



SilkWorm[®] 3900

Hardware Reference Manual

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Preface

Intended Audience

This document is intended for use by systems administrators and technicians experienced with networking, fibre channel, and storage area network (SAN) technologies.

Formatting Conventions

The following table describes the formatting conventions that are used in this book.

Convention	Purpose
bold text	<ul style="list-style-type: none">identifies command namesidentifies GUI elementsidentifies keywords/operandsidentifies text to enter at the GUI or CLI
<i>italic text</i>	<ul style="list-style-type: none">provides emphasisidentifies variablesidentifies paths and internet addressesidentifies book titles
code text	<ul style="list-style-type: none">identifies CLI outputidentifies syntax examples

Use of Notes, Cautions, and Warnings

The following notices are used in this document:

Note: A note provides a tip, emphasizes important information, or provides a reference to related information.

Caution A caution alerts you to potential damage to hardware, firmware, software, or data if the correct procedure is not followed.

Warning A warning alerts you to potential danger to personnel if the correct procedure is not followed.

Related Publications

Brocade Documentation

The following related publications are provided on the Brocade Documentation CD-ROM:

- Fabric OS documentation:
 - *Brocade Fabric OS Procedures Guide*
 - *Brocade Fabric OS Reference*
 - *Brocade Fabric OS Release Notes*
 - *Brocade Diagnostic and System Error Message Reference*
 - *Brocade MIB Reference*
- Fabric Manager documentation:
 - *Brocade Fabric Manager*
 - *Brocade Fabric Manager Release Notes*
- Documentation for Fabric OS optional software:
 - *Brocade Advanced Zoning User's Guide*
 - *Brocade ISL Trunking User's Guide*
 - *Brocade Advanced Web Tools User's Guide*
 - *Brocade Advanced Performance Monitoring User's Guide*
 - *Brocade Distributed Fabrics User's Guide* (covers Remote Switch and Extended Fabrics products)
 - *Brocade Fabric Watch User's Guide*

Additional Information

For additional Brocade documentation, including white papers, visit the Brocade website at:

<http://www.brocade.com>

For information about Fibre Channel standards, visit the Technical Committee T11 website at:

<http://www.t11.org>

For information about the Fibre Channel industry, visit the Fibre Channel Industry Association website at:

<http://www.fibrechannel.com>

Technical Support

Contact your switch supplier for hardware, firmware, and software support, including product repairs and part ordering.

Be prepared to provide the following information to your support personnel.

Note: This section provides information for all types of SilkWorm switches.

- **General Information**

- Technical Support registration number, if applicable
- Switch model
- Operating system version
- Error messages received
- Output from the **supportshow** command
- Fabric topology, provided by the **topologyshow** command
- Detailed description of the problem and specific questions
- Description of any troubleshooting steps already performed and results

- **Switch Serial Number**

The switch serial number and corresponding bar code are provided on the serial number label, as shown below:



The serial number label is located as follows:

- *On SilkWorm 2000 series switches:* Bottom of chassis
- *On SilkWorm 3000 series switches:* Back of chassis
- *On SilkWorm 6400 and 12000 switches:* Inside chassis, on wall to left of ports

- **Switch Worldwide Name**

- *SilkWorm 12000 switches:* The chassis WWN is available through the **wwn** command.
- *For all switches other than the SilkWorm 12000:* The switch WWN is available through the **switchshow** and **wwn** commands.

Introducing the SilkWorm 3900

This chapter provides the following information:

- [Overview on page 1-1](#)
- [Monitoring and Managing the SilkWorm 3900 on page 1-3](#)

Overview

The SilkWorm 3900 is a 32-port fibre channel switch that supports link speeds up to 2 Gbit/sec. It includes the Brocade Fabric Operating System, and is compatible with the entire Brocade SilkWorm product family. It can operate in a fabric containing multiple switches or as the only switch in a fabric.

The SilkWorm 3900 provides the following features:

- Air-cooled 1.5U chassis that can be set up as a stand-alone unit or mounted in a standard Electronic Industries Association (EIA) 19-inch rack.
- 32 fibre channel ports, with the following characteristics:
 - Automatic negotiation to highest common speed of all devices connected to port
 - Port interfaces compatible with small form factor pluggable (SFP) transceivers, both short wavelength (SWL) and long wavelength (LWL)
 - Universal and self-configuring: capable of becoming an F_Port (fabric enabled), FL_Port (fabric loop enabled), or E_Port (expansion port).
- 32 short-wave length SFP transceivers, if ordered
- One RS-232 serial port, designed to connect to a DTE port.
- One 10/100 Mbps ethernet port with an RJ-45 connector.
- Two redundant power supplies, with AC switches and built-in fans. The power supplies are load sharing and hot-swappable, if replaced one at a time.
- Three redundant fan assemblies, hot-swappable if replaced one at a time.
- A field-replaceable motherboard assembly enclosed in a grounded EMI cage
- Brocade Slide Rack Mount Kit
- The following LEDs:
 - Switch Power/Status LED on the port side of the switch
 - Port Readiness LED on the non-port side of the switch
 - Port Status LED and Port Speed LED for each port
 - Power LED on each power supply
 - Fan Failure LED on each fan assembly

Port Side of the SilkWorm 3900

Figure 1-1 shows the port side of the SilkWorm 3900.

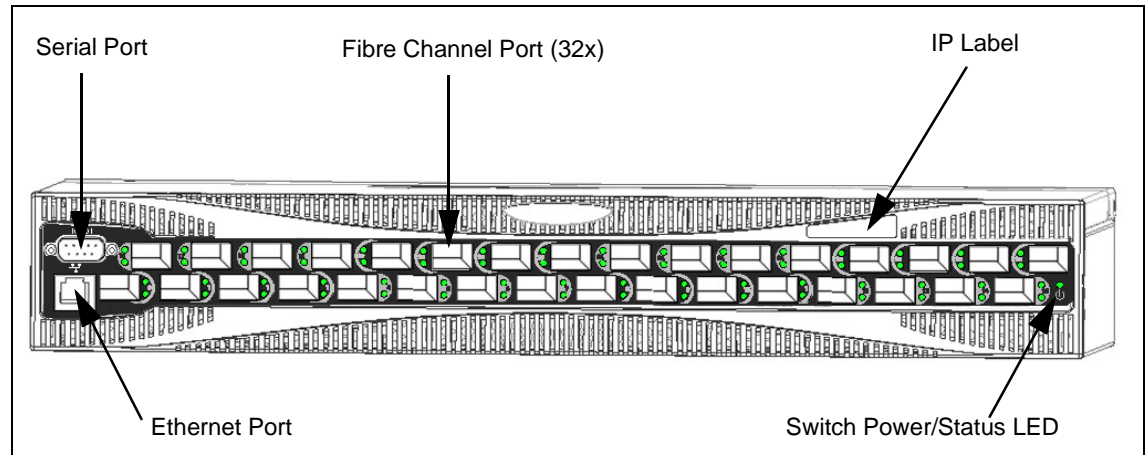


Figure 1-1 Port Side of SilkWorm 3900

The fibre channel ports are numbered from left to right, with ports 0 - 15 in the lower row and ports 16 - 31 in the upper row. The ports are color-coded into groups of four to indicate which ports can be used in the same interswitch link (ISL) trunking group.

Note: *Brocade ISL Trunking* is optional software that allows creation of trunking groups of ISLs between adjacent switches. For more information about trunking, refer to the *Brocade ISL Trunking User's Guide*.

Non-Port Side of the SilkWorm 3900

Figure 1-2 shows the non-port side of the SilkWorm 3900, which contains the fan assemblies and corresponding LEDs, the power supplies and corresponding LEDs, and the Port Readiness LED.

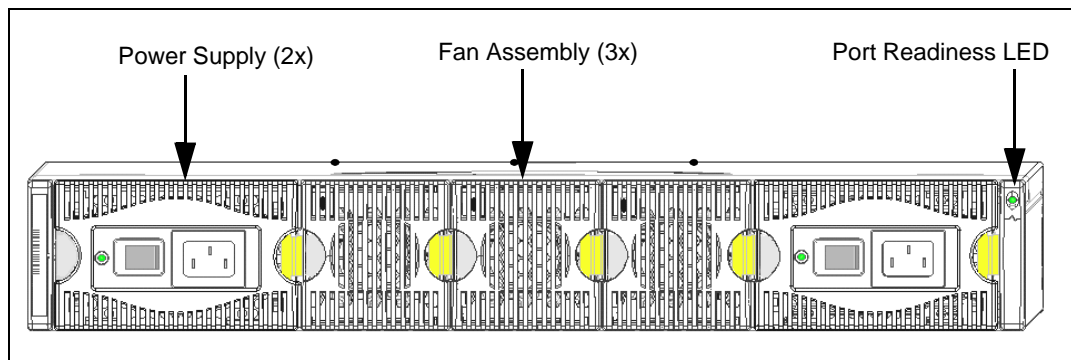


Figure 1-2 Non-Port Side of SilkWorm 3900

Monitoring and Managing the SilkWorm 3900

Managing the SilkWorm 3900

You can use the management functions built into the SilkWorm 3900 to monitor the fabric topology, port status, physical status, and other information to aid in performance analysis and system debugging.

You can manage the SilkWorm 3900 using any of the management options listed in Table 1-1.

Note: For information about upgrading the version of Fabric OS installed on the switch, refer to the *Brocade Fabric OS Procedures Guide*.

Table 1-1 Management Options for SilkWorm 3900

Management Tool	Out-of-band Support	In-band Support
Command line interface Up to two admin sessions and four user sessions at same time. For more information, refer to the <i>Brocade Fabric OS Procedures Guide</i> and the <i>Brocade Fabric OS Reference</i> .	Ethernet or serial connection	IP over fibre channel *
Brocade Fabric Manager For information refer to the <i>Brocade Fabric Manager User's Guide</i> .	Ethernet or serial connection	IP over fibre channel *
Brocade Advanced Web Tools For information refer to the <i>Brocade Advanced Web Tools User's Guide</i> .	Ethernet or serial connection	IP over fibre channel *
Standard SNMP applications For information refer to the <i>Brocade MIB Reference</i> .	Ethernet or serial connection	IP over fibre channel *
Management server For more information, refer to the <i>Brocade Fabric OS Procedures Guide</i> and the <i>Brocade Fabric OS Reference</i> .	Ethernet or serial connection	Native inband interface (over HBA only)

* Requirements for running IP over fibre channel:

- Must be run on both HBA and switch.
- Must be supported by both HBA and HBA driver.

Supported Features

The SilkWorm 3900 supports the following optional Brocade software, which can be activated with the purchase of the corresponding license key:

- Brocade Advanced Zoning
For information refer to the *Brocade Advanced Zoning User's Guide*.
- Brocade ISL Trunking
For information refer to the *Brocade ISL Trunking User's Guide*.
- Brocade Fabric Watch
For information refer to the *Brocade Fabric Watch User's Guide*.
- Brocade Advanced Performance Monitoring
For information refer to the *Brocade Advanced Performance Monitoring User's Guide*.
- Brocade Extended Fabrics
For information refer to the *Brocade Distributed Fabrics User's Guide*, which also covers Remote Switch.
- Brocade Remote Switch
For information refer to the *Brocade Distributed Fabrics User's Guide*.

Installing and Configuring the SilkWorm 3900

This chapter provides the following information:

- [Installation and Safety Considerations on page 2-1](#)
- [Items Included With the SilkWorm 3900 on page 2-2](#)
- [Setting Up the SilkWorm 3900 as a Stand-alone Unit on page 2-2](#)
- [Installing the SilkWorm 3900 in an EIA Cabinet on page 2-2](#)
- [Configuring the SilkWorm 3900 on page 2-10](#)

Installation and Safety Considerations

You can install the SilkWorm 3900 in the following two ways:

- As a stand-alone unit on a flat surface
- In an EIA cabinet using the Slide Rack Mount Kit provided with the switch.

