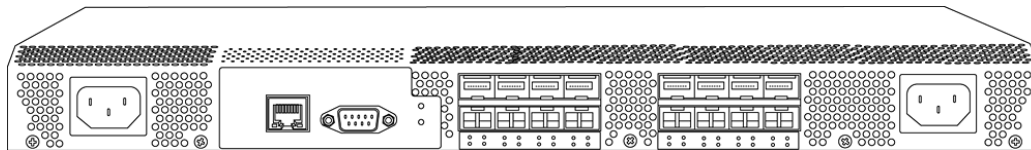# QuickSpecs

Overview

Introduction

The highly available HP StorageWorks SAN Switch 2/16V offers 2 Gb connectivity for an entry-level storage area network (SAN), and the ability to grow to a core-to-edge infrastructure. The simplicity and ease-of-use advantages of the SAN Switch 2/16V can help increase administrator productivity and lower the cost of management. This can be especially beneficial for organizations with limited IT expertise. It delivers sixteen high performance Auto Sensing 1 and 2 Gb Fibre Channel ports. Plus, the SAN Switch 2/16V is fully non-blocking and provides 32 Gb capacity for un-congested sustained, 2 Gb full duplex throughput. Its storage networking features include redundant power supplies and cooling, making it ideal for supporting corporate infrastructure implementations. The SAN Switch 2/16V scales to a maximum fabric configuration of two switches and can be upgraded to a SAN Switch 2/16N FF to scale to full SAN configurations. Small-form-factor-pluggable optical transceivers (SFPs) must be ordered separately. The increased performance of these switches is also appropriate where high throughput needs exist such as video streaming, intensive on-line transaction processing (OLTP), and medical imaging.

Key Features and Benefits

- Reduced Total Cost of Ownership (TCO) for SAN Infrastructure
  - Enables storage consolidation, simplified management of data center SAN environment
- Interoperability with the more than 1 MILLION port HP SAN Switch installed base
- Highest integration with HP Open View Storage Area Manager via:
  - SAN Switch API
  - SAN Switch element managers
  - HP StorageWorks Fabric Manager
- 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 SAN Switches
  - Support for multi-protocol gateways
- HP Power Pack - Highest supported modular functionality (Optional)
  - Trunking - highest throughput between switches (8Gb/sec.)
  - HW enforced WWN Zoning (Advanced Zoning)
  - Proactive threshold monitor (Fabric Watch)
  - Advanced Performance Monitor
  - Per Switch element manager (WebTools)
  - Support for extended distance (Extended Fabrics)
- Flexible storage connectivity
  - The only SAN solutions providing the complete HP SAN Switch functionality from Embedded to Enterprise. The HP SAN Switch value line products allows the capability to apply the complete SAN Switch functionality to an affordable entry level SAN deployment and then to grow that deployment to the largest SAN fabric solutions supported by HP.

Models

HP StorageWorks SAN Switch 2/16V Models	StorageWorks SAN Switch 2/16V	AA978A

SAN Switch 2/16V Optional Software	Fabric Manager , v5.x Base Edition (10 domains)	T4270A
	Fabric Manager, v5.x Enterprise Edition	T4269A
	Fabric Manager, v4 to v5 Enterprise License Upgrade	T4272A
	Fabric Manager, v4 to v5 Base License Upgrade	T4271A
	Fabric Manager, v5 base to v5 enterprise upgrade license	T4273A
	Secure Fabric OS for 8 & 16 port switches (v3.x firmware or higher)	332924-B21
	Power Pack Software Bundle	T3573A
	NOTE: The Power Pack Software Bundle includes the following: Advanced Performance Monitoring, Fabric Watch, and ISL Trunking. These options are also available for order separately below.	
	Fabric Watch	324504-B21
	Extended Fabric	324505-B21
	ISL Trunking	324506-B21
	HP StorageWorks SAN Switch 2/16V 2-Switch to 4-Switch Upgrade license	T3572A
	HP StorageWorks SAN Switch 2/16V 2-Switch to Full Fabric Upgrade license	T4261A
	3YR 24X7/4HR, FC/SAN Switch 16P, service	161308-002
	Basic Install, FC/SAN Switch 16P, service	161324-002

