Overview

The HP StorageWorks 4/256 SAN Director is an advanced B-series director-class switch, which provides high reliability, performance and scalability for Storage Area Networks (SANs) in mission critical enterprise environments.

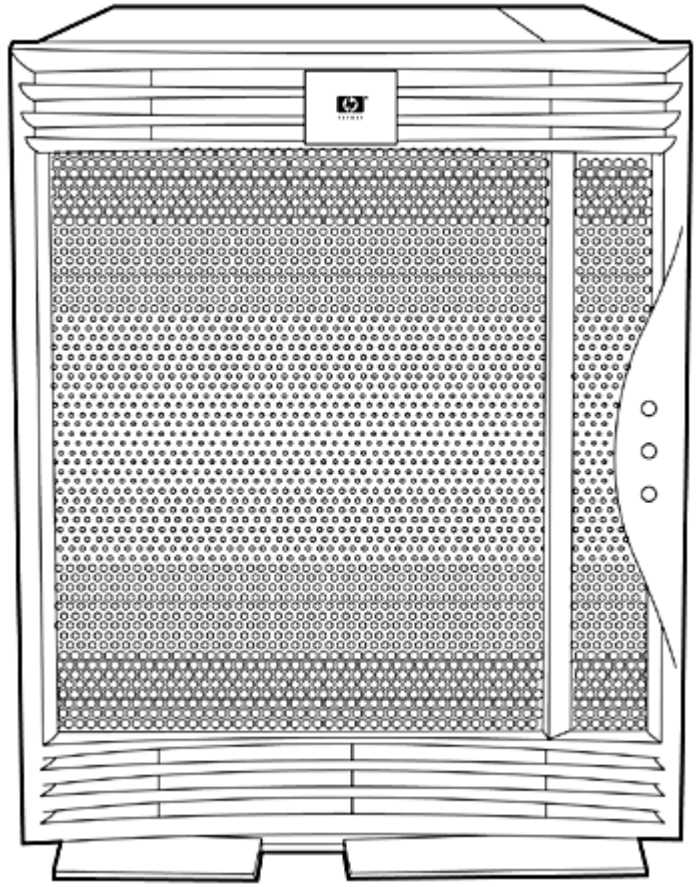
The 4/256 SAN Director provides a 4Gb/s backplane with industry-leading 10Gb, 8Gb, and 4Gb/s Fibre Channel port speeds. It delivers leading performance and scalability with up to 384 ports in a single domain. The high-performance architecture provides auto-speed negotiation to support legacy 1, 2, and 4 Gb/s server and storage devices for maximum flexibility. An 8Gb Fibre Channel blade also provides the ability to aggregate up to eight 8 Gb/s ports to create an Inter-Switch Link (ISL) trunk (optional software) for up to an unprecedented 64 Gb/s of bandwidth. For organizations with dark fiber, a 10Gb blade enables them to fully utilize 10Gbit/sec links via dark fiber. In most cases today, a leased 10Gbit/sec link is underutilized because organizations can transmit only 4 Gbit/sec Fibre Channel traffic over a 10 Gbit/sec connection.

With Extended Fabric software (optional) distance support for extended applications has been increased to support distances up to 500 kilometers depending on speed. The director also extends the distance for data transferred through ISL Trunking which enables new levels of performance between data centers.

The 4/256 SAN Director is designed for continuous operation and supports "five-nines" (I.e., 99.999%) availability. The director is engineered with built-in redundancy; FRUs capable of hot-swap install/de-install, and non-disruptive hardware and software upgrades concurrent with operation.

The unique industry-leading capabilities position the Director Switch and the B-series product family to be the standard solution for Corporate and Enterprise SANs. Administrators concerned with the threats of unauthorized SAN access and unauthorized SAN configuration changes can use security capabilities built into the ASIC and software. Plus, they can use the optional Power Pack set of tools to monitor the network's health and performance. Available pre-configured on the switch or as an upgrade, Power Pack also provides the foundation for integration into HP storage management tools, enabling infrastructure management through a single-pane-of-glass. The Power Pack tools can be ordered separately, as well.

Overview



What's New

Supports the HP Factory Express racking capability through the use of a factory integration option.