For successful installation and operation of the switch:

- Ensure the following electrical requirements are met:
 - Primary AC Input 100-240 VAC (switch auto-senses input voltage), 47-63 HZ.
 - Correctly wired primary outlet, with circuit protected by a circuit breaker and grounded in accordance with local electrical codes.
 - Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate.
 - For power supply information, refer to [Power Supply Specifications on page A-3](#).
- To ensure adequate cooling, install the switch with the non-port side, which contains the air intake vents, facing the cool-air aisle.
- Verify a minimum of 47 cubic feet/minute (79.8 cubic meters/hour) of air flow is available to the air intake vents on the non-port side of the switch.
- Verify that the ambient air temperature does not exceed 40° Celsius (104° Fahrenheit) while the switch is operating.
- If installing the switch in a cabinet:
 - The cabinet must be a standard EIA cabinet.
 - Plan a cabinet space that is 1.5 rack units high (2.6 inches; 6.7 cm), 19 inches (48.3 cm) wide, and at least 23 inches (68.6 cm) deep.
 - Ground all equipment in the cabinet through a reliable branch circuit connection, and maintain ground at all times. Do not rely on a secondary connection to a branch circuit, such as a power strip.
 - Ensure that airflow and temperature requirements are met on an ongoing basis, particularly if the switch is installed in a closed or multi-rack assembly.
 - Verify that the additional weight of the switch does not exceed the cabinet's weight limits or unbalance the cabinet in any way.
 - Secure the cabinet to insure stability in case of unexpected movement.

Items Included With the SilkWorm 3900

The following items are included with the standard shipment of the SilkWorm 3900:

- The SilkWorm 3900 switch, containing three fan assemblies and two power supplies
- Slide Rack Mount Kit, with installation instructions
- One accessory kit, containing the following items:
 - The *SilkWorm 3900 QuickStart Guide*
 - The Brocade Documentation CD-ROM
 - SFP (small form factor pluggable) transceivers (optional)
 - Rubber mounting feet
 - Two grounded 10 foot (approximately 3 meter) country-specific power cords
 - One serial cable, 10 ft. (3.0 m) long, which can be converted from a DB-9 serial cable to an RJ-45-style serial cable by removing adapter on end of cable

Setting Up the SilkWorm 3900 as a Stand-alone Unit

1. Unpack the SilkWorm 3900, and verify all ordered items are present.
2. Clean the four corner depressions on bottom of switch and place a rubber foot in each one. This helps prevent the switch from accidentally sliding off the supporting surface.
3. Place the switch on a stable, flat surface.

Caution Do not connect the switch to the network until the IP address is correctly set. For instructions on how to set the IP address, see [Configuring the SilkWorm 3900 on page 2-10](#).

Installing the SilkWorm 3900 in an EIA Cabinet

These instructions are for installing the SilkWorm 3900 in an EIA cabinet using the Slide Rack Mount Kit. The rack kit can be installed in two ways:

- To allow the port side of the switch to slide out of the exhaust-air side of the cabinet. In this installation, the port side of the switch is flush with the edge of the cabinet.
- To allow the non-port side of the switch to slide out the cool-air side of the cabinet. In this installation, the port side of the switch is set three inches back from the edge of the cabinet, allowing a more gradual bend in the fiber optic cables.

Note: This procedure is written with the assumption that the non-port side of the switch, which contains the air intake vents, is installed facing the cool-air aisle.

Items required:

- SilkWorm switch and power cords provided with the switch
- Slide Rack Mount Kit
- Phillips screwdriver, #2, with torque capability
- Slotted blade screwdriver, 1/4 inch, with torque capability

Slide Rack Mount Kit Parts List

Note: The Slide Rack Mount Kit is compatible with 8, 16, and 32-port SilkWorm switches.

Table 1 Items Supplied with the Slide Rack Mount Kit

Item #	Description	Total Qty.
Hardware required for installing an 8, 16, or 32-port switch:		
1	Assembly, Slide, containing one each of inner slide rail, outer slide rail, and Items 2, 3, 4, below	2
2	L-Bracket, Slide Mount, 3 hole	4
3	Nut, Hex, Locking, 8-32 (4 nuts in each slide assembly)	8
4	Screw, 8-32 x 3/8 inch, Slotted, Zinc (requires a torque of 15 inch-pounds, 17 cm-kgs) 4 nuts in each slide assembly	8
5	Clip, Power Cord	6
6	Screw, 10-32 x 3/8 inch, Phillips, Black (requires a torque of 25 inch-pounds, 29 cm-kgs)	12
7	Screw, 8-32 x 3/16 inch, Phillips, Zinc (requires a torque of 15 inch-pounds, 17 cm-kgs) 6 to attach inner rails to switch; 4 to attach Items 11, 12 to switch	10
8	Nut, Bar, Rack, 3 hole	4
Hardware specific to installing a switch in a cabinet that has square-holed rails:		
9	Washer, Alignment	12
10	Nut, Retainer, 10-32	12
Hardware specific to installing an 8 or 16-port switch to slide out the exhaust-air side of the cabinet:		
11	Bracket, Right, Rack Mount (optional bracket for port side)	1
12	Bracket, Left, Rack Mount (optional bracket for port side)	1
Hardware specific to installing a 32-port switch to slide out the exhaust-air side of the cabinet:		
13	Bracket, Mounting, Right (optional bracket for port side)	1
14	Bracket, Mounting, Left (optional bracket for port side)	1
15	Screw, 8-32 x 1/4 inch, Phillips, Zinc (requires a torque of 15 inch-pounds, 17 cm-kgs)	4
Hardware specific to installing either type of switch to slide out the cool-air side of the cabinet:		
16	Bracket, Back Rack Mount (optional bracket for non-port side)	2
(3)	Nut, Hex, Locking, 8-32	4
(4)	Screw, 8-32 x 3/8", Slotted, Zinc (requires a torque of 15 inch-pounds)	4

Cabinet Installation Procedure

1. Separate the inner and outer slide rails for both slide assemblies (Item 1):
 - a. Pull the inner slide rail out until the lock engages.
 - b. Depress the lock release lever located inside the inner rail, and pull the inner rail out of the outer rail.
 - c. Repeat with the second slide assembly.
2. Install the inner slide rails on the switch chassis:

Caution Using screws longer than the specified length can damage the switch.

- a. Position one of the inner slide rails with the flat side against the switch, oriented as follows:
 - To allow the switch to slide out the exhaust-air side of the cabinet:
Orient the rail as shown in [Figure 2-1 on page 2-7](#), with the end containing the lock release lever towards the non-port side of switch.
 - To allow the switch to slide out the cool-air side of the cabinet:
Orient the rail as shown in [Figure 2-2 on page 2-8](#), with the end containing the lock release lever towards the port side of switch.
 - b. Attach the rail using three of the Phillips head 8-32 x 3/16 inch screws (Item 7).
 - c. Tighten the screws to a torque of 15 inch-pounds.
 - d. Repeat with the second inner slide rail on the other side of the switch.
3. Optional: Install the Rack Mount Brackets on the switch.
These brackets prevent the switch from sliding out of the cabinet in case the cabinet is accidentally moved.

Caution Using screws longer than the specified length can damage the switch.

- To allow the switch to slide out the exhaust-air side of the cabinet:
 - i. Position the right Rack Mount Bracket (Item 11 or 13, depending on switch type) as shown in [Figure 2-1 on page 2-7](#).
 - ii. Attach bracket (Items 13 and 14) to switch using two Phillips head 8-32 x 1/4 inch screws (Item 15).
 - iii. Tighten screws to a torque of 15 inch-pounds.
 - iv. Repeat with left Rack Mount Bracket (Item 14).
- To allow the switch to slide out the cool-air side of the cabinet:
 - i. Position a rear Rack Mount Bracket (Item 16) at the end of an inner slide rail (the end that does not contain the lock release lever), as shown in [Figure 2-2 on page 2-8](#).
 - ii. Attach the bracket (Item 16) to the slide rail using two of the slotted head 8-32 x 3/8 inch screws (Item 4), with a lock nut (Item 3) on the end of each screw.
 - iii. Tighten the screw to a torque of 15 inch-pounds.
 - iv. Repeat with the second inner slide rail.

4. Verify that two of the slide mount L-brackets (Item 2) are attached to each outer slide rail, using two of the slotted head 8-32 x 3/8 inch screws (Item 4) per bracket, with the screw heads on the inside of the slide rails and a lock nut (Item 3) on the end of each screw. These screws should be at a torque of 15 inch-pounds.
5. Install the power cord clips (Item 5) onto the outer slide rails. Install the clips on the outer surface of the slide rails, so that they do not interfere with sliding the rails. The clips can be oriented with the tabs above or below, provided they are consistent.
6. Insert the power cords into the power cord clips, with the pronged end of the power cords toward the cool-air aisle, for access to the power source.

Note: Allow a minimum service loop of 6 inches at the switch to ensure freedom of movement to plug and unplug cords from switch.

- To allow the switch to slide out the exhaust-air side of the cabinet:
Install the power cords into the clips with the receptacle end towards the *closed* end of the slide rail.
- To allow the switch to slide out the cool-air side of the cabinet:
Install the power cords into the clips with the receptacle end towards the *open* end of the slide rail.

Caution Ensure cords are not exposed to stress when switch is moved on slide rails. To prevent cords from being pulled out of clips, unplug them from switch before moving switch on slide rails.

7. Install the outer slide rails in the cabinet:
 - a. Position one of the outer slide rails in the cabinet, as follows:
 - To allow the switch to slide out the exhaust-air side of the cabinet: Orient as shown in [Figure 2-1 on page 2-7](#), with the closed end of the slide rail towards the cool-air side of the cabinet.
 - To allow the switch to slide out the cool-air side of the cabinet: Orient as shown in [Figure 2-2 on page 2-8](#), with the closed end of the slide rail towards the exhaust-air side of the cabinet.
 - b. Attach the bracket on one end of the slide rail to the corresponding cabinet rail, as shown in [Figure 2-1](#), and [Figure 2-2](#).

Note: If the Rack Mount Brackets were installed in step 3, leave the middle hole of the set of three empty for attaching the Rack Mount Bracket.

For *round-holed rack rails*, use the following hardware:

- One 3-hole bar nut (Item 8)
- Two Phillips head 10-32 x 3/8 inch screws (Item 6)

For *square-holed rack rails*, there are two possible methods (see [Figure 2-3 on page 2-9](#) and [Figure 2-4 on page 2-9](#)):

- Method A:
 - Three retainer nuts (Item 10)
 - Two Phillips head 10-32 x 3/8 inch screws (Item 6)
 - Method B:
 - One 3-hole bar nut (Item 8)
 - Three alignment washers (Item 9)
 - Two Phillips head 10-32 x 3/8 inch screws (Item 6)
- c. Tighten the screws to a torque of 25 inch-pounds.
 - d. Repeat steps 7a through 7c with the bracket on the other end of the same slide rail. The bracket position can be adjusted to fit the cabinet.
 - e. Repeat steps 7a through 7d with the second slide rail.
8. Install the switch in the cabinet:
- a. Position the switch next to the cabinet as shown in [Figure 2-1](#) or [Figure 2-2](#) as appropriate, and align then insert the inner slide rails into the outer slide rails.
 - b. Gently slide the switch into the cabinet.
 - c. Check rail alignment by sliding the switch in and out of the cabinet. If there is any difficulty, pull the switch out of the cabinet and realign the slide rails.
 - d. Optional: If the Rack Mount Brackets were installed in step 3, attach the brackets to the cabinet rails using one Phillips head 10-32 x 3/8 inch screw (Item 6) per bracket, and tighten the screws to a torque of 25 inch-pounds.

Note: For power on instructions, refer to [Configuring the SilkWorm 3900 on page 2-10](#).

Caution Do not connect the switch to the network until the IP address is correctly set. For instructions on how to set the IP address, see [Configuring the SilkWorm 3900 on page 2-10](#).

