Brocade 5000

Hardware Reference Manual

Supporting Fabric OS v5.3

Supporting Brocade 5000

BROCADE

Brocade Communications Systems, Incorporated

Document History

The following table lists all versions of the *Brocade 5000 Hardware Reference Manual*.

Document Title	Publication Number	Summary of Changes	Publication Date
Brocade 5000 Hardware Reference Manual	*53-1000424-01*	None; this is the first draft of a new document.	December 2006
Brocade 5000 Hardware Reference Manual	*53-1000424-02*	Rebranded and updated with technical changes.	June 2007
Brocade 5000 Hardware Reference Manual	*53-1000424-03*	Added Japanese power cord statement and revised copyright.	March 2008

Contents

About This Document

This document is written for network administrators to provide a complete set of Brocade 5000 switch installation procedures and an overview of the switch hardware. This document is specific to the Brocade 5000 switch running Fabric OS v5.2.1.

"About This Document" contains the following sections:

- "How This Document Is Organized," next
- "Supported Hardware and Software" on page vi
- "What's New in This Document" on page vi
- "Document Conventions" on page vi
- "Additional Information" on page vii
- "Getting Technical Help" on page ix
- "Document Feedback" on page x

How This Document Is Organized

This document is organized to help you find the particular information that you want as quickly and easily as possible. The document begins with an introduction to the Brocade 5000 switch and gradually proceeds through installation and operation procedures.

The document contains the following components:

- Chapter 1, "Introducing the Brocade 5000" provides a brief overview of the switch itself.
- Chapter 2, "Installing and Configuring the Brocade 5000" describes the installation procedures for the switch.
- Chapter 3, "Operating the Brocade 5000" provides an overview of switch operation.
- Appendix 4, "Product Specifications" provides all of the technical specifications for the switch.
- The index points you to the exact pages on which specific information is located.

Supported Hardware and Software

Although many different software and hardware configurations are tested and supported by Brocade Communications Systems, Inc. for the Brocade 5000, documenting all possible configurations and scenarios is beyond the scope of this document.

What's New in This Document

Minor corrections were made in several chapters.

Document Conventions

This section describes text formatting conventions and important notices formats.

TEXT FORMATTING

The following table describes the narrative-text formatting conventions that are used in this document.

Table 0-1

Convention	Purpose
bold text	• Identifies command names • Identifies GUI elements • Identifies keywords/operands • Identifies text to enter at the GUI or CLI
italic text	• Provides emphasis • Identifies variables • Identifies paths and internet addresses • Identifies document titles and cross references
`code` text	• Identifies CLI output • Identifies syntax examples

NOTES, ATTENTIONS, CAUTIONS, AND DANGERS

The following notices appear in this document.

NOTE

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

ATTENTION

An attention alerts you to potential damage to firmware, hardware, and software.

CAUTION

A caution alerts you to potential injury to personnel.

DANGER

A danger alerts you to potential danger to personnel.

For definitions of SAN-specific terms, visit the Storage Networking Industry Association online dictionary at *http://www.snia.org/education/dictionary*.

Additional Information

This section lists additional Brocade and industry-specific documentation that you might find helpful.

BROCADE RESOURCES

The following related documentation is provided on the Brocade Documentation CD-ROM and on the Brocade Web site, through Brocade Connect.

NOTE

Go to *http://www.brocade.com* and click **Brocade Connect** to register at no cost for a user ID and password.

Brocade 5000

- Fixed Rack Mount Kit Installation Procedure
- Brocade 5000 Mounting Ears Installation Procedure
- Brocade 5000 Power Supply and Fan Assembly Replacement Procedure
- Brocade 5000 QuickStart Guide
- Slide Rack Mount Kit Installation Procedure

Fabric OS

- Brocade SilkWorm SAN Glossary
- Fabric OS Command Reference
- Fabric OS Administrator's Guide
- Fabric OS MIB Reference
- Fabric OS Message Reference
- Fabric Watch Administrator's Guide
- Secure Fabric OS Administrator's Guide
- Web Tools Administrator's Guide

For practical discussions about SAN design, implementation, and maintenance, you can obtain *Building SANs with Brocade Fabric Switches* through:

> *http://www.amazon.com*

For additional Brocade documentation, visit the Brocade SAN Info Center and click the Resource Library location:

> http://www.brocade.com

Release notes are available on the Brocade Connect Web site and are also bundled with the Fabric OS.

OTHER INDUSTRY RESOURCES

For additional resource information, visit the Technical Committee T11 Web site. This Web site provides interface standards for high-performance and mass storage applications for Fibre Channel, storage management, as well as other applications:

> *http://www.t11.org*

For information about the Fibre Channel industry, visit the Fibre Channel Industry Association Web site:

> *http://www.fibrechannel.org*

Getting Technical Help

Contact your switch support supplier for hardware, firmware, and software support, including product repairs and part ordering. To expedite your call, have the following information available:

1. General Information

    - Technical Support contract number, if applicable

    - Switch model

    - Switch operating system version

    - Error numbers and messages received

    - **supportSave** command output

    - Detailed description of the problem and specific questions

    - Description of any troubleshooting steps already performed and results

2. Switch Serial Number

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

    ```
    *FT00X0054E9

    FT00X0054E9
    ```
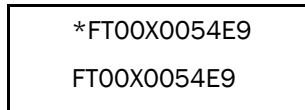
    The serial number label is located as follows:

    - *SilkWorm 2000-series switches:* Bottom of chassis.

    - *SilkWorm 3200, 3250, 3800, and 3850 switches:* Back of chassis.

    - *SilkWorm 3900 switch:* Bottom of chassis.

    - *SilkWorm 4100 and Brocade 5000 switches*: On the switch ID pull-out tab located on the bottom of the port side of the switch.

    - *SilkWorm 12000 and 24000 directors:* Inside the front of the chassis, on the wall to the left of the ports.

    - *SilkWorm Fabric AP7420:* On the bottom of the chassis and on the back of the chassis.

3. World Wide Name (WWN)

    - *SilkWorm 3250, 3850, 3900, 4100, Brocade 5000 switches, and SilkWorm 12000 and 24000 directors:* Provide the license ID. Use the **licenseIdShow** command to display the license ID.

    - *SilkWorm Fabric AP7420:* Provide the switch WWN. Use the **switchShow** command to display the switch WWN.

    - *All other SilkWorm switches:* Provide the switch WWN. Use the **wwn** command to display the switch WWN.