Key Features and Benefits

- Outstanding scalability and performance:
  - Delivers up to 384 4 Gb/s ports or 128 8 Gb/s ports in a single domain and a 14U enclosure
  - Greater trunking bandwidth and distance support
  - Optimized fabric performance and load balancing by automatically routing of data to most efficient path
- State of the art reliability:
  - Meets ultra-high availability requirements with redundant, hot-pluggable components, no single point of failure, and non-disruptive software upgrades
- Reduced total Cost of Ownership (TCO) for SAN Infrastructure
  - Enables storage consolidation, simplified management of data center SAN environment
  - Low Cost Server connectivity via iSCSI minimizes cost of connecting second tier assets
- Broadest range of compatibility with SAN products
  - Multi-vendor server and storage environment
  - Widest range of HP SAN solutions
  - Backward compatible with previously installed 1Gb, 2Gb, and 4Gb SAN Switches
  - Interoperability with the more than 3.0 MILLION port HP SAN Switch installed base

Overview

- Flexible SAN Services
  - 4Gb Fibre Channel routing services
  - FCIP Services for SAN Extension featuring:
    - Hardware assisted traffic forwarding for greater performance
    - Hardware-based Encryption for greater security (optional)
- HP Power Pack (Optional) - highest supported modular functionality
  - Trunking - highest throughput between switches (32Gb/sec)
  - Proactive threshold monitor (Fabric Watch)
  - Advanced Performance Monitor
  - Support for extended distance (Extended Fabrics)
- Broadest Range of HP Packaged SAN Services
  - Mission critical SAN Services SAN-ES
  - Assessment and installation services for security

Product Highlights

4/256 SAN Director and 4/256 Power Pack

- 384-port single-domain 4 Gb/s director that enables high-port-count SANs with fewer domains
- Flexibility to build a high-port-count or highest-performing director with 4Gb 48, 32 and16-port blades and 8Gb 16 port blades
- Full performance at 4 Gb/s across 128 ports using 16-port 4 Gb/s blades, providing excellent performance
- Full performance at 2 Gb/s across 256 ports using 32-port 4 Gb/s blades, providing leading performance and port density
- 3 to 1 maximum oversubscription ratio with 48-port 4 Gb/s blades for outstanding fan-out scalability
- Local switching capability on every port for each port blade providing full 4 Gb or 8Gb bandwidth
- Enhanced control processors with approximately twice the processing power and an optimized memory bus for more powerful fabric services processing
- Automatic port speed negotiation at 1, 2, 4, and 8 Gb/s to help ensure seamless integration and interoperability with existing networked storage environments
- "Five-nines" availability and reliability
- Built-in redundancy with no single point of failure for AC power input, power supplies, and cooling blowers, as well as control processors with stateful failover
- Concurrent hardware and software upgradeability with hot code loading and activation
- Hot-swappable Field-Replaceable Units (FRUs)
- Employs (optional) Inter-Switch Link (ISL) Trunking to provide high-speed data path between switches
- Integrates fully with HP OpenView storage management products
- Ships with two power supplies and control processors
- Ships with zero ports; flexibility to configure the Director with either 16-port, 32-port or 48-port, Multi-Protocol blade and/or iSCSI 4Gb/s blades
- Outstanding flexibility with 4Gb routing services, FCIP SAN extension services , and iSCSI support

SAN scalability

Scales up to 384 ports in a single switch domain, participating in large core-to-edge fabrics. Please see the following web site for SAN configuration support information:
http://www.hp.com/go/SANDesignGuide

High-availability features

- Redundant, hot-swappable components
- Redundant power and cooling subsystems
- Enhanced data integrity on all data paths
- Fabric Shortest Path First (FSPF) rerouting around failed links
- Integration with SNMP managers
- Automatic Control Processor fail over
- Non-disruptive "hot" software code loads and activation
- Easy configuration, save and restore
- Remote Monitoring of entire data center via Instant Support Enterprise Edition (ISEE)

Product Highlights

Advanced Fabric Services

- ISL Trunking (optional)
- Hardware Enforced Zoning
- Frame Filtering
- Web Tools
- End-to-End Performance Analysis (optional)
- Extended Fabrics (optional)
- Fabric Watch (optional)
- Fabric Manager (optional)

Cabinet Support

22U, 36U, and 42U; 5000, 9,000 and 10,000 series StorageWorks Cabinets are supported
25U, 33U, and 41U HP system/e cabs

NOTE: A maximum of two Director switches currently are supported to ship configured to order from the factory in a StorageWorks 42U, 10000 (10KG2) cabinet. The Standard internal PDUs provided with StorageWorks cabinets CANNOT be used for the SAN Director when configured in a StorageWorks 42U, 10000 series cabinet. Two 30 AMP, 200-240V, L6-30p PDUs are required per cabinet. The part number for the required 30 AMP PDU is E7681A (E7681-63001).

