

### Overview

The HP StorageWorks SAN Switch 4/32 delivers excellent overall value and investment protection as the foundation for a small SAN or as an edge switch in a larger core to edge enterprise SAN.

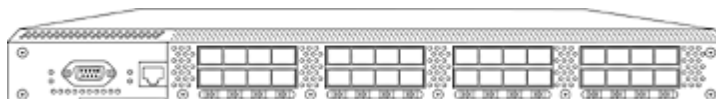
Whether incorporated into an expansive core fabric or tactically placed at the edge, this switch delivers the performance of 1,2, or 4 Gb technologies in a 1u footprint. The switch is available in three models:

- HP StorageWorks 4/32 Power Pack with 32 active ports and value added software
- HP StorageWorks 4/32 with 32 active ports (Full)
- HP StorageWorks 4/32 with 16 active ports (Base)

An optional 8 port license scales the number of active ports to 24 or up to 32 ports.

Each switch variant has removable redundant power supplies and removable redundant cooling units. The switch is ideal for supporting medium to large corporate infrastructure implementations.

The SAN Switch 4/32 Power Pack includes the SAN Switch 4/32 (Full) with additional software: Fabric Watch, ISL Trunking, Extended Fabric, and Performance Monitor. Power Pack software provides SAN administrators with the necessary tools to monitor the health and performance of the network while insuring the highest levels of security, scalability, and manageability.



### Key Features and Benefits

- Protects existing investments by providing 4 Gbit/sec technology with auto-sensing capabilities to recognize earlier 1 and 2 Gbit/sec devices
- Supports full 4 Gbit/sec operations at distances up to 100 kilometers (or 500 kilometers at 1 Gbit/sec) for cost-effective business continuance operations. Requires appropriate 4Gb SFPs.
- Increases network performance with enhanced Inter-Switch Link (ISL) Trunking, which enables a high-speed data path up to 32 Gbit/sec
- Utilizes Ports on Demand for fast, easy, and cost-effective scalability from 16 to 24 ports
- Meets high-availability requirements with redundant, hot-pluggable components, non-disruptive software upgrades, and hot code activation for a wide range of SAN configurations
- Leverages intelligent B-series SAN management and monitoring tools to increase operational efficiency and maximize SAN investments

Models

|   |  |        |
|---|--|--------|
| HP StorageWorks SAN<br>Switch 4/32 Models | HP StorageWorks SAN Switch 4/32 Power Pack           | A7394A |
|   | HP StorageWorks SAN Switch 4/32 with 32 active ports | A7393A |
|   | HP StorageWorks SAN Switch 4/32 with 16 active ports | A7537A |

### Product Highlights

#### SAN Switch 4/32

- Simplifies enterprise SAN deployment by combining higher edge switch port density with exceptional scalability, performance and reliability
- Delivers 16, 24, or 32-ports in a 1U enclosure
- Meets enterprise level availability requirements with redundant, hot pluggable components, no-single-points-of-failure within the switch
- Provides 1 Gb, 2 Gb, and 4Gb/s\* performance
- Employs optional Inter-Switch Link (ISL) Trunking to provide a high-speed data path between switches which enables a high speed data path between 4Gb/s switches up to 32 Gbit/sec

\*Full 4Gb/s end to end storage performance requires 4 Gb/s HBAs, 4Gb/s controllers, and 4Gb/s switches. 4Gb/s ISL performance can be obtained between two 4Gb/s switches.

#### Configuration Support

<http://h18000.www1.hp.com/products/storageworks/san/documentation.html>

#### High-availability features

- Redundant, hot swappable cooling fans
- Redundant, hot swappable power supplies
- Field replaceable motherboard
- Enhanced Fault Detection Logic

Parity protection on all data paths and system memory

#### Advanced Fabric Services

- Hardware and Software Enforced Zoning
- Frame Filtering
- Built-in Web browser management tools

### Software Components, Standard, Base Models

#### Frame Filtering

An ASIC based capability 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.

#### Advanced Zoning

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.

#### Web Tools

WebTools is an intuitive and easy-to-use graphical interface that enables organizations to monitor and manage SAN fabrics. Tasks can be performed through a Java-capable Web browser from a standard laptop, desktop PC or workstation from any location within the enterprise.

### Software Components, Optional

#### SAN Switch 4/32 Power Pack Software Bundle

The Power Pack Software Bundle for SAN Switch 4/32 includes the following:

- Fabric Watch
- Performance Monitor
- Extended Fabric
- ISL Trunking

### Product Highlights

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#### 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.

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#### 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.

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#### 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.