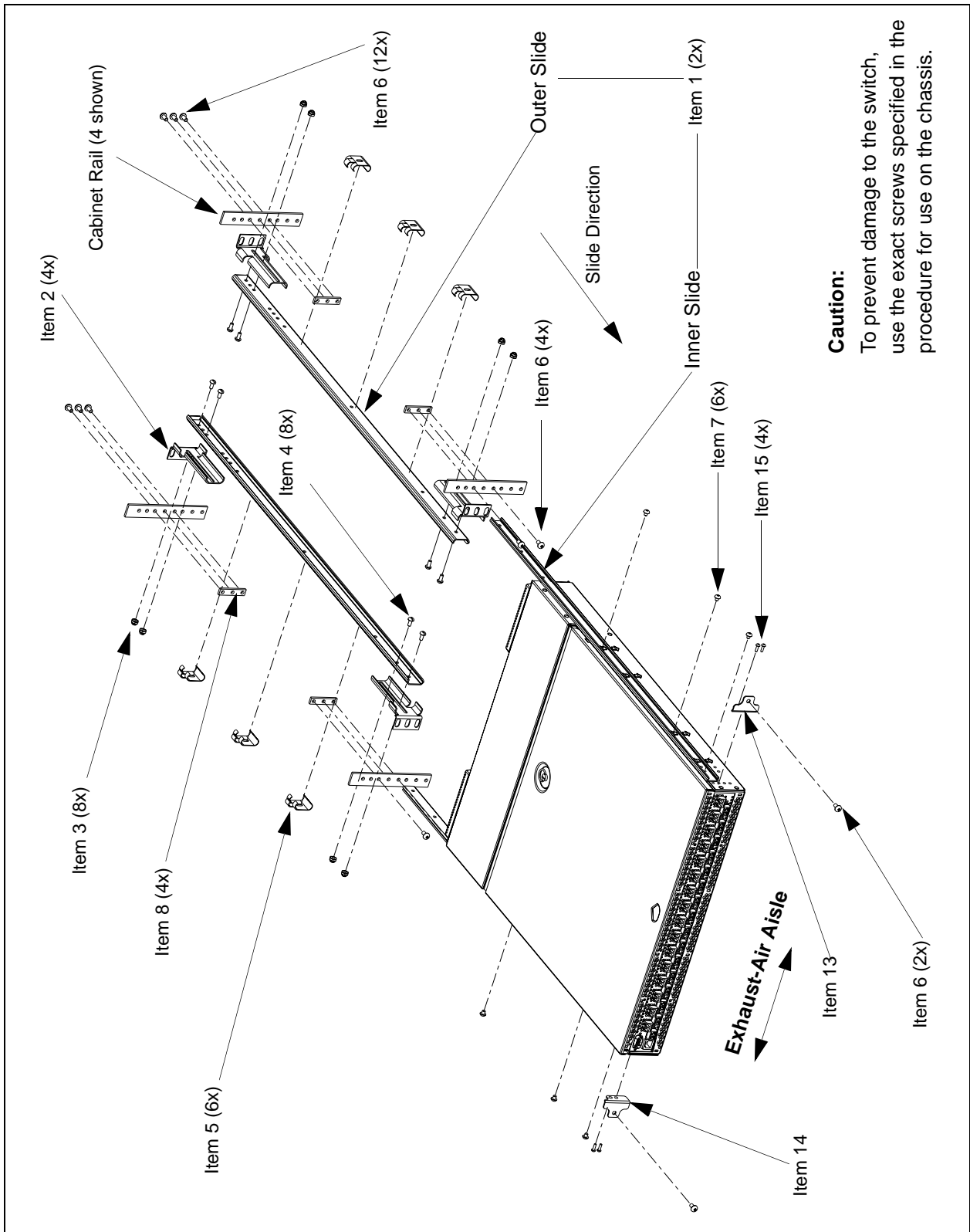


Figure 2-1 Installing a 32-Port Switch to Slide Out the Exhaust-air Side of the Cabinet

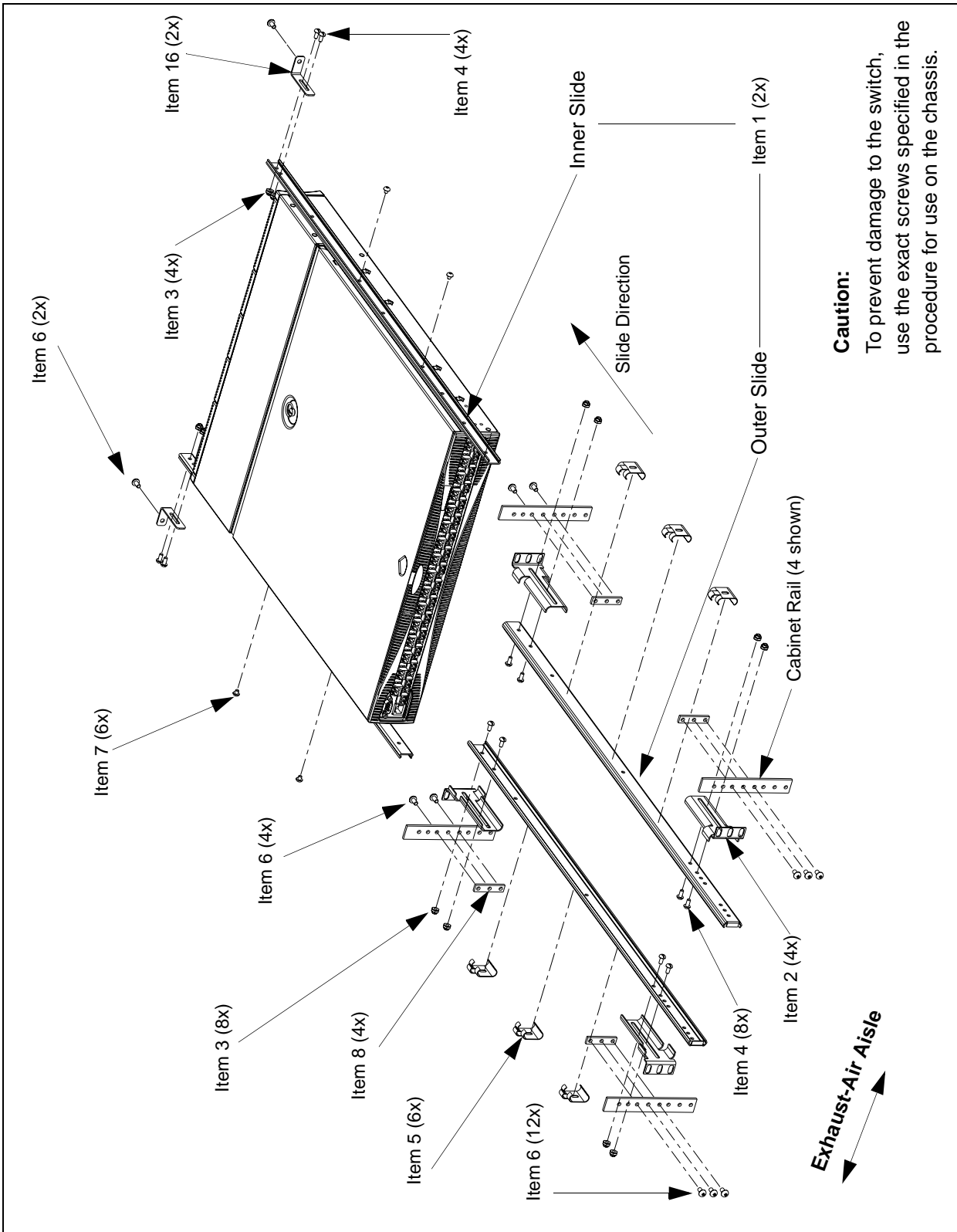


Figure 2-2 Installing a 32-Port Switch to Slide Out the Cool-air Side of the Cabinet

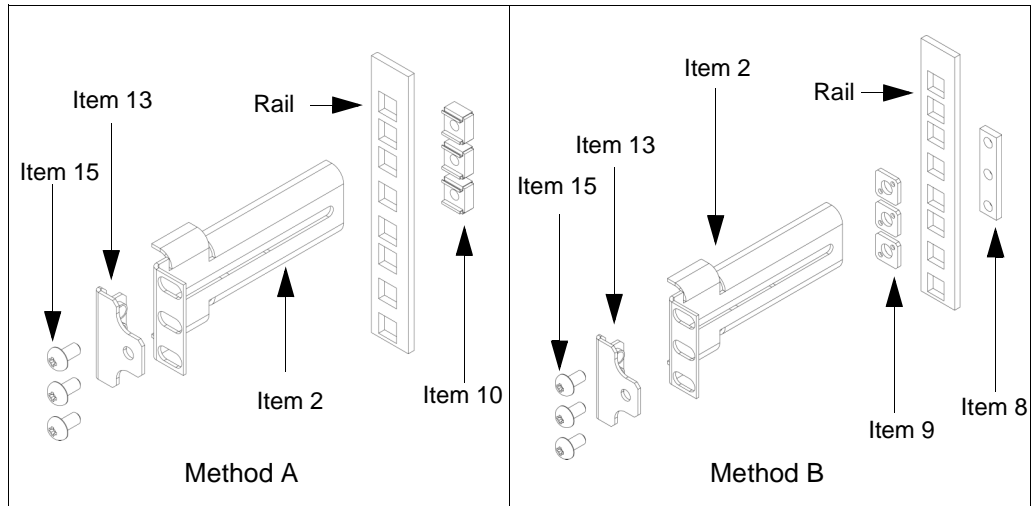


Figure 2-3 Installing the Switch to Slide Out the Exhaust-air Side of a Cabinet that has Square-Holed Rails

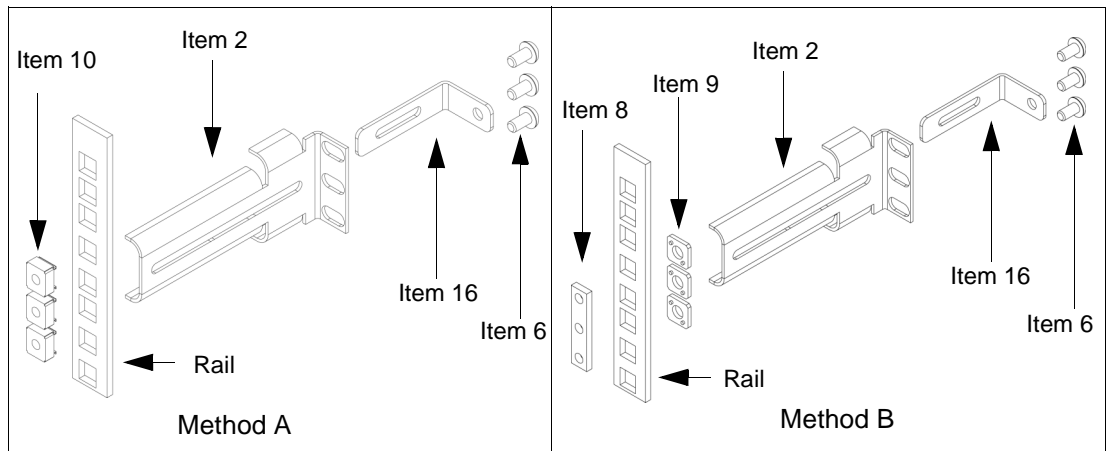


Figure 2-4 Installing the Switch to Slide Out the Cool-air Side of a Cabinet that has Square-Holed Rails

Configuring the SilkWorm 3900

The SilkWorm 3900 must be configured in order to operate correctly within a network and fabric. For instructions about configuring the switch to operate in a fabric containing switches from other vendors, refer to the *Brocade Fabric OS Procedures Guide*.

For more information about the commands used in this procedure, refer to the *Brocade Fabric OS Reference*.

Items Required

The following items are required for configuring and connecting the SilkWorm 3900 for use in a network and fabric:

- The SilkWorm 3900 installed and connected to a power source
- Workstation computer that has a terminal emulator application (such as HyperTerminal)
- Unused IP address and corresponding subnet mask and gateway address
- Serial cable provided with the switch
- Ethernet cable
- SFP transceivers and compatible cables, as required
- Access to an FTP server for backing up the switch configuration

Configuration Procedure

1. Create a serial connection to the SilkWorm 3900:
 - a. Remove the plug from the serial port and insert the serial cable provided with the SilkWorm 3900.
 - b. Connect the serial cable to the serial port on the switch and to an RS-232 serial port on the workstation.

