ 45) Replace 8 direct ports with 8 modem ports (maximum 8)	8 **	0.5A*	0.25A*

DTCs

NOTE: LAN cables must be ordered separately due to wide range of types and lengths.

* Each 16 port DTC

** Number of EIA units will depend on Modem Distribution Panel kit ordered: C2792AZ will rack up to 5 MDPs (total 40 modem ports) with 6 EIA units. J2084AZ will

rack up to 5 MDPs (total 40 modem ports) with 7 EIA units. J2087AZ will rack up to 10 MDPs (total 80 modem ports) with 7 EIA units

NOTE: Only one MDP racking kit is needed and must be ordered separately.

Technical Specifications

Brocade Silkworm 2800Fibre Channel Switch (A5624A/AZ)

Product Number	Standalone Switch with Universal Port Cards: Includes a rack mount kit for adding the switch to an existing cabinet and an air duct for cooling	A5624A
	Factory rack mounted Switch with Universal Port Cards	A5624AZ

Features	Fibre Channel protocol	Fibre Channel ANSI Standard (FC PH)
	Fabric initialization	Complies with FC SW 3.3
	System architecture	Non blocking shared memory switch
	Number of Fibre Channel ports	16 ports
	Fibre Channel port speed	1.0625 Gb/s half duplex; 2.125 Gb/s full duplex
	Modes of operation	Fibre Channel Class 2 service and Fibre Channel Class 3 connectionless service
	Aggregate switch I/O bandwidth	16 Gb/s, full duplex; 16 buffers per port at 2112 bytes per frame
	Latency	<2 microseconds with no contention
	Data transmission range	Up to 500 meters (1625 feet) for short wave optical link Up to 10 km for long wave optical link
	Chassis types	Back to front air flow (power out the front)

Equipment Cabinets	HP Rack 1.25 meter, 1.6 meter, 2.0 meter (HP or Standard EIA rack)	A4900A, A4901A, A4902A
---------------------------	--	------------------------------

Fabric Management (Simple Name Server, Alias Server, Brocade Zoning, Telnet, Fibre Channel Manager)	User Interface	VFD front panel display, LED indicators, front panel command console, Telnet commands, Fibre Channel Manager, Brocade Web Tools
	Maintenance Port	RJ-45 front panel connector for 10Base-T Ethernet or in band

Dimensions	Rackmount	Height	2u+, 19 in. (EIA Compliant); 8.73 cm (3.44 in)
		Width	42.86 cm (16.87 in)
		Depth	68.6 cm (27 in)
		Weight	12.94 kg (28.5 lbs)
	Table Top	Height	8.73 cm (3.44 in)
		Width	42.86 cm (16.87 in)
		Depth	52.8 cm (20.8 in)
		Weight	12.94 kg (28.5 lbs)

Technical Specifications

Power Supply	Dual Redundant Internal	<ul style="list-style-type: none"> Nominal voltage of 100-127 and 200-240 VAC Total input power: 219 watts typical with 16 FL-ports Input line frequency: 50 to 60 Hz
Airflow	Single Hot Swappable Fan Cage. N+1 redundant Fans with Cage.	
Operating Environment	Temperature	0°C to 40°C operating; -35°C to 65°C non-operating
	Humidity	5% to 80% non-condensing at 40°C operating; 5% to 90% RH non-condensing at 40° C non-operating
	Altitude	Up to 3 km (9800 feet) operating; up to 4.6 km (15000 feet) non-operating
	Operating environment	Server and network equipment rooms

Brocade Silksworm 2400Fibre Channel Switch (A5625A/AZ and A5667A)

Product Number	Standalone Switch with Universal Port Cards: Includes a rack mount kit for adding the switch to an existing cabinet and an air duct for cooling	A5625A
	Factory rack mounted Switch with Universal Port Cards	A5625AZ

Features	Fibre Channel protocol	Fibre Channel ANSI Standard (FC PH)
	Fabric initialization	Complies with FC SW 3.3
	System architecture	Non blocking shared memory switch
	Number of Fibre Channel ports	8 ports
	Fibre Channel port speed	1.0625 Gb/s half duplex; 2.125 Gb/s full duplex
	Modes of operation	Fibre Channel Class 2 service and Fibre Channel Class 3 connectionless service
	Aggregate switch I/O bandwidth	8 Gb/s, full duplex; 16 buffers per port at 2112 bytes per frame
	Latency	<2 microseconds with no contention
	Data transmission range	Up to 500 meters (1625 feet) for short wave optical link Up to 10 km for long wave optical link
	Chassis types	Back to front air flow (power out the front)

Equipment Cabinets	HP Rack 1.25 meter, 1.6 meter, 2.0 meter (HP or Standard EIA rack)	A4900A, A4901A, A4902A
---------------------------	--	------------------------------

Fabric Management (Simple Name Server, Alias Server, Brocade Zoning, Telnet, Fibre Channel Manager)	User Interface	VFD front panel display, LED indicators, front panel command console, Telnet commands, Fibre Channel Manager, Brocade Web Tools
	Maintenance Port	RJ-45 front panel connector for 10Base-T Ethernet or in band

Technical Specifications

Dimensions	Rackmount	Height	1u+, 19 in (EIA Compliant); 4.34 cm (1.71 in)
		Width	42.86 cm (16.87 in)
		Depth	68.6 cm (27 in)
		Weight	6.36 kg (14 lbs)
	Table Top	Height	4.34 cm (1.71 in)
		Width	42.86 cm (16.87 in)
		Depth	45.0 cm (17.72 in)
		Weight	6.36 kg (14 lbs)

Power Supply	Single included with base switch.	<ul style="list-style-type: none">Nominal voltage of 100-127 and 200-240 VACTotal input power: 110 watts typical with 8 FL-portsInput line frequency: 50 to 60 Hz
	Redundant Internal power supply available.	

Airflow	Single Hot Swappable Fan Cage. N+1 redundant Fans with Cage.
---------	---

Operating Environment	Temperature	0°C to 40°C operating; -35°C to 65°C non-operating
	Humidity	5% to 80% non-condensing at 40°C operating; 5% to 90% RH non-condensing at 40° C non-operating
	Altitude	Up to 3 km (9800 feet) operating; up to 4.6 km (15000 feet) non-operating
	Operating environment	Server and network equipment rooms

© Copyright 2005 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.