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#### 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 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 4G switches. Connections are load-balanced across the individual links, which comprise the logical trunk group.

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#### 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.

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#### Secure Fabric OS

Secure Fabric OS™ is available only on the B-Series platform and is the only solution that provides protection for both management access and switch-to-switch authentication. This comprehensive security solution for SAN fabrics provides 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

**NOTE:** The hardware warranty covers firmware and embedded non-saleable software. For extended hardware installation and maintenance information, click the link below:

<http://h18005.www1.hp.com/services/carepaq/us/install/>

<http://h18005.www1.hp.com/services/carepaq/us/hardware/>.

**NOTE:** Certain restrictions and exclusions apply. Consult the Customer Support Center for details. Hardware or Software product installation is not included in the warranty, but is available and highly recommended.

#### 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** **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.

**NOTE:** Certain restrictions and exclusions apply. Consult the Customer Support Center for details.

Hardware or Software product installation is not included in the warranty, but is available and highly recommended.

#### Hardware Product Services

(1-1-1) Hardware Warranty; 1-year parts; 1-year on-site (8x5, next business day response) and 1-year labor.

**NOTE:** The hardware warranty covers firmware and embedded non-saleable software. For extended hardware installation and maintenance information, click the link below:

<http://h18005.www1.hp.com/services/carepaq/us/install/>

<http://h18005.www1.hp.com/services/carepaq/us/hardware/>.

### Service and Support, HP Care Pack, and Warranty Information

#### 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

#### 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

Installation service; SAN Solution service; SAN-Environmental Support service; SAN Architecture service; Proactive 24

For more information on these and other service options, please contact any of our worldwide sales offices or visit our Web site at: <http://www.hp.com/hps/support>

### Family Information

| Features                                 | MSA SAN Switch 2/8 (embedded switch)   | 4/8 SAN Switch Base and 4/8 SAN Switch              | 4/16 SAN Switch and 4/16 SAN Switch Power Pack      | SAN Switch 4/32 and SAN Switch 4/32 Power Pack      | SAN Director 2/128 and Director 2/128 Power Pack    | 4/256 SAN Director and 4/256 Power Pack             |
|--|--|---|---|---|---|---|
| Targeted Environment                     | Workgroups, Departments  | Workgroups, Departments                             | Workgroups, Departments                             | Workgroups, Departments                             | Data Centers  | Data Centers  |
| Port Bandwidth                           | 2 Gbit/sec   | 4Gbit/sec   | 4Gbit/sec   | 4Gbit/sec   | 2 Gbit/sec  | Up to 4Gbit/sec                                     |
| Aggregate device bandwidth               | 32 Gbit/sec end to end   | 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                             | 2.176Tbit/sec                                       |
| OS Support                               | <b>NOTE:</b> Please Refer to SAN Design Guide pointer<br><a href="http://www.compaq.com/products/StorageWorks/san/documentation.html">http://www.compaq.com/products/StorageWorks/san/documentation.html</a> |   |   |   |   |   |
| Storage system support                   | MSA 1000   | MA8000<br>EMA12000/<br>EMA16000 EVA<br>v2.0, XP, VA | MA8000<br>EMA12000/<br>EMA16000 EVA<br>v2.0, XP, VA | MA8000<br>EMA12000/<br>EMA16000 EVA<br>v2.0, XP, VA | MA8000<br>EMA12000/<br>EMA16000 EVA<br>v2.0, XP, VA | MA8000<br>EMA12000/<br>EMA16000<br>EVA v2.0, XP, VA |
| Ports                                    | 7 external / 1 internal  | 16 SFP  | 16 SFP  | 32 SFP  | 32 SFP Base<br>128 Total                            | 256 Total   |
| Cascading support                        | Yes  | Yes   | Yes   | Yes   | Yes   | Yes   |
| Advanced Trunking                        | 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  | 14U   | 14U   |
| Zoning Software                          | Yes (Included)   | Yes (Included)                                      | Yes (Included)                                      | Yes (Included)                                      | Yes (Included)                                      | Yes (Included)                                      |
| Hot plug, redundant power supplies       | 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   |