If the serial port on the workstation is RJ-45 instead of RS-232, you can remove the adapter on the end of the serial cable and insert the exposed RJ-45 connector into the RJ-45 serial port on the workstation.
 - c. Disable any serial communication programs running on the workstation.
 - d. Open a terminal emulator application (such as HyperTerminal on a PC, or TERM in a Unix environment), and configure the application as follows:
 - In a Windows 95, 98, 2000, or NT environment:

<u>Parameter</u>	<u>Value</u>
Bits per second:	9600
Databits:	8
Parity:	None
Stop bits:	1
Flow control:	None
 - In a UNIX environment, enter the following string at the prompt:

```
tip /dev/ttyb -9600
```

2. Provide power to the switch:
 - Note:** Power is supplied to the switch as soon as the first power supply is connected and powered on.
 - a. Connect the power cords to both power supplies and to power sources. To protect against AC failure, connect the power cords to outlets on separate circuits. Ensure that the cords have a minimum service loop of 6 inches available at the connection to the switch, and are routed to avoid stress.
 - b. Power on the power supplies by flipping both AC switches to “1”. The power supply LED lights up green, and the switch begins running POST. The switch requires a minimum of three minutes to boot and complete POST.
 - c. After POST is complete, verify that the Switch Power/Status LED on the right front of the switch is green.
3. Log into the switch through the serial connection:
 - a. Verify that the switch has completed POST. When POST is complete, the Port Status and Switch Power/Status LEDs return to a standard healthy state; for information about LED signals refer to [Interpreting LED Activity on page 3-1](#).
 - b. When the terminal emulator application stops reporting information, press <Enter> to display the login prompt.
 - c. Log in using the administrative account; the logon is “admin” and the default password is “password”.
4. Replace the default IP address and related information with the information provided by your network administrator:
 - a. Enter the **ipaddrset** command at the terminal emulator application prompt, and enter the requested information at the prompts.

Example

```
switch:admin> ipaddrset
Ethernet IP Address [10.77.77.77]:10.32.53.47
Ethernet Subnetmask [255.0.0.0]:255.255.240.0
Fibre Channel IP Address [0.0.0.0]:
Fibre Channel Subnetmask [0.0.0.0]:
Gateway IP Address [0.0.0.0]:10.32.48.1
Set IP address now? [y = set now, n = next
reboot]:y
IP address being changed...
Committing configuration...Done.
switch:admin>
```

- b. Optional: Verify the address was correctly set by entering the **ipaddrshow** command at the prompt.
- c. Record the IP address on the label provided for this purpose on the port side of the SilkWorm 3900.
- d. If the serial port is no longer required, log out of the serial console, remove the serial cable, and replace the plug in the serial port.

5. Create an ethernet connection to the SilkWorm 3900:
 - a. Remove the plug from the ethernet port.
 - b. Connect an ethernet cable to the switch ethernet port and to the workstation or to an ethernet network containing the workstation.

Note: The switch can now be accessed remotely, by command line or by Brocade Advanced Web Tools. Ensure that the switch is not being modified from any other connections during the remaining steps.
6. Log on to the switch by telnet, using the administrative account.
7. Optional: Modify the domain ID if desired:

Note: The default domain ID is 1. If the switch is not powered on until after it is connected to the fabric, and the default domain ID is already in use, the domain ID for the new switch is automatically reset to a unique value. If the switch is connected to the fabric after it has been powered on, and the default domain ID is already in use, the fabric segments. The domain IDs that are currently in use can be determined using the **fabricshow** command.

 - a. Disable the switch by entering the **switchdisable** command.
 - b. Enter the **configure** command.
The command prompts display sequentially; enter a new value or press <Enter> to accept each default value.
 - c. Enter “y” after the “Fabric parameters” prompt:

```
Fabric parameters (yes, y, no, n): [no] y
```
 - d. Enter a unique domain ID (such as the domain ID used by the previous switch, if still available):

```
Domain: (1..239) [1] 3
```
 - e. Complete the remaining prompts or press CTRL-D to accept the remaining settings without completing all the prompts.
 - f. Re-enable the switch by entering the **switchenable** command.
8. Optional: Specify any custom status policies:
 - a. Enter the **switchstatuspolicyset** command at the prompt.
This command sets the policy parameters that determine the overall switch status.
 - b. Customize the status policies as desired.
To deactivate the alarm for a condition, enter “0” at the prompt for that condition.
9. Install the SFP transceivers in the fibre channel ports, as required:

Note: The ports selected for use in trunking groups must meet specific requirements. For a list of these requirements, refer to the *Brocade ISL Trunking User's Guide*.

 - a. Remove the plugs from the ports to be used.
 - b. Position a transceiver so that it is oriented correctly and insert into a port until it is firmly seated and the latching mechanism clicks.
For instructions specific to the type of transceiver, refer to the transceiver manufacturer's documentation.

Note: The transceivers are keyed to ensure correct orientation. If a transceiver does not install easily, ensure it is correctly oriented.

 - c. Repeat for the remaining ports as required.

10. Connect the cables to the transceivers:

Caution The minimum bend radius for a 50-micron cable is 2 inches under full tensile load, and 1.2 inches with no tensile load.

Tie wraps are not recommended for optical cables because they are easily overtightened.

Note: The cables used in trunking groups must meet specific requirements. For a list of these requirements, refer to the *Brocade ISL Trunking User's Guide*.

- a. Orient a cable connector so that the key (the ridge on one side of connector) aligns with the slot in the transceiver, then insert cable into transceiver until latching mechanism clicks.

For instructions specific to cable type, refer to the cable manufacturer's documentation.

Note: The cable connectors are keyed to ensure correct orientation. If a cable does not install easily, ensure it is correctly oriented.

- b. Repeat for the remaining transceivers as required.

11. Check the LEDs to verify all components are functional. For information about LED patterns, refer to [Interpreting LED Activity on page 3-1](#).

12. Verify the correct operation of the SilkWorm 3900 by entering the **switchshow** command from a workstation.

This command provides information about switch and port status.

13. Verify the correct operation of the SilkWorm 3900 in the fabric by entering the **fabricshow** command from the workstation.

This command provides general information about the fabric.

14. Back up the switch configuration to an FTP server by entering the **configupload** command and following the prompts.

This command uploads the switch configuration to the server, making it available for downloading to a replacement switch if necessary.

Note: Brocade recommends backing up the configuration on a regular basis to ensure that a complete configuration is available for downloading to a replacement switch. For specific instructions about how to back up the configuration, refer to the *Brocade Fabric OS Procedures Guide*.

Recommendations for Cable Management

Note: The minimum bend radius for a 50 micron cable is 2 inches under full tensile load, and 1.2 inches with no tensile load.

Cables can be organized and managed in a variety of ways, such as by using cable channels on the sides of the cabinet, or patch panels to minimize cable management. Following is a list of recommendations:

- Plan cable management before installing the switch in a rack, to allow planning for any rack space required for cable management.
- Leave at least one meter of slack for each port cable. This provides room to remove and replace the switch, allows for inadvertent movement of the rack, and helps prevent the cables from being bent to less than the minimum bend radius.
- If using Brocade ISL Trunking:
 - It may be useful to group cables by trunking groups.
 - The cables used in trunking groups must meet specific requirements. For a list of these requirements, refer to the *Brocade ISL Trunking User's Guide*.
- For easier maintenance, label the fiber optic cables and record the devices to which they are connected.
- Keep LEDs visible by routing port cables and other cables directly downwards or otherwise away from the LEDs.
- Do not use tie wraps on fiber optic cables, because they are easily overtightened and can damage the optic fibers.

Operating the SilkWorm 3900

This chapter provides the following information:

- [Powering the SilkWorm 3900 On and Off](#) on page 3-1
- [Interpreting LED Activity](#) on page 3-1
- [Interpreting POST Results](#) on page 3-6
- [Maintaining the SilkWorm 3900](#) on page 3-6

Powering the SilkWorm 3900 On and Off

To power the SilkWorm 3900 on:

Connect one or both power cords to the power connectors on the power supplies and to a power source, then flip the AC power switches to “1”. Power is supplied to the switch as soon as the first power supply is connected and powered on.

Note: The switch runs POST by default each time it is powered on, and requires a minimum of three minutes to boot and complete POST.

To power the SilkWorm 3900 off:

Power off both power supplies by flipping each AC power switch to “0”.

Note: All devices are returned to their initial state the next time the switch is powered on.

Interpreting LED Activity

System activity and status can be determined through the activity of the LEDs on the switch.

There are three possible LED states: no light, a steady light, and a flashing light. The lights may be any of the following colors:

- Green
- Orange (may be referred to as “amber” in other documentation)
- Yellow (appears when both green and orange LED elements are lit)

The LEDs may flash any of the colors during boot, POST, or other diagnostic tests. This is normal, and does not indicate a problem unless the LEDs do not indicate a healthy state after all boot processes and diagnostic tests are complete.

LEDs On the Port Side of the Switch

The port side of switch has the following LEDs:

- One Switch Power/Status LED on right side
- One Port Status LED next to each fibre channel port (lower LED)
- One Port Speed LED next to each fibre channel port (upper LED)

Note: The port LEDs for the upper ports (ports 16 - 31) are to the left of the ports. The Port LEDs for the lower ports (ports 0 - 15) are to the right of the ports.

Figure 3-1 shows the port side of the SilkWorm 3900.

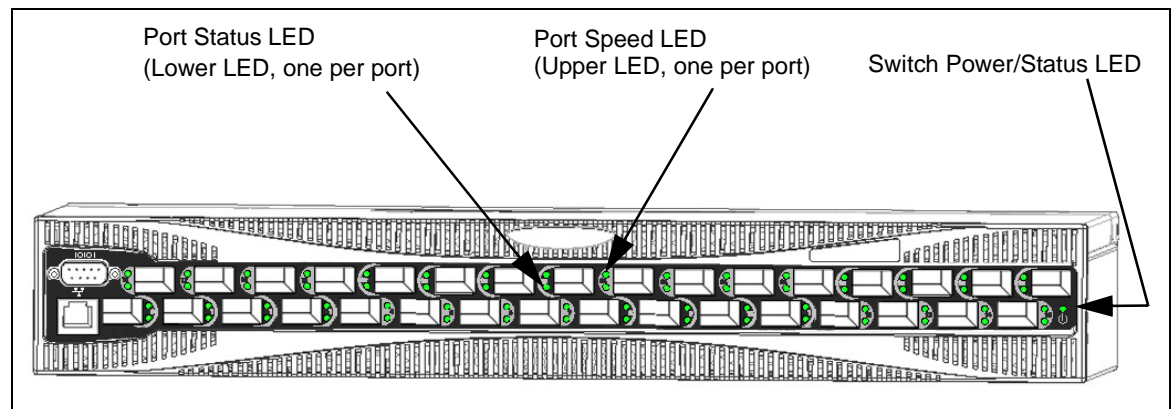


Figure 3-1 LEDs on Port Side of SilkWorm 3900

Table 3-1 describes the LEDs on the port side of the switch.

Table 3-1 Port Side LED Patterns During Normal Operation

LED Name and Location	Color of LED	Status of Hardware	Recommended Action
Switch Power/Status LED On far right when viewing switch from Port Side	No light	Switch is off, or boot is not complete, or boot failed.	Verify switch is on and has completed booting.
	Steady green	Switch is on and functioning.	No action required.
	Flashing green (on 1 second; off 1 second)	One or both of the following are true: <ul style="list-style-type: none"> • One or more environmental ranges are exceeded. • Error log contains one or more port diagnostic error messages. 	<ol style="list-style-type: none"> 1. Check environmental conditions, error log, Port Status LEDs, transceivers, cables, and loopback plugs. 2. Correct error condition. 3. Clear error log. 4. Rerun diagnostics to verify fix.

Table 3-1 Port Side LED Patterns During Normal Operation (Continued)

LED Name and Location	Color of LED	Status of Hardware	Recommended Action
Port Status LED Lower LED next to each port	No light	No signal or light carrier (media or cable) detected.	Check transceiver and cable.
	Steady green	Port is online (connected to external device) but has no traffic.	No action required.
	Slow-flashing green (on 1 second; off 1 second)	Port is online but segmented, indicating a loopback cable or incompatible switch.	Verify correct device is connected to port, and switch and port settings are correct.
	Fast-flashing green (on 1/4 second; off 1/4 second)	Port is in internal loopback (diagnostic).	No action required.
	Flickering green	Port is online, with traffic flowing through port.	No action required.
	Steady orange	Port is receiving light or signal carrier, but is not yet online.	No action required.
	Slow-flashing orange (on 1 second; off 1 second)	Port is disabled (result of diagnostics or portdisable command). If all ports are slow-flashing orange, the switch may be disabled.	Enable port (can use portenable command; refer to <i>Brocade Fabric OS Reference</i> for more information). If all ports are slow-flashing orange, enable the switch (switchenable command).
	Fast-flashing orange (on 1/4 second; off 1/4 second)	Port is faulty.	1. Check transceiver and cable or loopback plugs for correct insertion. 2. Check and clear error log, then rerun diagnostics to verify error is fixed.
	Alternating green and orange	Port is bypassed.	Check configuration of fibre channel loop.
Port Speed LED Upper LED next to each port	No light	Port is transmitting/receiving at 1 Gbit/sec.	No action required.
	Steady green	Port is transmitting/receiving at 2 Gbit/sec.	No action required.

