Brocade 6505

Hardware Reference Manual

BROCADE

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Brocade 6505 Hardware Reference Manual	53-1002449-01	New document	December 2011

Contents

About This Document

In this chapter

How this document is organized

This document is organized to help you find the information that you want as quickly and easily as possible.

The document contains the following components:

- Chapter 1, "Brocade 6505 Introduction" provides an overview of the Brocade 6505 switch, a feature list, and a look at the appearance of the switch.

- Chapter 2, "Brocade 6505 Installation and Configuration" provides the information needed to install the switch in your network.

- Chapter 3, "Brocade 6505 Operation" discusses the day-to-day operational procedures for using the switch.

- Chapter 4, "Removal and Replacement of Power Supplies and Fans" provides procedures for removing and replacing the field-replaceable units (FRUs).

- Appendix A, "Brocade 6505 Specifications" provides tables of physical, environmental, and general specifications.

Supported hardware and software

This document includes information specific to the Brocade 6505 running Brocade Fabric OS version 7.0.1. and later.

Document conventions

This section describes text formatting conventions and important notice formats used in this document.

Text formatting

The narrative-text formatting conventions that are used are as follows:

bold text	Identifies command names Identifies the names of user-manipulated GUI elements Identifies keywords and operands Identifies text to enter at the GUI or CLI
italic text	Provides emphasis Identifies variables Identifies paths and Internet addresses Identifies document titles
`code` text	Identifies CLI output Identifies command syntax examples

For readability, command names in the narrative portions of this guide are presented in mixed lettercase: for example, **switchShow**. In actual examples, command lettercase is often all lowercase. Otherwise, this manual specifically notes those cases in which a command is case-sensitive.

Command syntax conventions

Command syntax in this manual follows these conventions:

command	Commands are printed in bold.
--**option, option**	Command options are printed in bold.
-**argument,** arg	Arguments.
[ ]	Optional element.
variable	Variables are printed in italics. In the help pages, values are <u>underlined</u> or enclosed in angled brackets < >.
...	Repeat the previous element, for example "member[;member...]"
value	Fixed values following arguments are printed in plain font. For example, --**show** WWN
|	Boolean. Elements are exclusive. Example: --**show** -**mode** egress | ingress

Command examples

This book describes how to perform configuration tasks using the Fabric OS command line interface, but does not describe the commands in detail. For complete descriptions of all Fabric OS commands, including syntax, operand description, and sample output, see the *Fabric OS Command Reference*.

Notes, cautions, and warnings

The following notices and statements are used in this manual. They are listed below in order of increasing severity of potential hazards.

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

ATTENTION
An Attention statement indicates potential damage to hardware or data.

CAUTION

A Caution statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.

DANGER

A Danger statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

Key terms

For definitions specific to Brocade and Fibre Channel, see the technical glossaries on MyBrocade. See *"Brocade resources"* on page x for instructions on accessing MyBrocade.

For definitions of SAN-specific terms, visit the Storage Networking Industry Association online dictionary at:

http://www.snia.org/education/dictionary

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Corporation	Referenced trademarks and products
Red Hat, Inc.	Red Hat, Red Hat Network, Maximum RPM, Linux Undercover
Velcro Industries B.V.	Velcro

Additional information

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

Brocade resources

To get up-to-the-minute information, go to *http://my.brocade.com* to register at no cost for a user ID and password.

White papers, online demonstrations, and data sheets are available through the Brocade website at:

http://www.brocade.com/products-solutions/products/index.page

For additional Brocade documentation, visit the Brocade website:

http://www.brocade.com

Release notes are available on the MyBrocade website and are also bundled with the Fabric OS firmware.

Other industry resources

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

http://www.t11.org

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

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

   - Switch model
   - Switch operating system version
   - Error numbers and messages received

- **supportSave** command output
- Detailed description of the problem, including the switch or fabric behavior immediately following the problem, and specific questions
- Description of any troubleshooting steps already performed and the results
- Serial console and Telnet session logs
- syslog message logs

2. Brocade 6505 serial number

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

   FT00X0054E9
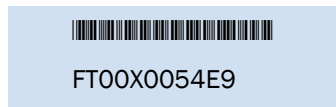
   The serial number label is located on the switch ID pull-out tab located inside the chassis on the port side on the left.

   In addition, the **chassisShow** command displays the Brocade 6505 serial number, as well as information about the port and application blades, and other field-replaceable units (FRUs).

3. License ID

   Use the **licenseIdShow** command to display the license ID.

4. World Wide Name (WWN)

   Use the **wwn** command to display the switch WWN.

   If you cannot use the **wwn** command because the switch is inoperable, you can get the WWN from the same place as the serial number.

Document feedback

Quality is our first concern at Brocade and 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 of the document and as much detail as possible about your comment, including the topic heading and page number and your suggestions for improvement.

Brocade 6505 Introduction

In this chapter

Brocade 6505 overview

The Brocade 6505 is a 24-port auto-sensing 2, 4, 8, or 16 Gbps Fibre Channel (FC) switch that delivers the latest Brocade single-chip architecture for Fibre Channel Storage Area Networks (SANs). The Brocade 6505 is a small-to-midsize business-class switch that is designed to handle smaller-scale SAN requirements.

The Brocade 6505 provides up to 24 ports in a single height (1U) switch that enables the creation of very dense fabrics in a relatively small space.

The Brocade 6505 offers Ports on Demand (POD) licensing as well. "Base" models of the switch contain 12 ports, and an additional 12-port POD license can be purchased. The base model also offers a single power supply and fan module with a second module available as an upgrade for redundancy.

The Brocade 6505 supplies Reliability, Availability, and Serviceability (RAS) performance and the scalability requirements of an enterprise switch along with interoperability and ease-of-use advantages.

The Brocade 6505 can also be configured in Access Gateway (AG) mode that lets you configure your Enterprise fabric to handle additional N_Ports instead of domains. By reducing the number of domain IDs and ports, you simplify configuration and management in a large fabric.

Switches in AG mode are logically transparent to the host and the fabric. You can increase the number of hosts that have access to the fabric without increasing the number of switches.