Software Components, Standard

Remote Switch

The Remote Switch fabric functions with the aid of a bridging device, or network bridge. The network bridge supports Fibre Channel physical interfaces, as well as secondary non-Fibre Channel FCIP physical interfaces.

Frame Filtering

An ASIC based capability in the 4 Gb family of SAN switches that enables new applications and features. The switch has the ability to "view" the first 64-bytes of the Fibre Channel frame. At this time, Frame Filtering enables advanced capabilities such as Advanced Zoning and Advanced Performance Monitoring (optional).

Advanced Zoning

In the 2Gb generation of switches, WWN Zoning and Access Control are enforced by hardware that provides the same simple administration previously enforced only with software. Administrators can organize a physical fabric into logical groups and prevent unauthorized access by devices outside the Zone.

WebTools

WebTools is an intuitive and easy-to-use graphical interface that enables organizations to monitor and manage HP SAN switch fabrics. SAN administrators can perform management tasks by using a Java-capable Web browser from standard laptops, desktop PCs, or workstations from any location within the enterprise.

Software Components, Optional

SAN Director Power Pack Software Bundle

The SAN Director Power Pack Software bundle includes:

- Extended Fabric
- ISL Trunking
- Advanced Performance Monitoring
- Fabric Watch

Product Highlights

Extended Fabric	Extends all of the scalability, reliability, and performance benefits of Fibre Channel Storage Area Networks (SANs) beyond the native 10 km distance specified by the Fibre Channel standard.
ISL Trunking	For high performance enhanced Trunking, this optional license logically groups up to eight E-ports to provide a high bandwidth trunk between two switches. Each 4 Gb switch needs its own license. The switch operating system views the trunk as a single, high bandwidth resource (up to 32 Gb) when routing connections between switches. Connections are load-balanced across the individual links, which comprise the logical trunk group.
Advanced Performance Monitor	This enabling technology helps administrators monitor and watch specific fabric metrics -- from a SID (Source ID) to a DID (Destination ID) -- so they can fine-tune and scale the fabric more efficiently. Plus, Advanced Performance Monitoring includes the ability for early warning detection of hot spots within the fabric, a powerful tool for maintaining overall balanced performance.
Fabric Watch	Fabric Watch enables each switch to monitor the SAN for potential faults and automatically alert network managers to problems before they become failures. Fabric Watch tracks a variety of SAN fabric elements, events, and counters. Monitoring fabric-wide events, ports, SFPs, and environmental parameters permits early fault detection and isolation as well as performance measurement. Each switch in the SAN needs its own Fabric Watch license.
Fabric Manager	Fabric Manager is a highly scalable, Java-based application that manages multiple switches and multiple fabrics (up to eight) in real time, helping SAN administrators with SAN configuration, monitoring, dynamic provisioning, and daily management. SAN administrators gain rapid access to critical SAN information across multiple personality fabrics, including both Fabric OS SANs and enhanced Secure Fabric OS SANs.
HP StorageWorks 4/256 SAN Director FICON CUP Active License	Ficon Director Switching provides Fibre Channel and FICON intermix, FICON Control Unit Port (CUP), and FICON cascading for more then one 4/256 SAN Director in XP Storage Array environments. The license feature provides Control Unit Port (CUP) in-and management function designed to allow mainframe applications to perform configuration, monitoring, management and statistics collection. These applications include System Automation for OS/390 (SA/390), Dynamic Channel Management Facility (DCM) and Resource Management Facility (RMF). Hardware- enforced FICON and FCP port zoning enhances separation with intermix operation.
HP StorageWorks MP Blade Performance Extension LTU	Optional software license to activate the high performance extension services. The HP MPR Blade provides two types of SAN Services: Optional software license to activate the FCIP SAN services. The HP MPR Blade provides two types of SAN Services: FC-FC Subnet Routing Service for SAN island consolidation: Logically connect devices in multiple SAN fabrics to share storage resources-from any fabric regardless of distance-with the administration and fault isolation benefits of separately managed fabrics FCIP Tunneling Service for SAN extension over distance: Seamlessly and reliably extend HP B-Series SANs across MAN and WAN IP networks with high performance FCIP services, fully integrated with HP CA solutions for EVA and XP. Configurable hardware-based encryption is also available in for the FCIP service with FOS v5.2 or later.