LEDs On the Non-Port Side of the Switch

The non-port side of the switch has the following LEDs:

- One Port Readiness LED on right side
- One Power Supply LED next to the AC power switch on each power supply
- One Fan Failure LED at the top of each fan assembly (inside the bezel)

Figure 3-2 shows the non-port side of the switch.

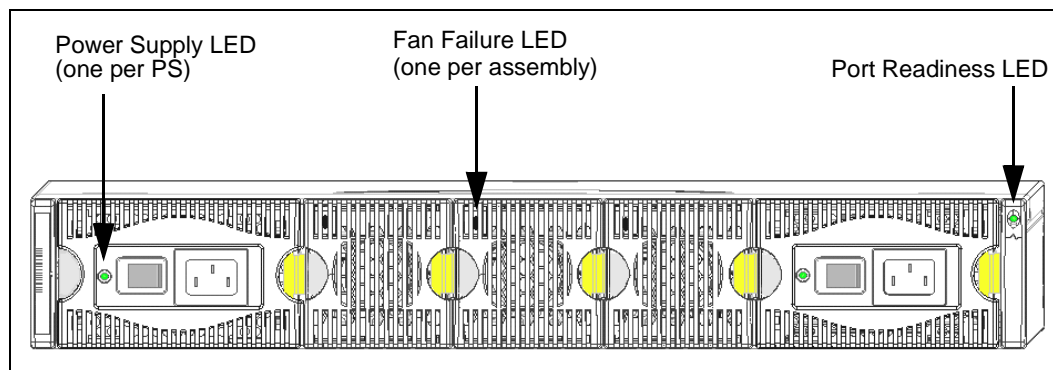


Figure 3-2 LEDs on Non-Port Side of SilkWorm 3900

Table 3-2 describes the LEDs on the non-port side of the switch.

Table 3-2 Non-Port Side LED Patterns During Normal Operation

LED Name, Location	Color of LED	Status of Hardware	Recommended Action
Port Readiness LED On far right when viewing switch from non-port Side	No light	Switch is off, or boot is not complete, or boot failed.	Verify switch is on and has completed booting.
	Steady green	Switch is on and all ports are ready for use.	No action required.
	Steady yellow	One or more ports are offline.	Verify switch has completed booting and is not disabled. If light is still yellow, check error log and Port Status LEDs.
	Slow-flashing yellow (on 1 second; off 1 second)	One or both of the following are true: <ul style="list-style-type: none"> • One or more environmental ranges are exceeded. • Error log contains one or more port diagnostic error messages. 	<ol style="list-style-type: none"> 1. Check environmental conditions, error log, Port Status LEDs, transceivers, cables, and loopback plugs. 2. Correct error condition. 3. Clear error log. 4. Rerun diagnostics to verify fix.

Table 3-2 Non-Port Side LED Patterns During Normal Operation (Continued)

LED Name, Location	Color of LED	Status of Hardware	Recommended Action
Power Supply Power LED On each power supply (left corner)	No light	Power supply is not providing power.	Verify power supply is on and seated, and power cord is connected to a functioning power source.
	Steady green	Power supply is providing power.	No action required.
Fan Failure LED On each fan assembly (left corner)	No light	Fan assembly is either healthy or is not receiving power.	Verify power supply is on and power cord is connected to a functioning power source.
	Flashing orange (on 1 second; off 1 second)	Fan assembly has failed.	Replace fan assembly.

Interpreting POST Results

POST is a system check that is performed each time the switch is powered on, rebooted, or reset, and during which the LEDs flash different colors.

To determine whether POST completed successfully, and whether any errors were detected:

- Verify that the LEDs on the switch indicate that all components are healthy (LED patterns are described in [Table 3-1 on page 3-2](#) and [Table 3-2 on page 3-4](#)). If one or more LEDs do not display a healthy state:
 1. Verify the LEDs are not set to “beacon” (this can be determined through the **switchshow** command or Web Tools). For information about how to turn beaconing on and off, refer to the *Brocade Fabric OS Procedures Guide* or the *Brocade Web Tools User’s Guide*.
 2. Follow the recommended action for the observed LED behavior, as listed in [Table 3-1 on page 3-2](#) or [Table 3-2 on page 3-4](#).

- Verify the switch prompt displays on the terminal of a computer workstation that is connected to the switch.

If the prompt does not display when POST completes, press <Enter>. If the prompt still does not display, try opening another telnet session or accessing through another management tool. If this is not successful, the switch did not successfully complete POST; contact your switch supplier for repair.

- Review the system log for errors.

Any errors detected during POST are written to the system log, which is accessible through the **errShow** command. For information about this command, refer to the *Brocade Fabric OS Reference*. For information about error messages, refer to the *Brocade Diagnostic and System Error Message Reference*.

Maintaining the SilkWorm 3900

The SilkWorm 3900 does not require any regular physical maintenance and is designed for high availability and to minimize the chance of failure. It includes diagnostic tests and field-replaceable units.

Diagnostic Tests

In addition to POST, Fabric OS includes diagnostic tests to help troubleshoot the hardware and firmware. This includes tests of internal connections and circuitry, fixed media, and the transceivers and cables in use. The tests are implemented by command, either through a telnet session or through a terminal set up for a serial connection to the switch. Some tests require the ports to be connected by external cables, to allow diagnostics can verify the serializer/deserializer interface, transceiver, and cable.

Diagnostic tests are run at link speeds of both 1 Gbit/sec and 2 Gbit/sec.

- Note:** Diagnostic tests may temporarily lock the transmit and receive speed of the links during diagnostic testing.

For information about specific diagnostic tests, refer to the *Brocade Fabric OS Procedures Guide*.

Field Replaceable Units (FRUs)

You can replace the power supplies, fan assemblies, and motherboard in the field without the use of special tools. The power supplies and fan assemblies are keyed to ensure correct orientation during installation. Replacement instructions are provided with all replacement units ordered.

Warning The SilkWorm 3900 has two power cords. To remove all power from the switch, disconnect both power cords before servicing.

Power Supplies

The two power supplies are hot-swappable if replaced one at a time. They are identical and fit into either power supply slot.

Fabric OS identifies the power supplies as follows (viewing the switch from the non-port side; see [Figure 3-3 on page 3-8](#)):

- Power supply #1 is on the right when viewing the switch from the non-port side.
- Power supply #2 is on the left when viewing the switch from the non-port side.

Any of the following methods can be used to determine whether a power supply requires replacing:

- Check the Power Supply LED next to the AC switch (see [LEDs On the Non-Port Side of the Switch on page 3-4](#))
- Enter the **psshow** command.
- In Web Tools, click the Power Status icon.

Fan Assemblies

The three fan assemblies are hot-swappable if replaced one at a time. They are identical and fit into any fan assembly slot.

Each fan assembly contains two fans, identified by Fabric OS as follows (viewing the switch from the non-port side; see [Figure 3-3 on page 3-8](#)):

- The fan assembly on the right contains fans #1 and #2.
- The fan assembly in the center contains fans #3 and #4.
- The fan assembly on the left contains fans #5 and #6.

Any of the following methods can be used to determine whether a fan assembly requires replacing:

- Check the Fan Failure LED on the face of the fan assembly (see [LEDs On the Non-Port Side of the Switch on page 3-4](#))
- Enter the **fanshow** command.
- In Web Tools, click the Fan Status icon.

Motherboard Assembly

The switch must be powered off and removed from the fabric (and possibly from the cabinet) to replace the motherboard assembly. To determine whether the motherboard assembly requires replacing, check the Switch Power/Status and Port Status LEDs (see [LEDs On the Non-Port Side of the Switch on page 3-4](#)), and run diagnostics (refer to the *Brocade Fabric OS Procedures Guide*). If the motherboard assembly appears to require replacing, contact your switch supplier.

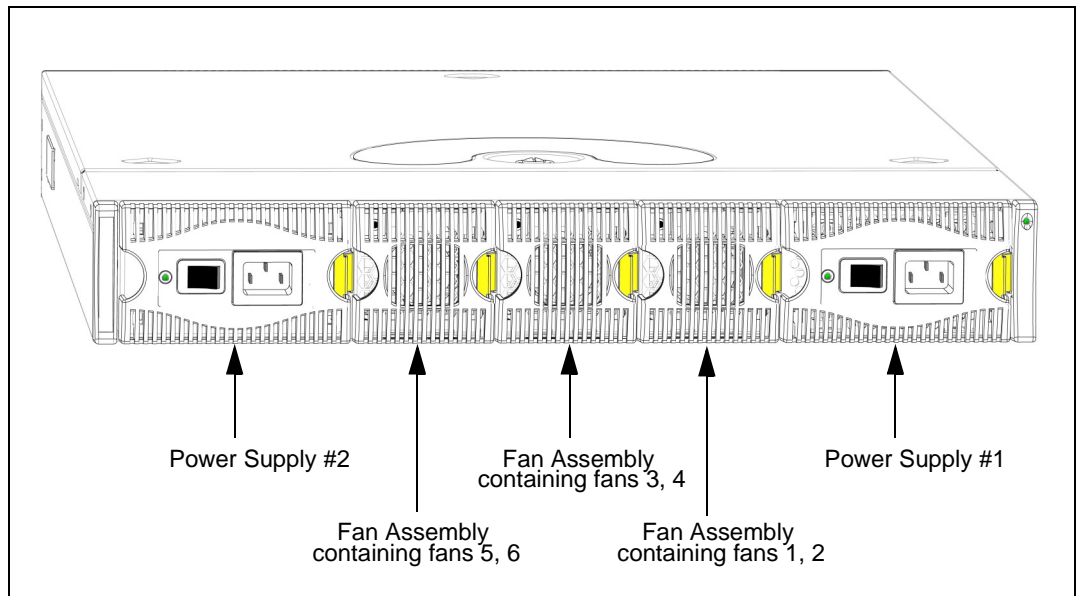


Figure 3-3 Numbering of Power Supplies and Fan Assemblies

Product Specifications

This appendix provides the following information:

- [Switch Components](#) on page A-1
- [Weight and Physical Dimensions](#) on page A-2
- [Facility Requirements](#) on page A-2
- [Power Supply Specifications](#) on page A-3
- [Environmental Requirements](#) on page A-3
- [General Specifications](#) on page A-4
- [Data Transmission Ranges](#) on page A-5
- [Memory Specifications](#) on page A-5
- [Fibre Channel Port Specifications](#) on page A-5
- [Serial Port Specifications](#) on page A-6
- [POST and Boot Specifications](#) on page A-6
- [Regulatory Compliance](#) on page A-7

Switch Components

The SilkWorm 3900 switch includes the following components:

- Cabinet-mountable 1.5U chassis designed to be mounted in a 19 inch cabinet space, with forced-air cooling that flows from the non-port side of the switch to the port side.
- 32 fibre channel ports, compatible with SFP transceivers, SWL and LWL.
- One RS-232 serial port on the port side of the switch (DB-9 connector)
- One IEEE compliant RJ-45 connector on the port side of the switch for use with 10/100 Mbps ethernet.
- The following LEDs (71 total):
 - One Switch Power/Status LED on the port side of switch
 - One Port Status LED and one Port Speed LED next to each fibre channel port
 - One Power Supply LED on each power supply
 - One Fan Failure LED on each fan assembly
 - One Port Readiness LED on the non-port side of switch
- Two universal AC input and redundant power supplies with AC switches and built-in fans.
- Three fan assemblies containing two fans each. The fans have two speeds, which are set automatically and cannot be modified. They default to high speed upon boot, then switch to low speed as Fabric OS comes online, returning to high speed only as required.
- Field-replaceable motherboard assembly, enclosed in a grounded EMI cage, with 32 Serializer/De-serializers (SerDes) and a real-time clock (RTC) with a 10-year battery.