Platform features

The Brocade 6505 offers the following features and capabilities:

* Up to 24 auto-sensing ports of high-performance 16-Gbps technology in a single domain.
* Ports on Demand scaling from 12 to 24 ports.
* 2, 4, 8, and 16 Gbps auto-sensing Fibre Channel switch and router ports.
    - 2, 4, and 8 Gbps performance is enabled by 8 Gbps SFP+ transceivers.
    - 4, 8, and 16 Gbps performance is enabled by 16 Gbps SFP+ transceivers.

- Universal ports self-configure as E, F, or M ports. EX_Ports can be activated on a per-port basis with the optional Integrated Routing license. D-port functionality is also available for diagnostics.

- Airflow is set for port side exhaust.

- Inter-Switch Link (ISL) Trunking, which allows up to eight ports (at 2, 4, 8, or 16 Gbps speeds) between a pair of switches combined to form a single, logical ISL with a speed of up to 128 Gbps (256 Gbps full duplex) for optimal bandwidth utilization and load balancing. The base model permits one eight-port trunk plus one four-port trunk.

- Dynamic Path Selection (DPS), which optimizes fabric-wide performance and load balancing by automatically routing data to the most efficient available path in the fabric.

- Brocade-branded SFP+ optical transceivers that support any combination of Short Wavelength (SWL), Long Wavelength (LWL), and Extended Long Wavelength (ELWL) optical media among the switch ports.

- Extended distance support enables native Fibre Channel extension up to 7,500 km at 2 Gbps.

- Support for unicast traffic type.

- Brocade Fabric OS, which delivers distributed intelligence throughout the network and enables a wide range of value-added applications including Brocade Advanced Web Tools, Brocade Enhanced Group Management, and Brocade Zoning.

- Licensable fabric services include:
  - Adaptive Networking with QoS
  - Brocade Extended Fabrics
  - Brocade Fabric Watch
  - ISL Trunking
  - Advanced Performance Monitoring (APM)
  - Server Application Optimization (SAO)

- Support for Access Gateway configuration where server ports connected to the fabric core will be virtualized.

- Hardware zoning is accomplished at the port level of the switch and by World Wide Name (WWN). Hardware zoning permits or denies delivery of frames to any destination port address.

- Extensive diagnostics and system-monitoring capabilities for enhanced high Reliability, Availability, and Serviceability (RAS).

- The Brocade EZSwitchSetup wizard that makes SAN configuration a three-step point-and-click task.

- Real-time power monitoring enables users to monitor real-time power usage of the fabric at a switch level.

- Port-to-port latency minimized to 800 nanoseconds through the use of cut-through frame routing at 16 Gbps.

Platform components

- A system motherboard that features a PowerPC 440EPx Reduced Instruction Set Computer (RISC) CPU running at 667 MHz, with integrated peripherals.

- An RJ45 10/100 BaseT Ethernet system management port, in conjunction with Brocade EZSwitchSetup, that supports switch IP address discovery and configuration, eliminating the need to attach a serial cable to configure the switch IP address and greatly increasing the ease of use.

- One RS-232 serial port with an RJ45 connector for initial switch setup (if not using EZSwitchSetup) and factory default restoration.

- A USB 2.0 port that provides storage for firmware updates, output of the **supportSave** command, and storage for configuration uploads and downloads.

- One power supply and fan assembly in the base model. There are two fans per assembly. A second assembly is available for redundancy and hot-swap capability.

- One LED (green/amber) per FC port to indicate status.

- One LED (green) for system power.

- One LED (green/amber) for system status.

- Two Ethernet port LEDs (integrated with RJ45) for speed and port activity. (A green LED for port speed and an amber LED for port activity.)

- SEEPROM for switch identification.

- Voltage monitor.

- Fan monitor.

- Temperature monitor.

- Real-time clock (RTC) with battery.

Port side of the Brocade 6505

The port side of the Brocade 6505 includes the system status LED, the console port, the Ethernet port and accompanying LEDs, the USB port, and the Fibre Channel ports and corresponding port status LEDs.

Figure 1 shows the port side of the Brocade 6505.
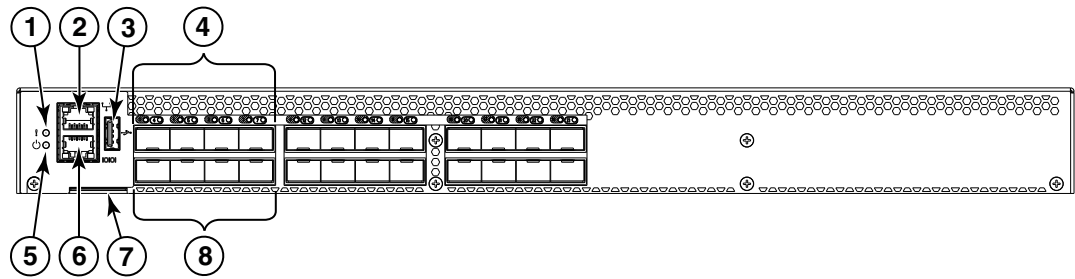
1	System status LED	5	System power LED
2	Management Ethernet port with LEDs	6	Serial console port
3	USB port	7	Switch ID pull-out tab
4	FC ports 0-3 (all LEDs above)	8	FC ports 4-7

FIGURE 1   **Port side of the Brocade 6505**

NOTE
The two LEDs on the serial console port are non-functional.

Nonport side of the Brocade 6505

shows the nonport side of the Brocade 6505, which contains the power supply (including the AC power receptacle and AC power switch) and fan assemblies. The base model configuration with a single assembly is shown.
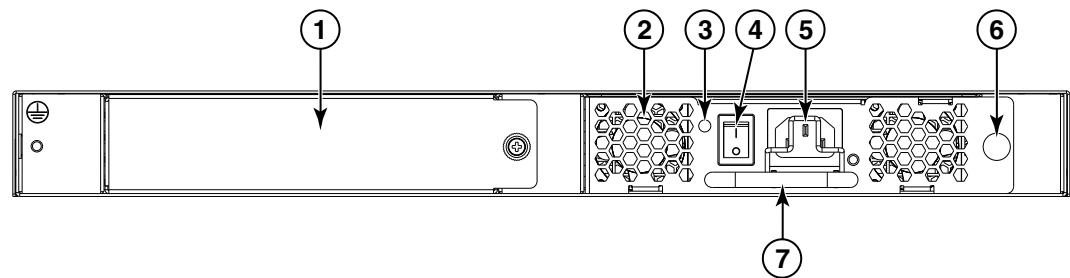
1	Filler panel	5	Power plug receptacle (with plug retainer)
2	Power supply and fan assembly #1	6	Captive screw
3	Power supply and fan assembly LED	7	Handle
4	On/off switch		

