

# HP StorageWorks 2/8q Fibre Channel Switch

First Edition (November 2004)

**Part Number:** A7540-96010

This manual describes the features of, and installation procedures for, the HP StorageWorks 2/8q Fibre Channel Switch.

Sections include:

- [Introduction](#)—provides an overview of LEDs, connections, and user controls.
- [Planning](#)—describes the factors to consider when planning a fabric.
- [Installing](#)—explains how to install and configure the switch.
- [Troubleshooting](#)—describes the diagnostic methods and troubleshooting procedures.
- [Regulatory Compliance Notices](#)—includes notices about the switch.
- [Electrostatic Discharge](#)—discusses static electricity concerns.
- [Specifications](#)—lists the switch specifications.



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HP StorageWorks 2/8q Fibre Channel Switch Installation Guide  
First Edition (November 2004)  
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## About This Guide

About this Guide topics include:

- [Intended audience](#), page 7
- [Related documentation](#), page 7
- [Document conventions](#), page 8
- [Text symbols](#), page 8
- [Equipment symbols](#), page 9
- [Rack stability](#), page 10
- [Getting help](#), page 10

## Intended audience

This guide is intended for use by the system administrator responsible for the 2/8q FC Switch and the MSA1000 storage system.

## Related documentation

The following MSA1000 SAN Kit and 2/8q FC Switch documents are on the MSA1000 Small Business SAN documentation CD:

- *HP StorageWorks Modular Smart Array 1000 Small Business SAN Kit Installation Instructions* (also printed)
- *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide*
- *HP StorageWorks 2/8q Fibre Channel Switch SNMP Reference Guide*
- *HP StorageWorks 2/8q Fibre Channel Switch Event Messages Reference Guide*

The following MSA1000-specific documents are on the MSA1000 documentation CD:

- *HP StorageWorks MSA1000 Configuration Overview*
- *HP StorageWorks MSA1000 Installation Guide*
- *HP StorageWorks Modular Smart Array 1000 Maintenance and Service Guide*
- *HP StorageWorks Modular Smart Array 1000/1500 cs Command Line Interface User Guide*
- *HP StorageWorks Modular Smart Array 1000 Controller Reference Guide*
- *HP Array Configuration Utility User Guide*

## Document conventions

This document follows the conventions in [Table 1](#).

**Table 1: Document conventions**

Convention	Element
Blue text: <a href="#">Figure 1</a>	Cross-reference links
<b>Bold</b>	Menu items, buttons, and key, tab, and box names
<i>Italics</i>	Text emphasis and document titles in body text
Monospace font	User input, commands, code, file and directory names, and system responses (output and messages)
<i>Monospace, italic font</i>	Command-line and code variables
Blue underlined sans serif font text ( <a href="http://www.hp.com">http://www.hp.com</a> )	Web site addresses

## Text symbols

The following symbols may be found in the text of this guide. They have the following meanings:



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.

---



**Caution:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

---

---

**Tip:** Text in a tip provides additional help to readers by providing nonessential or optional techniques, procedures, or shortcuts.

---

---

**Note:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

---



## Equipment symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings:



Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

**WARNING:** To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.

---



Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

**WARNING:** To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

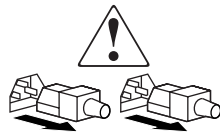
---



Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

**WARNING:** To reduce the risk of personal injury from a hot component, allow the surface to cool before touching.

---



Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

**WARNING:** To reduce the risk of personal injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

---



Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

**WARNING:** To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

---

## Rack stability

Rack stability protects personnel and equipment.



**WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
  - The full weight of the rack rests on the leveling jacks.
  - In single rack installations, the stabilizing feet are attached to the rack.
  - In multiple rack installations, the racks are coupled.
  - Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.
- 

## Getting help

If you still have a question after reading this guide, contact an HP Authorized Service Provider or access our web site: <http://www.hp.com>.

---

**Note:** HP call centers use product and serial numbers to validate warranty entitlement. Most HP products can provide product number, serial number and firmware revision electronically through the use of supplied management or diagnostic utilities, eliminating the need to physically inspect or remove products from installed enclosures. You may be directed by HP to run these utilities to gather required entitlement information.

---

## HP installation and configuration assistance

A moderate level of SAN-related knowledge is required to successfully install this product. If you are not familiar with installing and configuring storage array systems in a SAN, HP can install it for you.

For more information, access our web site at [http://www.hp.com/hps/storage/ns\\_implementation.html](http://www.hp.com/hps/storage/ns_implementation.html).

Depending on your needs, different levels of assistance are available.

For example, the HP Installation and Startup for HP StorageWorks Disk Arrays Service Package includes:

- Physical installation of the MSA
- Virtual disk design and configuration of the MSA
- Service planning
- Service deployment
- Installation Verification Testing (IVT)
- Customer orientation

## HP technical support

Telephone numbers for worldwide technical support are listed on the following HP web site: <http://www.hp.com/support/>. From this web site, select the country of origin.

---

**Note:** For continuous quality improvement, calls may be recorded or monitored.

---

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

## HP storage web site

The HP web site has the latest information on this product, as well as the latest drivers. Access storage at: <http://www.hp.com/country/us/eng/prodserv/storage.html>. From this web site, select the appropriate product or solution.

## HP authorized reseller

For the name of your nearest HP Authorized Reseller:

- In the United States, call 1-800-282-6672
- In Canada, call 1-800-863-6594
- Elsewhere, see the HP web site for locations and telephone numbers: <http://www.hp.com>.



# Introduction

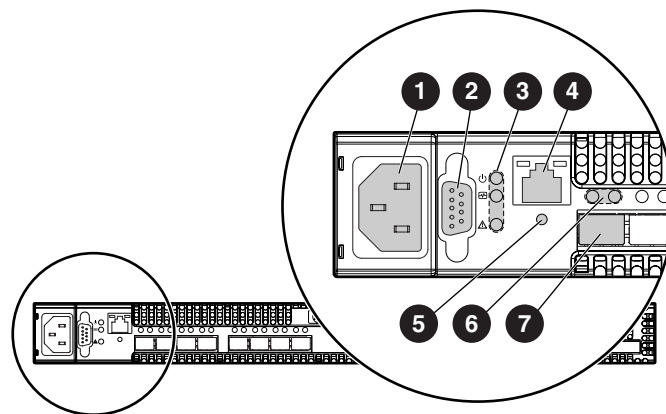


This chapter describes switch features, including the LEDs, user controls, and connections. An overview of the switch management tools is also provided.

Included sections:

- [Switch chassis features](#), page 13
- [Switch management](#), page 19

## Switch chassis features



- ❶ [Power supply](#), page 14
- ❷ [Serial port](#), page 14
- ❸ [Chassis LEDs](#), page 14
- ❹ [Ethernet port](#), page 15
- ❺ [Maintenance button](#), page 16
- ❻, ❼ [Fibre Channel ports and LEDs](#), page 17

**Figure 1: Chassis features**

## Power supply

The power supply converts standard 110 or 230 VAC to DC voltages for the various switch circuits. Four internal fans provide cooling. The switch monitors internal air temperature, and therefore does not monitor or report fan operational status. Air flows into the switch from the bezel side and is exhausted from the port side of the switch.

To apply power to the switch, plug the power cord into the switch AC receptacle, and then into a 110 or 230 VAC power source.

---

**Note:** The power supply and fans are not field replaceable units.

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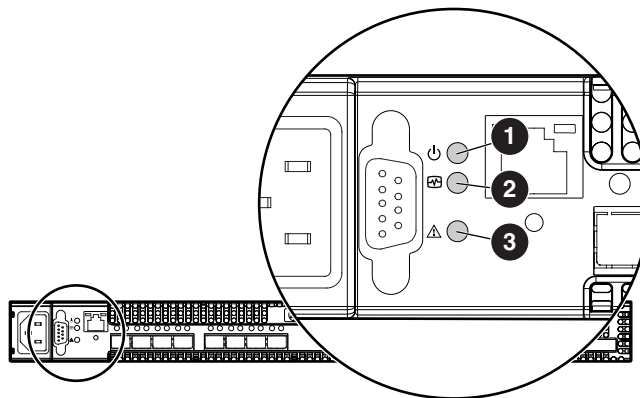
## Serial port

The switch is equipped with an RS-232 serial port, to access the Command Line Interface for advanced configuration tasks and maintenance purposes. (Figure 1)

The serial port connector requires a null-modem female/female DB9 cable, using the pin configuration and connection information as detailed in [“Cable pin configurations”](#) on page 64.

## Chassis LEDs

The chassis LEDs ([Figure 2](#)) provide status information about switch operation.



- ❶ Input Power LED (green)
- ❷ Heartbeat LED (green)
- ❸ System Fault LED (amber)

**Figure 2: Chassis LEDs**

### Input Power LED (green)

The Input Power LED indicates the voltage status at the switch logic circuitry. During normal operation, this LED illuminates to indicate that the switch logic circuitry is receiving the proper DC voltages. When the switch is in maintenance mode, this LED is extinguished.

## Heartbeat LED (green)

The Heartbeat LED indicates the status of the internal switch processor and the results of the Power On Self Test (POST).