Product Highlights

Warranty

(1-1-1) Hardware Warranty - One-year on-site warranty, 8x5, next business day response, installation not included.
NOTE: The hardware warranty covers firmware and embedded non-saleable software.
Saleable software carries its own warranty, see below.
Software Warranty - HP warrants only that the software media will be free of physical defects for a period of ninety (90) days from delivery.
EXCLUSIVE REMEDY: The entire liability of HP and its suppliers and your exclusive remedy for software that does not conform to this Limited Warranty shall be the repair or replacement of the defective media. This warranty and remedy are subject to your returning the defective media during the warranty period to HP in the country in which you obtained the software.

HP Service & Warranty Support

HP Service & Warranty Support Additional Warranty protection and/or HP Installation packages can be purchased.
NOTE: Certain restrictions and exclusions apply. Consult the Customer Support Center for details. HP provides a one-year, hardware limited warranty, fully supported by a worldwide network of resellers and service providers. The first year of Rights to New License Version and standard business day, standard business hours telephone support is included with the purchase of an HP Power Pack. In order to continue to receive telephone support and Rights to New License Version after the first year, the purchase of a software support contract or Care Pack is required.
In addition, available service offerings include a full range of HP Care Pack packaged hardware and software services:

- Installation
- Extended coverage hours and enhanced response times
- System management and performance services

For more information on warranty and support options, please visit our Web site at: http://www.hp.com/hps/tech/storage/supp/.

Software Product Services

- Stand-alone telephone support
- Rights to new license version
- Media and documentation updates

Hardware Product Services

- Installation services
- On-site maintenance (includes warranty support)
- Response time upgrades during the warranty period
- Post-warranty coverage

HP Care Pack Services Warranty Upgrade Options

Service offerings include a full range of Customer HP Care Pack services for both hardware and software services:

- Response - Upgrade on-site response from next business day to same day 4-hours
- Coverage - Extend hours of coverage from 5 days x 9 hours to 7 days x 24 hours
- Duration - Select duration of coverage for a period of 1, 3, or 5 years

Additional Warranty protection and/or HP Installation packages can be purchased.
NOTE: Certain restrictions and exclusions apply. Consult the HP Customer Support Center for details.

Service and Support, HP Care Pack, and Warranty Information

HP Care Pack Information

HP Care Pack is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage.

- HP Care Pack is not available for less than the product's warranty duration.
- HP Care Pack is available for sale anytime during the warranty period for most products, but the commencement date will be the same as the Warranty Start Date (delivery date to end user customer). Proof of purchase may be required.
- HP Care Pack services are prepaid.

For additional HP Care Pack (hardware & software) information, as well as orderable part numbers, please refer to the URL listed below:
http://h18005.www1.hp.com/services/carepaq/index.html

Additional Services

Implementation service, SAN Architecture service. For more information on service options, please visit our Web site at: http://www.hp.com/go/san.

Family Information

Features	4/8 SAN Switch Base and 4/8 SAN Switch	4/16 SAN Switch and 4/16 SAN Switch Power Pack	4/32 SAN Switch and 4/32 SAN Switch Power Pack	4/64 SAN Switch and 4/64 SAN Switch Power Pack	4/256 SAN Director and 4/256 SAN Director Power Pack	DC SAN Backbone Director Power Pack
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Data Centers	Large Data Center
Port Bandwidth	4 Gbit/sec	4 Gbit/sec	2 Gbit/sec	4Gbit/sec	4Gbit/sec 8Gbit/sec 10Gbit/sec ISL	8Gbit/sec 10Gbit/sec ISL
Aggregate device bandwith	64 Gbit/sec end-to-end	128 Gbit/sec end-to-end	128-256 Gbit/sec end-to-end	512 Gbit/sec end-to-end	3.264Tbit/sec end-to-end	6 Tbit/sec end-to-end6 Tbit/sec end-to-end
OS Support	NOTE: Please Refer to SAN Design Guide pointer http://www.hp.com/go/SANdesign or http://www.hp.com/go/SANdesignguide					
Storage system support	MA8000, EMA12000/ EMA16000, EVA,XP, VA, MSA	MA8000 EMA12000/ EMA16000 EVA, XP, VA, MSA	MA8000 EMA12000/ EMA16000 EVA, XP, VA, MSA	MA8000 EMA12000/ EMA16000 EVA, XP, VA, MSA	MA8000 EMA12000/ EMA16000, EVA,XP,VA, MSA	MA8000 EMA12000/ EMA16000 EVA,XP,VA, MSA
Ports	16 SFP	16 SFP	32 SFP	32 SFP Base 64 64 SFP PP	Up to 384 SFP	Up to 384 SFP and/or XFP
Cascading support	Yes	Yes	Yes	Yes	Yes	Yes
Advanced Trunking	Optional Upgrade	Included with Power Pack or Optional Upgrade	Included with Power Pack or Optional Upgrade	Included with Power Pack or Optional Upgrade	Included with Power Pack or Optional Upgrade	Included
Form factor	1U	1U	1U	2U	14U	14U
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	No	No	Yes	Yes	Yes	Yes
Hot plug fans	No	No	Yes	Yes	Yes	Yes
Enterprise Backup Solution (EBS) support	Yes	Yes	Yes	Yes	Yes	Yes