FIGURE 2   **Nonport side of the Brocade 6505**

Brocade 6505 Installation and Configuration

In this chapter

Items included with the Brocade 6505

The following items are included with the standard shipment of a fully-configured Brocade 6505. When you open the Brocade 6505 packaging, verify that these items are included in the package and that no damage has occurred during shipping:

- The Brocade 6505 switch, containing one combined power supply and fan assembly
- 16 Gbps or 8 Gbps SFP+ modules for the Fibre Channel ports (speed and quantity as ordered)
- One accessory kit, containing the following items:
    - Serial cable with an RJ45 connector
    - RJ45-to-DB9 adapter
    - One 6 foot power cord
    - Rubber feet, required for setting up the switch as a standalone unit
    - *Brocade 6505 EZSwitchSetup* poster
    - EZSwitchSetup CD

Installation and safety considerations

You can install the Brocade 6505 switch in the following ways:

- As a standalone unit on a flat surface.
- In an EIA cabinet using a slim rail rack mount kit. The rack mount kit can be ordered from your switch retailer.
- In an EIA cabinet using an optional mid-mount rack kit for switches. The optional mid-mount rack kit for switches can be ordered from your switch retailer.

Electrical considerations

To install and operate the switch successfully, ensure the following:

- 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.
- The power supply standards provided in Table 7, "System power specifications" are met.

Environmental considerations

For successful installation and operation of the switch, ensure that the following environmental requirements are met:

- At a minimum, adequate cooling requires that you install the switch with the intake side, the nonport side of the switch, facing the cool-air aisle.
- All equipment in the rack should force air in the same direction to avoid intake of exhaust air.
- A maximum of 102 cubic meters/hour (60 cubic feet/minute) and a minimum of 74.8 cubic meters/hour (44 cubic feet/minute) of airflow is available for air intake.???
- The ambient air temperature does not exceed 40°C (104°F) while the switch is operating.

Cabinet considerations

For successful installation and operation of the switch in a cabinet, ensure the following cabinet requirements are met:

- The cabinet must be a standard EIA cabinet.
- A cabinet space that is at least one rack unit (1U) high; 4.45 cm (1.75 inches) high and 48.3 cm (19 inches) wide.
- The two rack kit options for the Brocade 6505 use rails that are slimmer than standard rails to accommodate the slightly wider chassis. Be sure to use one of these kits. Do not use standard rails to install the Brocade 6505 in a rack; they will not fit with the switch.
- The equipment in the cabinet is grounded through a reliable branch circuit connection and maintains ground at all times. Do not rely on a secondary connection to a branch circuit, such as a power strip.
- Airflow and temperature requirements are met on an ongoing basis, particularly if the switch is installed in a closed or multicabinet assembly.
- The additional weight of the switch does not exceed the cabinet's weight limits or unbalance the cabinet in any way.
- The cabinet is secured to ensure stability in case of unexpected movement, such as an earthquake.

Recommendations for cable management

The minimum radius to which a 50 micron cable can be bent under full tensile load is 5.1 cm (2 in.). For a cable under no tensile load, that minimum is 3.0 cm (1.2 in.).

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

NOTE
You should not use tie wraps with optical cables because they are easily overtightened and can damage the optic fibers.

- Plan for rack space required for cable management before installing the switch.
- Leave at least 1 m (3.28 ft) 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 you are using Brocade ISL Trunking, consider grouping cables by trunking groups. The cables used in trunking groups must meet specific requirements, as described in the *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 cables and other cables away from the LEDs.
- Use Velcro® type straps to secure and organize fiber-optic cables.

Items required for installation

The following items are required for installing, configuring, and connecting the Brocade 6505 for use in a network and fabric:

- A workstation with an installed terminal emulator, such as HyperTerminal
- An unused IP address and corresponding subnet mask and gateway address
- A serial cable (provided) if not using EZSwitchSetup
- An Ethernet cable
- Brocade-branded SFP+ optical transcceivers and compatible cables (Brocade-branded 16 Gbps SFP+ optical transcceivers required for 16 Gbps performance), as required
- Access to an FTP server or USB device for backing up the switch configuration (optional)

Standalone installation for a Brocade 6505

Complete the following steps to install the Brocade 6505 as a standalone unit.

1. Unpack the Brocade 6505 and verify the items listed in "Items included with the Brocade 6505" on page 5. Verify the items are present and undamaged.

2. Apply the adhesive rubber feet. Applying the rubber feet onto the switch helps prevent the switch from sliding off the supporting surface.

   a. Clean the indentations at each corner of the bottom of the switch to ensure that they are free of dust or other debris that might lessen the adhesion of the feet.

   b. With the adhesive side against the chassis, place one rubber foot in each indentation and press into place.

3. Place the switch on a flat, sturdy surface.

4. Provide power to the switch as described in

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 "Brocade 6505 configuration."

Cabinet installation for a Brocade 6505

Follow the installation instructions shipped with the appropriate rack mount kit:

- To install the switch into a fixed-rail rack, refer to the *Slim Rail Rack Mount Kit Installation Procedure*.

- To install the switch into a 2-post Telco rack, refer to the *Flush Mount Rack Mount Kit Installation Procedure*.

Brocade 6505 configuration

Once you have set up the Brocade 6505 in a rack or as a standalone switch, it is time to apply power and a basic configuration. If you are going to use the Brocade 6505 in a single-switch setup, you can use EZSwitchSetup to complete the basic configuration.

See the EZSwitchSetup CD, included with the Brocade 6505, for more information. You can also use the Brocade 6505 *EZSwitchSetup* poster.

If you do not want to use EZSwitchSetup, continue with the instructions in this section.

Providing power to the switch

Perform the following steps to provide power to the Brocade 6505.

1. Connect the power cord to the power supply, and then to a power source. If using two power supplies, be sure to connect the cords 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 the "❙" symbol. The power supply LEDs display amber until power-on self-test (POST) is complete, and then change to green. The switch usually requires several minutes to boot and complete POST.

