

## Overview

HP StorageWorks SAN Switch 2/16 Models	StorageWorks SAN Switch 2/16	322118-B21
	StorageWorks SAN Switch 2/16 PowerPak	322119-B21
	(Includes SAN Switch 2/16 with software bundle)	
SAN Switch 2/16 Optional Software	ISL Trunking	324506-B21
	Advanced Performance Monitor	324507-B21
	Fabric Watch for 2/16	324504-B21
	PowerPak Software Bundle includes:	325892-B21
	QuickLoop	324508-B21
	Remote Switch	325891-B21
	Fabric Manager	313455-B21
	Extended Fabric	324505-B21
	ZBun	268642-001
	3YR 24X7/4HR,FC/SAN Switch 16P, service	161308-002
Basic Install, FC/SAN Switch 16P, service	161324-002	

## Feature List

- Sixteen High Performance auto-sensing 1 and 2 Gb ports.
  - May be optionally programmed to a fixed 1Gb or 2 Gb speed if desired
  - Universal, self-configuring ports (F, FL, E) with new industry-standard removable Small Form Factor Pluggable optical transceivers (SFP) (ordered separately)
  - Fully non-blocking for all 16-ports Full 32 Gb switching capacity for uncongested fully sustained, 2 Gb full duplex throughput.
  - High availability design
  - Redundant, hot swappable power supplies.
  - Hot-swappable cooling unit.
  - Optional Hot pluggable SFP optical transceivers required.
  - Refer to the SAN Design Guide Addendum for 2 Gb switch configuration information
- Rack optimized design: 1U (1.75") tall for high density rack installations

## Product Description

The StorageWorks SAN Switch 2/16 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 the new, 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 is also appropriate where high throughput needs exist such as video streaming, intensive on-line transaction processing (OLTP), and medical imaging. The SAN Switch 2/16 combines 1 Gb and 2 Gb Fibre Channel throughput with new features that greatly enhance switch operation.



## Product Highlights

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<b>SAN Switch 2/16 Customer benefits include</b>	<ul style="list-style-type: none"><li>• Twice the potential throughput compared to 1 Gb Fabric Switches. 2 Gb controllers and HBAs required for 2 Gb end to end performance.</li><li>• Unprecedented performance with optional Inter-Switch Link (ISL) Trunking technology combines up to four ISLs between a pair of 2 Gb switches into a single, logical high-speed trunk running at up to 8 Gb.</li><li>• Provides investment protection for presently installed 1Gb SAN Switches.** Please refer to SAN Design Guide Supplemental Tables for 1 Gb switch interoperability guidelines.</li><li>• Meets high availability requirements with redundant, hot pluggable components and automatic port rerouting.</li></ul> <p><b>NOTE:</b> The discontinued HP StorageWorks Fibre Channel 8/16 switches are not supported with 2 Gb switches. 2 Gb switch will operate at a 1 Gb performance level if connected to 1 Gb external connections and 1 Gb HBAs.</p>
<b>Configuration Support</b>	SAN Switch 2/16 will interoperate with SAN Switch 1/x running the firmware version defined in the SAN Design Guide Support Tables: <a href="http://h18000.www1.hp.com/products/storageworks/san/documentation.html">http://h18000.www1.hp.com/products/storageworks/san/documentation.html</a> <b>NOTE:</b> This Web site is available in English only.
<b>16 non-blocking ports</b>	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 uncongested fully sustained, 2 Gb full duplex throughput.
<b>High-availability features</b>	<ul style="list-style-type: none"><li>• Redundant hot swappable cooling (fan) unit.</li><li>• Redundant, hot swappable power supplies.</li><li>• Enhanced Fault Detection Logic. Parity protection on all data paths and for system memory.</li><li>• Three digital thermometers for temperature sensing.</li></ul>
<b>Advanced Fabric Services</b>	<ul style="list-style-type: none"><li>• Optional ISL Trunking</li><li>• Hardware Enforced Zoning</li><li>• Frame Filtering</li><li>• Web tools</li><li>• Optional End-to-End Performance Analysis</li><li>• Optional Remote Switch</li><li>• Optional Fabric Manager</li></ul>

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## SOFTWARE COMPONENTS, INCLUDED

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<b>Frame Filtering</b>	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.
<b>Advanced Zoning</b>	In the 2 Gb generation of switches, WWN Zoning and Access Control are enforced by hardware providing the same simple administration that was previously only enforced with software. Administrators can organize a physical fabric into logical groups and prevent unauthorized access by devices outside the Zone.
<b>QuickLoop</b> 324508-B21	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.