Family Information

Features	Brocade 4Gb SAN Switch for HP p-Class BladeSystem	Brocade 4Gb SAN Switch for HP c-Class BladeSystem	MSA SAN Switch 2/8 (embedded switch)	HP 400 Multi-protocol Router	B-Series iSCSI Blade	B-Series Multi-protocol Router Blade
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Data Centers	Data Centers
Port Bandwidth	4 Gbit/sec	4 Gbit/sec	2 Gbit/sec	4 Gbit/sec Ethernet: 1 Gbit/sec	4 Gbit/sec Ethernet: 1 Gbit/sec	4 Gbit/sec Ethernet: 1 Gbit/sec
Aggregate device bandwith	48 Gbit/sec end-to-end	192 Gbit/sec end-to-end	32 Gbit/sec end-to-end	128 Gbit/sec end to end	N/A	N/A
OS Support	NOTE: Please Refer to SAN Design Guide pointer http://www.hp.com/go/SANdesign or http://www.hp.com/go/SANdesignguide					
Storage system support	MSA, EVA, XP	MSA, EVA, XP	MSA 1000	MSA, EVA, XP	MSA, EVA, XP	MSA, EVA, XP
Ports	4 external / 8 internal	4 or 8 external / 8 or 16 internal	7 external / 1 internal	18 ports: 16 FC and 2 Gigabit Ethernet	16 ports: 8 FC and 8 Gigabit Ethernet	18 ports: 16 FC and 2 Gigabit Ethernet
Cascading support	Yes	Yes	Yes	Yes	Yes	Yes
Advanced Trunking	Optional Upgrade	Optional Upgrade	Optional Upgrade	Optional Upgrade	Optional Upgrade to chassis	Optional Upgrade to chassis
Form factor	Embedded	Embedded	Embedded	1U	Blade in Director	Blade in Director
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	Yes, in BladeSystem Enclosure	Yes, in BladeSystem Enclosure	No	Yes	Yes, in director chassis	Yes, in director chassis
Hot plug fans	Yes, in BladeSystem Enclosure	Yes, in BladeSystem Enclosure	No	Yes	Yes, in director chassis	Yes, in director chassis
Enterprise Backup Solution (EBS) support	Yes	Yes	Yes	Yes	MSA, EVA, XP	Yes

Configuration Information

Step 1 – Base Configuration and Power Pack

Select one:

Model	Model Description	Part Number
StorageWorks 4/256 SAN Director	256-port capable Fibre Channel Director with 2 control processors, 2 power supplies, rack rails, Zoning, Web tools. Does not include Port blades or SFPs	A7988A
StorageWorks 4/256 SAN Director Power Pack	256-port capable Fibre Channel Director with 2 control processors, 2 power supplies, rack rails, Zoning, Web tools, Advanced Performance Monitor, Fabric Watch, ISL Trunking, Extended Fabrics. Does not include Port blades or SFPs	A7989A