ATTENTION

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

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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. See Figure 3 for the specific location of the LEDs.

Creating a serial connection

NOTE

You will perform all configuration tasks in this guide using a serial connection.

Complete the following steps to create a serial connection to the switch.

1. 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 RJ45 instead of RS-232, remove the adapter on the end of the serial cable and insert the exposed RJ45 connector into the RJ45 serial port on the workstation.

2. Open a terminal emulator application (such as HyperTerminal on a PC, or TERM, TIP, or Kermit in a UNIX environment), and configure the application as follows:

    *   In a Windows environment, use 9600 bits per second, 8 databits, no parity, 1 stop bit, and no flow control.
    *   In a UNIX environment using TIP, enter the following string at the prompt:

        `tip /dev/ttyb -9600`

        If ttyb is already in use, use ttya instead and enter the following string at the prompt:

        `tip /dev/ttya -9600`

Switch IP address

You can configure the Brocade 6505 with a static IP address, or you can use a Dynamic Host Configuration Protocol (DHCP) server to set the IP address of the switch. DHCP is enabled by default. The Brocade 6505 supports both IPv4 and IPv6.

Using DHCP to set the IP address

When using DHCP, the Brocade 6505 obtains its IP address, subnet mask, and default gateway address from the DHCP server. The DHCP client can only connect to a DHCP server that is on the same subnet as the switch. If your DHCP server is not on the same subnet as the Brocade 6505, use a static IP address.

Setting a static IP address

1. Log in to the switch using the default password (which is password).
2. Use the **ipaddrset** command to set the Ethernet IP address.

    If you are going to use an IPv4 IP address, enter the IP address in dotted decimal notation as prompted. As you enter a value and press **Enter** for a line in the following example, the next line appears.

    For instance, the Ethernet IP address appears first. When you enter a new IP address and press **Enter** or simply press **Enter** to accept the existing value, the Ethernet Subnetmask line appears.

    In addition to the Ethernet IP address itself, you can set the Ethernet subnet mask, the Gateway IP address, and whether to obtain the IP address by way of DHCP.

    ```
    switch:admin> ipaddrset
    Ethernet IP Address [192.168.74.102]:
    Ethernet Subnetmask [255.255.255.0]:
    Gateway IP Address [192.168.74.1]:
    DHCP [Off]: off
    ```

If you are going to use an IPv6 address, enter the network information in semicolon-separated notation as a standalone command.

```
switch:admin> ipaddrset -ipv6 --add 1080::8:800:200C:417A/64
IP address is being changed...Done.
```

Date and time settings

The Brocade 6505 maintains the current date and time inside a battery-backed real-time clock (RTC) circuit. Date and time are used for timestamping log events. Switch operation does not depend on the date and time; a Brocade 6505 with an incorrect date and time value still functions properly. However, because the date and time are used for logging, error detection, and troubleshooting, you should set them correctly.

Time zones

You can set the time zone for the switch by name. You can select continent, country, or time zone region names.

If the time zone is not set with the named options, the switch retains the offset time zone settings. This is a number of hours offset from Greenwich Mean Time (GMT). If you have set the time zone with a name, you can revert to the offset format if you choose. For more information about the **tsTimeZone** command, refer to the *Fabric OS Command Reference*.

You can set the time zone for a switch using the **tsTimeZone** command. The **tsTimeZone** command allows you to perform the following tasks:

* Display all of the time zones supported in the firmware
* Set the time zone based on a country and city combination or based on a time zone ID such as PST

The time zone setting has the following characteristics:

* You can view the time zone settings. However, only those with administrative permissions can set the time zones.
* The **tsTimeZone** setting automatically adjusts for Daylight Savings Time.
* Changing the time zone on a switch updates the local time zone setup and is reflected in local time calculations.
* By default, all switches are in the GMT time zone (0,0). If all switches in a fabric are in one time zone, it is possible for you to keep the time zone setup at the default setting.
* System services that have already started will reflect the time zone changes only after the next reboot.
* Time zone settings persist across failover for high availability.

Local time synchronization

You can synchronize the local time of the principal or primary fabric configuration server (FCS) switch to a maximum of eight external Network Time Protocol (NTP) servers. To keep the time in your SAN current, it is recommended that the principal or primary FCS switch has its time synchronized with at least one external NTP server. The other switches in the fabric will automatically take their time from the principal or primary FCS switch.

All switches in the fabric maintain the current clock server IP address in non-volatile memory. By default, this value is LOCL, the local clock server of the Principal (when FCS not enabled) or Primary (when FCS is enabled) switch. Changes to the clock server value on the Principal or Primary switch are propagated to all switches in the fabric.

When a new switch enters the fabric, the time server daemon of the Principal or Primary switch sends out the addresses of all existing clock servers and the time to the new switch. If a switch with Fabric OS v5.3.0 or later has entered the fabric, it will be able to store the list of all the clock server addresses; switches running Fabric OS versions earlier than v5.3.0 will ignore the new list parameter in the payload and will update only the active server address.

If the active NTP server configured is IPv6, then distributing the IP address in the fabric will not be possible to switches earlier than Fabric OS v5.3.0 because IPv6 is supported for Fabric OS v5.3.0 and later. The default value LOCL will be distributed to switches earlier than Fabric OS v5.3.0.

The **tsClockServer** command accepts multiple server addresses in IPv4, IPv6, or DNS name formats. When multiple NTP server addresses are passed, **tsClockServer** sets the first obtainable address as the active NTP server. The rest are stored as backup servers that can take over if the active NTP server fails. The Principal or Primary switch synchronizes its time with the NTP server every 64 seconds.

Setting the date

1. Log in to the switch using the default password (which is password).

2. Enter the **date** command, using the following syntax:

   date `"mmddHHMMyy"`

   The values are:

   - mm is the month; valid values are 01 through 12.

   - dd is the date; valid values are 01 through 31.

   - HH is the hour; valid values are 00 through 23.

   - MM is minutes; valid values are 00 through 59.

   - yy is the year; valid values are 00 through 99 (values greater than 69 are interpreted as 1970 through 1999, and values less than 70 are interpreted as 2000 through 2069).