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## Product Highlights

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### SOFTWARE COMPONENTS, OPTIONAL

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<b>SAN Switch PowerPak Bundle</b> 325892-B21	Includes bundled license for ISL Trunking, Advanced Performance Monitor, Remote Switch, Extended Fabric and Fabric Watch
<b>Fabric Watch</b> 324504-B21	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.
<b>ISL Trunking</b> 324506-B21	High performance enhanced trunking: 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.
<b>Performance Monitoring</b> 324507-B21	This enabling technology provides the ability to monitor and watch specific fabric metrics from a SID (Source ID) to a DID (Destination ID), creating a method to be able to fine-tune and scale your fabric more efficiently. Performance Monitoring also allows the ability to have an early warning detection of hot-spots within the fabric providing a powerful tool for maintaining overall balanced performance.
<b>Fabric Manager</b> 313455-B21	Management Station Software for SAN-wide switch fabric management.
<b>Extended Fabric</b> 324505-B21	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.
<b>Remote Switch</b> 325891-B21	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.
<b>QuickLoop</b> 324508-B21	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.
<b>Manageability</b>	Web Tools, OpenView, SNMP, IP, API.
<b>Scalability</b>	Initial support: Refer to the guidelines described in the Heterogenous Open SAN Design Reference Guide available at: <a href="http://www.compaq.com/products/storageworks/san/documentation.html">http://www.compaq.com/products/storageworks/san/documentation.html</a> . <b>NOTE:</b> This Web site is available in English only.
<b>Warranty</b>	( 1-1-1) Hardware Warranty — One-year on-site warranty, 8x5, next business day response, installation not included. <b>NOTE:</b> 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.

## Service & Support, CarePak and Warranty Information

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### Software Product Services

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

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### Hardware Product Services

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

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### Care Pack Services Warranty Upgrade Options

- 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 Centre for details

- Care Pack is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage.
- Care Pack is not available for less than the product's warranty duration.
- 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.
- Care Pack services are prepaid.

For additional Care Pack (hardware & software) information, as well as orderable part numbers, please refer to the URL listed below:

English: <http://www.compaq.ca/English/productinfo/storage/storageworks.htm>

French: <http://www.compaq.ca/Francais/Produits/stockage/Storageworks.htm>

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### 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>

**NOTE:** This Web site is available in English only.

System management and performance services

# QuickSpecs

## 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 Centres	Departments, Data Centres	Data Centres
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 <a href="http://www.compaq.com/products/StorageWorks/san/documentation.html">http://www.compaq.com/products/StorageWorks/san/documentation.html</a> NOTE: This Web site is available in English only.			
"QuickLoop" emulation	Yes (Included)	Yes (Included)	No	No
Storage system support	MA8000 EMA12000/16000 Enterprise Virtual Array v2.0, XP, VA	MA8000 EMA12000/16000 Enterprise Virtual Array v2.0, XP, VA	MA8000 EMA12000/16000 Enterprise Virtual Array v2.0, XP, VA	MA8000 EMA12000/16000 Enterprise Virtual Array v2.0, XP, VA
Ports	8 SFP	16 SFP	32 SFP	32/64 SFP
Cascading support	Yes	Yes	Yes	Yes
Advanced Trunking	Optional	Optional	Included	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 – "PRODUCT" – BASE CONFIGURATION

Select one:

Model	Model Description	Part Number
StorageWorks SAN Switch 2/16	16-port Fibre Channel Fabric Switch with rack rails & 2 power supplies <a href="#">Requires optical transceivers listed below.</a>	322118-B21
StorageWorks SAN Switch 2/16 PowerPak	SAN Switch 2/16, software package, with rack rails & 2 power supplies <a href="#">Requires optical transceivers listed below.</a>	322119-B21

