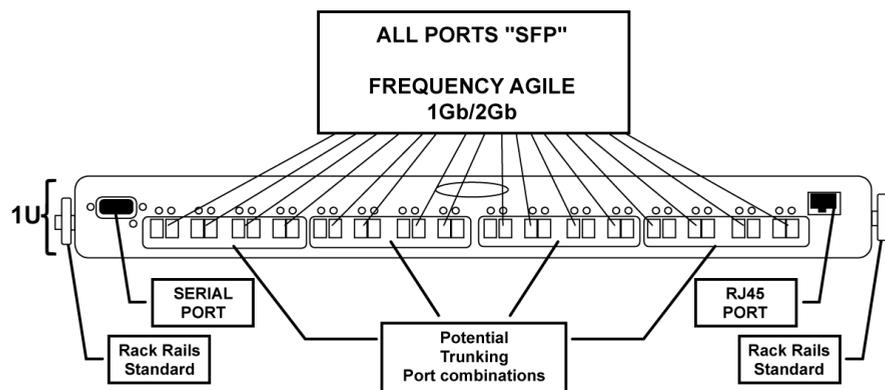


Overview

The HP StorageWorks SAN Switch 2/16-EL is a 2 Gb transfer speed Fibre Channel SAN Fabric Switch featuring the optional ability to trunk or aggregate the throughput of up to four inter switch ports. With sixteen ports, users will be able to create up to four 8 Gb Trunked ISLs between two or more similar 2 Gb switches. It also features optional SFP (Small-Form-Factor-Pluggable) connectors, which allow for higher port density than was available using GBICs. The higher speed, coupled with the optional Trunking feature, will allow users to install these switches in pairs for use as high speed backbone devices for joining SAN islands with little to no performance degradation. The increased performance of these switches also is appropriate where high throughput needs exist, such as video streaming, intensive on-line transaction processing (OLTP), and medical imaging. The SAN Switch 2/16-EL combines 1 Gb and 2 Gb Fibre Channel throughput with new features that greatly enhance switch operation.

The SAN Switch 2/16-EL scales to a maximum of 4 switches in a SAN fabric. An optional upgrade license increases switch scaling to full SAN configurations.



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 1 Gb and 2 Gb SAN Switches

Models

HP StorageWorks SAN Switch 2/16-EL	HP StorageWorks SAN Switch 2/16-EL	344181-B21
	HP StorageWorks SAN Switch 2/16-EL Full SAN scaling license	325889-B21

Product Highlights

Configuration support	SAN Switch 2/16-EL will interoperate with 1 Gb SAN Switch 1/x running the firmware version defined in the SAN Design Guide: http://h18000.www1.hp.com/products/storageworks/san/documentation.html .
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.
High-availability features	<ul style="list-style-type: none">• Redundant hot swappable cooling (fan) unit• Redundant, hot swappable power supplies• Enhanced Fault Detection Logic.• Parity protection on all data paths and for system memory• Three digital thermometers for temperature sensing
Advanced Fabric Services	<ul style="list-style-type: none">• ISL Trunking (optional)• Hardware Enforced Zoning• Frame Filtering• WebTools• End-to-end Performance Analysis (optional)• Remote switch (optional)• Fabric Manager (optional)

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, World Wide Node (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.
QuickLoop	QuickLoop enables Fibre Channel private-loop devices in legacy environments to migrate to a fully scalable fabric to be used for a Storage Area Network (SAN). It supports Fibre Channel Arbitrated Loop (FC-AL) devices with a fabric. This advanced service enables private-loop hosts and storage devices to attach to a fabric without modifying host drivers.

Software Components, Optional

SAN Switch Power Pak Bundle	Includes bundled license for the following: <ul style="list-style-type: none">• ISL Trunking• Advanced Performance Monitor• Remote Switch• Extended Fabric• Fabric Watch
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Product Highlights

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.
Remote Switch	Remote switch fabric functions with the aid of a bridging device or network bridge. The network bridge supports both Fibre Channel physical interfaces as well as secondary non-Fibre Channel FCIP physical interface.
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. Required with future use of Very Long Distance SFPs and/or wavelength division multiplexing (WDM or DWDM).
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 v4.1.1	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.
Fabric Manager v3 to v4 license upgrade	Management Station Software for SAN-wide switch fabric management.
QuickLoop	QuickLoop enables Fibre Channel private-loop devices in legacy environments to migrate to a fully scalable Fabric to be used for a Storage Area Network (SAN). It supports Fibre Channel Arbitrated Loop (FC-AL) devices with a Fabric. This advanced service enables private-loop hosts and storage devices to attach to a Fabric without modifying host drivers.