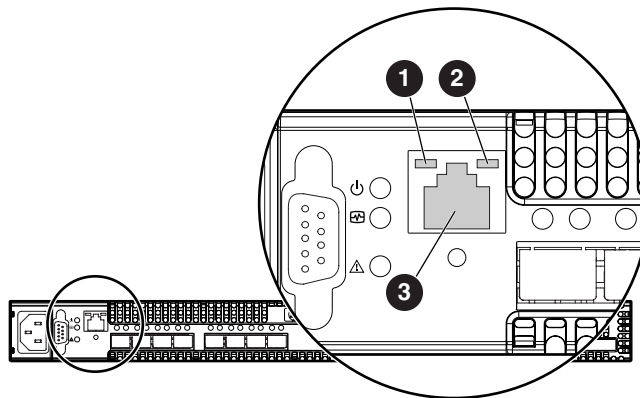
Following a normal power-up, the Heartbeat LED blinks about once per second to indicate that the switch passed the POST and that the internal switch processor is running. In maintenance mode, the Heartbeat LED illuminates continuously. The Heartbeat LED also shows a blink code for POST errors and the over temperature condition. See “[Heartbeat LED blink patterns](#)” on page 42 for more information.

## System Fault LED (solid amber)

The System Fault LED illuminates to indicate an over temperature condition or a POST error and the Heartbeat LED shows a blink code that defines the condition. See “[Heartbeat LED blink patterns](#)” on page 42 for more information.

## Ethernet port

The Ethernet port ([Figure 3](#)) is an RJ-45 connector that provides a connection to a management workstation through a 10/100 Base-T Ethernet cable. The workstation can be a Windows® or a Linux® workstation that is used for advanced configuration and management tasks. You can manage the switch over the Ethernet connection using Switch Manager, the Command Line Interface (CLI), or SNMP. The switch through which the fabric is managed is called the fabric management switch.



- ❶ Link Status LED (green)
- ❷ Activity LED (green)
- ❸ Ethernet port

**Figure 3: Ethernet port and LEDs**

The Ethernet port has two LEDs that provide activity and status information. ([Figure 3](#))

- The Activity LED illuminates when data is being transmitted or received.
- The Link Status LED illuminates continuously when an Ethernet connection has been established.

## Maintenance button

The Maintenance button is a dual-function momentary switch on the front panel. (Figure 1) Its purpose is to reset the switch or place the switch in maintenance mode. See [“Maintenance mode options” on page 47](#) for more information.

### Resetting the switch

Use a pointed tool, such as an opened paper clip, to momentarily press and release (less than 2 seconds) the Maintenance button.

The switch responds as follows:

- All chassis LEDs illuminate, and then the System Fault LED extinguishes, leaving only the Input Power LED and Heartbeat LED illuminated.
- After approximately 1 minute, the power-on self test (POST) begins, extinguishing the Heartbeat LED.
- When the POST is complete, the Input Power LED is illuminated and the Heartbeat LED flashes once per second.

### Placing the switch in maintenance mode

1. Isolate the switch from the fabric.
2. Press and hold the Maintenance button with a pointed tool until the Heartbeat LED alone is illuminated (between 2–7 seconds).
3. After approximately 1 minute, the POST begins illuminating all chassis LEDs.
4. When the POST is complete, the chassis LEDs extinguish, leaving only the Heartbeat LED illuminated. The Heartbeat LED illuminates continuously while the switch is in maintenance mode.

### Exiting maintenance mode

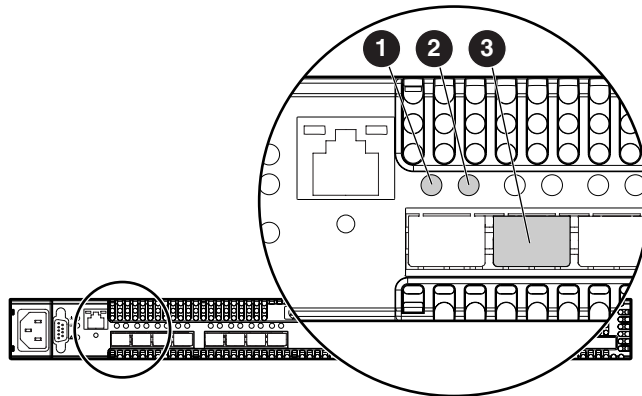
To exit maintenance mode and return to normal operation, momentarily press and release the Maintenance button to reset the switch.



## Fibre Channel ports and LEDs

The switch has eight Fibre Channel ports, numbered 0–7. (Figure 4)

Each Fibre Channel port is served by a 2 Gbps Small Form-Factor Pluggable (SFP) optical transceiver. SFPs are hot-pluggable. User ports self-discover both the port type and transmission speed of the connected devices. The Fibre Channel port LEDs are located above their respective ports and provide port log-in and activity status information.



- ❶ Port Logged-in LED (green)
- ❷ Port Activity LED (green)
- ❸ Fibre Channel port

**Figure 4: Fibre Channel port and LED locations**

### Port Logged-in LED (green)

The Logged-in LED indicates the logged-in or initialization status of the connected devices. After successful completion of the POST, the switch extinguishes all Logged-in LEDs. Following a successful loop initialization or port login, the switch illuminates the corresponding logged-in LED. This shows that the port is properly connected and able to communicate with its attached devices. The Logged-in LED remains illuminated as long as the port is initialized or logged in. If the port connection is broken or an error occurs that disables the port, the Logged-in LED flashes. See “[Logged-In LED indications](#)” on page 44 for more information.

### Port Activity LED (green)

The Activity LED indicates that data is passing through the port. Each frame that the port transmits or receives causes this LED to illuminate for 50 milliseconds. This makes it possible to observe the transmission of a single frame. When extending credits, the Activity LED for a donor port will reflect the traffic of the recipient port. See “[Distance](#)” on page 24 for more information about extended credits and donor ports.

## SFP transceivers

The switch supports SFP optical transceivers for the Fibre Channel ports. A transceiver converts electrical signals to and from optical laser signals to transmit and receive data. Duplex fiber optic cables plug into the transceivers, which then connect to the devices. A Fibre Channel port is capable of transmitting at 1 Gbps or 2 Gbps; however, the transceiver must be capable of 2 Gbps for the port to deliver at that rate.

SFP transceivers are hot pluggable. This means that you can remove or install a transceiver while the switch is operating, without harming the switch or the transceiver. However, communication with the connected device is interrupted. See “[Install SFP transceivers](#)” on page 34 for information.

## Port types

The switch supports generic ports (G\_Port, GL\_Port) and fabric ports (F\_Port, FL\_Port). Switches come from the factory with all Fibre Channel ports configured as GL\_Ports.

Ports function as follows:

- A GL\_Port self-configures as an FL\_Port when connected to a public loop device, and as an F\_Port when connected to a single public device.
- A G\_Port self-configures as an F\_Port when connected to a single public device.
- An FL\_Port supports a loop of up to 126 public devices. An FL\_Port can also configure itself during the fabric login process as an F\_Port when connected to a single public device (N\_Port).
- An F\_Port supports a single public device. If the device is a single device on a loop, the GL\_Port will attempt to configure first as an F\_Port, then if that fails, as an FL\_Port.

## Switch management

Fabrics are managed with following tools:

- [Switch Manager user interface](#)
- [Command Line Interface](#)
- [File Transfer Protocol](#)
- [Simple Network Management Protocol](#)

### Switch Manager user interface

Switch Manager is a workstation-based Java® application that provides a graphical user interface for fabric management. This application runs on a Windows or Linux workstation. A management workstation connects to the fabric through the Ethernet port of one or more switches and can provide in-band management for all other switches in the fabric. See [“Management System Requirements” on page 63](#) for connection information and to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for information about Switch Manager.

### Command Line Interface

The CLI provides monitoring and configuration functions by which the administrator can manage the fabric and its switches, and can be accessed over an Ethernet connection or a serial connection. See [“Management System Requirements” on page 63](#) for connection information and refer to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for information about the CLI.

### File Transfer Protocol

FTP provides the command line interface for exchanging files between the switch and the management workstation. These files include firmware image files, configuration files, and log files.

### Simple Network Management Protocol

SNMP provides monitoring and trap functions for the fabric. This switch supports SNMP versions 1 and 2, the Fibre Alliance Management Information Base (FA-MIB) version 4.0, and the Fabric Element Management Information Base (FE-MIB) RFC 2837. Traps can be formatted using SNMP version 1 or 2. Refer to the *HP StorageWorks 2/8q Fibre Channel Switch SNMP Reference Guide* for more information.



# Planning

## 2

Consider the following when planning a fabric:

- [Devices](#), page 22
- [Device access](#), page 22
- [Performance](#), page 24
- [Fabric security](#), page 25
- [Fabric management](#), page 25

## Devices

When planning a fabric, consider the number of public devices and the anticipated demand. This determines the number of ports that are needed and in turn the number of switches. Consider how many and what types of switches are needed.

Consider the distribution of targets and initiators. An F\_Port supports a single public device. An FL\_Port can support up to 126 public devices in an arbitrated loop.

## Device access

Consider device access needs within the fabric. Access is controlled by the use of zones and zone sets.

Some zoning strategies include:

- Grouping devices by operating system.
- Separating devices that have no need to communicate with other devices in the fabric or have classified data.
- Separating devices into department, administrative, or other functional group.
- Reserving a path and its bandwidth from one port to another.

A zone is a named group of devices that can communicate with each other. Membership in a zone can be defined by domain ID and switch port number, port Fibre Channel address, or by device worldwide name (WWN). Devices can communicate only with devices within the same zone. A zone can be a member of more than one zone set. Several zone sets can be defined for a fabric, but only one zone set can be active at one time. The active zone set determines the current fabric zoning.

A zoning database is maintained on each switch consisting of all inactive zone sets, the active zone set, all zones, aliases, and their membership. Refer to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for more information about zoning.