     ```
     switch:admin> date
     Fri Sep 29 17:01:48 UTC 2007
     switch:admin> date "0927123007"
     Thu Sep 27 12:30:00 UTC 2007
     switch:admin>
     ```

Setting time zones

You must perform the procedure on *all* switches for which the time zone must be set. However, you only need to set the time zone once on each switch, because the value is written to nonvolatile memory.

Use one of the two following procedures to set the time zone. The first procedure requires you to select the actual time zone and the second requires you to select the country location of the switch.

The following procedure describes how to set the current time zone to Central Standard time using timezonename mode.

1. Log in to the switch using the default password (which is password).

2. Enter the **tsTimeZone** command as follows:

   Use *timezonename* to set the time zone by time zone ID, such as PST or Country/City.

   The following example shows how to change the time zone to US/Central. The **tsTimeZone** command by itself display the current time zone.

   ```
   switch:admin> tstimezone
   Time Zone : US/Pacific
   switch:admin> tstimezone US/Central
   switch:admin> tstimezone
   Time Zone : US/Central
   ```

The following procedure describes how to set the current time zone to Pacific Standard Time using interactive mode.

1. Enter the **tsTimeZone** command as follows:

   ```
   switch:admin> tstimezone --interactive
   ```

2. You are prompted to select a general location from a list.

   ```
   Please identify a location so that time zone rules can be set correctly.
   ```

3. Enter the appropriate number from the list that appears or **Ctrl-D** to quit.

4. At the prompt, select a country location from the list.

5. At the prompt, enter the appropriate number from the list to specify the time zone region or **Ctrl-D** to quit.

Synchronizing local time using NTP

Perform the following steps to synchronize the local time using NTP.

1. Log in to the switch using the default password(which is password).

2. Enter the **tsClockServer** command:

   ```
   switch:admin> tsclockserver "<ntp1;ntp2>"
   ```

   In the syntax *ntp1* is the IP address or DNS name of the first NTP server, which the switch must be able to access. The value *ntp2* is the name of the second NTP server and is optional. The entire operand *"<ntp1;ntp2>"* is optional; by default, this value is LOCL, which uses the local clock of the principal or primary switch as the clock server.

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

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

   The following example shows how to set up more than one NTP server using a DNS name:

   ```
   switch:admin> tsclockserver "10.32.170.1;10.32.170.2;ntp.localdomain.net"
   Updating Clock Server configuration...done.
   Updated with the NTP servers
   ```

Changes to the clock server value on the principal or primary FCS switch are propagated to all switches in the fabric.

Brocade Inter-Switch Link Trunking

Brocade Inter-Switch Link (ISL) Trunking is optional software that allows you to create trunking groups of ISLs between adjacent switches. Up to eight FC ports on the Brocade 6505 can be used as a trunking group to achieve speeds up to 128 Gbps (256 Gbps full duplex) for optimal bandwidth utilization and load balancing. For more information about Brocade ISL Trunking, see the *Fabric OS Administrator's Guide*.

Brocade Switch Status Policy

Brocade switch status policy is a feature that monitors different switch parameters such as power supplies, fan units, and so forth and provides switch status based on their health.

The switch status policy configuration can be updated using the **switchstatuspolicyset** command. The example shows the default settings of 2 and 0 for DOWN and MARGINAL units for both Bad PowerSupplies and Bad Fans.

```
switch:admin>switchstatuspolicyset

<some output skipped>

The minimum number of
    Bad PowerSupplies contributing to DOWN status: (0..2) [2]
    Bad PowerSupplies contributing to MARGINAL status: (0..2) [0]
    <some output skipped>
    Bad Fans contributing to DOWN status: (0..2) [2]
    Bad Fans contributing to MARGINAL status: (0..2) [0]
<output truncated>
```

If a second power supply and fan assembly unit is installed in the switch, Brocade recommends changing the configuration to 2 and 1 for DOWN and MARGINAL for both the Bad PowerSupplies and Bad Fans. You can use the **switchStatusPolicyShow** command to see the results of your changes.

Fabric OS Native and Access Gateway modes

The Brocade 6505 can function in either Fabric OS Native mode or Brocade Access Gateway mode. The switch is shipped in Fabric OS Native mode by default.

- You can enable Access Gateway mode using Fabric OS commands or Web Tools.

- All additional POD licenses must be installed before you can enable Access Gateway mode.

- When you enable Access Gateway, you can use the default F_Port-to-N_Port mappings or change this mapping using the command line interface (CLI) or Web Tools (after you configure an IP address using instructions under "Switch IP address").

- Access Gateway simplifies SAN deployment by using N_Port ID Virtualization (NPIV). NPIV provides Fibre Channel switch functions that improve switch scalability, manageability, and interoperability. For more information on Access Gateway, refer to the following:

  - For a list of F_Ports mapped to N_Ports by default, refer to "Access Gateway default port mapping" on page 37.

  - For general information and details on using Access Gateway, refer to the *Brocade Access Gateway Administrator's Guide.*

  - For specific instructions to prepare the edge fabric before connecting it to Access Gateway (because Access Gateway relies on NPIV technology for its connection to the edge fabric), refer to the *Brocade Access Gateway Administrator's Guide*.

NOTE
Access Gateway cannot be connected directly into an array; it requires a fabric to support NPIV.

- Fabric OS features available to the Brocade 6505 depend on whether the switch is configured in Access Gateway or Fabric OS Native mode. For a list of available features for each mode, refer to the *Brocade Access Gateway Administrator's Guide.*

- In Access Gateway mode, cascading is not available for the Brocade 6505. Refer to the *Brocade Access Gateway Administrator's Guide* for details on any other restrictions specific to the Brocade 6505.

- In Fabric OS Native mode, the switch provides up to 48 external Fibre Channel ports. These universal and self-configuring ports are capable of becoming one of the following port types:

  - F_Port (fabric enabled)

  - FL_Port (fabric loop enabled)

  - E_Port (expansion port)

  - M_Port (mirror port)

- In Access Gateway mode, the switch provides up to 48 external Fibre Channel ports. However, these ports are configured as N_Ports, and you cannot reconfigure these as any other port type.

Disabling and enabling Access Gateway mode

This section provides steps to disable and enable Access Gateway mode using Fabric OS commands. For more information on using these commands, refer to the *Brocade Access Gateway Administrator's Guide* or the *Brocade Fabric OS Administrator's Guide*.