Product Highlights

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

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/carepack/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	SAN Switch 8-EL	SAN Switch 2/16	SAN Switch 2/32	SAN Core 2/64
Targeted Environment	Workgroups, Departments	Departments, Data Centers	Departments, Data Centers	Data Centers
Port Bandwidth	200 MB/s	200 MB/s	200 MB/s	200 MB/s
Aggregate device bandwidth	800 MB/s	1600 MB/s	1600 MB/s	1600 MB/s
OS Support	Refer to SAN Design Guide pointer http://h18000.www1.hp.com/products/StorageWorks/san/documentation.html			
"QuickLoop" emulation	Yes (Included)	Yes (Included)	No	No
Storage system support	MA8000 EMA12000/ 16000 EVA v2.0, XP, VA	MA8000 EMA12000/ 16000 EVA v2.0, XP, VA	MA8000 EMA12000/ 16000 EVA v2.0, XP, VA	MA8000 EMA12000/ 16000 EVA v2.0, XP, VA
Ports	8 SFP	16 SFP	32 SFP	32SFP Base 64 Total
Cascading support	Yes	Yes	Yes	Yes
Advanced Trunking	Optional	Optional	Optional	Optional
Form factor	1U	1U	1.5U	14U
Zoning Software	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	No	Yes	Yes	Yes
Hot plug fans	No	Yes	Yes	Yes
Enterprise Backup Solution (EBS) support**	Yes	Yes	Yes	Yes
**NOTE: Requires correct Host Bus Adapter. Not all Operating Systems Supported.				

Configuration Information

Step 1 – Base Configuration and Power Pack

Select one:

Model Name	Model Description	Part Number
StorageWorks SAN Switch 2/16-EL	16-port Fibre Channel Fabric Switch with rack rails. Requires optical transceivers (SFPs) listed below.	344181-B21
StorageWorks SAN Switch 2/16-EL Full SAN scaling upgrade license	Optional license which increases switch scaling from four switches to full SAN configurations	325889-B21

Step 2 – Additional Options

Optical Transceivers (SFPs)	Short Wave, 300M, 2X, FC	300834-B21
	Short Wave, 2Gb SFF-SW	221470-B21
	Long Wave (10 km)	300835-B21
	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 v4	345690-B21
Fabric Manager v3 to v4 upgrade license	345691-B21
ISL Trunking	324506-B21
Advanced Performance Monitor	324507-B21
Fabric Watch for 2/16	324504-B21
Power Pack software	325892-B21
QuickLoop	324508-B21
Extended Fabric	324505-B21
Remote Switch	325891-B21
Secure Fabric OS	332924-B21

Fibre Channel standards	FC-AL Rev. 4.5	FC-FLA Rev 2.7	FC-PLDA Rev 2.1
And revisions	FC-GS-2 Rev 5.3	FC-PH-3 Rev 9.4	FC-SW Rev 3.3
	FC-PH Rev 4.3		

Technical Specifications

Fibre Channel ports	16 universal ports		
Scalability	4 switch max scaling limit http://h18006.www1.hp.com/products/storageworks/san/documentation.html		
Certified maximum Interoperability	http://h18000.www1.hp.com/products/storageworks/san/documentation.html SAN Switch 8, SAN Switch 16, SAN Switch 8-EL, SAN Switch 16-EL, SAN switch 2/32, Core Switch 2/64		
Performance	2.125 Gb/s line speed, full duplex		
Switch core	Non-blocking		
Fabric latency	<2 μ 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/500 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 QuickLoop, Fabric Watch, Extended Fabrics, and Remote Switch		
Options	SFP media		
Supported software	Telnet, SNMP, WEBTOOLS, Zoning, Fabric Watch, Extended Fabrics, Remote Switch, ISL Trunking, Advanced Perf Monitor, Fabric Manager		
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	17.72 in (45.0 cm)	
	Height	1.71 in (4.34 cm)	
	Width	16.87 in (42.86 cm)	
	Single power supply weight	25.6 lb (11.59 kg)	
Environment	Temperature	Operating	50° to 104° F (10° to 40° C)
		Non-operating	-31° to 147° F (-35° to 65° C)
	Vibration	Operating	5 G, 0-3 kHz
		Non-operating	10 G, 0-5 kHz
	Humidity	Operating: 5% to 85% non-condensing at 104° F (40° C)	
	Altitude	Up to 9,800 ft/3,000 m	
	Shock	4 G, 11 ms_sine low impulse	
	Supported power Range	Nominal: 100 to 230 VAC contiguous	
	Frequency	Operational: 85 to 264 VAC 47 to 63 Hz	

Technical Specifications

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