### Configuration Information

#### Step 1 – Base Configuration

Select one:

| Model                         | Model Description   | Part Number |
|-------------------------------|---|-------------|
| SAN Switch 4/32<br>Power Pack | SAN Switch 4/32 with 32 active ports; rackmount kit; accessory kit (enterprise safety and regulatory information, installation guide, rack-mounting instructions), power cords, Advanced Fabric OS, Advanced Web Tools, Advanced Zoning, Fabric Watch, Advanced Performance Monitor, Extended Fabric, ISL Trunking. Includes serial cable | A7394A      |
| SAN Switch 4/32<br>Full       | SAN Switch 4/32 with 32 active port; rackmount kit; accessory kit (enterprise safety and regulatory information, installation guide, rack-mounting instructions), power cords, Advanced Fabric OS, Advanced Web Tools and Advanced Zoning. Includes serial cable  | A7393A      |
| SAN Switch 4/32<br>Base       | SAN Switch 4/32 with 16 active ports; rackmount kit; accessory kit (enterprise safety and regulatory information, installation guide, rack-mounting instructions), power cords, Advanced Fabric OS, Advanced Web Tools and Advanced Zoning. Includes serial cable   | A7537A      |
| 8 port upgrade license        | 8 port upgrade license for SAN Switch 4/32 (base model)   | T3677A      |

#### Step 2 – Options

Select each type of required options with quantities specified:

|                     | Model Description  | Quantity | Part Number              |
|---------------------|--|----------|--------------------------|
| 4 Gb Transceivers   | 4Gb shortwave transceiver- Single Distance <ul style="list-style-type: none"> <li>4Gb performance: 150 meters between devices</li> <li>2Gb performance: 300 meters between devices</li> <li>1Gb performance: 500 meters between devices</li> </ul> | 1        | A7446A                   |
| 2 Gb Transceivers   | Short Wave, 300 m, 2X, FC  | 1        | A6515A                   |
|                     | Long Wave - 10 km  | 1        | 300834-B21<br>A6516A     |
|                     | Long Wave - 35 km  | 1        | 300835-B21<br>300836-B21 |
| 2 Gb optical cables | <b>LC-LC for between two 2 Gb or 4Gb devices</b>   |          |                          |
|                     | 2 m LC-LC Multi-Mode Fibre Channel Cable   | 1        | 221692-B21               |
|                     | 5 m LC-LC Multi-Mode Fibre Channel Cable   | 1        | 221692-B22               |
|                     | 15 m LC-LC Multi-Mode Fibre Channel Cable  | 1        | 221692-B23               |
|                     | 30 m LC-LC Multi-Mode Fibre Channel Cable  | 1        | 221692-B26               |
|                     | 50 m LC-LC Multi-Mode Fibre Channel Cable  | 1        | 221692-B27               |
|                     | <b>LC-SC for between a 1 Gb and a 2 Gb device</b>  |          |                          |
|                     | 2 m LC-SC Multi-Mode Fibre Channel Cable   | 1        | 221691-B21               |
|                     | 5 m LC-SC Multi-Mode Fibre Channel Cable   | 1        | 221691-B22               |
|                     | 15 m LC-SC Multi-Mode Fibre Channel Cable  | 1        | 221691-B23               |
|                     | 30 m LC-SC Multi-Mode Fibre Channel Cable  | 1        | 221691-B26               |
|                     | 50 m LC-SC Multi-Mode Fibre Channel Cable  | 1        | 221691-B27               |



Configuration Information

Step 3 – Optional Software

|                              |   |            |
|------------------------------|---|------------|
| Software for SAN Switch 4/32 | 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     |
|                              | Power Pack Software Bundle  | 313448-B21 |
|                              | <b>NOTE:</b> The Power Pack Software Bundle kit includes Fabric Watch, ISL Trunking, Extended Fabric, and Advanced Performance Monitor. |            |
|                              | Extended Fabric   | 313458-B21 |
|                              | Fabric Watch  | 313454-B21 |
|                              | Advanced Performance Monitor  | 313450-B21 |
|                              | ISL Trunking  | 313452-B21 |
|                              | Secure Fabric OS  | 332925-B21 |