Step 2 – Additional Port Configurations

	Model Description	Quantity	Part Number
4/16 port blade	16-port 4Gb/s Director Blade NOTE: Requires optical transceivers for each port as listed below.	Add the appropriate quantity of 16-port blades to meet requirements	A7990A
4/32 port blade	32-port 4Gb/s Director Blade NOTE: Requires optical transceivers for each port as listed below.	Add the appropriate quantity of 32-port blades to meet requirements	A7991A
4/48 port blade	48-port 4 Gb/s Director NOTE: Requires optical transceivers for each port as listed below NOTE: If the 4/256 SAN Director was manufactured prior to 9/30/06, customers installing the 4/48 blade for added port connectivity beyond 256 ports will need to order the new high density cable management comb to accommodate the increase number of fiber optic cables	Add the appropriate quantity of 48-port blades to meet requirements	AG561A
8/16 port blade	16-port 8Gb/s Director Blade NOTE: Requires B-series optical transceivers (AJ716A, and AJ715A) for each port as listed below. Requires additional power supply (AG460A) if the 4/256 SAN Director is fully populated with the 8/16 blade.	Add the appropriate quantity of 16-port blades to meet requirements	AK858A
10/6 port blade	6-port 10Gb/s Director Blade NOTE: Requires optical XFP transceivers for each port as listed below. Requires additional power supply (AG460A) if the 4/256 SAN Director is fully populated with the 10/6 blade.	Add the appropriate quantity of 6-port blades to meet requirements	AK861A
HP StorageWorks B-Series iSCSI Blade	16 ports (8 Fibre Channel and 8 Gigabit Ethernet) per blade enables bridging of iSCSI hosts to Fibre Channel Fabrics NOTE: Requires additional power supply (AG460A) and optical transceivers listed below	A maximum of 4 iSCSI blades supported per Director chassis	AG671A
HP StorageWorks Multi-protocol Router Blade for B-Series	18 ports (16 Fibre Channel and 2 Gigabit Ethernet) multi-protocol router providing 2 types of SAN services: FC subnet routing, and FCIP tunneling. Includes rack mount kit, advanced zoning and web tools. NOTE: Requires additional power supply (AG460A) and optical transceivers listed below.	A maximum of two B-Series MP Router Blades supported per Director chassis	AG461A
High Density Cable Management Comb	HP StorageWorks B-Director Cable Mgmt Comb One per Chassis	One per chassis	AG562A

Configuration Information

Add Software:		
Power Pack Software Bundle for SAN Director	Fabric Watch, ISL Trunking, Extended Fabric, Advanced Performance Monitoring	330882-B21
Optional Software:	HP StorageWorks MP Blade Perf Extens LTU: Optional software license to activate the high performance extension services for either IP or FC connectivity in the MP Blade. IP and FC extension services are mutually exclusive. It includes the Encryption Services License.	T4427A
	HP StorageWorks B-Series Fabric Watch Dir Swt LTU ALL	334218-B21
	HP StorageWorks B-Series ISL Trunking Dir Swt LTU ALL	325887-B21
	HP StorageWorks B-Series Advanced Performance Monitor Dir Swt LTU ALL	334219-B21
	HP StorageWorks B-Series Extended Fabric Dir Swt LTU ALL	325886-B21
	HP StorageWorks 4/256 Director FICON Cup Active License* *Check for availability in region; only supported in XP Storage array environments	T4401A*
	Fabric Manager , v5.x Base 10 domains	T4270A
	Fabric Manager, v5.x Enterprise 200 domains, 8 fabrics	T4269A
	Fabric Manager, v4 Enterprise to v5.x Enterprise upgrade	T4272A
	Fabric Manager v5 base to v5.x enterprise upgrade license	T4273A
	Fabric Manager, v4 Base to v5.x Base upgrade	T4271A

Step 3 – Additional Options

Additional Power Supply	HP StorageWorks Power Supply for Director Chassis - Quantity 2 NOTE: Required when using either B-Series iSCSI Blade or Multi-protocol Router Blades for B-Series	AG460A
Optical Transceivers	8Gb Short Wave B-Series FC SFP+ 1 Pack NOTE: Only the "B-Series" branded are supported with the 8/16 Fibre Channel Blade (AK858A)	AJ716A
	4Gb/s Short Wave FC SFP 1 Pack	A7446B
	4Gb Short Wave B-Series FC SFP 1 Pack NOTE: Only the "B-Series" branded are supported with the 8/16 Fibre Channel Blade (AK858A)	AJ715A
	4Gb Long Wave FC SFP 1 Pack - 10km	AE493A
	HP 4Gb Long Wave B-Series FC SFP 1 Pack - 10km NOTE: Required when using a 8/16 Fibre Channel Blade (AK858A) at 4Gb speed	AK870A
	2Gb/s Long Wave FC SFP 1 Pack - 10 km	A6516A
	2Gb/s Long Wave FC SFP 1 Pack - 35 km	300836-B21
	HP BLc 10Gb SR XFP Opt Kit NOTE: Required when using a 10/6 Fibre Channel Blade (AK861A)	443756-B21
	HP BLc 10Gb LR XFP Opt Kit NOTE: Required when using a 8/16 Fibre Channel Blade (AK861A)	443757-B21