The two types of zones are:

- [Hard zones \(Access Control Lists\)](#)
- [Soft zones](#)

**Table 2: Zoning database limits**

Zoning item	Description	Limit
MaxZoneSets	Maximum number of zone sets.	256
MaxZones	Maximum number of zones.	256
MaxAliases	Maximum number of aliases.	256
MaxTotalMembers	Maximum number of zone and alias members that can be stored in the switch's zoning database.	2000

**Table 2: Zoning database limits (Continued)**

Zoning item	Description	Limit
MaxZonesInZoneSets	Maximum number of zones that are components of zone sets, excluding the orphan zone set, which can be stored in the switch zoning database. Each instance of a zone in a zone set counts toward this maximum.	1000
MaxMembersPerZone	Maximum number of members in a zone that can be stored in the switch zoning database.	2000
MaxMembersPerAlias	Maximum number of members in all zones and aliases.	2000

## Hard zones (Access Control Lists)

Access Control List (ACL) zoning divides the fabric for purposes of controlling discovery and inbound traffic. ACL zoning is a type of hard zoning that is hardware enforced. This type of zoning is useful for controlling access to certain devices without totally isolating them from the fabric. Members can communicate with each other and transmit outside the ACL zone, but cannot receive inbound traffic from outside the zone. The following rules apply to ACL zones:

- The ACL zone boundary is secure against inbound traffic.
- ACL zones can overlap; that is, a port can be a member of more than one ACL zone.
- ACL zone boundaries supersede soft zone boundaries.
- Membership can be defined only by domain ID and port ID. A switch port can be a member of multiple ACL zones whose combined membership does not exceed 128.

## Soft zones

Soft zoning divides the fabric for purposes of controlling device discovery. Devices in the same soft zone automatically discover and communicate freely with all other members of the same zone. The soft zone boundary is not secure; traffic across soft zones can occur if addressed correctly. The following rules apply to soft zones:

- Soft zone boundaries yield to ACL zone boundaries.
- Soft zones can overlap; that is, a port can be a member of more than one soft zone.
- Membership can be defined by Fibre Channel address, domain ID and port number, or worldwide name.
- Soft zoning supports FL\_Ports and F\_Ports.

## Performance

The switch supports class 2 and class 3 Fibre Channel service at transmission rates of 2 Gbps, with a maximum frame size of 2148 bytes.

Related performance characteristics include:

- [Distance](#)
- [Bandwidth](#)
- [Latency](#)

### Distance

Consider the physical distribution of devices and switches in the fabric. See “[Specifications](#)” on page 59 for more information about cable types and transceivers.

Each Fibre Channel port is supported by a data buffer with a 16 credit capacity; that is, 16 maximum sized frames. For fiber optic cables, this enables full bandwidth over a distance of 13 kilometers at 2 Gbps (1.2 credits/Km). Beyond this distance, however, there is some loss of efficiency because the transmitting port must wait for an acknowledgement before sending the next frame.

Longer distances can be spanned at full bandwidth by extending credits to the ports. Each port can donate 15 credits to a pool from which a recipient port can borrow. The recipient port also loses a credit in the process. For example, you can configure a recipient port to borrow 15 credits from one donor port for a total of 30 credits (15+15=30). This supports communication over approximately 25 Km at 2 Gbps (30÷1.2).

### Bandwidth

Bandwidth is a measure of the volume of data that can be transmitted at a given transmission rate. The Fibre Channel ports transmit and receive at a rate of 2 Gbps, for a maximum bandwidth of 200 MB.

### Latency

Latency is a measure of how fast a frame travels from one port to another. Factors that affect latency include transmission rate and the source/destination port relationship. 2 Gbps to 2 Gbps transmissions have a latency factor < 0.4 µsec.



## Fabric security

Fabric security consists of the following:

- [User account security](#)
- [Simple Network Management Protocol security](#)

### User account security

User account security consists of account names, passwords, expiration dates, and authority levels. If an account has Admin authority, all management tasks can be performed by that account in both Switch Manager and the CLI. Without Admin authority, only monitoring tasks are available. The default account name, Admin, is the only account that can create or change account names and passwords. Account names and passwords are required when connecting to a switch. Consider your management needs and determine the number of user accounts, their authority needs, and expiration dates.

### Simple Network Management Protocol security

SNMP is the protocol governing network management and monitoring of network devices, and is enabled by default. SNMP security consists of a read community string and a write community string, which are the passwords that control read and write access to the switch. The read community string ("public") and write community string ("private") are set at the factory to these well-known defaults and should be changed. If the read and write community strings have not been changed from their defaults, you risk unwanted access to the switch.

## Fabric management

Switch Manager and the CLI execute on a management workstation that provides for the advanced configuration, control, and maintenance of the fabric. Supported platforms include Windows and Linux. Consider how many fabrics will be managed, how many management workstations are needed, and whether the fabrics will be managed with the CLI or Switch Manager.

A switch supports a combined maximum of 19 logins reserved as follows:

- 4 logins or sessions for internal applications such as management server and SNMP
- 9 high priority Telnet sessions
- 6 logins or sessions for Switch Manager logins and Telnet logins. Additional logins are refused.

See [“Management System Requirements” on page 63](#) for connection information and refer to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for information about using these management tools.



# Installing

## 3

This section describes how to install and initially configure the 2/8q FC Switch. It also describes how to backup and update switch firmware.

Topics include:

- [Site requirements](#), page 27
- [Installing and initially configuring the switch](#), page 28
- [Backing up the switch configuration](#), page 37
- [Powering down the switch](#), page 37
- [Updating switch firmware](#), page 38

## Site requirements

Consider factors that affect the climate in your facility, such as equipment heat dissipation and ventilation. The switch requires the following operating conditions (See “[Specifications](#)” on page 59 for a detailed list):

**Table 3: Environmental requirements**

Item	Requirement
Power requirements	1 Amp at 120 VAC or 0.5 Amp at 240 VAC
Operating temperature range	5°-40°C (41°-104°F)
Operating relative humidity	15%-80%, non-condensing

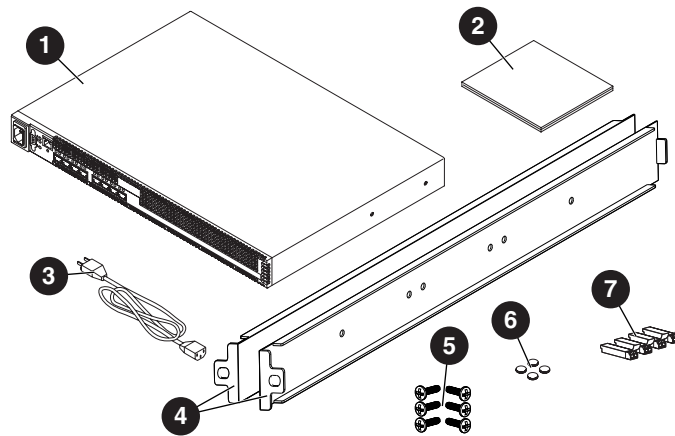
## Installing and initially configuring the switch

Installing a 2/8q FC Switch involves the following steps, each of which is discussed in the following sections:

- [Unpack the switch and verify carton contents](#), page 28
- [Mount the switch](#), page 29
- [Install SFP transceivers](#), page 34
- [Connect the cables](#), page 35
- [Configure the switch](#), page 36

### Unpack the switch and verify carton contents

The 2/8q FC Switch is shipped with the components shown in [Figure 5](#).



- ❶ 2/8q FC Switch
- ❷ 2/8q FC Switch Quick Start Installation Instructions (printed)
- ❸ Power cable (approved for use in the United States)
- ❹ Mounting adapter brackets
- ❺ Screws for the mounting adapter brackets (6)
- ❻ Rubber feet (4)
- ❼ Small Form Factor Pluggable (SFP) transceivers (4)

**Figure 5: Switch carton contents**

## Mount the switch

The 2/8q FC Switch can be placed on a stable flat surface or mounted in a 19" EIA rack. When placing the switch on a flat surface, attach the provided adhesive rubber feet to the bottom of the switch and then place the switch on work surface.

When mounting the switch in a rack, do the following:



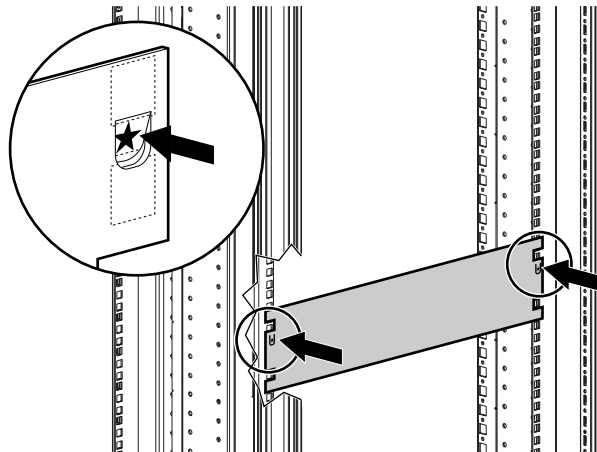
**WARNING:** Mount devices in the rack so that the weight is distributed evenly. An unevenly loaded rack can become unstable, possibly resulting in equipment damage or personal injury.



**Caution:** If the switch is mounted in a closed or multi-unit rack assembly, make sure that the operating temperature inside the rack enclosure does not exceed the maximum rated ambient temperature. See "Environmental" on page 61.

- Do not restrict chassis air flow. Allow 16 cm (6.5 in) minimum clearance at the front and rear of the switch or rack for service access and ventilation.
- Multiple rack-mounted units connected to the AC supply circuit may overload that circuit or overload the AC supply wiring. Consider the power source capacity and the total power usage of all switches on the circuit. See "Electrical" on page 61.
- Reliable grounding in the rack must be maintained.