Document Feedback

Because quality is our first concern at Brocade, we have made every effort to ensure the accuracy and completeness of this document. However, if you find an error or an omission, or you think that a topic needs further development, we want to hear from you. Forward your feedback to *documentation@brocade.com*. Provide the title and version number and as much detail as possible about your issue, including the topic heading and page number and your suggestions for improvement.

Introducing the Brocade 5000

This chapter provides the following information:

-
-
-

Overview of Brocade 5000

The Brocade 5000 switch is a 1U Fibre Channel switch with 32 fixed Fibre Channel SFP ports that supports link speeds up to 1, 2, or 4 Gbit/sec. It includes the Brocade Fabric Operating System and is compatible with the entire Brocade SilkWorm product family. The Brocade 5000 can operate in a fabric containing multiple switches or independently.

The switch's enclosure has forced-air cooling, with the fans pushing the air from the rear part intake through the enclosure, and exhausting across the SFP devices through venting holes in the front panel (port side). The SFP media and integrated power supply/fan assembly FRUs are hot-swappable so they can be removed and replaced without interrupting the system power.

On the port side of the unit there are two port connections:

- Ethernet Port: The Brocade 5000 provides a fully IEEE-compliant 10/100BaseT Ethernet port for switch management console interface. When a device is connected to the port, both ends negotiate to determine the optimal speed. The Brocade 5000 adopts a 1x2 RJ45 connector to provide Ethernet and serial ports to the outside. The Ethernet connection uses one of two RJ-45 ports. There are two integrated visible LEDS for Ethernet port (see Figure 1 on page 2). One indicates transmit/receive activity and one indicates speed (10 Mbps or 100 Mbps). The TCP/IP address for the port can be configured from the serial port or directly from the Ethernet port itself.

- Serial Port: An RS-232 DTE terminal port is provided on the Brocade 5000. The serial console uses the other RJ45 port in the 1x2 RJ45 connector. The serial port parameters are fixed at 9600 baud, 8 data bits, no parity and no hardware flow control (except during boot up for the console port). This connector is for initial IP address configuration and for recovery of the switch to its factory default settings should Flash memory contents be lost. The serial port connection is not intended for performance of normal administration/maintenance functions. Customer or field personnel accessible functions are limited to connecting a terminal to the port to re-initialize the switch defaults, which will restore the switch to its factory configuration. This will be required to restore the switch passwords to a known state and to allow users to set a specific switch IP address.

The Fibre Optic cables, Ethernet cables and Serial port cables connect in to the port side of the switch. AC power input cables and the power supply/fan assembly FRUs are inserted and removed from the port side of the switch.

The Brocade 5000 can be mounted in a 1U 19-inch Electronic Industries Association (EIA) rack, with a height of 1U. Because of the shallow depth, no rail kits are required for a rack mount, however the switch can be installed using the fixed or slide rack mount kits. The Brocade 5000 can also be used in a tabletop configuration.

Figure 1 shows the port side of the Brocade 5000.

FIGURE 1   **Port Side View of the Brocade 5000**
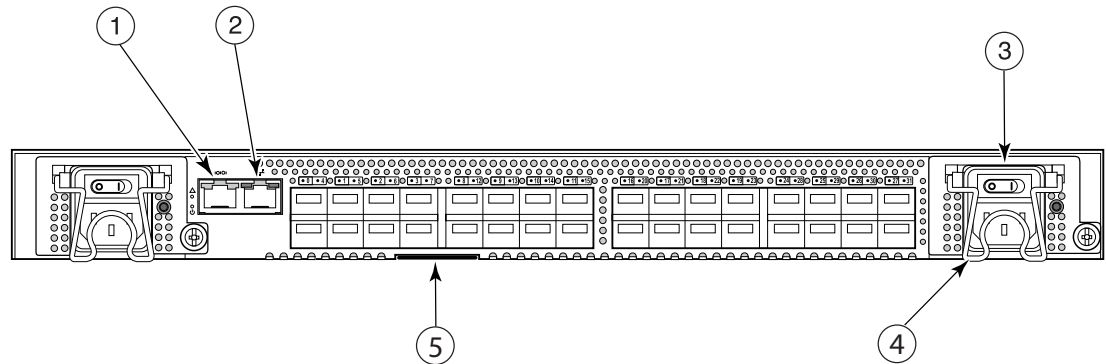
1	**System Console Port**
2	**System Ethernet Port**
3	**Power Supply/Fan Assembly Field Replaceable Unit (2x)**
4	**Power Cord Retainer (2x)**
5	**Switch ID Pull Out Tab**

The Fibre Channel ports are numbered from left to right, in eight-port groups, and are also numbered on the faceplate (see Figure 2).

FIGURE 2   **Port Numbering in the Brocade 5000**
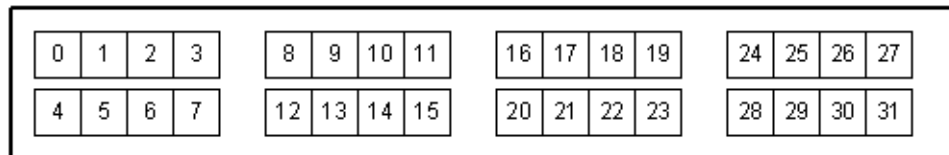
NOTE
Blade port numbers (physical port numbers) do not correspond directly to user port numbers (which are displayed in Figure 2).

Brocade ISL Trunking is an optionally licensed software that allows you to create trunking groups of ISLs between adjacent switches. For more information about Brocade ISL Trunking, refer to the *Brocade Fabric OS Administrator's Guide*.

The port side of the Brocade 5000 also displays the system status LED, power status LED, and port status LEDs (see Figure 3 on page 16).

FIELD REPLACEABLE UNITS

Power supply/fan assembly units are the only Field Replaceable Units (FRUs) in the Brocade 5000. There are two power supply/fan assembly units in the Brocade 5000. They are hot-swappable and redundant, and capable of functioning universally without voltage jumpers or switches. The FRU units are identical and interchangeable. The front panel of the FRUs has a status LED to indicate status of the unit.

Managing the Brocade 5000

You can use the management functions built into the Brocade 5000 to monitor the fabric topology, port status, physical status, and other information to help you analyze switch performance and to accelerate system debugging.

NOTE
The Brocade 5000 automatically performs power-on self-test (POST) each time it is turned on. Any errors are recorded in the error log. For more information about POST, see "POST and Boot Specifications" on page 29.