NOTE
You can also disable and enable Access Gateway mode using Web Tools. Refer to the *Web Tools Administrator's Guide* for more information.

Enabling Access Gateway mode

Note the following when enabling Access Gateway mode:

- After you enable Access Gateway mode, some fabric information is erased, such as the zone and security databases.

- Enabling Access Gateway mode is disruptive because the switch is disabled and rebooted.

- Ensure that no zoning or Admin Domain (AD) transaction buffers are active. If any transaction buffer is active, enabling Access Gateway mode will fail with the error, "Failed to clear Zoning/Admin Domain configuration."

Use the following steps to enable Access Gateway mode using Fabric OS commands.

1. Before disabling a switch to enable Access Gateway mode, save the current configuration file using the **configupload** command in case you might need this configuration again.

2. Enter the **switchshow** command to verify the switch mode.

   - "Access Gateway Mode" displays for the switchMode value if the switch is in Access Gateway mode.
   - "Native" displays for the switchMode value if the switch is in Fabric OS Native mode.

3. Enter **switchDisable** to disable the switch. Access Gateway mode can only be enabled or disabled when the switch is in a disabled state.

4. Enter **ag –modeEnable** to enable Access Gateway mode.

5. Enter the **ag --modeshow** command to verify that Access Gateway mode is enabled.

```
switch:admin> ag --modeshow
Access Gateway mode is enabled.
```

Disabling Access Gateway mode

When you disable Access Gateway mode, the switch automatically reboots and comes back online using the fabric switch configuration. The Access Gateway parameters, such as F_Port-to-N_Port mapping, Failover, and Failback are automatically removed. When the switch reboots, it starts in Fabric OS Native mode. To rejoin the switch to the core fabric, refer to the *Brocade Access Gateway Administrator's Guide*.

Use the following steps to disable Access Gateway mode using Fabric OS commands.

1. Enter the **switchshow** command to verify the switch mode.

   - "Access Gateway Mode" displays if the switch is in Access Gateway mode.
   - "Native" displays if the switch is in Fabric OS Native mode.

2. Enter **switchDisable** to disable the switch. Access Gateway mode can only be disabled or enabled when the switch is in a disabled state.

3. Enter **ag –modeDisable** to disable Access Gateway mode.

4. Enter the **ag --modeshow** command to verify that Access Gateway mode is disabled.

```
switch:admin> ag --modeshow
Access Gateway mode is NOT enabled
```

Brocade 6505 Operation

In this chapter

Powering the Brocade 6505 on and off

Complete the following steps to power on the Brocade 6505. These steps apply to the base model of the switch which has a single power supply.

1. Connect the power cord to the power connector on the power supply and fan assembly.

2. Set the AC power switch to "**I**".

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

    The switch runs POST by default each time it is powered on; it can take up to several minutes to boot and complete POST.

Complete the following steps to power off the Brocade 6505.

1. Enter the **sysShutDown** command.

    ```
    switch:admin> sysshutdown
    This command will shutdown the operating systems on your
    switch. You are required to power-cycle the switch in
    order to restore operation.
    Are you sure you want to shutdown the switch [y/n]? y
    Broadcast message from root (ttyS0) Mon Sep 12 17: \
    52:12 2005...
    The system is going down for system halt NOW !!
    INIT: Switching to runlevel:
    INIT: Sending processes the TERM signal
    switch:root> Unmounting all filesystems.
    The system is halted
    flushing ide devices: hda
    Power down.
    ```

2. Set the AC power switches to **O**.

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

LED activity interpretation

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. Flashing LEDs may be slow, fast, or flickering. The LED colors are either green or amber.

Sometimes, the LEDs flash either 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 6505 LEDs

The Brocade 6505 has the following LEDs:

- One system status LED (upper) on the left side.
- One power status LED (lower) on the left side.
- Two Ethernet port LEDs (one amber, one green).
- One bicolor (green and amber) port status LED for each port on the switch. These LEDs are arrayed above each pair of Fibre Channel ports.
- One power supply and fan assembly LED above the AC power switch on each power supply on the non-port side of the switch.

LED locations

Figure 3 shows the LEd locations on the port side of the Brocade 6505. The port status LEDs for the FC ports are arranged left and right to correspond to the upper and lower ports respectively in each pair. Refer to Figure 1 for the locations of the FC ports.
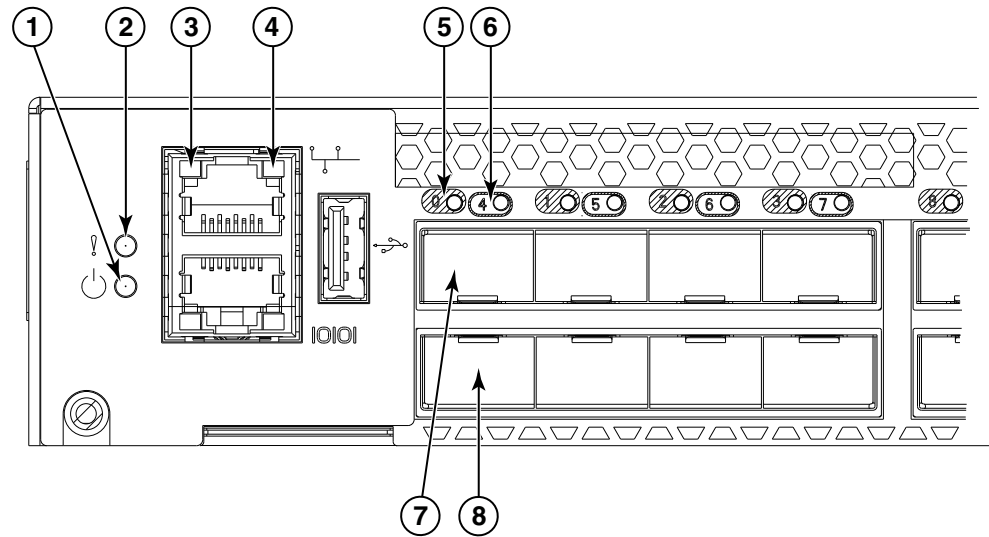
1	System power LED (green)	5	FC port status LED (port 0)
2	System status LED green/amber)	6	FC port status LED (port 4)
3	Ethernet port activity LED (amber)	7	FC port 0
4	Ethernet port speed LED (green)	8	FC port 4

FIGURE 3   **LEDs on the port side of Brocade 6505**

NOTE
The two LEDs on the serial console port are non-functional.