1. Obtain the 2U rack template and the 2U rail kit from the SAN Kit carton.
2. Obtain the switch mounting adapter brackets and screws from the 2/8q FC Switch carton.
3. Use the template as a guide to mark the location for the rails in the rack.
  - a. Hold the template up to the rack, and when the template is level, push the template tabs into the rack holes to hold the template in place. (Figure 6)
  - b. Use a pencil to mark the locations of the rail pins on the rack.



**Figure 6: Using the rack template**

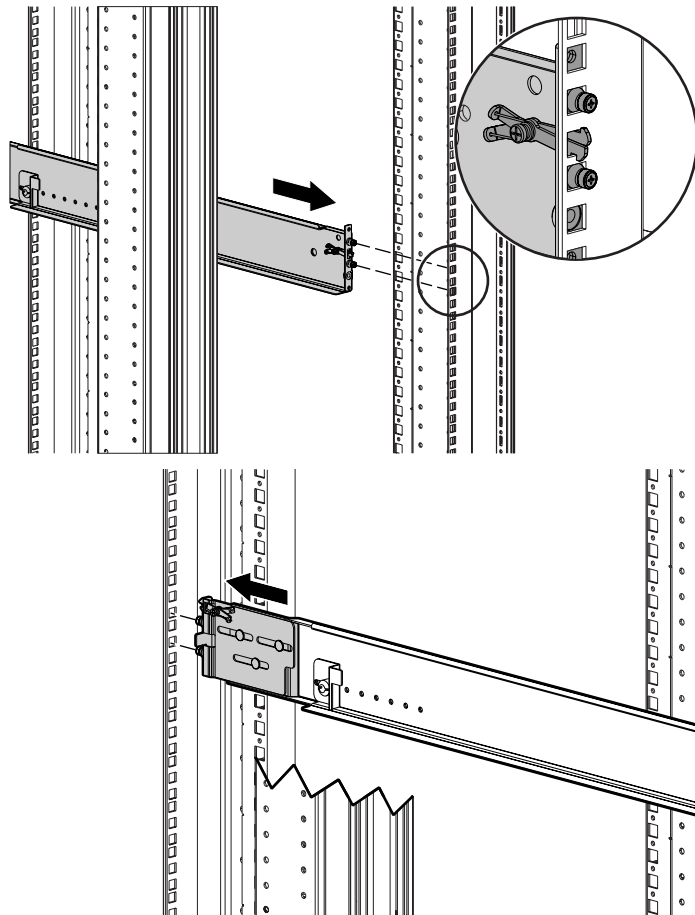
**Note:** If the holes in the rack are round instead of square, remove the standard pins from the rails and replace them with the round-hole pins provided with the rail kit.

---

**Note:** The rails and the switch are installed from the rear of the rack. To ensure proper airflow through the device, the port-side of the switch must face the rear of the rack.

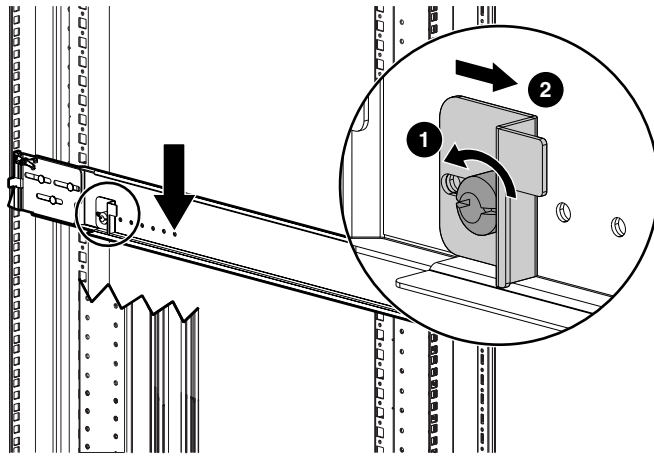
---

4. Install the rails in the rack.
  - a. Identify the left (L) and right (R) rails by markings stamped into the rails.
  - b. From the rear of the rack, insert the right rail into the inside right rear of the rack, until the pins extend through the holes marked in [step 3](#) and the scissor-type locking latch engages. ([Figure 7](#))
  - c. Extend the other end of the rail toward the inside front of the rack until the pins extend through the marked holes and the locking latch engages. ([Figure 7](#))



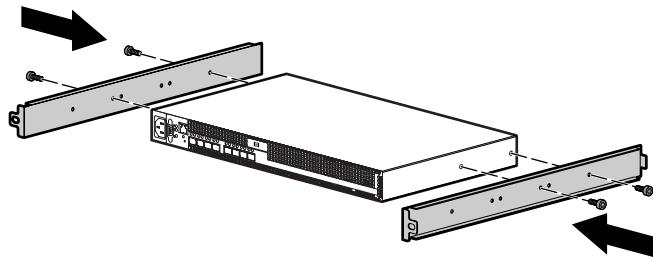
**Figure 7: Attaching the right rail to the rack - rear view**

- d. Remove the locking nut on the rail retaining bracket and move the bracket to the farthest position inside the rail. (Figure 8)



**Figure 8: Moving the rail retaining bracket on the right rail - rear view**

- e. Repeat [step a](#) through [step d](#) for the other rail.
5. Fasten the mounting adapter brackets to the sides of the switch. (Figure 9)
  - a. Place the switch on a stable work surface, and then position the switch and the brackets so that the port-side of the switch faces the flanges of the brackets.
  - b. Determine which mounting set-back on the brackets to use. The brackets can be mounted so that the switch is flush with the rear of the rack, or set back approximately three inches.
  - c. Use four of the provided screws to attach the brackets to the switch.



**Figure 9: Attaching the mounting adapter brackets to the switch**

6. From the rear of the rack, place the switch assembly onto the rails, and slide the assembly back until the flanges of the mounting adapter brackets are flush with the rear uprights of the rack. (Figure 10)

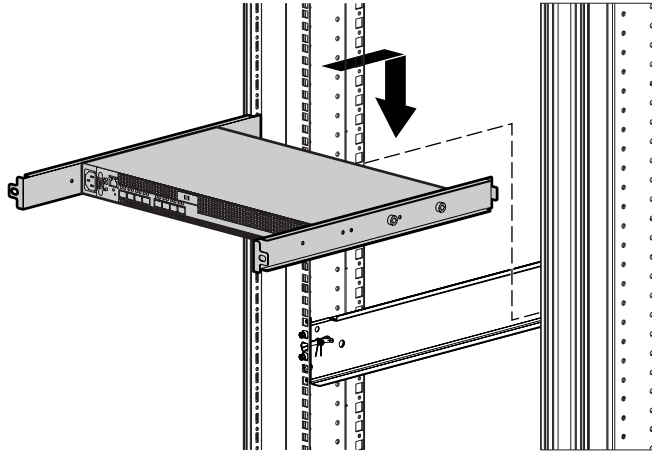


Figure 10: Placing the switch on the rails - rear view

7. Secure the switch to the back of the rack by inserting and tightening the 2 remaining provided screws through the bracket flanges. (Figure 11)

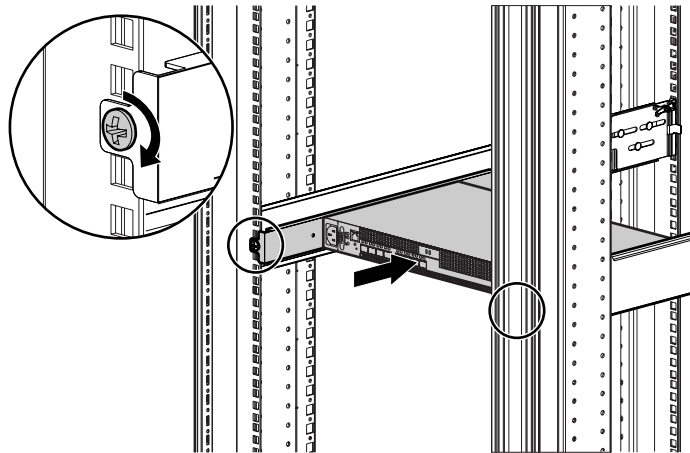
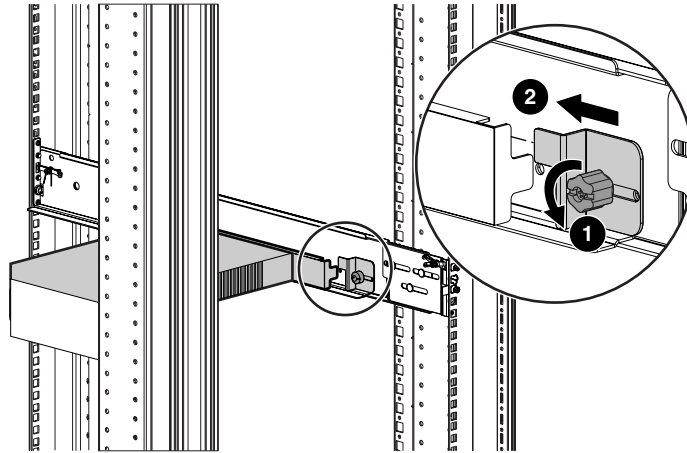


Figure 11: Securing the switch flanges to the rear of the rack



8. From the front of the rack, secure the switch by sliding the rail retaining brackets on the rails toward the switch until they engage the mounting adapter brackets, and then tighten the rail bracket thumbscrews to secure the device. (Figure 12)



**Figure 12: Securing the rail retaining brackets to the switch - front view**

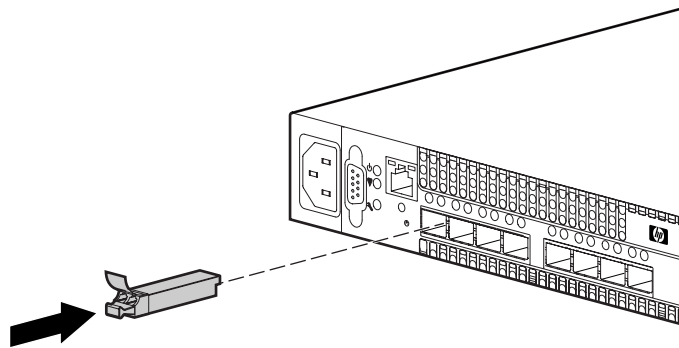
## Install SFP transceivers

The switch has been validated with transceivers that support a variety of interconnection media. To install a transceiver, insert the transceiver into the port and gently push in on the SFP until it snaps in place. To remove a transceiver, gently press the transceiver into the port to release the tension, and then pull out on the release tab to remove the transceiver from the chassis.