For information about upgrading the version of Fabric OS installed on your switch, refer to the *Brocade Fabric OS Administrator's Guide.*

You can manage the Brocade 5000 using any of the management options listed in Table 1.

TABLE 1   Management Options for the Brocade 5000

Management Tool	Out-of-band Support	In-band Support
Command line interface (CLI) Up to two admin sessions and four user sessions simultaneously. For more information, refer to the *Brocade Fabric OS Administrator's Guide* and the *Brocade Fabric OS Command Reference Manual*.	Ethernet or serial connection	IP over Fibre Channel
Brocade Advanced Web Tools For information, refer to the *Brocade Advanced Web Tools Administrator's Guide*.	Ethernet or serial connection	IP over Fibre Channel
Standard SNMP applications For information, refer to the *Brocade MIB Reference Manual*.	Ethernet or serial connection	IP over Fibre Channel
Brocade Fabric Manager (option to purchase) For information, refer to the *Brocade Fabric Manager User's Guide*.	Ethernet or serial connection	IP over Fibre Channel
Management Server For information, refer to the *Brocade Fabric OS Administrator's Guide* and the *Brocade Fabric OS Command Reference Manual*.	Ethernet or serial connection	Native in-band interface (over HBA only)

NOTE

To achieve in-band support for IP over Fibre Channel, the software must be run on both the HBA and the switch, and it must be supported by both the HBA and HBA driver.

Supported Features

The Brocade 5000 services include:

- Brocade Advanced Web Tools
- Brocade Advanced Zoning
- Registered State Change Notification (RSCN)
- Simple Name Server

The Brocade 5000 supports the following optional Brocade software, which you can activate by purchasing a corresponding license key:

- Brocade Advanced Performance Monitoring
- Brocade Extended Fabrics
- Brocade Fabric Watch
- Brocade ISL Trunking
- Brocade Ports on Demand (1 and 2)
- Brocade Secure Fabric OS

For information on these features, refer to the *Brocade Fabric OS Administrator's Guide*.

PORTS ON DEMAND

The Brocade 5000 has 32 ports. By default, ports 0-15 are enabled. To enable additional ports, you must install Ports On Demand (POD) licenses.

To enable ports 16 through 23, you must install the POD1 license. To enable ports 24 through 31, you must install the POD2 license. Although you can install the POD2 license without having the POD1 license installed, you cannot use ports 16 through 23 until the POD1 license is *enabled*.

For detailed information on enabling additional ports using the Ports on Demand license, refer to the *Fabric OS Administrator's Guide*.

Installing and Configuring the Brocade 5000

This chapter provides the following information:

Items Included with the Brocade 5000

The following items are included with the standard shipment of the Brocade 5000:

- The Brocade 5000 switch, containing two power supply/fan assembly units
- One accessory kit, containing the following items:
  - The *Brocade 5000 QuickStart Guide*
  - The Brocade Documentation CD-ROM
  - 32 SFP (small-form-factor pluggable) transceivers (optional)
  - Mounting ears and screws
  - Rubber mounting feet (to be used when setting up the Brocade 5000 as a standalone unit)
  - Two grounded 6-ft. (approximately 1.83 meters) power cords
    - The power plug type is NEMA5-15
    - Power plug current/voltage rating: 1.4A/125V
    - Cordage type: SVT
    - Current rating/wire gauge: 10A/ 18AWG
    - Connector at system end of cordset: IEC 60320/ C13
  - One serial cable, 10-ft. (approximately 3 meters) long
  - EZSwitch Setup CD
  - EZSwitch Setup ReadMe First document
  - Fabric Manager Evaluation CD

Installation and Safety Considerations

You can install the Brocade 5000 in the following four ways:

- In an EIA cabinet using the mounting ears provided with the switch. This is the recommended installation method. For instructions and more information, refer to "Setting Up the Switch Using Mounting Ears" on page 6.

- As a standalone unit on a flat surface. For instructions and more information, refer to "Setting Up the Brocade 5000 as a Standalone Unit" on page 7.

- In an EIA cabinet using the Fixed Rack Mount Kit. The Fixed Rack Mount Kit is optional and can be purchased separately. For detailed installation instructions, refer to the *Fixed Rack Mount Kit Installation Procedure*.

- In an EIA cabinet using the Slide Rack Mount Kit.The Slide Rack Mount Kit is optional and can be purchased separately. For detailed installation instructions, refer to the *Slide Rack Mount Kit Installation Procedure*.

To install and operate the switch successfully, ensure that the following requirements are met:

- The primary AC input is 100-240 VAC (switch autosenses input voltage), 47-63 Hz.

- The primary outlet is correctly wired, protected by a circuit breaker, and grounded in accordance with local electrical codes.

- The supply circuit, line fusing, and wire size are adequate, as specified by the electrical rating on the switch nameplate.

For power supply information, refer to *Power Supply Specifications on page 4-25*.

Verify that a minimum of 47 cubic feet/minute (79.8 cubic meters/hour) of air flow is available to the air intake vents on the nonport side of the switch.

Verify that the ambient air temperature does not exceed 40° Celsius (104° Fahrenheit) and that the ambient humidity remains between 10 percent and 85 percent 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 rack unit high (1.75 inches; 4.44 cm), 19 inches (48.3 cm) wide, and at least 24 inches (61cm) 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 multirack 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 ensure stability in case of unexpected movement.

For additional installation, electrical, environmental, and other considerations, refer to the *SilkWorm Switch Safety Guide*.

Setting Up the Switch Using Mounting Ears

The Brocade 5000 is shipped with mounting ears already installed on the switch. If you need to replace the mounting ears, or reattach them to the Brocade 5000 switch, perform the following steps:

1. Locate the mounting ear marked "L" for left.

2. Place the long side of the mounting ear against the side of the switch (when facing the port-side of the switch), aligning the holes on the mounting ear to the holes on the side of the switch.

3. Using three of the screws provided in the FRU kit and a screwdriver, attach the mounting ear to the switch.

4. Repeat steps 1 through 3 for the mounting ear marked "R" for right on the right side of the switch.

Once the mounting ears are securely attached to the switch, you can install the switch in a standard EIA rack.

To install the Brocade 5000 switch in the rack:

1. Align the holes on the mounting ears with empty holes in the rack.

2. While supporting the switch from the bottom with one hand, use the screws to attach the mounting ears to the rack.

    Be sure to use three screws to fasten each mounting ear to the rack.