Weight and Physical Dimensions

[Table A-1](#) lists the weight and dimensions of the SilkWorm 3900.

Table A-1 Physical Specifications

Dimension	Value
Height	65.5 mm (2.58 inches)
Depth	585.6 mm (23.06 inches)
Width	428.6 mm (16.87 inches)
Weight (with two power supplies and three fan assemblies installed)	16.2 kg (35.8 lbs)

Facility Requirements

To ensure correct operation of the switch, the facility where the switch is in use must meet the following requirements:

- Electrical:
 - Primary AC Input 100-240 VAC (switch auto-senses input voltage), 47-63 HZ.
 - Correctly wired primary outlet, with circuit protected by a circuit breaker and grounded in accordance with local electrical codes.
 - Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate
 - The electrical interference must be less than the levels stated in the standards listed in [Table A-4 on page A-4](#), under “Immunity”.
- Thermal:
 - A minimum air flow of 47 cubic feet/minute (79.8 cubic meters/hour) available in the immediate vicinity of the switch
 - Ambient air temperature must not exceed 40° Celsius (104° Fahrenheit) while the switch is operating.
- Environmental: The specifications listed in [Table A-3 on page A-3](#)
- Cabinet:
 - Cabinet space: One rack unit in a 19-inch cabinet
 - All equipment in cabinet grounded through a reliable branch circuit connection
 - Additional weight of switch must not exceed the cabinet’s weight limits
 - Cabinet must be secured to insure stability in case of unexpected movement
 - Ensure the additional of the switch does not exceed the rack’s weight limits

Power Supply Specifications

The power supplies are universal and capable of functioning worldwide without voltage jumpers or switches. They meet IEC 61000-4-5 surge voltage requirements and are autoranging in terms of accommodating input voltages and line frequencies. Each power supply has a built-in fan for cooling, pushing air towards the port side of the switch.

Table A-2 lists the power supply specifications for the SilkWorm 3900.

Table A-2 Power Supply Specifications

Specification	Value
Outlet	Outlet must be correctly wired primary with earth ground
Maximum output	300 Watts, with internal fans operating
Maximum system power consumption	190 - 220 Watts, with some variation depending on transceiver vendor
Input voltage	100 - 240 VAC (nominal 80% efficiency), auto-ranging
Input line frequency	47 - 63 Hz
Harmonic distortion	Active power factor correction per EN61000-3-2
BTU rating at 80% efficiency	220 Watts / 0.8 X 3.412 BTU/hr/watts = 938 BTU/hr
Inrush current	Maximum of 15 amps for periods longer than 300 microseconds, at 50° Celsius, hot or cold start
Input line protection	Fused in both hot & neutral lines, using independent fuses

Environmental Requirements

Table A-3 lists the acceptable environmental ranges for both operating and non-operating (such as during transportation or storage) conditions.

Table A-3 Environmental Requirements

Condition	Acceptable During Operation	Acceptable During Non-Operation
Ambient Temperature	10° to 40° Celsius (50° to 104° Fahrenheit)	-25° to +70° Celsius (-13° to 158° Fahrenheit)
Humidity	20% to 85% RH non-condensing, at 40° Celsius, with maximum gradient of 10% per hour	10% to 85% RH non-condensing, at 70° Celsius
Altitude	0 to 3 kilometers (10,000 feet) above sea level	0 to 40,000 feet (12 km) above sea level
Shock	80 G, 2.4ms, half-sine	20 G, 11 milliseconds, half sine wave
Vibration	0.5G, 5-500 Hz	2.0G, 5-500 Hz
Air flow	25 cubic feet/minute (42.5 cubic meters/hour)	None required.

General Specifications

Table A-4 lists the general specifications for the SilkWorm 3900.

Table A-4 General Specifications

Specification	Description
Configurable port types	F_Port, FL_Port, and E_Port
EMC (electromagnetic compatibility)	<p><i>Emissions</i></p> <p>An operating SilkWorm 3900 conforms to the emissions requirements specified by the following regulations:</p> <ul style="list-style-type: none"> • FCC Rules & Regulations, Part 15 subpart B, Class A • CISPR22 Class A • EN55022 Class A • VCCI Class A ITE • AS/NZS 3548 Class A • CNS13438 Class A • ICES-003 Class A <p><i>Immunity</i></p> <ul style="list-style-type: none"> • IEC 61000-4-2 Severity Level 3 for Electrostatic Discharge • IEC 61000-4-3 Severity Level 3 for Radiated Fields • IEC 61000-4-4 Severity Level 3 for Fast Transients • IEC 61000-4-5 Severity Level 3 for Surge Voltage • IEC 61000-4-6 Conducted Emissions • IEC 61000-4-11 Voltage Variations
System architecture	Non-blocking shared-memory switch
System processor	PowerPC 405GP, 200 MHz CPU
ANSI fibre channel protocol	FC-PH (Fibre Channel Physical and Signalling Interface standard)
Modes of operation	Fibre Channel Class 2 and Class 3
Fabric initialization	Complies with FC-SW 5.0
FC-IP (IP over fibre channel)	Complies with FC-IP 2.3 of FCA profile
Aggregate switch I/O bandwidth	128 Gbit/sec if all 32 ports are running at 2 Gbit/sec, full duplex
Port to port latency	Less than 2 microseconds with no contention (destination port is free)

Data Transmission Ranges

[Table A-5](#) provides the data transmission ranges for different cable types and port speeds.

Table A-5 Laser Data Transmission Ranges

Port Speed	Cable Size (microns)	Short Wavelength	Long Wavelength
1 Gbit/sec	50	1,640 feet (500 meters)	N/A
1 Gbit/sec	62.5	984 feet (300 meters)	N/A
1 Gbit/sec	9	N/A	6.2 miles (10 km)
2 Gbit/sec	50	984 feet (300 meters)	N/A
2 Gbit/sec	62.5	492 feet (150 meters)	N/A
2 Gbit/sec	9	N/A	10 km (6.2 miles) without a Brocade Extended Fabrics license; 50 to 100 km with a Brocade Extended Fabrics license

Memory Specifications

The SilkWorm 3900 has four types of memory devices:

- Boot flash: 512 KB
- User Flash: 32 MB
- Compact Flash: 256 MB
- Main memory (SDRAM): 128 MB

Fibre Channel Port Specifications

The fibre channel ports in the SilkWorm 3900 are compatible with SWL and LWL SFP transceivers. The strength of the signal is determined by the type of transceiver in use.

The ports meet all required safety standards. For more information about these standards, see [Regulatory Compliance on page A-7](#).

The ports are capable of operating at 2.125 Gbit/sec or 1.0625 Gbit/sec, and are able to auto-sense the highest speed of which all attached devices are capable.

Serial Port Specifications

The serial port is located on the port side of the switch, and is a three-wire RS-232 port with a “DB-9” male connector, designed to connect to a DTE port.

Note: To provide dust and ESD protection, keep the cover on the serial port whenever the port is not in use.

The serial port can be used to connect to a computer workstation to configure the switch IP address without connecting to the fabric. The serial port’s parameters are 9600 baud, 8 data bits, no parity, 1 stop bit, and no flow control.

The port requires a straight serial cable with a female 9-pin subminiature-D connector. Only pins 2, 3, and 5 are supported. [Table A-6](#) lists the cabling pinouts.

A 10 ft. (3.0 m) serial cable is provided with the switch. It can be converted from a DB-9 serial cable to an RJ-45-style serial cable by removing the adapter on the end of the cable.

Table A-6 Cabling Pinouts

PIN	Signal	Description
1	--	--
2	TxDATA	Transmit data
3	RxDATA	Receive data
4	--	--
5	GND	Logic ground
6	--	--
7		
8	--	--
9	--	--

POST and Boot Specifications

The switch performs POST by default each time it is powered on, rebooted, or the system is reset. Total boot time with POST is a minimum of three minutes.

POST can be skipped after subsequent reboots by entering the **fastboot** command. For more information about this command, refer to the *Brocade Fabric OS Reference*.

POST

The success/fail results of the diagnostic tests that run during POST can be monitored through LED activity, the error log, or a command-line interface.

POST includes the following steps:

1. Preliminary POST diagnostics
2. Operating system is initialized.
3. Hardware is initialized.
4. Diagnostic tests are run on several functions, including circuitry, port functionality, memory, statistics counters, and serialization.

Boot

Boot completes in a minimum of three minutes if POST is run. In addition to POST, boot includes the following steps after POST is complete:

1. Universal port configuration is performed.
2. Links are initialized.
3. Fabric is analyzed. If any ports are connected to other switches, the switch participates in a fabric configuration.
4. The switch obtains a domain ID and assigns port addresses.
5. Unicast routing tables are constructed.
6. Normal port operation is enabled.

Regulatory Compliance

FCC Warning (USA only)

This equipment has been tested and complies with the limits for a Class A computing 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 instruction manual, 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 the user's own expense.

사용자 안내문 : A 급기기

이 기기는 업무용으로 전자파 적합등록을 받은 기기 이오니, 판매자 또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에서 비업무용으로 교환하시기 바랍니다.

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。

VCCI Statement

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

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。

CE Statement

WARNING This is a class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take corrective measures.

The standards compliance label on the SilkWorm 3900 contains the CE mark which indicates that this system conforms to the provisions of the following European Council directives, laws, and standards:

- Electromagnetic Compatibility (EMC) Directive 89/336/EEC and the Complementary Directives 92/31/EEC and 93/68/EEC
- Low Voltage Directive (LVD) 73/23/EEC and the Complementary Directive 93/68/EEC
- EN50082-2/EN55024:1998 (European Immunity Requirements)
 - EN61000-3-2
 - EN61000-3-3/JEIDA (European and Japanese Harmonics Spec)

Canadian Requirements

This class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations, ICES-003 Class A.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada, NMB-003.

Laser Compliance

This equipment contains class 1 laser products, and complies with FDA Radiation Performance Standards, 21 CFR Subchapter J and the international laser safety standard IEC 825-2.

Caution	Use only optical transceivers that are qualified by Brocade Communications Systems and comply with the FDA Class 1 radiation performance requirements defined in 21CFR Subchapter J, and with IEC 825-1. Optical products which do not comply with these standards may emit light that is hazardous to the eyes.
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RTC Battery

Warning	Do not attempt to replace the real time clock (RTC) battery. There is danger of explosion if the battery is incorrectly replaced or disposed of. Contact your switch supplier if the real time clock begins to lose time.
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Electrical Safety

Warning	To reduce the risk of electric shock, disconnect both power cords before servicing. This switch may have more than one power cord.
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Warning	Connect the power cord only to a grounded outlet. Apparaten skall an slutas till jordat nattutag.
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Warning (Norway only)	This product is designed for an IT power system with phase-to-phase voltage 230V. After operation of the protective device, the equipment is still under voltage if it is connected to an IT power system.
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Regulatory Certifications

Table A-7 lists the safety and EMC (electromagnetic compatibility) specifications for which the SilkWorm 3900 is certified.