Product Highlights

16 non-blocking ports	Sixteen auto-sensing 1 and 2 Gb universal, self-configuring ports (F, FL, E). Can be programmed to fixed 1 Gb or 2 Gb speed. Full 32 Gb switching capacity for un-congested fully sustained, 2 Gb full duplex throughput.
Configuration support	SAN Switch 2/16V will interoperate with other SAN Switches running the firmware versions defined in the SAN Design Guide: http://h18000.www1.hp.com/products/storageworks/san/documentation.html
High-availability features	• Hot Code Load Activation
Advanced Fabric Services	• ISL Trunking (optional) • Hardware Enforced Zoning • WebTools • Fabric Watch (optional) • End-to-End Performance Analysis (optional) • Extended Fabric (optional)
Manageability	WebTools, OpenView, SNMP, IP, API.
Scalability	Initial support: Refer to the guidelines described in the Heterogenous Open SAN Design Reference Guide available at: http://h18000.www1.hp.com/products/storageworks/san/documentation.html
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

Software Components, Standard

Frame Filtering	An ASIC based capability in the 2 Gb family of switches that enables new applications and features. The switch now 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.
Advanced Zoning	In the 2 Gb 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.

Product Highlights

Software Components, Optional

SAN Switch 2/16V Power Pack Software Bundle

The SAN Switch 2/16V Power Pack Software bundle includes:

- Fabric Watch
- Advanced Performance Monitoring
- ISL Trunking

NOTE: The Extended Fabric license is no longer part of the Power Pack bundle for the 8-port and 16-port switch models.

ISL Trunking

For high performance enhanced Trunking, this optional license logically groups up to four E-ports to provide a high bandwidth trunk between two switches. Each 2 Gb switch needs its own license. The switch operating system views the trunk as a single, high bandwidth resource (up to 8 Gb) when routing connections between switches. Connections are load-balanced across the individual links, which comprise the logical trunk group. Each 16-port switch can have a total of four separate 4-port Trunk groups.

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.

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.
NOTE: The Extended fabric option is no longer supported in the new 4 Gb/s 8-port and 16-port switch models. It is supported only in the 2 Gb/s legacy models.

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.

Secure Fabric OS

Secure Fabric OS™ is a comprehensive security solution for SAN fabrics providing policy-based security protection for more predictable change management, assured configuration integrity and reduced risk of downtime. Secure Fabric OS protects the network by using the strongest, enterprise-class security methods available, including digital certificates and digital signatures, multiple levels of password protection, strong password encryption and Public Key Infrastructure (PKI)-based authentication, and 128-bit encryption of the switch's private key used for digital signatures. With its flexible design, Secure Fabric OS enables organizations to customize SAN security to meet specific policy requirements. In addition, Secure Fabric OS works in conjunction with Advanced Zoning to further secure access to the SAN, simplify storage management, and reduce provisioning time.

Service and Support, HP Care Pack, and Warranty Information

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. 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.

QuickSpecs

Family Information

Features	MSA SAN Switch 2/8 (embedded switch)	SAN Switch 2/8V and SAN Switch 2/8V Power Pack	SAN Switch 2/16V	SAN Switch 2/16N FF and SAN Switch 2/16N Power Pack	SAN Switch 2/32 and SAN Switch 2/32 Power Pack	Core 2/64 and Core 2/64 Power Pack	SAN Director 2/128 and Director 2/128 Power Pack
Targeted Environment	Workgroups, Departments	Workgroups, Departments	Workgroups, Departments	Departments, Data Centers	Departments, Data Centers	Data Centers	Data Centers
Port Bandwidth	2 Gbit/sec	2 Gbit/sec	2 Gbit/sec	2 Gbit/sec	2 Gbit/sec	2 Gbit/sec	2 Gbit/sec
Aggregate device bandwith	32 Gbit/sec end-to-end	32 Gbit/sec end-to-end	64 Gbit/sec end-to-end	64 Gbit/sec end-to-end	128 Gbit/sec end-to-end	256 Gbit/sec end-to-end	512 Gbit/sec end-to-end
OS Support	Refer to SAN Design Guide pointer http://www.compaq.com/products/StorageWorks/san/documentation.html						
Storage system support	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, MA8000 EMA12000/ EMA16000 EVA, XP, VA	MSA, MA8000 EMA12000/ EMA16000 EVA, XP, VA
Ports	7 external/1 internal	8 SFP	16 SFP	16 SFP	32 SFP	32 SFP Base 64 Total	32 SFP Base 128 Total
Cascading support	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Advanced Trunking	Optional Upgrade	Included with Power Pack or Optional Upgrade	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
Form factor	Embedded	1U	1U	1U	1.5U	14U	14U
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	No	No	No	No	Yes	Yes	Yes
Hot plug fans		No	No	No	Yes	Yes	Yes
Enterprise Backup Solution (EBS) support**	Yes	Yes	Yes	Yes	Yes	Yes	Yes
**NOTE: Requires correct Host Bus Adapter. Not all Operating Systems Supported.							