---

**Note:** The transceiver fits only one way in the port. If the transceiver does not install under gentle pressure, pull it out of the port, turn it over, and re-insert it.

---



**Figure 13: Installing an SFP transceiver**

## Connect the cables

- [Connect Fibre Channel devices to the switch](#)
- [Connect power to the switch](#)

## Connect Fibre Channel devices to the switch

Connect cables to the SFP transceivers and their corresponding devices, and then apply power to the devices. LC-type duplex fiber optic cable connectors are designed for use with the SFP transceivers. Duplex cable connectors are keyed to ensure proper orientation.

GL\_Ports self configure as FL\_Ports when connected to loop of public devices or F\_Ports when connected to a single device. G\_Ports self configure as F\_Ports when connected to single public devices.

## Connect power to the switch



**WARNING:** This product is supplied with a 3-wire power cable and plug. Use this power cable in conjunction with a properly grounded outlet to avoid electrical shock. An electrical outlet that is incorrectly wired could place hazardous voltage on metal parts of the switch chassis.

- A different power cable than the one supplied may be required in some countries.
- For 125 Volt electrical service, the cable must be rated at 10 Amps and be approved by UL and CSA.
- For 250 Volt electrical service, the cable must be rated at 10 Amps, meet the requirements of H05VV-F, and be approved by VDE, SEMKO, and DEMKO.

1. Connect the power cord to the AC power port on the switch chassis and to a grounded AC outlet or uninterruptible power supply.
2. Verify that the chassis LEDs illuminate, followed by all port Logged-in LEDs.
3. After a few moments, verify that the chassis System Fault LED is extinguished while the Input Power LED and Heartbeat LED remain illuminated.
4. Wait approximately one minute for the POST to complete, and the following LED pattern to begin:
  - The Input Power LED remains illuminated indicating that the switch logic circuitry is receiving DC voltage. If not, contact your authorized maintenance provider.
  - The Heartbeat LED indicates the results of the POST. The POST tests the condition of firmware, memories, data-paths, and switch logic circuitry. If the Heartbeat LED blinks steadily about once per second, the POST was successful, and you can continue with the installation process. Any other blink pattern indicates that an error has occurred. See "[Heartbeat LED blink patterns](#)" on page 42 for more information about error blink patterns.

## Configure the switch

---

**Note:** Advanced switch configuration and monitoring tasks are executed using the Switch Manager application or the Command Line Interface, using a workstation connected to the switch. See “[Management System Requirements](#)” on page 63 for information about connecting the workstation, and the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for details about the interfaces.

---

The switch is initially configured during the set up and installation of the MSA1000 Small Business SAN, using the Small Business SAN Software CD.

If Switch Manager is not installed on your system, do the following:

### Installing Switch Manager on Windows® systems

1. Close all programs currently running, and then insert the Small Business SAN Software CD into the server or management workstation CD-ROM drive.

The CD automatically starts, and displays the HP Small Business SAN Wizard.

2. In the Welcome window, click **Next**, and then follow the onscreen instructions.

---

**Note:** Switch Manager is installed and placed in the following system folder:

`C:\Program Files\HP\HP_StorageWorks_Switch_Manager.`

---

### Installing Switch Manager on Linux® systems

1. Close all programs currently running, and then insert the Small Business SAN Software CD into the server or management workstation CD-ROM drive.

The CD auto-mounts, and executes an installation script.

If the CD does not auto-mount, mount the CD and execute the HP Small Business Linux Wizard script from the `/linux` directory. (`install_smb.sh`)

2. Follow the onscreen instructions to complete the installation.

## Backing up the switch configuration

Backing up and restoring a configuration is useful to protect your work or to use as a template in configuring other switches. The CLI `Config Backup` command creates a file on the switch, named `configdata`. This file can be used to restore a switch configuration only from the command line interface; it cannot be used to restore a switch using Switch Manager.

The `configdata` file contains all of the switch configuration information including:

- All named switch configurations, including the default configuration. This includes port, switch, port threshold alarm, and zoning configuration components.
- All SNMP and network information defined with the Set Setup command.
- The zoning database included all zone sets, zones, and aliases.

Use FTP to download the `configdata` file to your workstation for safe keeping and to upload the file back to the switch for the restore function.

See “[Management System Requirements](#)” on page 63 for information about connecting a workstation to the switch and refer to “Backing up a switch configuration” in the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide*, for procedural details.

## Powering down the switch

Simply unplugging the switch from the power source does not allow the switch to complete executing tasks and could lead to flash memory corruption.

To initiate an orderly shut down, access the CLI and execute the `Shutdown` command. Then, power down the switch by unplugging the power cord.

See “[Management System Requirements](#)” on page 63 for information about connecting a workstation to the switch and refer to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for information about the CLI.

## Updating switch firmware

The switch comes with firmware installed. You can upgrade the firmware from the management workstation as new firmware becomes available. Firmware updates are available on the MSA1000 web site at [www.hp.com/go/msa1000](http://www.hp.com/go/msa1000).

See “[Management System Requirements](#)” on page 63 for information about connecting a workstation to the switch and refer to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for detailed information about Switch Manager and the CLI.

---

**Note:** You can load and activate new firmware on an operating switch without disrupting data traffic or having to re-initialize attached devices. If you attempt to perform a non-disruptive activation without satisfying the following conditions, the switch will perform a disruptive activation:

- No changes are being made to switches in the fabric including powering up, powering down, and changing the switch configuration.
- No port in the fabric is in the diagnostic state.
- No zoning changes are being made in the fabric.
- No changes are being made to attached devices including powering up, powering down, disconnecting, connecting, and HBA configuration changes.

Ports that are stable when the non-disruptive activation begins, but then change states, are reset. When the non-disruptive activation is complete, Switch Manager sessions reconnect automatically. However, Telnet sessions must be restarted manually.

---

## Using Switch Manager to install firmware

1. Select a switch in the topology display and double-click to open the Faceplate display. Open the **Switch** menu and select **Load Firmware**.
2. In the Firmware Upload window, click **Select** to browse and select the firmware file to be uploaded.
3. Click **Start** to begin the firmware load process. A warning message is displayed.
4. Click **OK** or **Cancel**.
  - If conditions exist for performing a non-disruptive firmware activation (outlined in the previous note), Switch Manager performs a hot reset, to activate the firmware without disrupting data traffic. During a non-disruptive activation, all Logged-in LEDs are extinguished for several seconds.
  - If conditions do not exist for a non-disruptive activation, Switch Manager prompts for a hard reset, and then performs a disruptive activation.

## Using the CLI to install firmware

1. Enter the following command to download the firmware from a remote host to the switch, install the firmware, and reset the switch to activate the firmware:

```
(admin) #> firmware install
```

```
Warning: Installing new firmware requires a switch reset. Continuing with this action will terminate all management sessions, including any Telnet sessions. When the firmware activation is complete, you may log in to the switch again.
```

```
Do you want to continue? [y/n]: y
```

```
Press 'q' and the ENTER key to abort this command.
```

2. Enter your account name on the remote host and the IP address of the remote host. When prompted for the source file name, enter the path for the firmware image file. When prompted to install the new firmware, enter **Yes** to continue or **No** to cancel. This is the last opportunity to cancel.

```
User Account : johndoe
```

```
IP Address : 10.20.20.200
```

```
Source Filename : 4.0.3.xx_mpc
```

```
About to install image. Do you want to continue? [y/n] y
```

```
Connected to 10.20.20.200 (10.20.20.200).
```

```
220 localhost.localdomain server (Version wu-2.6.1-18) ready.
```

3. The switch attempts a non-disruptive activation if possible; otherwise a disruptive activation is performed. When prompted to install the new firmware, enter **Yes** to continue or **No** to cancel. This is the last opportunity to cancel.

```
About to install image. Do you want to continue? [y/n] y
```

```
Connected to 10.20.20.200 (10.20.20.200).
```

```
220 localhost.localdomain server (Version wu-2.6.1-18) ready.
```

4. Enter the password for your account name.

```
331 Password required for johndoe.
```

```
Password:*****
```

```
230 User johndoe logged in.
```

The firmware is downloaded from the remote host to the switch, is installed, and is activated.





# Troubleshooting

## 4

Diagnostic information about the switch is available through the chassis LEDs and the port LEDs. Diagnostic information is also available through the Switch Manager and CLI event logs and error displays.

This section describes the following diagnostics and tasks:

- [POST diagnostics](#), page 42
- [Chassis diagnostics](#), page 46
- [Maintenance mode options](#), page 47

## POST diagnostics

The switch performs a series of tests as part of its power-up procedure. The POST diagnostic program performs checksum tests on the boot firmware in PROM and the switch firmware in flash memory, internal data loopback tests on all ports, and access and integrity tests on the ASIC.