### STEP 2 – ADDITIONAL OPTIONS

Optical Transceivers	Short Wave	221470-B21
	Short Wave	300834-B21
	Long Wave (10 m)	300835-B21
	Long Wave (35 km)	300836-B21
	Very Long Wave	Not Available at this time
2 Gb optical cables	<i>LC-LC for between two 2 Gb devices</i>	
	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
	<i>LC-SC for between a 1 Gb and a 2 Gb device</i>	
	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

Optional Software	Fabric Manager	313455-B21		
	ISL Trunking	324506-B21		
	Advanced Performance Monitor	324507-B21		
	Fabric Watch for 2/16	324504-B21		
	PowerPak Software	325892-B21		
	QuickLoop	324508-B21		
	Extended Fabric	324505-B21		
	Remote Switch	325891-B21		
Fibre Channel Standards And Revisions	FC-AL Rev. 4.5	FC-FLA Rev 2.7	FC-PLDA Rev 2.1	313455-B21
	FC-GS-2 Rev 5.3	FC-PH-3 Rev 9.4	FC-SW Rev 3.3	
	FC-PH Rev 4.3			

## Technical Specifications

<b>Fibre Channel ports</b>	16 universal ports	
<b>Scalability</b>	Full fabric architecture <a href="http://h18006.www1.hp.com/products/storageworks/san/documentation.html">http://h18006.www1.hp.com/products/storageworks/san/documentation.html</a> NOTE: This Web site is available in English only.	
<b>Certified maximum</b>	<a href="http://h18006.www1.hp.com/products/storageworks/san/documentation.html">http://h18006.www1.hp.com/products/storageworks/san/documentation.html</a> NOTE: This Web site is available in English only.	
<b>Interoperability</b>	SAN SWITCH 8, SAN SWITCH 16, SAN SWITCH 8-EL, SAN SWITCH 16-EL, SAN SWITCH 2/32, CORE 2/64	
<b>Performance</b>	2.125 GBIT/SEC LINE SPEED, FULL DUPLEX	
<b>Switch core</b>	Non-blocking	
<b>Fabric latency</b>	<2 $\mu$ SEC. WITH NO CONTENTION, CUT-THROUGH ROUTING	
<b>Maximum frame size</b>	2112-byte payload	
<b>Classes of service</b>	Class 2, Class 3, Class F (inter-switch frames)	
<b>Port types</b>	FL_Port, F_Port, and E_Port; self-discovery based on switch type (U_Port)	
<b>Data traffic types</b>	Fabric switches support unicast, multicast (256 groups), and broadcast	
<b>Media types</b>	Small Form-Factor Pluggable (SFP)	
<b>Laser</b>	Short-wave up to 1,640 ft/300 m; long-wave up to 6.2 mi/10 km and 35km	
<b>Fabric services</b>	Simple Name Server, Registered State Change Notification (RSN), Alias Server (multicast); and Zoning, WEB TOOLS. Optional QuickLoop, Fabric Watch, Extended Fabrics, and Remote Switch	
<b>Options</b>	SFP media	
<b>Supported software</b>	Telnet, SNMP, WEBTOOLS, Zoning, Fabric Watch, Extended Fabrics, Remote Switch	
<b>Management access</b>	10/100 Ethernet (RJ-45), serial port	
<b>Diagnostics</b>	POST and embedded online/offline diagnostics	
<b>Back-to-front airflow, power from rear</b>	1 u, 19-in.-EIA compliant	
	Depth	17.72 in/45.0 cm
	Height	1.71 in/8.73 cm
	Width	16.87 in/42.86 cm
	Weight	25.6 lb/11.59 kg
<b>Environment</b>	Temperature	Operating 50° F to 104° F/10° C to 40° C Non-operating -31° F to 147° F/-35° C 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	Nominal: 100 to 230 VAC contiguous
	Range	Operational: 85 to 264 VAC
	Frequency	47 to 63 Hz

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