Configuration Information

Step 1 – Base Configuration

Select one:

Model Name	Model Description	Part Number
StorageWorks SAN Switch 2/16V	16-port Fibre Channel Fabric Switch with rack rails & 2 power supplies NOTE: Requires optical transceivers listed below.	AA978A

Step 2 – Additional Options

Optical Transceivers	2Gb/s Short Wave	A6515A
		300834-B21
	2Gb/s Long Wave (10 km)	A6516A
		300835-B21
	2Gb/s Long Wave (35 km)Long Wave (35 km)	300836-B21

2 Gb optical cables	*LC-LC for between two 2 Gb devices*	
	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 for between a 1 Gb and a 2 Gb device	
	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

Step 3– Optional Software

Fabric Manager, v5.x Base Edition (10 domains)	T4270A
Fabric Manager, v5.x Enterprise Edition	T4269A
Fabric Manager, v4 to v5 Enterprise License Upgrade	T4272A
Fabric Manager, v4 to v5 Base License Upgrade	T4271A
Fabric Manager, v5 base to v5 enterprise upgrade license	T4273A
ISL Trunking	324506-B21
Advanced Performance Monitor	324507-B21
Fabric Watch	324504-B21
Power Pack Software Upgrade	T3573A
Extended Fabric	324505-B21
Secure Fabric OS for 8 and 16 port switches	332924-B21

Fibre Channel Standards And Revisions	FC-AL Rev. 4.5	FC-GS-2 Rev 5.3	FC-PH Rev 4.3	FC-PLDA Rev 2.1	FC-AL Rev. 4.5
	FC-AL-2 Rev 7.0	FC-FG Rev 3.5	FC-PH-2 Rev 7.4	FC-SW Rev 3.3	FC-AL-2 Rev 7.0
	FC-FLA Rev 2.7	FC-FH Rev 1.7	FC-PH-3 Rev 9.4	FC-VI Rev 1.5	FC-FLA Rev 2.7
				IPFC RFC 2625	

Technical Specifications

Fibre Channel ports	16 universal ports		
Scalability	Full fabric architecture: http://h18006.www1.hp.com/products/storageworks/san/documentation.html		
Certified maximum	Certified maximum information available at: http://h18006.www1.hp.com/products/storageworks/san/documentation.html		
Interoperability	SAN Switch 8, SAN Switch 16, SAN Switch 8-EL, SAN Switch 2/8V, SAN Switch 16-EL, SAN Switch 2/16N FF, SAN Switch 2/32, Core Switch 2/64, SAN Director 2/128		
Performance	2.125 Gbit/sec line speed, full duplex		
Switch core	Non-blocking		
Fabric latency	$<2\,\mu$ sec. with no contention, cut-through routing		
Maximum frame size	2112-byte payload		
Classes of service	Class 2, Class 3, Class F (inter-switch frames)		
Port types	FL_Port, F_Port, and E_Port; self-discovery based on switch type (U_Port)		
Data traffic types	Fabric switches support unicast, multicast (256 groups), and broadcast		
Media types	Small Form-Factor Pluggable (SFP)		
Laser	Short-wave up to 1,640 ft (300 m); long-wave up to 6.2 mi (10 km) and 35km		
Fabric services	Simple Name Server, Registered State Change Notification (RSN), Alias Server (multicast); and Zoning, Web Tools. Optional Fabric Watch, and Extended Fabrics		
Options	SFP media		
Supported software	Telnet, SNMP, WebTools, Advanced Zoning, Fabric Watch, Extended Fabrics		
Management access	10/100 Ethernet (RJ-45), serial port		
Diagnostics	POST and embedded online/offline diagnostics		
Back-to-front airflow, power from rear	1 u, 19-in.–EIA compliant		
Dimensions	Depth	12.1 in (30.73 cm)	
	Height	1.71 in (8.73 cm)	
	Width	16.87 in (42.86 cm)	
	Weight	9.4 lb (4.3 kg)	
Environment	Temperature	Operating	50° to 104° F (10° to 40° C)
		Non-operating	-13° to 158° F (-25° to 70° C)
	Humidity	Operating	5% to 85% at 104° F (40° C)
		Non-operating	104° F (40° C)
	Altitude	Up to 9,800 ft (3,000 m)	
	Shock	80 G, 2.5 ms, half sine	
	Vibration	Operating	.5 G, 5-500-5 Hz
		Non-operating	2 G, 5-5 kHz
Power	Supported power	Nominal	100 to 240 VAC contiguous, 0.5 A for each power supply
		Operational	90 to 264 VAC
	Frequency	47 to 63 Hz	

Technical Specifications