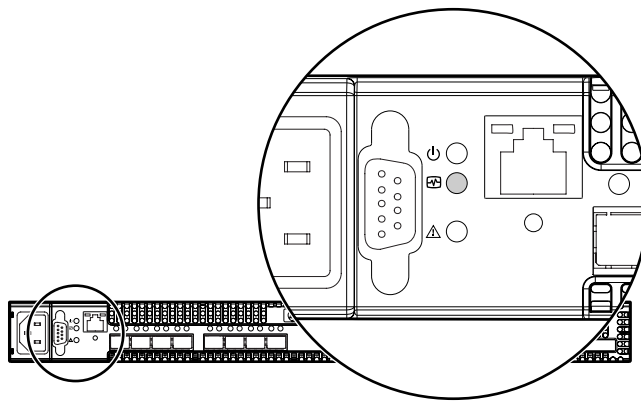
During the POST, the switch logs any errors encountered. Some POST errors are critical, others are not. The switch uses the Heartbeat LED and the Logged-In LED to indicate switch and port status. A critical error disables the switch so that it does not operate. A non-critical error allows the switch to operate, but disables the ports that have errors. Whether the problem is critical or not, contact your HP Authorized Maintenance Provider.

If there are no errors, the Heartbeat LED blinks at a steady rate of once per second. If a critical error occurs, the Heartbeat LED shows an error blink pattern and the System Fault LED will illuminate. If there are non-critical errors, the switch disables the failed ports and flashes the associated Logged-In LEDs.

### Heartbeat LED blink patterns

The Heartbeat LED indicates the operational status of the switch. When the POST completes with no errors, the Heartbeat LED blinks at a steady rate of once per second. When the switch is in maintenance mode, the Heartbeat LED illuminates continuously. See [“Maintenance mode options” on page 47](#) for more information about maintenance mode. All other blink patterns indicate critical errors.

The Heartbeat LED shows an error blink pattern for the following conditions:



Blinking pattern	Description
1 blink	Normal operation
2 blinks	Internal firmware failure
3 blinks	System error
4 blinks	Configuration file system error
5 blinks	Over temperature

**Figure 14: Heartbeat LED location and blinking patterns**

## Internal firmware failure blink pattern

An internal firmware failure blink pattern is 2 blinks followed by a two second pause. The 2-blink error pattern indicates that the firmware has failed, and that the switch must be reset. Momentarily press and release the Maintenance button to reset the switch.

## System error blink pattern

A system error blink pattern is 3 blinks followed by a two second pause. The 3-blink error pattern indicates that a POST failure or a system error has left the switch inoperable. If a system error occurs, contact your HP Authorized Maintenance provider. Momentarily press and release the Maintenance button to reset the switch.

## Configuration file system error blink pattern

A configuration file system error blink pattern is 4 blinks followed by a two second pause. The 4-blink error pattern indicates that a configuration file system error has occurred, and that the configuration file must be recreated. See [“Maintenance mode options” on page 47](#) for more information. To recreate the configuration file:

---

**Note:** Recreating the configuration file deletes all switch configuration settings.

---

1. Place the switch in maintenance mode. Press and hold the Maintenance button for 2–7 seconds. See [“Maintenance mode options” on page 47](#) for more information.
2. Establish a Telnet session using the default IP address 10.0.0.1, or the user assigned IP address of the switch. (See [“Management System Requirements” on page 63](#) for information about connecting a workstation to the switch.)  

```
telnet 10.0.0.1
```
3. Enter the account name (prom) and password (prom), and then press **Enter**.  

```
switch login: prom  
Password:xxxx
```
4. The following menu is displayed. Enter "6" (Remake Filesystem), and then press **Enter** to recreate the configuration file.  

```
0) Exit  
1) Image Unpack  
2) Reset Network Config  
3) Reset User Accounts to Default  
4) Copy Log Files  
5) Remove Switch Config  
6) Remake Filesystem  
7) Reset Switch  
8) Show Firmware Versions  
9) Set Active Image  
10) Update Boot Loader  
Option: 6
```
5. When the recreate process is complete, select option 7 to reset the switch and exit maintenance mode.

---

**Note:** If a previously saved configuration file is available for the switch, you can restore the settings in that configuration file to the switch. Refer to *“Restoring a switch configuration”* in the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for instructions.

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### Over temperature blink pattern

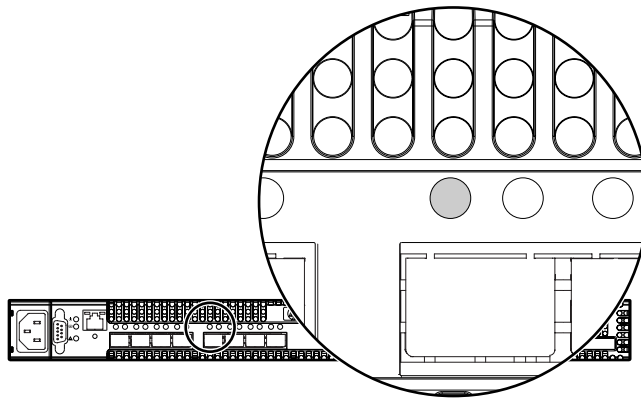
An over temperature blink pattern is 5 blinks followed by a two second pause. The 5-blink error pattern indicates that the air temperature inside the switch has exceeded the failure temperature threshold (70° C) and all ports are down.

If the Heartbeat LED shows the over temperature blink pattern:

1. Inspect the chassis fans and vents. Are the intake and exhaust vents clear? Are the fans operating and producing air flow?
  - Yes - Continue.
  - No - Remove any debris from fan intake and exhaust if necessary. If the condition remains, continue.
2. Consider the ambient air temperature near the switch and clearance around the switch. Make necessary corrections. If the condition remains, unplug the switch from the AC power source, and contact your HP Authorized Maintenance Provider.
3. Open a command line window and log on to the switch. Enter the Shutdown command, then power down the switch. Contact your HP Authorized Maintenance Provider.

### Logged-In LED indications

Port diagnostics are indicated by the Logged-in LED for each port and consists of the following patterns:



Blinking pattern	Description
Solid illumination, not blinking	Logged in
Blinking once per second	Logging in
Blinking twice per second	<a href="#">Port Error blinking pattern</a> —the port is down, offline, or excessive port errors exist

**Figure 15: Logged-In LED location and blinking patterns**

See the following sections for information about identifying the cause of the error, and refer to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for information about correcting the error condition.

## Port Error blinking pattern

The switch can monitor a set of port errors and generates alarms based on user-defined sample windows and thresholds. Port errors include the following:

- CRC errors
- Decode errors
- Login / Logout errors
- Loss-of-signal errors

Port threshold alarm monitoring is disabled by default. Refer to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for information about managing port threshold alarms.

If the count for any of these errors exceeds the rising trigger for three consecutive sample windows, the switch generates an alarm and disables the affected port, changing its operational state to “down.”

Port errors can be caused by the following:

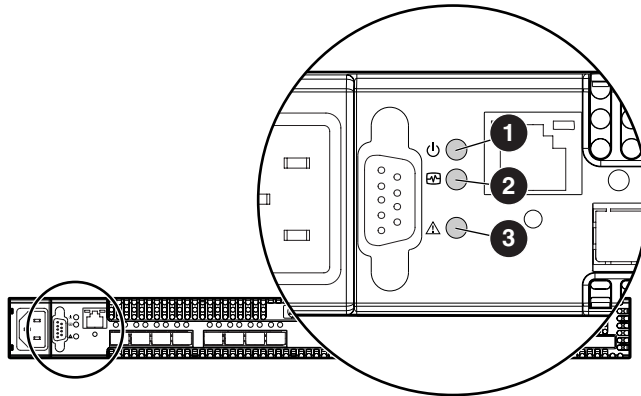
- Triggers are too low or the sample window is too small
- Faulty Fibre Channel port cable
- Faulty SFP
- Faulty port
- Faulty storage device, HBA, or server

Review the event browser to determine if excessive port errors are responsible for disabling the port. Look for a message that mentions one of the monitored error types indicating that the port has been disabled, then do the following:

1. Examine the alarm configuration for the associated error using the CLI `Show Config Threshold` command or the Switch Manager application.  
Are the thresholds and sample window correct?
  - Yes - Continue.
  - No - Correct the alarm configuration. If the condition remains, continue.
2. Reset the port, then perform an external port loopback test to validate the port and the SFP.  
Does the port pass the test?
  - Yes - Continue.
  - No - Reseat or replace the SFP and repeat the test. If the port does not pass the test, contact your HP Authorized Service Provider. Otherwise continue.
3. Replace the Fibre Channel port cable.  
Is the problem corrected?
  - Yes - Complete.
  - No - Continue.
4. Inspect the device (server or storage) to which the affected port is connected and confirm that the device is working properly. Make repairs and corrections as needed. If the condition remains, contact your HP Authorized Service Provider.

## Chassis diagnostics

Chassis diagnostics are indicated by the chassis LEDs, as shown in [Figure 16](#).



Item	Description
❶	Input Power LED (green)
❷	Heartbeat LED (green)
❸	System Fault LED (amber)

Figure 16: Chassis LEDs

### Input Power LED is extinguished

The Input Power LED illuminates to indicate that the switch logic circuitry is receiving proper voltages. If the Input Power LED is extinguished:

1. Inspect the power cords and connectors. Is the cord unplugged? Is the cord or connector damaged?
  - Yes - Make necessary corrections or repairs. If the condition remains, continue.
  - No - Continue.
2. Inspect the AC power source. Is the power source delivering the proper voltage?
  - Yes - Continue.
  - No - Make necessary repairs. If the condition remains, contact your HP Authorized Maintenance Provider.