Table A-7 SilkWorm 3900 Regulatory Certifications

Country	Safety Specification	EMC Specification
Canada	CSA 22.2 No. 60950 Third Ed.	ICES-003 Class A
United States	UL 60950 Third Ed., Info. Tech. Equip.	FCC Part 15, Subpart B (CFR title 47), Class A
Japan	IEC 60950+A1+A2+A3+A4+A11	VCCI V-3/2000.04, Class A
International	IEC 60950+A1+A2+A3+A4+A11	CISPR22 Class A
Norway	IEC 60950+A1+A2+A3+A4+A11 (NEMKO CB Report)	
European Union (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom)	EN 60950:92 +A1:93+A2:93+A3:95+A4:96+A11:97 73/23/EEC TUV (Germany only)	89/336/EEC EN 55022:1998 Class A EN 55024 (Immunity) EN60825-1:1994/A11, -2 EN 61000-4-2 Severity Level 3 for Electrostatic Discharge EN 61000-4-3 Severity Level 3 for Radiated Fields EN 61000-4-4 Severity Level 3 for Electrical Fast Transients EN 61000-4-5 Severity Level 3 for Surge Voltage EN 61000-4-6 Conducted Emissions EN 61000-4-8 Magnetic Fields EN 61000-4-11 Line Interruption
Australia and New Zealand		AS/NZS 3548:1995 Class A (radio interference)

Glossary

8b/10b encoding	An encoding scheme that converts each 8-bit byte into 10 bits. Used to balance ones and zeros in high-speed transports.
address identifier	A 24-bit or 8-bit value used to identify the source or destination of a frame.
AL_PA	Arbitrated loop physical address. A unique 8-bit value assigned during loop initialization to a port in an arbitrated loop.
alias	An alternate name for an element or group of elements in the fabric. Aliases can be used to simplify the entry of port numbers and WWNs when creating zones.
alias address identifier	An address identifier recognized by a port in addition to its standard identifier. An alias address identifier may be shared by multiple ports. See also <i>alias</i> .
alias AL_PA	An AL_PA value recognized by an L_Port in addition to the AL_PA assigned to the port. See also <i>AL_PA</i> .
alias server	A fabric software facility that supports multicast group management.
ANSI	American National Standards Institute. The governing body for fibre channel standards in the U.S.A.
API	Application programming interface. A defined protocol that allows applications to interface with a set of services.
arbitrated loop	A shared 100 MBps fibre channel transport structured as a loop. Can support up to 126 devices and one fabric attachment. See also <i>topology</i> .
ASIC	Application specific integrated circuit.
ATM	Asynchronous transfer mode. A transport used for transmitting data over LANs or WANs that transmit fixed-length units of data. Provides any-to-any connectivity, and allows nodes to transmit simultaneously.
AW_TOV	Arbitration wait time-out value. The minimum time an arbitrating L_Port waits for a response before beginning loop initialization.
backup FCS switch	Backup fabric configuration server switch. The switch or switches assigned as backup in case the primary FCS switch fails. See also <i>FCS switch, primary FCS switch</i> .
bandwidth	The total transmission capacity of a cable, link, or system. Usually measured in bps (bits per second). May also refer to the range of transmission frequencies available to a link or system. See also <i>throughput</i> .
BB_Credit	Buffer-to-buffer credit. The number of frames that can be transmitted to a directly connected recipient or within an arbitrated loop. Determined by the number of receive buffers available. See also <i>buffer-to-buffer flow control, EE_Credit</i> .

beacon	When all the port LEDs on a switch are set to flash from one side of the switch to the other, to enable identification of an individual switch in a large fabric. A switch can be set to beacon by telnet command or through Brocade Advanced Web Tools.
beginning running disparity	The disparity at the transmitter or receiver when the special character associated with an ordered set is encoded or decoded. See also <i>disparity</i> .
BER	Bit error rate. The rate at which bits are expected to be received in error. Expressed as the ratio of error bits to total bits transmitted. See also <i>error</i> .
block	As applies to fibre channel, upper-level application data that is transferred in a single sequence.
boot code	Software that initializes the system environment during the early phase of the boot up process. For example, boot code may determine the amount of available memory and how to access it.
boot flash	Flash (temporary) memory that stores the boot code and boot parameters.
broadcast	The transmission of data from a single source to all devices in the fabric, regardless of zoning. See also <i>multicast, unicast</i> .
buffer-to-buffer flow control	Management of the frame transmission rate in either a point-to-point topology or in an arbitrated loop. See also <i>BB_Credit</i> .
cascade	Two or more interconnected fibre channel switches. SilkWorm 2000 and later switches can be cascaded up to 239 switches, with a recommended maximum of seven interswitch links (no path longer than eight switches). See also <i>fabric, ISL</i> .
chassis	The metal frame in which the switch and switch components are mounted.
circuit	An established communication path between two ports. Consists of two virtual circuits capable of transmitting in opposite directions. See also <i>link</i> .
Class 1	The class of frame switching service for a dedicated connection between two communicating ports (also called connection-oriented service), with acknowledgement of delivery or nondelivery of frames.
Class 2	A connectionless class of frame switching service that includes acknowledgement of delivery or nondelivery of frames.
Class 3	A connectionless class of frame switching service that does not include acknowledgement of delivery or nondelivery of frames. Can be used to provide a multicast connection between the frame originator and recipients, with acknowledgement of delivery or nondelivery of frames.
Class F	The class of frame switching service for a direct connection between two switches, allowing communication of control traffic between the E_Ports, with notification of delivery or nondelivery of data.
class of service	A specified set of delivery characteristics and attributes for frame delivery.
CLI	Command line interface. Interface that depends entirely on the use of commands, such as through telnet or SNMP, and does not involve a GUI.
comma	A unique pattern (either 1100000 or 0011111) used in 8B/10B encoding to specify character alignment within a data stream. See also <i>K28.5</i> .

community (SNMP)	A relationship between a group of SNMP managers and an SNMP agent, in which authentication, access control, and proxy characteristics are defined. See also <i>SNMP</i> .
compact flash	Flash (temporary) memory that is used in a manner similar to hard disk storage. It is connected to a bridging component which connects to the PCI bus of the processor. Not visible within the processor's memory space.
Configuration	The way in which a system is set up. May refer to hardware or software. <ul style="list-style-type: none"> • Hardware: The number, type, and arrangement of components that make up a system or network. • Software: The set of parameters that guide switch operation. May include general system parameters, IP address information, domain ID, and other information. Modifiable by any login with administrative privileges. May also refer to a set of zones. See also <i>zone configuration</i> .
CRC	Cyclic redundancy check. A check for transmission errors that is included in every data frame.
credit	As applies to fibre channel, the number of receive buffers available for transmission of frames between ports. See also <i>BB_Credit</i> , <i>EE_Credit</i> .
cut-through	A switching technique that allows the route for a frame to be selected as soon as the destination address is received. See also <i>route</i> .
data word	A type of transmission word that occurs within frames. The frame header, data field, and CRC all consist of data words. See also <i>frame</i> , <i>ordered set</i> , <i>transmission word</i> .
defined zone configuration	The set of all zone objects defined in the fabric. May include multiple zone configurations. See also <i>enabled zone configuration</i> , <i>zone configuration</i> .
disparity	The proportion of ones and zeros in an encoded character. “Neutral disparity” means an equal number of each, “positive disparity” means a majority of ones, and “negative disparity” means a majority of zeros.
DLS	Dynamic load sharing. Dynamic distribution of traffic over available paths. Allows for recomputing of routes when an Fx_Port or E_Port changes status.
domain ID	Unique identifier for all switches in a fabric, used in routing frames. Usually automatically assigned by the principal switch, but can be assigned manually. The domain ID for a SilkWorm switch can be any integer between 1 and 239.
E_D_TOV	Error detect time-out value. The minimum amount of time a target waits for a sequence to complete before initiating recovery. Can also be defined as the maximum time allowed for a round-trip transmission before an error condition is declared. See also <i>R_A_TOV</i> , <i>RR_TOV</i> .
E_Port	Expansion port. A type of switch port that can be connected to an E_Port on another switch to create an ISL. See also <i>ISL</i> .
EE_Credit	End-to-end credit. The number of receive buffers allocated by a recipient port to an originating port. Used by Class 1 and 2 services to manage the exchange of frames across the fabric between source and destination. See also <i>BB_Credit</i> , <i>end-to-end flow control</i> .
EIA rack	A storage rack that meets the standards set by the Electronics Industry Association.

enabled zone configuration	The currently enabled configuration of zones. Only one configuration can be enabled at a time. See also <i>defined zone configuration, zone configuration</i> .
end-to-end flow control	Governs flow of class 1 and 2 frames between N_Ports. See also <i>EE_Credit</i> .
error	As applies to fibre channel, a missing or corrupted frame, time-out, loss of synchronization, or loss of signal (link errors). See also <i>loop failure</i> .
exchange	The highest level fibre channel mechanism used for communication between N_Ports. Composed of one or more related sequences, and can work in either one or both directions.
F_Port	Fabric port. A port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N_Port to a switch. See also <i>FL_Port, Fx_Port</i> .
fabric	A fibre channel network containing two or more switches in addition to hosts and devices. May also be referred to as a switched fabric. See also <i>cascade, SAN, topology</i> .
fabric name	The unique identifier assigned to a fabric and communicated during login and port discovery.
FC-AL-3	The Fibre Channel Arbitrated Loop standard defined by ANSI. Defined on top of the FC-PH standards.
FC-FLA	The Fibre Channel Fabric Loop Attach standard defined by ANSI.
FCIA	Fibre Channel Industry Association. An international organization of fibre channel industry professionals. Among other things, provides oversight of ANSI and industry developed standards.
FCP	Fibre channel protocol. Mapping of protocols onto the fibre channel standard protocols. For example, SCSI FCP maps SCSI-3 onto fibre channel.
FC-PH-1, 2, 3	The Fibre Channel Physical and Signalling Interface standards defined by ANSI.
FC-PI	The Fibre Channel Physical Interface standard defined by ANSI.
FC-PLDA	The Fibre Channel Private Loop Direct Attach standard defined by ANSI. Applies to the operation of peripheral devices on a private loop.
FCS switch	Fabric configuration server switch. One or more designated SilkWorm switches that store and manage the configuration and security parameters for all switches in the fabric. FCS switches are designated by WWN, and the list of designated switches is communicated fabric-wide. See also <i>backup FCS switch, primary FCS switch</i> .
FC-SW-2	The second generation of the Fibre Channel Switch Fabric standard defined by ANSI. Specifies tools and algorithms for the interconnection and initialization of fibre channel switches in order to create a multi-switch fibre channel fabric.
fibre channel transport	A protocol service that supports communication between fibre channel service providers. See also <i>FSP</i> .
fill word	An IDLE or ARB ordered set that is transmitted during breaks between data frames to keep the fibre channel link active.
firmware	The basic operating system provided with the hardware.

FIFO	First in, first out. May specifically refer to a data buffer that follows the first in, first out rule.
FL_Port	Fabric loop port. A port that is able to transmit under fabric protocol and also has arbitrated loop capabilities. Can be used to connect an NL_Port to a switch. See also <i>F_Port</i> , <i>Fx_Port</i> .
FLOGI	Fabric login. The process by which an N_Port determines whether a fabric is present, and if so, exchanges service parameters with it. See also <i>PLOGI</i> .
frame	The fibre channel structure used to transmit data between ports. Consists of a start-of-frame delimiter, header, any optional headers, data payload, cyclic redundancy check (CRC), and end-of-frame delimiter. There are two types of frames: Link control frames (transmission acknowledgements, etc.) and data frames.
FRU	Field-replaceable unit. A component that can be replaced on site.
FS	Fibre channel service. A service that is defined by fibre channel standards and exists at a well-known address. For example, the Simple Name Server is a fibre channel service. See also <i>FSP</i> .
FSP	Fibre channel service protocol. The common protocol for all fabric services, transparent to the fabric type or topology. See also <i>FS</i> .
FSPF	Fabric shortest path first. Brocade's routing protocol for fibre channel switches.
full-duplex	A mode of communication that allows the same port to simultaneously transmit and receive frames. See also <i>half-duplex</i> .
Fx_Port	A fabric port that can operate as either an F_Port or FL_Port. See also <i>F_Port</i> , <i>FL_Port</i> .
gateway	Hardware that connects incompatible networks by providing translation for both hardware and software. For example, an ATM gateway can connect a fibre channel link to an ATM connection.
G_Port	Generic port. A port that can operate as either an E_Port or F_Port. A port is defined as a G_Port when it is not yet connected or has not yet assumed a specific function in the fabric.
GBIC	Gigabit interface converter. A removable serial transceiver module that allows gigabaud physical-level transport for fibre channel and gigabit ethernet.
Gbit/sec	Gigabits per second (1,062,500,000 bits/second).
Gbyte/sec	Gigabytes per second (1,062,500,000 bytes/second).
half-duplex	A mode of communication that allows a port to either transmit or receive frames at any time, but not simultaneously (with the exception of link control frames, which can be transmitted at any time). See also <i>full-duplex</i> .
hard address	The AL_PA that an NL_Port attempts to acquire during loop initialization.
hardware translative mode	A method for achieving address translation. The following two hardware translative modes are available to a QuickLoop enabled switch: <ul style="list-style-type: none"> • Standard translative mode: Allows public devices to communicate with private devices that are directly connected to the fabric. • QuickLoop mode: Allows initiator devices to communicate with private or public devices that are not in the same loop.