For detailed instructions, refer to the *Brocade 5000 Mounting Ear Replacement Procedure*.

Setting Up the Brocade 5000 as a Standalone Unit

The Brocade 5000 can be configured as a standalone unit, which means that it resides outside of a rack.

To configure the Brocade 5000 as a standalone unit:

1. Unpack the Brocade 5000 and verify that all ordered items are present.

2. Clean the four corner depressions on the bottom of the 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.

Configuring the Brocade 5000

The Brocade 5000 must be configured correctly before it can operate within a network and fabric.

If configuring the Brocade 5000 in a single-switch setup, refer to the EZSwitch Setup CD and the *EZSwitchSetup Read Me First* document included with the switch for an easy and quick installation.

For instructions on configuring the switch to operate in a fabric containing switches from other vendors, refer to the *Brocade Fabric OS Administrator's Guide*.

The following items are required for configuring and connecting the Brocade 5000 for use in a network and fabric:

- The Brocade 5000, installed and connected to a power source
- A workstation computer that has a terminal emulator application (such as HyperTerminal for Windows)
- An unused IP address and corresponding subnet mask and gateway address
- The serial cable provided with the switch
- An Ethernet cable
- SFP transceivers and compatible fibre cables, as required
- Access to an FTP server, for backing up the switch configuration

To configure the Brocade 5000, you must perform the following tasks:

1. "Providing Power to the Switch" on page 8
2. "Creating a Serial Connection" on page 8
3. "Connecting to the Switch Using the Serial Connection" on page 9
4. "Setting the Switch IP Address" on page 9
5. "Creating an Ethernet Connection" on page 10
6. "Completing Switch Configuration" on page 10

ATTENTION

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 Brocade 5000" on page 7.

Providing Power to the Switch

To provide electrical power to the Brocade 5000:

1. Connect the power cords to both power supplies and then to power sources on separate circuits to protect against AC failure. Ensure that the cords have a minimum service loop of 6 inches available and are routed to avoid stress.

2. Power on the power supplies by flipping both AC switches to "**I**". 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.

CAUTION

Power is supplied to the switch as soon as the first power supply is connected and turned on.

3. After POST is complete, verify that the switch power and status LEDs on the left of the port side of the switch are green.

Creating a Serial Connection

To create a serial connection to the Brocade 5000:

1. Remove the plug from the serial port and insert the serial cable provided with the Brocade 5000.

2. Connect the serial cable to the serial port on the switch and to a serial port on the workstation.

3. Disable any serial communication programs running on the workstation.

4. Open a terminal emulator application (such as HyperTerminal for Windows or TERM in a UNIX environment) and configure the application as follows:

   - In a Windows 95, 98, 2000, or NT environment:

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/ttyyb -9600
     ```

Connecting to the Switch Using the Serial Connection

To log in to the switch through the serial connection:

1. Verify that the switch has completed POST. When POST is complete, the port status and switch power and status LEDs return to a standard healthy state; for information about LED signals, refer to "Interpreting LED Activity" on page 15.

2. When the terminal emulator application stops reporting information, press **Enter** to display the login prompt.

Setting the Switch IP Address

To replace the default IP address and related information:

1. Enter the **ipAddrSet** command at the terminal emulator application prompt, and enter the requested information at the prompts:

   ```
   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>
   ```

2. Optionally, verify that the address was correctly set by typing the **ipAddrShow** command at the prompt.

3. Record the IP address on the pull out tab (see Figure 1 on page 2) provided for this purpose on the bottom, port side of the Brocade 5000.

4. 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.

Creating an Ethernet Connection

To create an Ethernet connection to the Brocade 5000:

1. Remove the plug from the Ethernet port.

2. Connect an Ethernet cable to the switch Ethernet port and to the workstation or to an Ethernet network containing the workstation.

NOTE
At this point, the switch can 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 tasks.

Completing Switch Configuration

To complete the switch configuration:

1. Log on to the switch by telnet.

2. Modify the domain ID if required.

   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 is has been powered on and the default domain ID is already in use, the fabric segments. To find the domain IDs that are currently in use, run the **fabricShow** command on another switch in the fabric.

   a. Disable the switch by typing 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. Enable the switch by entering the **switchEnable** command.

7. Optionally, specify any custom status policies:

   a. Enter the **switchStatusPolicySet** command at the prompt.
      This command sets the policy parameters that determine overall switch status.

   b. Customize the status policies as desired.
      To deactivate the alarm for a condition, type **0** at the prompt for that condition.

3. Install the SFP transceivers in the Fibre Channel ports, as required. The ports selected for use in trunking groups must meet specific requirements. For a list of these requirements, refer to the *Brocade Fabric OS Administrator's Guide*.

   a. Remove the plugs from the ports to be used.

   b. Position a transceiver so that it is oriented correctly and insert it 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.

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

   c. Repeat Steps a and b for the remaining ports, as required.

4. Connect the cables to the transceivers.

   The cables used in trunking groups must meet specific requirements. For a list of these requirements, refer to the *Brocade Fabric OS Administrator's Guide*.

ATTENTION
A 50-micron cable should not be bent to a radius less than 2 inches under full tensile load and 1.2 inches with no tensile load. A 50-micron cable should not be bent to a radius less than 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.

   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 the cable into the transceiver until the latching mechanism clicks. For instructions specific to cable type, refer to the cable manufacturer's documentation.

   b. Repeat Step a for the remaining transceivers as required.

3. Check the LEDs to verify that all components are functional. For information about LED patterns, refer to "Interpreting LED Activity" on page 15.

4. Verify the correct operation of the Brocade 5000 by typing the **switchShow** command from the workstation.

   This command provides information about switch and port status.

5. Verify the correct operation of the Brocade 5000 in the fabric by typing the **fabricShow** command from the workstation.

   This command provides general information about the fabric.

6. Back up the switch configuration to an FTP server by typing 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.

You should back 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 *Fabric OS Administrator's Guide*. The **switchShow**, **fabricShow**, and **configUpload** commands are described in detail in the *Fabric OS Command Reference.*

SETTING THE SWITCH DATE AND TIME

The date and time switch settings are used for logging events. Switch operation does not depend on the date and time; a switch with an incorrect date and time value still functions properly.

You can synchronize the local time of the principal or primary fabric configuration server (FCS) switch to that of an external Network Time Protocol (NTP) server.