Configuration Information

Optical cables	LC-LC type cables	
	2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
	5 m LC-LC Multi-Mode Fibre Channel Cable	221692-B22
	15 m LC-LC Multi-Mode Fibre Channel Cable	221692-B23
	30 m LC-LC Multi-Mode Fibre Channel Cable	221692-B26
	50 m LC-LC Multi-Mode Fibre Channel Cable	221692-B27
	LC-SC type cables	
	2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
	5 m LC-SC Multi-Mode Fibre Channel Cable	221691-B22
	15 m LC-SC Multi-Mode Fibre Channel Cable	221691-B23
	30 m LC-SC Multi-Mode Fibre Channel Cable	221691-B26
	50 m LC-SC Multi-Mode Fibre Channel Cable	221691-B27

Fibre Channel Standards And Revisions	Up to 384 ports, universal (E, F, and FL); up to eight Fibre Channel modules, either 16 port, 32 port or 48 port

Technical Specifications

Fibre Channel ports	Up to 384 ports, universal (E, F, and FL); up to eight Fibre Channel modules, either 16 port, 32 port, or 48 port	
Control processor	Redundant (active/standby) control processor modules	
Scalability	Full fabric architecture: http://h18006.www1.hp.com/products/storageworks/san/documentation.html	
Performance	1.063 Gb line speed, full duplex; 2.125 Gb line speed, full duplex ; 4.25 Gb line speed, full duplex; auto-sensing of 1 Gb, 2 Gb, 4Gb, and 8Gb port speeds; optionally programmable to fixed port speed; speed matching between 1 Gb, 2 Gb, 4Gb, and 8Gb ports	
ISL Trunking	Up to eight 8 Gbit/sec ports per ISL trunk; up to 64 Gbit/sec per ISL trunk. Up to two 8-port trunk groups supported on 16-port blades, four 8-port trunk groups supported on 32-port blades, and eight 8-port trunk groups supported on 48-port blades. ISL Trunking at 2 Gbit/sec for compatibility with B-Series legacy switches and directors.	
Aggregate bandwidth	3.264 Tbit/sec	
Switch latency	<2.1 µsec any port to any port at 2 Gbit/sec, cut-through routing; <3.6 µsec any port to any port at 4 Gbit/sec, cut-through routing	
Maximum frame size	2112-byte payload	
Frame buffers	1024 per blade dynamically allocated up to 255 per port	
Classes of service	Class 2, Class 3, Class F (inter-switch frames)	
Port types	FL_Port (all except on 48-port blades), F_Port, E_Port, self-discovery based on switch type (U_Port); port type control for EX_Port, VE_Port and Vex_Port; Gigabit Ethernet for VE_Port and Vex_Port	
Data traffic types	Fabric Switches supporting unicast, multicast (255 groups), and broadcast	
Media types	Hot-pluggable, industry-standard Small Form-factor Pluggable (SFP), LC connector; Short-Wavelength Laser (SWL) up to 500 meters (1,640 feet); Long-Wavelength Laser (LWL) up to 10 km (6.2 mi); Extended Long- Wavelength Laser (ELWL) up to 100 km (62.1 mi); distance depends on fiber optic cable and port speed Note: For 4 Gbit/sec operations, only SWL is supported.	
Fabric services	Simple Name Server; Registered State Change Notification (RSCN); Alias Server (multicast); Advanced Zoning; WebTools; Fabric Watch; ISL Trunking (optional); Advanced Performance Monitoring; FICON Control Unit Port (CUP) on 4/16 and 4/32 SAN Director blades	
High availability	Control Processor	Redundant (active/standby) control processor modules; automatic failover; non-disruptive software upgrades; dual-flash memory on each control processor to store two software images
	Modules	Hot swappable
	Backplane	Fully passive
	Input power	Dual AC inputs
	Chassis power	Dual AC-DC power supply modules
	Cooling	Three blower assembly modules (two operational required)
Management	Telnet; RADIUS, SNMP (FE MIB, FC Management MIB); WebTools; Fabric Watch Optional; Fabric Access layer	
Management access	10/100 Ethernet (RJ-45), in-band over Fibre Channel (requires fabric); two serial ports (DB-9) per control processor module	
Diagnostics	POST and embedded online/offline diagnostics	
Mechanical specifications	Mounting	Rack-mountable in a standard 19-inch (48.26 cm) EIA rack; Telco-style mid-mounting available
	Ports per rack	Up to 768-ports per 42U rack
	Enclosure	Rear panel-to-door airflow
	Width	17.22 in (43.74 cm)
	Height	24.11 in (61.24 cm) 14U
	Depth (without door)	27.90 in (70.90 cm)