Figure 4 shows the LEDs on the nonport side of the switch.

1   Power supply and fan assembly #1 status LED

FIGURE 4   **LEDs on the nonport side of Brocade 6505**

LED patterns

Table 1 describes the port side LEDs and their behavior.

TABLE 1   Port side LED patterns during normal operation

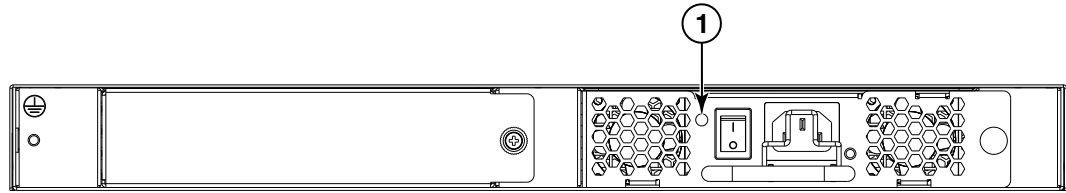| LED name	LED color	Status of hardware	Recommended action
Power Status (green)	No light	System is off or there is an internal power supply failure.	Verify the system is powered on (power supply switches to **I**), the power cables are attached, and your power source is live. Otherwise, contact your switch service provider.
	Steady green	System is on and power supplies are functioning properly.	No action required.
System Status (bicolor)	No light	System is off or there is no power.	Verify the system is on and has completed booting.
	Steady green	System is on and functioning properly.	No action required.
	Steady amber (for more than five seconds)	A system fault has occurred. This LED displays steady amber during POST; this is normal and does not indicate a fault.	Check the failure indicated on the system console. Contact your switch service provider.
	Blinking amber	Attention is required. A number of factors can cause this status, including a single power supply failure, a fan failure, or one or more environmental ranges has been exceeded.	Check the management interface and the error log for details on the cause of status. Contact your switch service provider.
Ethernet Speed (green)	No light	Port speed is 10 Mbps.	No action required.
	Steady green	Port speed is 100 Mbps.	No action required.
Ethernet Activity/Link (amber)	No light	There is no link.	Verify that the Ethernet cable is connected correctly.
	Steady amber	There is a link.	No action required.
	Blinking amber	There is link activity (traffic).	No action required.

TABLE 1 Port side LED patterns during normal operation (Continued)

LED name	LED color	Status of hardware	Recommended action
Optical media port status (one bicolor LED for each FC port)	Off	No light or signal carrier on the media interface.	Verify that the transceiver is installed correctly and that the cable is connected correctly.
	Steady amber	Receiving light or carrier, but not online.	No action required.
	Slow blinking amber (2 sec)	Disabled (by diagnostics or by **portDisable** command).	Verify that the diagnostic tests are not being run. Re-enable the port using the **portEnable** command.
	Fast blinking amber (1/2 sec)	Port failure.	Check the management interface and the error log for details on the cause of the failure. Contact Technical Support if necessary.
	Steady green	Online.	No action required.
	Slow blinking green (2 sec)	Online but segmented (loopback cable or incompatible switch).	No action required.
	Fast blinking green (1/2 sec)	Internal loopback (diagnostic).	No action required.
	Flickering green	Online, frames flowing through port.	No action required.

Table 2 describes the LEDs on the nonport side of the switch.

TABLE 2 Nonport side LED patterns during normal operation

LED name	LED color	Status of hardware	Recommended action
Power supply and fan assembly status (green)	No light	Power supply and fan assembly is not receiving power or is off.	Verify the power supply and fan assembly is on and seated and the power cord is connected to a functioning power source.
	Steady green	Power supply and fan assembly is operating normally.	No action required.
	Flashing green	Power supply and fan assembly is faulty. **Note:** When the switch is first powered on the power supply and fan assembly status LED will show flashing green until POST has completed.	Check the power cable connection. Verify that the power supply and fan assembly is powered on. Replace the power supply and fan assembly FRU.

POST and boot specifications

When the switch is turned on or rebooted, the switch performs power-on self-test (POST). Total boot time with POST can be several minutes. POST can be omitted after subsequent reboots by using the **fastboot** command or entering the **diagDisablePost** command to persistently disable POST.

For more information about these commands, refer to the *Fabric OS Command Reference Manual*.

POST

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

POST includes the following tasks:

- Conducts preliminary POST diagnostics.

- Initializes the operating system.

- Initializes hardware.

- Runs diagnostic tests on several functions, including circuitry, port functionality, memory, statistics counters, and serialization.

Boot

In addition to POST, boot includes the following tasks after POST is complete:

- Performs universal port configuration.

- Initializes links.

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

- Obtains a domain ID and assigns port addresses.

- Constructs unicast routing tables.

- Enables normal port operation.

Interpreting POST results

POST is a system check that is performed each time the switch is powered on, rebooted, or reset. During POST, the LEDs flash either amber or green. Any errors that occur during POST are listed in the error log.

Complete the following steps to determine whether POST completed successfully and whether any errors were detected.

1. Verify that the switch LEDs indicate that all components are healthy.

   See Table 1 and Table 2 for descriptions and interpretations of LED patterns. If one or more LEDs do not display a healthy state, verify that the LEDs on the switch are not set to "beacon" by entering the **switchShow** command to detect if beaconing is active.

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

   If there is no switch prompt when POST completes, press **Enter**. If the switch prompt still does not display, try opening a Telnet session or accessing the switch through another management tool. If this is not successful, the switch did not successfully complete POST. Contact your switch supplier for repair.

3. Review the switch error log for errors. Any errors detected during POST are written to the error log, accessible through the **errShow** command.

For information about all referenced commands, and on accessing the error log, refer to the *Fabric OS Administrator's Guide*. For information about error messages, refer to the *Fabric OS Message Reference Manual*.

Brocade 6505 maintenance

The Brocade 6505 is designed for high availability and low failure; it does not require any regular physical maintenance. Maintenance includes running diagnostic tests and checking and replacing field-replaceable units, described in the following sections.