To set the date and time of a switch:

1. Log in to the switch as admin.

2. Type the **date** command at the command line using the following syntax:

   date *"MMDDhhmm[CC]YY"*

   The values represent the following:

   - MM is the month (01-12).
   - DD is the date (01-31).
   - hh is the hour (00-23).
   - mm is minutes (00-59).
   - CC is the century (19-20).
   - YY is the year (00-99).

Year values greater than 69 are interpreted as 1970-1999; year values less than 70 are interpreted as 2000-2069. The date function does not support Daylight Savings Time or time zones, so changes will have to be reset manually.

Example

```
switch:admin> date
Fri May  5 21:50:00 UTC 1989
switch:admin>
switch:admin> date "0624165203"
Tue Jun 24 16:52:30 UTC 2003
switch:admin>
```

SYNCHRONIZING LOCAL TIME WITH AN EXTERNAL SOURCE

Use this procedure to synchronize the local time of the principal or primary FCS switch with that of an external NTP server:

1. Log in as admin.

2. Enter the **tsClockServer** [*ipaddr*] command

   The *ipaddr* variable represents the IP address of the NTP server that the switch can access. This argument is optional; by default, its value is "LOCL".

Example

```
switch:admin> tsclockserver
LOCL
switch:admin> tsclockserver 132.163.135.131
switch:admin>
```

CORRECTING THE TIME ZONE OF A SWITCH

If the time of your switch(es) is off by hours (and not minutes), use the following procedure on all switches to set the time zone:

1. Log in as admin.

2. Enter the **tsTimeZone - - interactive** command.

3. Follow the prompts to select the correct time zone for the switch.

   Refer to the **tsTimeZone** command in the *Fabric OS Command Reference* for more detailed information about the command parameters.

4. Repeat Steps 1 through 3 on all switches for which the time zone needs to be set.

   This needs to be done only once, because the value is stored in nonvolatile memory.

Recommendations for Cable Management

Cables can be organized and managed in a variety of ways, such as by using cable channels or patch panels. Following is a list of recommendations:

- Plan cable management before installing the switch in a rack.
- 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.

ATTENTION
A 50-micron cable should not be bent to a radius less than 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.

- If using Brocade ISL Trunking:
  - It might 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 Fabric OS Administrator'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 and other cables directly down or otherwise away from the LEDs.

Operating the Brocade 5000

This chapter provides the following information:

- next
-
-
-

Powering the Brocade 5000 On and Off

To power the Brocade 5000 on, connect one or both power cords to the power connectors on the power supplies and to a power source; then, set the AC power switches to "**I**". Power is supplied to the switch as soon as the first power supply is connected and powered on.

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

To power the Brocade 5000 off, power off both power supplies by setting each AC power switch to "**O**". 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 are in one of the following colors:

- Green
- Amber

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

BROCADE 5000 LEDS

The Brocade 5000 has the following LEDs:

- One system status LED (above) on the left side
- One power status LED (below) on the left side
- 32 port status LEDs, one for each Fibre Channel port, located above the ports
- One power supply status LED on each power supply FRU, in the upper right corner

Figure 3 shows the locations of the LEDs on the Brocade 5000.

FIGURE 3   LEDs on Port Side of Brocade 5000
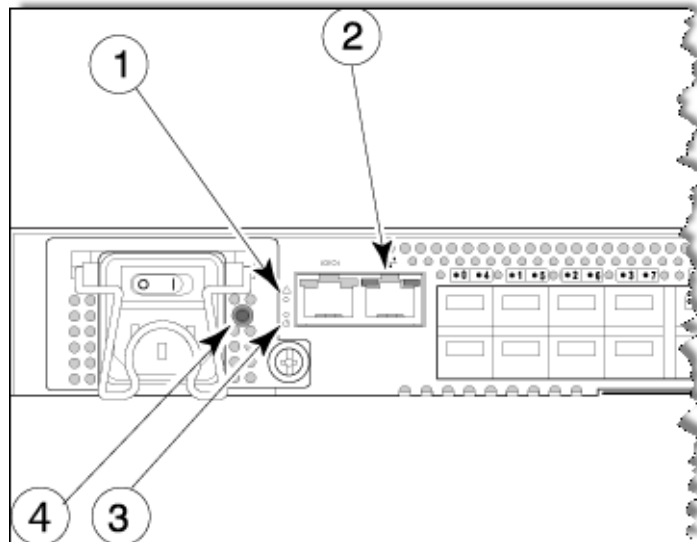
1	System Status LED
2	Port Status LED
3	System Power LED
4	Power Supply Status LED

Table 2 describes the LEDs and their actions on the switch.

TABLE 2   Brocade 5000 LED Patterns During Normal Operation

LED Name	LED Color	Status of Hardware	Recommended Action
Power Supply Status	No light	Power supply is not receiving power or is off.	Verify that the power supply is on and seated and the power cord is connected to a functioning power source.
	Steady green	Power supply is operating normally.	No action required.
Power Status	No light	System is off or there is an internal power supply failure.	Verify that system is on. If the system is on, the unit is faulty. Contact Technical Support.
	Steady green	System is on and power supplies are functioning properly.	No action required.

TABLE 2   Brocade 5000 LED Patterns During Normal Operation (Continued)

LED Name	LED Color	Status of Hardware	Recommended Action
System Status	No light	System is off, boot is not complete, or boot failed.	Verify that system is on and has completed booting.
	Steady green	System is on and power supplies are functioning properly.	No action required.
	Steady amber (for more than five seconds)	Boot failed, the system is faulty.	Perform the following steps: 1. Connect a serial cable to the system. 2. Reboot the system. 3. Check the failure indicated on the system console. 4. Contact Technical Support.
	Flashing amber/green	Attention is required. A number of variables can cause this status including a single power supply failure, a fan failure, or one or more environmental ranges has exceeded.	Check the management interface and the error log for details on the cause of status. Contact Technical Support if required.
Ethernet Speed	No light	Port speed is 10 Mb/sec.	No action required.
	Steady green	Port speed is 100 Mb/sec.	No action required.
Ethernet Link	No light	There is no link.	Verify that the Ethernet cable is connected correctly.
	Steady amber	There is a link.	No action required.
	Flashing amber/no light	There is link activity (traffic).	No action required.