Technical Specifications

	Depth (with door)	29.20 in (74.20 cm)	
	Weight	95 kg (210 lb) for 128-port configuration (eight FC4-16 blades, without media) 98 kg (216 lb) for 256-port configuration (eight FC4-32 blades, without media) 98 kg (216 lb) for 384-port configuration (eight FC4-48 blades, without media)	
Environment	**Temperature**	**Operating**	32° to 104° F (0° to 40° C)
		Non-operating	-25° to 70° C (-13° to 158° F)
	Humidity	**Operating**	5% to 85% non-condensing at 104° F (40° C)
		Non-operating and storage (non-condensing)	0% to 93%
	Altitude	Up to 3000 meters(9800 feet)	
	Shock	20 g,11 ms, half sine	
	Vibration	**Operating**	Operating: 20G, 11 ms, half sine 1G p-p, 5-500Hz, 1 octave min Non-operating: 33G, 11 ms, half sine 2.4G p-p, 5-500Hz, 1 octave min
		Non-operating	Operating: 5G p-p, 0 to 3kHz at 1.0 octave min Non-operating: 10G p-p, 0 to 5 kHz at 1.0 octave min
	Heat dissipation	1160 W or 3949 BTU (eight 48-port blades and two CP4 blades) 915 W or 3115 BTU (eight 32-port blades and two CP4 blades) 710 W or 2425 BTU (eight 16-port blades and two CP4 blades)	
Power	**Supported power range**	**Nominal**	200-240 VAC, 12A single phase
		Operational	180-264 VAC, auto-sensing
		In-rush current	40A maximum, peak
		Input frequency range	47-63 Hz
		NOTES: A fully loaded switch requires a maximum of 750 Volt-Amps. A fully populated 4/256 SAN Director with no multi-protocol blades can function by the power supplied with two power supplies in redundant power mode A fully populated 4/256 SAN Director populated with either the 8/16 blade (AK858A) or the10/6 blade (AK861A) requires four functional power supplies. A 4/256 SAN Director populated with either the B-Series MP Router blade (AG461A) or the B-Series iSCSI Blade (AG671A) requires four functional power supplies	
	Power Supplies	Two power supplies included with each director	Output voltages (each): 48V at 20 amps; 12V at 4 amps Maximum output power: 1000 watts AC inrush current 40A maximum, peak
	Power Cables	Power Cables included	Two, IEC 60320/C19 to IEC 60320/C20 to connect from the director to the rack PDU Two, IEC 320, EN60320 C19-Angled, 16A/250VAC to L6-20 to connect from director to wall outlet
Certified maximum	Please Refer to SAN Design Guide at the following URL http://www.hp.com/go/SANDesignGuide		
Interoperability	• SAN Switch 8		

- SAN Switch 16
- SAN Switch 8-EL
- SAN Switch 2/8V
- 4/8 SAN Switch
- SAN Switch 16-EL
- SAN Switch 2/16V
- SAN Switch 2/16N FF
- 4/16 SAN Switch
- Integrated /32
- SAN Switch 2/32
- 4/32 SAN Switch
- 4/64 SAN Switch
- Core Switch 4/64
- SAN Director 2/128
- SAN Switch 2/16
- SAN Switch 1/16-EL
- MSA SAN Switch 2/8
- Brocade 4Gb SAN Switch for p-class HP BladeSystem
- Brocade 4Gb SAN Switch for c-class HP BladeSystem
- 400 MP Router
- B-Series MP Router Blade

Switch core	Non-blocking
Fabric latency	< 2 μ sec. with no contention, cut-through routing
Hardware Options	16, 32 and 48 port FC Card, iSCSI blade, MP-Router blades ; SFP media
Supported software	Telnet, SNMP, WebTools, Zoning, Fabric Watch Optional, Fabric Manager Optional