### System Fault LED is illuminated

The System Fault LED illuminates to indicate that the switch logic circuitry is overheating or that a POST error has occurred. The System Fault LED is accompanied by a Heartbeat LED error blink code. If the System Fault LED illuminates, identify the Heartbeat LED error blink pattern and take the necessary actions. See "[Heartbeat LED blink patterns](#)" on page 42.

## Maintenance mode options

If a switch becomes inoperable or unmanageable because the firmware is corrupt, the IP address is lost, the switch configuration is corrupt, or the password is forgotten, you can recover the switch using the switch Maintenance button.

Maintenance options include:

- Unpack a firmware image file
- Restore the network configuration parameters to the default values
- Remove all user accounts and restore the Admin account name password to the default
- Copy the log file
- Restore factory defaults for all but user accounts and zoning
- Restore all switch configuration parameters to the factory default values
- Reset the switch
- Display firmware versions stored on the switch
- Select the firmware image to activate
- Update the system boot loader

To access the Maintenance menu:

1. Place the switch in maintenance mode by pressing and holding the Maintenance button with a pointed tool for 2–7 seconds, until the Heartbeat LED alone is illuminated.
2. Allow one minute for the switch to complete its tests. When the switch is in maintenance mode, the Heartbeat LED illuminates continuously. All other chassis LEDs are extinguished.
3. Establish a Telnet session with the switch using the maintenance mode IP address of 10.0.0.1.

---

**Note:** For information about connecting a workstation to the switch, see [“Management System Requirements” on page 63](#).

---

4. Enter the maintenance mode account name and password (prom, prom), and then press **Enter**.

```
login: prom
password:xxxx
```

5. The maintenance menu displays several recovery options. To select a switch recovery option, press the corresponding number (displayed in option: field) on the keyboard, and then press **Enter**.

```
0) Exit
1) Image Unpack
2) Reset Network Config
3) Reset User Accounts to Default
4) Copy Log Files
5) Remove Switch Config
6) Remake Filesystem
7) Reset Switch
8) Show Firmware Versions
9) Set Active Image
10) Update Boot Loader
Option:
```

These options and their use are described in the following subsections.

### **Maintenance menu – Exit**

This option closes the current login session. To log in again, enter the maintenance mode account name and password (prom, prom). To return to normal operation, momentarily press and release the Maintenance button or power cycle the switch.

### **Maintenance menu – Image Unpack**

This option unpacks and installs new firmware when the current firmware becomes corrupt. Before using this option, you must load the new firmware image file onto the switch. The steps to install new firmware using this option are as follows:

1. Place the switch in maintenance mode. See the procedure for maintenance mode in [“Maintenance mode options” on page 47](#).
2. Use FTP to load a new firmware image file onto the switch. See [“Using the CLI to install firmware” on page 38](#). Do not unpack the firmware image file with the Image command.
3. Select option 1 from the maintenance menu. When prompted for a file name prompt, enter the firmware image file name.

```
Image filename: filename
Unpacking 'filename', please wait...
Unpackage successful.
```

4. Select option 7 to reset the switch and exit maintenance mode.

### **Maintenance menu – Reset Network Config**

This option resets the network properties to the factory default values and saves them on the switch. Refer to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for default network configuration values.

### **Maintenance menu – Reset User Accounts to Default**

This option restores the password for the Admin account name to the default (password) and removes all other user accounts from the switch.

### **Maintenance menu – Copy Log Files**

This option copies all log file buffers to a file on the switch named *logfile*. You can use FTP to download this file to the management workstation. You must download the *logfile* before resetting the switch.

### **Maintenance menu – Remove Switch Config**

This option restores the switch configuration parameters to the factory defaults and deletes all other configurations from the switch. User account and zoning information is retained. Refer to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for the default values.



---

## Maintenance menu – Remake Filesystem

In the event of sudden loss of power, it is possible that the switch configuration may become corrupt. The file system on which the configuration is stored must be re-created. This option resets the switch to the factory default values including user accounts and zoning. Refer to the *HP StorageWorks 2/8q Fibre Channel Switch Management User Guide* for the factory default values.

---

**Note:** If you choose the `Remake Filesystem` option, you lose all changes made to the fabric configuration that involve that switch, such as password and zoning changes. You must then reconfigure the portions of the fabric that involve the switch.

---

## Maintenance menu – Reset Switch

This option closes the Telnet session, exits maintenance mode and reboots the switch using the current switch configuration. All unpacked firmware image files that reside on the switch are deleted.

## Maintenance menu – Show Firmware Versions

This option displays the image numbers and firmware versions that are stored on the switch.

## Maintenance menu – Set Active Image

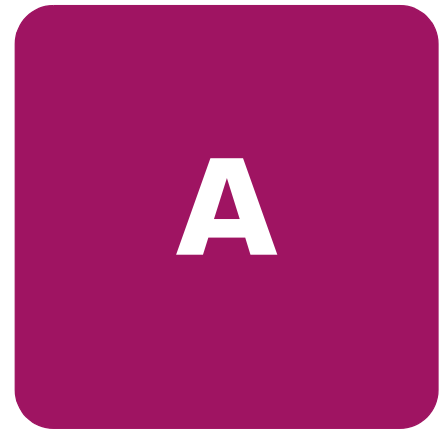
This option specifies the firmware version to be used when the switch returns to normal operation. A message reminds you of the pending firmware version and gives you an opportunity to change it by selecting the other image number.

## Maintenance menu – Update Boot Loader

This option updates the system boot loader. This is the program that loads the Linux kernel into memory. Use this option only at the direction of your HP Authorized Maintenance Provider.



# Regulatory Compliance Notices



## Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (personal computers, for example). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

The rating label on the device shows which class (A or B) the equipment falls into. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC logo or FCC ID on the label. Once the class of the device is determined, refer to the following corresponding statement.

### Class A equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

### Class B equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

## Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

## Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

## Declaration of conformity for products marked with the FCC logo - United States only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding your product, contact:

Hewlett-Packard Company  
P. O. Box 692000, Mail Stop 530113  
Houston, Texas 77269-2000

Or, call

1-800- 652-6672

For questions regarding this FCC declaration, contact:

Hewlett-Packard Company  
P. O. Box 692000, Mail Stop 510101  
Houston, Texas 77269-2000

Or, call

(281) 514-3333

To identify this product, refer to the Part, Series, or Model number found on the product.

## Canadian Notice (Avis Canadien)

### Class A equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

### Class B equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## European Union Notice



Products bearing the CE marking comply with the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community and if this product has telecommunication functionality, the R&TTE Directive (1999/5/EC).

Compliance with these directives implies conformity to the following European Norms (in parentheses are the equivalent international standards and regulations):

- EN 55022 (CISPR 22) - Electromagnetic Interference
- EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11) - Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2) - Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3) - Power Line Flicker
- EN 60950 (IEC 60950) - Product Safety

## BSMI Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

## Japanese Notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。  
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

## Japanese Power Cord Notice

製品には、同梱された電源コードをお使い下さい。  
同梱された電源コードは、他の製品では使用出来ません。

## Korean notices

큐로직스위치 프러덕

## Class A equipment

### A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약 잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

## Laser compliance

The SFP Module contains a laser diode of either gallium aluminum arsenide (GaALAs) emitting in the wavelength range of 770-860 nm, or indium gallium arsenide phosphide (InGaAsP) emitting in the wavelength range of 1270-1355 nm. All HP systems equipped with a laser device comply with safety standards, including International Electrotechnical Commission (IEC) 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. The product does not emit hazardous laser radiation.



**WARNING:** Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- Do not try to open the unit enclosure. There are no user-serviceable components inside.
  - Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
  - Allow only HP Authorized Service technicians to repair the unit.
- 

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States. This device is classified as a Class 1 laser product as defined by IEC 825.



This indicates that the product is classified as a CLASS 1 LASER PRODUCT.

---

## Battery replacement notice

Your device is provided with a Lithium Manganese Dioxide, a Nickel-Metal Hydride, or a Vanadium Pentoxide, batteries. There is a danger of explosion and risk of personal injury if the array is incorrectly replaced or mistreated. Replace only with the HP spare designated for this product. For more information about battery replacement or proper disposal, contact your HP Authorized Reseller or your HP Authorized Service Provider.



**WARNING:** Your Accelerator Array contains Lithium Manganese Dioxide, Nickel-Metal Hydride, or Vanadium Pentoxide batteries. There is risk of fire and burns if the battery pack is not handled properly. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
  - Do not expose to temperatures higher than 60° C (140° F).
  - Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
  - Replace only with HP spare designated for this product.
- 



**Caution:** Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, your authorized HP Partners, or their agents.

---



# Electrostatic Discharge

## B

To prevent damage to the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

### Prevention methods

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always make sure you are properly grounded when touching a static-sensitive component or assembly.

### Grounding methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm  $\pm$  10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the equipment suggested for proper grounding, either have an HP Authorized Reseller install the part or discharge any potential static by touching a piece of sheet metal immediately before touching the component or the device.

---

**Note:** For more information on static electricity, or assistance with product installation, contact your HP Authorized Reseller.

---



# Specifications



This appendix contains the specifications for the 2/8q FC Switch. See “[Introduction](#)” on page 13 for the location of all connections, switches, controls, and components.