TABLE 2   Brocade 5000 LED Patterns During Normal Operation (Continued)

LED Name	LED Color	Status of Hardware	Recommended Action
Port Status	No light	No signal or light carrier (media or cable) detected.	Check transceiver and cable.
	Slow flashing green (flashing in two-second intervals)	Port is online but segmented because of a loopback cable or incompatible switch connection.	No action required.
	Fast flashing green (flashing in half-second intervals)	Port is online and an internal loopback diagnostic test is running.	No action required.
	Flickering green (steady with random flashes)	Port is online and frames are flowing through the port.	No action required.
	Steady green	Port is online (connected to external device) but has no traffic.	No action required.
	Slow flashing amber (flashing in two-second intervals)	Port is disabled (because of diagnostics or the **portDisable** command).	Verify that the diagnostic tests are not running. Enable the port using the **portEnable** command.
	Fast flashing amber (flashing in half-second intervals)	Port is faulty.	Check the management interface and the error log for details on the cause of status. Contact Technical Support if required.
	Steady amber (for more than five seconds)	Port is receiving light or signal carrier at 4 Gbit/sec; but is not yet online.	No action required.

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 2 on page 3-16). If one or more LEDs do not display a healthy state:

  1. Verify that the LEDs are not set to "beacon" (this can be determined through the **switchShow** command or Advanced Web Tools). For information about how to turn beaconing on and off, refer to the *Brocade Fabric OS Administrator's Guide or the Brocade Web Tools Administrator's Guide*.

  2. Follow the recommended action for the observed LED behavior, as listed in Table 2 on page 3-16.

- Verify that 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, open another telnet session or access the switch 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 Command Reference*. For information about error messages, refer to the *Brocade System Message Reference*.

Maintaining the Brocade 5000

The Brocade 5000 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, described in the following sections.

Diagnostic Tests

In addition to POST, Fabric OS includes diagnostic tests to help you 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 to verify the serializer/deserializer interface, transceiver, and cable. Some tests require loop back plugs.

Diagnostic tests are run at link speeds of 1 Gbit/sec, 2 Gbit/sec, and 4 Gbit/sec.

NOTE
Diagnostic tests might 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 Administrator's Guide*.

Field Replaceable Units (FRUs)

The power supplies have the fans inside and can be replaced onsite without the use of special tools. The power supplies/fan assemblies units are keyed to ensure correct orientation during installation. Replacement instructions are provided with all replacement units ordered.

CAUTION

The Brocade 5000 has two power cords. To remove all power from the switch, disconnect both power cords before servicing.

Power Supply/Fan Assembly FRU Replacement

The Brocade 5000 fans are fixed inside the integrated power supply/fan FRU to provide necessary airflow to cool the whole system. There is one fan located in the rear section of each FRU. The system software sets fan speed and measures their speeds through the tachometer interface.

The two power supply/fan assembly FRU units are hot-swappable if replaced one at a time. They are identical and fit into either slot.

Fabric OS identifies the power supplies as follows (viewing the switch from the *port* side):

- Power supply #1 is on the left
- Power supply #2 is on the right

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

- Check the power supply status LED next to the **I/O** switch. If the power supply status LED is not on, verify that the power supply is on and seated and the power cord is connected to a functioning power source. If the light does not turn green, the power supply needs to be replaced.
- In Advanced Web Tools, click the **Power Status** icon.
- Type the **psShow** command at the command prompt to display power supply status as shown below:

```
switch:admin> psshow

Power Supply #1 is OK
Power Supply #2 is OK
```

To determine whether a fan assembly requires replacing , do any of the following:

- Check the system status LED (see Figure 3 on page 3-16 for location of system status LED). If the system status LED is flashing amber and green, it could mean the fan has failed. Check the management interface and the error log for details on the cause of status.
- In Advanced Web Tools, check the **Fan Status** icon background color. It will be either yellow or red if the fan has failed. When the fan is functioning correctly, the background color is green.

- Type the **fanShow** command at the command prompt to display fan status as shown below:

```
switch:admin> fanshow
Fan 1 is OK, speed is 7105 RPM
Fan 2 is OK, speed is 7258 RPM
```

Product Specifications

This appendix provides the following information:

Switch Components

The Brocade 5000 switch includes the following components:

- Cabinet-mountable 1U chassis designed to be mounted in a 19-inch cabinet space, with forced-air cooling that flows from the nonport side of the switch to the port side.
- 32 Fibre Channel ports, compatible with short wavelength (SWL), long wavelength (LWL), and extended long wavelength (ELWL) SFP transceivers.
- One RS-232 serial port on the port side of the switch
- One IEEE-compliant RJ-45 connector on the port side of the switch for use with 10/100 MB/sec Ethernet
- 32 port LEDs, 1 switch power LED, 1 switch status LED, 2 Ethernet LEDs, and 2 power supply LEDs
- Two universal AC input and redundant power supplies with AC switches and built-in fans.

Weight and Physical Dimensions

Table 3 lists the weight and dimensions of the Brocade 5000.

TABLE 3   Physical Specifications

Dimension	Value
Height	1U = 43.5 mm (1.71 inches)
Depth	264 mm (10.39 inches)
Width	428.75 mm (16.88 inches)
Weight (with two power supplies/fan assemblies installed, no SFPs)	10.8 lbs (4.9 kg)

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 autosenses input voltage), 47-63 Hz.
    - Correctly wired primary outlet, 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.
    - Electrical interference must be less than the levels stated in the standards listed in Table 6 on page 4-26, under "Immunity."
- Thermal:
    - Air flows from the non-port side to the port side. 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 5 on page 4-26
- Cabinet:
    - Cabinet space of one rack unit in a 19-inch cabinet.
    - All equipment in cabinet must be grounded through a reliable branch circuit connection.
    - The additional weight of the switch must not exceed the cabinet's weight limits.
    - The cabinet must be secured to ensure stability in case of unexpected movement.

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 4 lists the power supply specifications for the Brocade 5000.

TABLE 4   Power Supply Specifications

Specification	Value
Outlet	The outlet must be a correctly wired, primary with earth ground
Maximum output	60 Watts
System power consumption	56 Watts maximum, 50 Watts typical
Input voltage	100 - 240 VAC, Universal
Input line frequency	47 - 63 Hz
BTU rating at 80% efficiency	56 Watts / 0.8 X 3.412 BTU/hr/Watts = 239 BTU/hr
Inrush current	Maximum of 15 amps for period between 10-150 ms at 50 degrees Celsius (122 degrees Fahrenheit), hot or cold start

Power Cords (Japan, Denan)

注意 – 添付の電源コードを他の装置や用途に
使用しない
添付の電源コードは本装置に接続し、使用する
ことを目的として設計され、その安全性が確認
されているものです。決して他の装置や用途に
使用しないでください。火災や感電の原因とな
る恐れがあります。

CAUTION

Never use the power cord packed with your equipment for other products.