HBA	Host bus adapter. The interface card between a server or workstation bus and the fibre channel network.
hub	A fibre channel wiring concentrator that collapses a loop topology into a physical star topology. Nodes are automatically added to the loop when active and removed when inactive.
idle	Continuous transmission of an ordered set over a fibre channel link when no data is being transmitted, to keep the link active and maintain bit, byte, and word synchronization.
initiator	A server or workstation on a fibre channel network that initiates communications with storage devices. See also <i>target</i> .
integrated fabric	The fabric created by connecting multiple SilkWorm switches with multiple ISL cables, and configuring the switches to handle traffic as a seamless group.
IOD	In-order delivery. A parameter that, when set, guarantees that frames are either delivered in order or dropped.
ISL	Interswitch link. A fibre channel link from the E_Port of one switch to the E_Port of another. See also <i>cascade</i> , <i>E_Port</i> .
ISL trunking	The distribution of traffic over the combined bandwidth of multiple ISLs. A set of trunked ISLs is called a trunking group, and the ports in a trunking group are called a trunking ports. See also <i>master port</i> .
isolated E_Port	An E_Port that is online but not operational due to overlapping domain IDs or nonidentical parameters (such as E_D_TOVs). See also <i>E_Port</i> .
IU	Information unit. A set of information as defined by either upper-level process protocol definition or upper-level protocol mapping.
JBOD	Just a bunch of disks. Indicates a number of disks connected in a single chassis to one or more controllers. See also <i>RAID</i> .
K28.5	A special 10-bit character used to indicate the beginning of a transmission word that performs fibre channel control and signaling functions. The first seven bits of the character are the comma pattern. See also <i>comma</i> .
kernel flash	Flash (temporary) memory connected to the peripheral bus of the processor, and visible within the processor's memory space. Also known as "user flash".
L_Port	Loop port. A node port (NL_Port) or fabric port (FL_Port) that has arbitrated loop capabilities. An L_Port can be in one of two modes: <ul style="list-style-type: none"> • Fabric mode: Connected to a port that is not loop capable, and using fabric protocol. • Loop mode: In an arbitrated loop and using loop protocol. An L_Port in loop mode can also be in participating mode or non-participating mode. See also <i>non-participating mode</i>, <i>participating mode</i>.
latency	The period of time required to transmit a frame, from the time it is sent until it arrives. Together, latency and bandwidth define the speed and capacity of a link or system.
LED	Light emitting diode. Used to indicate status of elements on switch.
link	As applies to fibre channel, a physical connection between two ports, consisting of both transmit and receive fibres. See also <i>circuit</i> .

link services	A protocol for link-related actions.
LIP	Loop initialization primitive. The signal used to begin initialization in a loop. Indicates either loop failure or resetting of a node.
LM_TOV	Loop master time-out value. The minimum time that the loop master waits for a loop initialization sequence to return.
loop failure	Loss of signal within a loop for any period of time, or loss of synchronization for longer than the time-out value.
loop initialization	The logical procedure used by an L_Port to discover its environment. Can be used to assign AL_PA addresses, detect loop failure, or reset a node.
Loop_ID	A hex value representing one of the 127 possible AL_PA values in an arbitrated loop.
looplet	A set of devices connected in a loop to a port that is a member of another loop.
LPSM	Loop port state machine. The logical entity that performs arbitrated loop protocols and defines the behavior of L_Ports when they require access to an arbitrated loop.
LWL	Long wavelength. A type of fiber optic cabling that is based on 1300nm lasers and supports link speeds up to 2 Gbit/sec. May also refer to the type of transceiver. See also <i>SWL</i> .
master port	The port that determines the routing paths for all traffic flowing through a trunking group. One of the ports that is in the first ISL in the trunking group is designated as the master port for that group. See also <i>ISL trunking</i> .
MIB	Management information base. An SNMP structure to help with device management, providing configuration and device information.
multicast	The transmission of data from a single source to multiple specified N_Ports (as opposed to all the ports on the network). See also <i>broadcast, unicast</i> .
multimode	A fiber optic cabling specification that allows up to 500 meters between devices.
N_Port	Node port. A port on a node that can connect to a fibre channel port or to another N_Port in a point-to-point connection. See also <i>NL_Port, Nx_Port</i> .
name server	Frequently used to indicate Simple Name Server. See also <i>SNS</i> .
NL_Port	Node loop port. A node port that has arbitrated loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL_Port. See also <i>N_Port, Nx_Port</i> .
node	A fibre channel device that contains an N_Port or NL_Port.
node name	The unique identifier for a node, communicated during login and port discovery.
non-participating mode	A mode in which an L_Port in a loop is inactive and cannot arbitrate or send frames, but can retransmit any received transmissions. This mode is entered if there are more than 127 devices in a loop and an AL_PA cannot be acquired. See also <i>L_Port, participating mode</i> .
Nx_Port	A node port that can operate as either an N_Port or NL_Port.

ordered set	<p>A transmission word that uses 8B/10B mapping and begins with the K28.5 character. Ordered sets occur outside of frames, and include the following items:</p> <ul style="list-style-type: none"> • Frame delimiters: Mark frame boundaries and describe frame contents. • Primitive signals: Indicate events. • Primitive sequences: Indicate or initiate port states. <p>Ordered sets are used to differentiate fibre channel control information from data frames and to manage the transport of frames.</p>
packet	A set of information transmitted across a network. See also <i>frame</i> .
participating mode	A mode in which an L_Port in a loop has a valid AL_PA and can arbitrate, send frames, and retransmit received transmissions. See also <i>L_Port, non-participating mode</i> .
path selection	The selection of a transmission path through the fabric. Brocade switches use the FSPF protocol. See also <i>FSPF</i> .
phantom address	An AL_PA value that is assigned to a device that is not physically in the loop. Also known as phantom AL_PA.
phantom device	A device that is not physically in an arbitrated loop but is logically included through the use of a phantom address.
PLOGI	Port login. The port-to-port login process by which initiators establish sessions with targets. See also <i>FLOGI</i> .
point-to-point	A fibre channel topology that employs direct links between each pair of communicating entities. See also <i>topology</i> .
port cage	The metal casing extending out of the fibre channel port on the switch, and into which a transceiver can be inserted. See also <i>GBIC, SFP</i> .
Port_Name	The unique identifier assigned to a fibre channel port. Communicated during login and port discovery.
POST	Power on self-test. A series of tests run by a switch after it is powered on.
primary FCS switch	Primary fabric configuration server switch. The switch that actively manages the configuration and security parameters for all switches in the fabric. See also <i>backup FCS switch, FCS switch</i> .
private device	A device that supports arbitrated loop protocol and can interpret 8-bit addresses, but cannot log into the fabric.
private loop	An arbitrated loop that does not include a participating FL_Port.
private NL_Port	An NL_Port that communicates only with other private NL_Ports in the same loop and does not log into the fabric.
protocol	A defined method and set of standards for communication.
public device	A device that supports arbitrated loop protocol, can interpret 8-bit addresses, and can log into the fabric.
public loop	An arbitrated loop that includes a participating FL_Port, and may contain both public and private NL_Ports.
public NL_Port	An NL_Port that logs into the fabric, can function within either a public or a private loop, and can communicate with either private or public NL_Ports.
quad	A group of four adjacent ports that share a common pool of frame buffers.

QuickLoop	A loop created using the Brocade QuickLoop application. A QuickLoop allows private devices within the loop to communicate with public and private devices across the fabric, and can contain a number of devices or looplets. May also refer to the Brocade QuickLoop product.
R_A_TOV	Resource allocation time-out value. The maximum time a frame can be delayed in the fabric and still be delivered. See also <i>E_D_TOV</i> , <i>RR_TOV</i> .
RAID	Redundant array of independent disks. A collection of disk drives that appear as a single volume to the server and are fault tolerant through mirroring or parity checking. See also <i>JBOD</i> .
request rate	The rate at which requests arrive at a servicing entity. See also <i>service rate</i> .
route	As applies to a fabric, the communication path between two switches. May also apply to the specific path taken by an individual frame, from source to destination. See also <i>FSPF</i> .
routing	The assignment of frames to specific switch ports, according to frame destination.
RR_TOV	Resource recovery time-out value. The minimum time a target device in a loop waits after a LIP before logging out a SCSI initiator. See also <i>E_D_TOV</i> , <i>R_A_TOV</i> .
RSCN	Registered state change notification. A switch function that allows notification of fabric changes to be sent from the switch to specified nodes.
SAN	Storage area network. A network of systems and storage devices that communicate using fibre channel protocols. See also <i>fabric</i> .
SDRAM	The main memory for the switch.
sequence	A group of related frames transmitted in the same direction between two N_Ports.
service rate	The rate at which an entity can service requests. See also <i>request rate</i> .
SFP	Small form factor pluggable. A type of fibre channel transceiver used to convert signals between optical fiber cables and switches.
SI	Sequence initiative.
SilkWorm	The brand name for the Brocade family of switches.
single mode	The fiber optic cabling standard that corresponds to distances of up to 10 km between devices.
SNMP	Simple network management protocol. An internet management protocol that uses either IP for network-level functions and UDP for transport-level functions, or TCP/IP for both. Can be made available over other protocols, such as UDP/IP, because it does not rely on the underlying communication protocols. See also <i>community (SNMP)</i> .
SNS	Simple name server. A switch service that stores names, addresses, and attributes for up to 15 minutes, and provides them as required to other devices in the fabric. SNS is defined by fibre channel standards and exists at a well-known address. May also be referred to as directory service. See also <i>FS</i> .
switch	Hardware that routes frames according to fibre channel protocol and is controlled by software.
switch name	The arbitrary name assigned to a switch.

switch port	A port on a switch. Switch ports can be E_Ports, F_Ports, or FL_Ports.
SWL	Short wavelength. A type of fiber optic cabling that is based on 850nm lasers and supports link speeds up to 2 Gbit/sec. May also refer to the type of transceiver. See also <i>LWL</i> .
target	A storage device on a fibre channel network. See also <i>initiator</i> .
tenancy	The time from when a port wins arbitration in a loop until the same port returns to the monitoring state. Also referred to as loop tenancy.
throughput	The rate of data flow achieved within a cable, link, or system. Usually measured in bps (bits per second). See also <i>bandwidth</i> .
topology	As applies to fibre channel, the configuration of the fibre channel network and the resulting communication paths allowed. There are three possible topologies: <ul style="list-style-type: none"> • Point to point: A direct link between two communication ports. • Switched fabric: Multiple N_Ports linked to a switch by F_Ports. • Arbitrated loop: Multiple NL_Ports connected in a loop.
translative mode	A mode in which private devices can communicate with public devices across the fabric.
transmission character	A 10-bit character encoded according to the rules of the 8B/10B algorithm.
transmission word	A group of four transmission characters.
trap (SNMP)	The message sent by an SNMP agent to inform the SNMP management station of a critical error. See also <i>SNMP</i> .
trunking	See <i>ISL trunking</i> .
tunneling	A technique for enabling two networks to communicate when the source and destination hosts are both on the same type of network, but are connected by a different type of network.
U_Port	Universal port. A switch port that can operate as a G_Port, E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not connected or has not yet assumed a specific function in the fabric.
UDP	User datagram protocol. A protocol that runs on top of IP and provides port multiplexing for upper-level protocols.
ULP	Upper-level protocol. The protocol that runs on top of fibre channel. Typical upper-level protocols are SCSI, IP, HIPPI, and IPI.
ULP_TOV	Upper-level time-out value. The minimum time that a SCSI ULP process waits for SCSI status before initiating ULP recovery.
unicast	The transmission of data from a single source to a single destination. See also <i>broadcast, multicast</i> .
user flash	See <i>kernal flash</i> .
well-known address	As pertaining to fibre channel, a logical address defined by the fibre channel standards as assigned to a specific function, and stored on the switch.
workstation	A computer used to access and manage the fabric. May also be referred to as a management station or host.

WWN	Worldwide name. An identifier that is unique worldwide. Each entity in a fabric has a separate WWN.
zone	A set of devices and hosts attached to the same fabric and configured as being in the same zone. Devices and hosts within the same zone have access permission to others in the zone, but are not visible to any outside the zone.
zone configuration	A specified set of zones. Enabling a configuration enables all zones in that configuration. See also <i>defined zone configuration</i> , <i>enabled zone configuration</i> .

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