## Fabric specifications

**Table 4: Fabric specifications**

Item	Description
Fibre Channel protocols	FC-PH Rev. 4.3 FC-PH-2 FC-PH-3 FC-AL Rev 4.6 FC-AL-2 Rev 7.0 FC-FLA FC-GS FC-GS-2 FC-GS-3 FC-FG FC-Tape FC-VI FC-SW-2 Fibre Channel Element MIB RFC 2837 Fibre Alliance MIB Version 4.0
Fibre Channel classes of service	Classes 2 and 3
Modes of operation	Fibre Channel Classes 2 and 3, connectionless
Port types	G_Port, GL_Port F_Port, FL_Port
Port characteristics	All ports are auto-discovering and self-configuring
Number of Fibre Channel ports	(8) 2 Gbps FC ports
Buffer credits	16 buffer credits per port, ASIC embedded memory
Media type	SFP optical transceiver, hot-pluggable
Fabric port speed	2.125 Gbps
Maximum frame size	2148 bytes (2112 byte payload)

**Table 4: Fabric specifications (Continued)**

Item	Description
System processor	200 MHz Motorola® 8245 PowerPc®
Fabric latency (intra-switch) 2 Gbps to 2 Gbps	< 0.4 $\mu$ sec
Bandwidth Point-to-point	2.125 Gbps, Full Duplex
Aggregate (single switch)	16 Gbps, full duplex

## Maintainability

**Table 5: Maintainability options**

Item	Description
Diagnostics	Power-On Self Test (POST) tests all functional components except SFP transceivers. Port tests include online, internal, and external tests.
User Interface	LED indicators

## Fabric management

**Table 6: Fabric management options and requirements**

Item	Description
Management methods	<ul style="list-style-type: none"> <li>■ Switch Manager Graphical User Interface</li> <li>■ Command Line Interface (CLI)</li> <li>■ Simple Management Network Protocol (SNMP)</li> <li>■ File Transfer Protocol (FTP)</li> </ul>
Maintenance connection	RS-232 connector; null modem F/F DB9 cable
Ethernet connection	RJ-45 connector; 10/100 BASE-T cable
Switch agent	Allows a network management station to obtain configuration values, traffic information, and failure data pertaining to the Fibre Channels using SNMP through the Ethernet interface.

## Dimensions

**Table 7: 2/8q FC Switch chassis dimensions**

Item	Dimension
Width	17 inches (432 mm), 19-inch rack mount
Height	1.70 inches (43.2 mm) (1U)
Depth	12.0 inches (305 mm)
Weight	9 lbs (4.08 Kg)

## Electrical

**Table 8: Electrical requirements**

Item	Requirement
Operating voltage	90 to 240 VAC; 50 to 60 Hz
Power source loading (maximum)	0.5 A at 120 VAC 0.25 A at 240 VAC
Heat Output (maximum)	50 watts
Circuit Protection	Internally fused

## Environmental

**Table 9: Environmental requirements**

Item	Requirement
<b>Temperature</b> Operating Non-operating	5° - 40°C (41 - 104°F) -40° - 70°C (-4 - 158°F)
<b>Humidity</b> Operating Non-operating	15% - 80%, non-condensing 25% - 90%, non-condensing
<b>Altitude</b> Operating Non-operating	0 - 3048m (0 - 10,000 feet) 0 - 15,240m (0 - 50,000 feet)
<b>Vibration</b> Operating Non-operating	IEC 68-2 5-500 Hz, random, 0.21 G rms, 10 minutes 5-500 Hz, random, 2.09 G rms, 10 minutes
<b>Shock</b> Operating Non-operating	IEC 68-2 4 g, 11ms, 20 repetitions 30g, 292 ips, 3 repetitions, 3 axis
<b>Air flow</b>	Bezel side to port side

## Regulatory certifications

Table 10: Regulatory certifications

Item	Description
Safety Standards	UL60950:2000 CSA 22.2 No. 60950-00 (Canada) EN60950:2000 (EC) CB Scheme-IEC 60950:1999
Emissions Standards	FCC Part 15B Class A ICES-03 Issue 3 VCCI Class A ITE CISPR 22, Class A EN 55022, Class A
Voltage Fluctuations	EN 61000-3-3
Harmonics	EN 61000-3-2
Immunity	EN 55024:1998
Marking	FCC Part 15 UL <sub>US</sub> (United States) TUV <sub>US</sub> (United States) cUL (Canada) cTUV (Canada) TUV Europe (Germany) VCCI CE

# Management System Requirements



Advanced configuration and monitoring tasks are performed through the Switch Manager application or the Command Line Interface (CLI).

This section includes the following information about connecting to these user interfaces:

- [Management system requirements](#), page 63
- [Cable pin configurations](#), page 64
- [Establishing an Ethernet or serial connection](#), page 65

## Management system requirements

The requirements for the server and any other workstations are described in [Table 11](#):

**Table 11: Workstation requirements**

Item	Requirement
Operating system	Microsoft Windows® 2000/2003 Standard and Enterprise Editions (32-bit) Red Hat Linux® Enterprise Advanced Server 2.1 Enterprise Linux 3.0 (32-bit) SuSe Linux SLES 8 (32-bit)
Memory	256 MB, minimum
Disk space	150 MB, per installation
Processor	300 MHz or faster
Hardware	CD-ROM drive, RS-232 serial port, RJ-45 Ethernet port
Internet browser	Windows: Microsoft® Internet Explorer®, version 5.5 or greater Linux: Netscape Navigator, version 6.2 or greater or Mozilla , version 1.0.2 or greater with Personal Security Manager

## Cable pin configurations

Switch Manager and the CLI are used for advanced configuration tasks, and are accessed through an Ethernet or serial connection from a workstation to the switch.

Use one of the following connection methods.

See [Table 12](#) for illustrations of the pin configurations.

### Indirect Ethernet cable

This connection method requires a 10/100 Base-T straight cable to the switch RJ-45 Ethernet port through an Ethernet switch or a hub.

With this type of connection, you can access Switch Manager or the Command Line Interface.

### Direct Ethernet cross-over cable

This connection method requires a 10/100 Base-T cross-over cable from the management workstation to the switch RJ-45 Ethernet port.




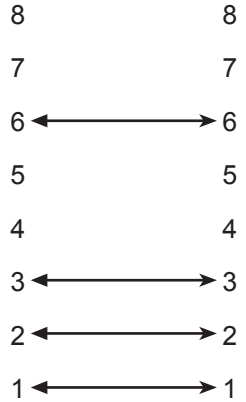
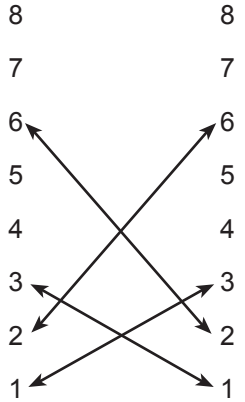
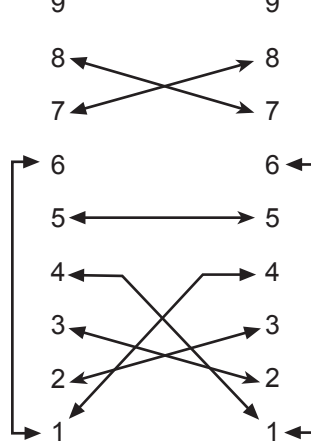
With this type of connection, you can access Switch Manager or the Command Line Interface.

### Serial cable

This connection method requires a null modem F/F DB9 cable.

With this type of connection, you can access the Command Line Interface.

**Table 12: Ethernet and serial Cable Pin Configurations**

Indirect Ethernet connection straight cable	Direct Ethernet connection cross-over cable	Serial connection null modem cable
		
		



## Establishing an Ethernet or serial connection

To access Switch Manager or the CLI, connect the management workstation to the switch in one of three ways, as previously described in [“Cable pin configurations” on page 64](#).

---

**Note:** Ethernet or serial cable connections are not used when initially configuring the switch.

---

### Ethernet connection information

The default IP address of a new switch is 10.0.0.1. Use the Switch Manager Configuration Wizard to set the IP address of a new switch without re-configuring the management workstation.

To establish an Ethernet connection:

1. Connect a 10/100 Base-T straight cable indirectly over an Ethernet network or a 10/100 Base-T cross-over cable from an RJ-45 port on the management workstation directly to the RJ-45 Ethernet port. See [“Cable pin configurations” on page 64](#) for information about the cables.
2. Open a command line window.
3. Open a Telnet session by entering the following command with the switch IP address (Default IP address: 10.0.0.1):

```
telnet 10.0.0.1
```

4. Log in to the switch. The default account name and password are (admin, password).

```
switch login: admin
```

```
password: *****
```

## Serial connection information

1. Connect a null modem F/F DB9 cable from a COM port on the management workstation to the RS-232 serial port on the switch.
2. Configure the connection according to your platform:

### For Windows environments:

- d. Open the HyperTerminal application on a Windows platform. Select **Start>Programs>Accessories>HyperTerminal>HyperTerminal**.
- e. Enter a name for the switch connection, choose an icon in the Connection Description window, and then click **OK**.
- f. Select the COM port in the Connect To window and click **OK**.
- g. Enter the following COM Port settings in the COM Properties window and click **OK**:
  - Bits per second: 9600
  - Data Bits: 8
  - Parity: None
  - Stop Bits: 1
  - Flow Control: None

### For Linux environments:

- a. Set up minicom to use the serial port. Create or modify the `/etc/minirc.dfl` file with the following content:

```
pr portdev/ttyS0
pu minit
pu mreset
pu mhangup
```

`pr portdev/ttyS0` specifies port 0 on the workstation. Choose "pr" setting to match the workstation port to which you connected the switch.
  - b. Verify that all users have permission to run minicom. Review the `/etc/minicom.users` file and confirm that the line "ALL" exists or that there are specific user entries.
  - c. Enter the following command at the Linux prompt:

```
minicom
```
3. Log in to the switch.

If fabric security is disabled, account names and passwords are not enforced. Refer to the `Set Setup` command in the CLI portion of the *HP StorageWorks 2/8q FC Switch Management User Guide* for information about setting fabric security. The default account name and password are (admin, password).

```
switch login: admin
password: *****
```

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