Environmental Requirements

Table 5 lists the acceptable environmental ranges for both operating and non-operating (such as during transportation or storage) conditions.

TABLE 5   Environmental Requirements

Condition	Acceptable During Operation	Acceptable During Non-Operation
Ambient Temperature	0° to 40° Celsius (32° to 104° Fahrenheit)	-25° to 70° Celsius (-13° to 158° Fahrenheit)
Humidity	10% to 85% RH non-condensing, at 40° Celsius (104° Fahrenheit) , with maximum gradient of 10% per hour	10% to 90% RH non-condensing, at 70° Celsius (158° Fahrenheit)
Altitude	3,000 meters (9,842 feet) above sea level	0 to 12 kilometers (39,370 feet) above sea level
Shock	20 G, 6 ms, half-sine wave	Half sine, 33G 11ms, 3/eg Axis
Vibration	0.5 G sine, 0.4 grms random, 5-500 Hz	2.0 G sine, 1.1 grms random 5-500 Hz
Air flow	High speed, 9300 RPM, 20.8 cubic feet/minute Low speed, 7200 RPM, 15.4 cubic feet/minute	None required.

General Specifications

Table 6 lists the general specifications for the Brocade 5000.

TABLE 6   General Specifications

Specification	Description
Configurable port types	F_Port, FL_Port, and E_Port
EMC (electromagnetic compatibility)	Emissions: See *EMC Certifications,* on page 4-32 Immunity - 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 - EN 61000-4-12 Oscillatory Waves Immunity - EN 61000-3-2 Limits for Harmonic Current Emissions - EN 61000-3-3 JEIDA

TABLE 6 General Specifications (Continued)

System architecture	Nonblocking shared-memory switch
System processor	PowerPC 440GP, 333 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-3 Rev. 6.6
FC-IP (IP over Fibre Channel)	Complies with FC-IP 2.3 of FCA profile
Aggregate switch I/O bandwidth	256 Gbit/sec if all 32 ports are running at 4 Gbit/sec, full duplex
Port-to-port latency	800 nano-seconds

Data Transmission Ranges

Table 7 provides the data transmission ranges for different cable types and port speeds.

TABLE 7 Laser Data Transmission Ranges

Port Speed	Cable Size (microns)	Short Wavelength (SWL)	Long Wavelength (LWL)	Extended Long Wavelength (ELWL)
1 Gbit/sec	50	1,640 feet (500 meters)	n.a	n.a
	62.5	984 feet (300 meters)	n.a	n.a
	9	n.a	6.2 miles (10 km)	24.8 miles (40 km)
2 Gbit/sec	50	984 feet (300 meters)	n.a	n.a
	62.5	492 feet (150 meters)	n.a	n.a
	9	n.a	10 km (6.2 miles) without a Brocade Extended Fabrics license; 50 to 100 km with a Brocade Extended Fabrics license	24.8 miles (40 km)
4 Gbit/sec	50	492 feet (150 meters)	n.a	n.a
	62.5	230 feet (70 meters)	n.a	n.a
	9	n.a	n.a	n.a

Memory Specifications

The Brocade 5000 has three types of memory devices:

- Boot flash: 4 MB
- Compact flash: 1 GB
- Main memory (SDRAM): 256 MB

Fibre Channel Port Specifications

The Fibre Channel ports in the Brocade 5000 are compatible with SWL, LWL, and ELWL 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 29.

The ports are capable of operating at 1, 2, or 4 Gbit/sec and are able to autonegotiate to the higher of 1, 2, or 4 Gbit/sec.

Serial Port Specifications

The serial port is located on the port side of the switch. The Brocade 5000 uses an RJ-45 connector for serial port.

ATTENTION
To protect the serial port from damage, keep the cover on the port when not in use.

The serial port can be used to connect to a workstation to configure the switch IP address before connecting the switch to a fabric or IP network. The serial port's parameters are fixed at 9600 baud, 8 data bits, and no parity, with flow control set to None.

This connector is for initial IP address configuration and for recovery of the switch to its factory default settings if Flash memory contents are lost. The serial port is not intended for performance of normal administration or maintenance functions. You should only use this port to connect a terminal to the port to re initialize the switch defaults, restoring the switch to its factory configuration. This is required to restore switch passwords to a known state and allow you to assign an IP address to the switch.

Table 8 lists the serial cable pinouts.

TABLE 8   Serial Cable Pinouts

PIN	Signal	Description
1	Not supported	NA
2	Not supported	NA
3	UART1_TXD	Transmit data
4	GND	Logic ground
5	GND	Logic ground

TABLE 8   Serial Cable Pinouts

PIN	Signal	Description
6	UART1_RXD	Receive data
7	Not supported	NA
8	Not supported	NA

POST and Boot Specifications

The switch performs POST by default each time it is powered on or rebooted or the system is reset. 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 Command 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 tasks:

1. Conducting preliminary POST diagnostics.

2. Initializing the operating system.

3. Initializing hardware.

4. Running diagnostic tests 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 tasks after POST is complete:

1. Performing universal port configuration.

2. Initializing links.

3. Analyzing fabric. If any ports are connected to other switches, the switch participates in a fabric configuration.

4. Obtaining a domain ID and assigning port addresses.

5. Constructing unicast routing tables.

6. Enabling normal port operation.

Regulatory Compliance

This section describes the regulatory compliance requirements for the Brocade 5000 switch. It contains:

- "FCC Warning (US only)," next

FCC WARNING (US 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, might 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.

MIC STATEMENT (REPUBLIC OF KOREA)

사용자 안내문 : A 급기기

이 기기는 업무용으로 전자파 적합 등록을 받은 기기
이오니, 판매자 또는 사용자는 이점을 주의하시기
바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에
서 비업무용으로 교환하시기 바랍니다.

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 might arise. When such trouble occurs, the user might 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に要求されることがあります。

BSMI STATEMENT (TAIWAN)

The BSMI Statement is applicable to Brocade 5000 power supplies.

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。

CE STATEMENT

ATTENTION
This is a Class A product. In a domestic environment, this product might cause radio interference, and the user might be required to take corrective measures.

The standards compliance label on the Product Name 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/JEIDA (European and Japanese Harmonics Spec)
    - EN61000-3-3

CANADIAN REQUIREMENTS

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

LASER COMPLIANCE

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

ATTENTION
Use only optical transceivers that are qualified by Brocade Communications Systems, Inc. and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 825-2. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

RTC BATTERY

CAUTION

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.