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

### Technical Specifications

|                     |                               |   |
|---------------------|-------------------------------|---|
| System Architecture | Fibre Channel ports           | 32 ports, universal (E, F, and FL)  |
|                     | Scalability                   | Full fabric architecture:<br><a href="http://h18006.www1.hp.com/products/storageworks/san/documentation.html">http://h18006.www1.hp.com/products/storageworks/san/documentation.html</a>  |
|                     | Certified maximum             | Refer to SAN Design Guide for current configuration information:<br><a href="http://h18006.www1.hp.com/products/storageworks/san/documentation.html">http://h18006.www1.hp.com/products/storageworks/san/documentation.html</a>   |
|                     | Interoperability              | SAN Switch 8, SAN Switch 16, SAN Switch 8-EL, SAN Switch 16-EL, SAN Switch 2/8v, SAN Switch 2/16v, SAN Switch 2/16N, SAN Switch 2/16, SAN Switch 2/1-EL, Core Switch 2/64, SAN Switch 2/32, SAN Director 2/128; 4/256 SAN Director; SAN Switch 4/32; 4/8 SAN Switch; 4/16 SAN Switch; Brocade 4Gb SAN Switch for HP p-Class BladeSystem; MSA SAN Switch 2/8 |
|                     | Performance                   | 1.063 Gbit/sec line speed (full duplex); 2.125 Gbit/sec line speed (full duplex); 4.25 Gbit/sec line speed (full duplex); auto-sensing of 1 Gbit/sec, 2 Gbit/sec, and 4 Gbit/sec port speeds; optionally programmable to fixed port speed; speed matching between 1, 2, and 4 Gbit/sec ports  |
|                     | ISL Trunking                  | Up to eight 4.25 Gbit/sec ports per ISL trunk; up to 32 Gbit/sec per ISL trunk  |
|                     | Aggregate bandwidth           | 256 Gbit/sec end to end   |
|                     | Fabric latency                | <2.1 $\mu$ sec with no contention, cut-through routing at 4 Gbit/sec  |
|                     | Maximum frame size            | 2112-byte payload   |
|                     | Classes of service            | Class 2, Class 3, Class F (inter-switch frames)   |
| Management          | Port types                    | FL_Port, F_Port, and E_Port; self-discovery based on switch type (U_Port)   |
|                     | Data traffic types            | Fabric switches supporting unicast and broadcast  |
|                     | Media types                   | Small Form-factor Pluggable (SFP) media; short-wave up to 500 meters (1640 feet); long-wave up to 10 kilometers (6.2 miles); extended long-wave up to 100 km (62.1 mi). Distance depends on fiber optic cable and port speed.   |
|                     | Fabric services               | Simple Name Server; Registered State Change Notification (RSCN).<br>Optional fabric services include: Advanced Zoning; Fabric Watch; Extended Fabrics; ISL Trunking; Advanced Performance Monitoring; WEB TOOLS   |
|                     | Options                       | SFP media   |
|                     | Management software supported | Telnet; SNMP (FE MIB, FC Management MIB); Advanced WEB TOOLS (optional); Fabric Manager (optional)  |
|                     | Management access             | 10/100 Ethernet port (RJ-45); Serial port (RS-232); in-band through Management Server   |
|                     | Diagnostics                   | POST and embedded online/offline diagnostics  |
|                     | Enclosure                     | Back-to-front airflow (non-Fibre Channel port side to Fibre Channel port side).<br>Power from rear. 1.0U, 19-inch EIA compliant   |
|                     | Size                          | Width: 42.90 cm (16.89 in)<br>Height: 4.24 cm (1.67 in)<br>Depth: 58.42 cm (23.00 in)   |
| Environment         | System Weight                 | 9.25 kg (20.4 lb) with single power supply, no SFP<br>10.16 kg (22.4 lb) with dual power supplies, no SFP   |
|                     | Temperature                   | Operating: 0°C to 40°C (32°F to 104°F)<br>Non-operating: -25°C to 70°C (-13°F to 158°F)   |
|                     | Humidity                      | Operating: 20 to 85 percent non-condensing at 40°C (104°F)  |
|                     | Altitude                      | Operating: Up to 3000 meters (9842 feet)<br>Storage: Up to 12 kilometers (39,370 feet)  |
|                     | Shock                         | Operating: 20 g, 6 ms half-sine<br>Non-operating: 15 g, 12-18 ms trapezoid  |
|                     | Vibration                     | Operating: 0.5 g sine, 0.4 grms random, 5 to 500 Hz<br>Non-operating: 2.0 g sine, 1.1 grms random, 5 to 500 Hz  |

Technical Specifications

|         |                             |  |
|---------|-----------------------------|--|
| Airflow | High speed                  | 40 CFM (cu. ft./min)   |
|         | Low speed (65%)             | 27.5 CFM   |
| Power   | Maximum output              | 210 Watts  |
|         | System power consumption    | 120 Watts max, 80 Watts typical  |
|         | Nominal input voltage       | 110- 230 VAC, Universal  |
|         | Input line frequency        | 47 - 63 Hz   |
|         | Minimum input voltage       | 85 VAC   |
|         | Maximum input voltage       | 260 VAC  |
|         | BTU rating (80% efficiency) | 512 BTU/hr   |
|         | Inrush current              | Maximum of 15 amps for period between 10-150 ms at 50° Celsius (122° Fahrenheit) |

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