ELECTRICAL SAFETY

⚡ **CAUTION**

This switch might have more than one power cord. To reduce the risk of electric shock, disconnect both power cords before servicing.

⚡ **CAUTION**

Connect the power cord only to a grounded outlet.

⚡ **CAUTION**

This product is designed for an IT power system with phase-to-phase voltage of 230V. After operation of the protective device, the equipment is still under voltage if it is connected to an IT power system.

REGULATORY CERTIFICATIONS

Table 9 lists the safety and EMC (electromagnetic compatibility) specifications for which the Brocade 5000 switch is certified.

TABLE 9   EMC Certifications

Country	Safety Specification	EMC Specification
Canada	CSA C22.2 No. 60950-1-03	CSA 108.8 Class A
United States	CSA NRTL Certification to UL 60950-1: 2003, First Edition	EN55022 Class A FCC Part 15, Subpart B (CFR title 47), Class A
Japan	IEC 60950-1(2001)	EN55022 Class A EN 61000-3-2 Harmonics (JEIDA Limits)
International	IEC 60950-1 (2001)	EN55022 Class A

TABLE 9   EMC Certifications (Continued)

Country	Safety Specification	EMC Specification
European Union (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, The Netherlands, United Kingdom) and Republic of Korea	EN 60950-1:200173/23/EEC EN60825-1:1994/A11, -2 TUV (Germany only) EN 60950-1:2001(NEMKO CB Report) (Norway only)	EN 55022:1998 Class A EN 55024 (Immunity) EN 61000-4-2 Electrostatic Discharge EN 61000-4-3 Radiated Fields EN 61000-4-4 Electrical Fast Transients EN 61000-4-5 Surge Voltage EN 61000-4-6 Conducted Emissions EN 61000-4-8 Magnetic Fields EN 61000-4-11 Voltage Dips and Interruptions EN 61000-3-2 Limits for Harmonic Current Emissions EN 61000-3-3 Flicker
Australia and New Zealand		EN 55022: 1998 Class A

Environmental Regulation Compliance

This section describes the "China RoHS" environmental regulatory compliance requirements for the Brocade 5000 switch.

CHINA ROHS

The contents included in this section are per the requirements of the People's Republic of China-Management Methods for Controlling Pollution by Electronic Information products.

守环境法规

国 **RoHS**

节中包含的内容都遵守了中华人民共和国《电子信息产品污染控制管理办法》的
求。

Environmental Protection Use Period (EPUP) Disclaimer

In no event do the EPUP logos shown on the product and FRU's alter or expand that warranty that Brocade provides with respect to its products as set forth in the applicable contract between Brocade and its customer. Brocade hereby disclaims all other warranties and representations with respect to the information contained on this CD including the implied warranties of merchantability, fitness for a particular purposes and non-infringement.

The EPUP assumes that the product will be used under normal conditions in accordance with the operating manual of the product.

环保使用期限 **(EPUP)** 免责声明：

EPUP　　标志不会出现在产品和　　FRU　　的改装产品中，也不会对　　Brocade 所提供的相关产品保修条款（该保修条款在　　　　　　　　　　　　　　Brocade 及其客户间达成的适用合同中列出）进行增补。对于此　　　　　　　　　CD 上包含的相关信息，如适销性、针对特定用途的适用性和非侵权性的暗示保证，Brocade 在此郑重声明本公司对于与上述信息相关的所有其他保证和陈述概不负责。EPUP 假设在"产品操作手册"中注明的常规条件下使用该产品。

TS/HS Dual Language Sheet

In accordance with China's Management Measures on the Control of Pollution caused by Electronic Information products (Decree No. 39 by the Ministry of Information Industry), the following information is provided regarding the names and concentration level of Hazardous substances (HS) which may be contained in this product.

China ROHS Hazardous Substances/Toxic Substances (HS/TS) Concentration Chart

Name of the Component	Hazardous/Toxic Substance/Elements					
	Lead (PB)	Mercury (Hg)	Cadium (CD)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Fibre Channel Switch	X	O	O	O	O	O
Fan, Blower assemblies	X	O	O	O	O	O
PCBA cards	X	O	O	O	O	O
Power Supply kit	X	O	O	O	O	O
SFPs (optical cable connectors)	X	O	O	O	O	O
Sheet Metal	X	O	O	O	O	O
Chassis Assembly	X	O	O	O	O	O
Mechanical brackets and Slides	X	O	O	O	O	O
Slot Filler	X	O	O	O	O	O

China ROHS Hazardous Substances/Toxic Substances (HS/TS) Concentration Chart

Name of the Component	Hazardous/Toxic Substance/Elements					
	Lead (PB)	Mercury (Hg)	Cadium (CD)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Cable management tray	X	O	O	O	O	O
Cable Comb	O	O	O	O	O	O
Cables and power cords	O	O	O	O	O	O
Replacement Doors	X	O	O	O	O	O
Software Documentation CDs	O	O	O	O	O	O

<div align="center">

CHINA ROHS有害物质/有毒物质(HS/TS)限量列表

</div>

有毒与有害物质或元素的名称及含量
根据中国的<<电子信息产品污染控制管理办法>>
(信息产业部第39号令)，本公司提供以下有关产品中可能含有的有害物质(HS)的名称及含量水平的
信息。

主要部件名称	有害/有毒物质或元素					
	铅（Pb）	汞（Hg）	镉（Cd）	六价镉（CR6+）	多溴联苯（PBB）	多溴二苯醚（PBDE）
光纤通道交换机	X	O	O	O	O	O
风扇/冷却组装件	X	O	O	O	O	O
线路板部件	X	O	O	O	O	O
电源	X	O	O	O	O	O
⑳ SFP（光纤接头）	X	O	O	O	O	O
钣金件	X	O	O	O	O	O
机箱部件	X	O	O	O	O	O
机械支架及滑轨	X	O	O	O	O	O
插槽填充物	X	O	O	O	O	O
电缆整理盘	X	O	O	O	O	O
梳状线缆	O	O	O	O	O	O
⑳ 线束及电源线	O	O	O	O	O	O
替换门	X	O	O	O	O	O
软件/文档光盘	O	O	O	O	O	O

X   表示此类部件内同质材料中的有害/有毒含量高于SJ/T11363-2006的限量要求。
O   表示未使用此类物质或其含量低于上述限量要求。

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