Installing an SFP+ transceiver

The Brocade 6505 only supports Brocade-branded 8 Gbps and 16 Gbps SFP+ optical transceivers. For the Fibre Channel connections, the Brocade 6505 uses SFP+ transceivers that support any combination of Short Wavelength (SWL), Long Wavelength (LWL), and Extended Long Wavelength (ELWL) optical media.

If you use an unqualified transceiver, the **switchShow** command output shows the port in a Mod_Inv state. Fabric OS also logs the issue in the system error log.

For this procedure, see Figure 5 or Figure 6.

Complete the following steps to an SFP+ transceiver.

1. Making sure that the bail (wire handle) is in the unlocked position, position the optical transceiver so that the key is oriented correctly to the port. Insert the transceiver into the port until it is firmly seated and the latching mechanism clicks; then close the bail.

    Transceivers are keyed so that they can only be inserted with the correct orientation. If a transceiver does not slide in easily, ensure that it is correctly oriented.

2. Position a cable so that the key (the ridge on one side of the cable connector) is aligned with the slot in the transceiver. Insert the cable into the transceiver until the latching mechanism clicks.

    Cables are keyed so that they can be inserted in only one way. If a cable does not slide in easily, ensure that it is correctly oriented. Do not insert a cable intended for an mSFP transceiver into a regular SFP+ transceiver. You may damage the cable. Do not force a standard SFP cable into an mSFP transceiver. You may damage the transceiver.

NOTE
Each SFP+ transceiver has a 10-pad gold-plated PCB-edge connector on the bottom. The correct position to insert an SFP+ transceiver into the upper row of ports is with the gold-plated edge down. The correct position to insert an SFP+ transceiver into the lower row of ports is with the gold-plated edge up.

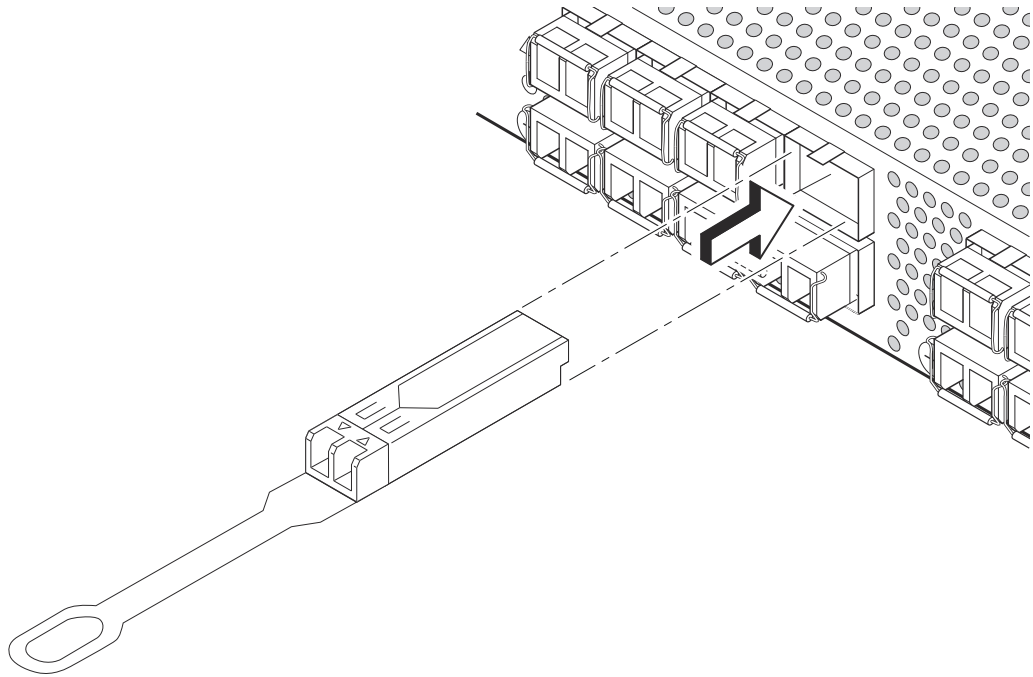**FIGURE 5**   Installing a 16 Gbps SFP+ optical transceiver in the upper row port slot
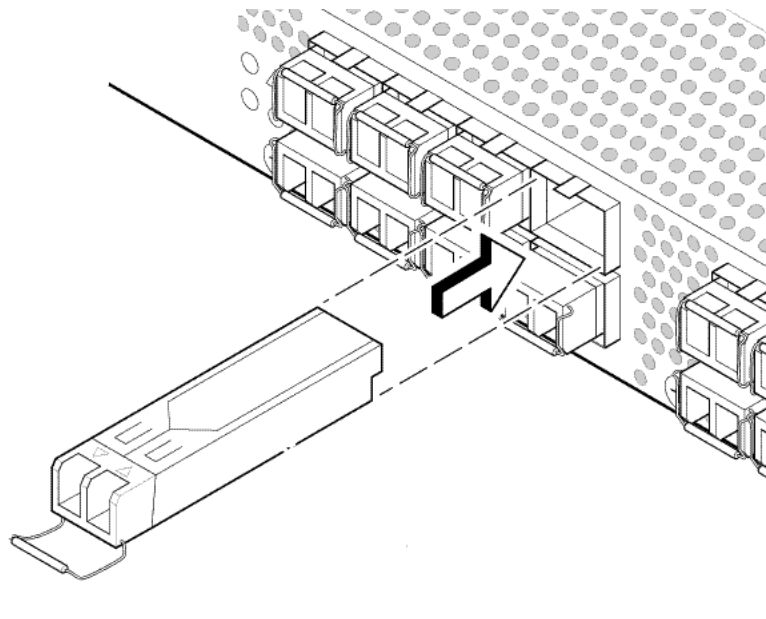

FIGURE 6   Installing an 8 Gbps SFP+ optical transceiver in the upper row port slot

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 console set up to the 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 loopback plugs.

Diagnostic tests run at link speeds of 2, 4, 8, or 16 Gbps depending on the speed of the link being tested and the type of port.

NOTE
Diagnostic tests might temporarily lock the transmit and receive speed of the links during diagnostic testing.

For information about specific diagnostic tests, see the *Fabric OS Troubleshooting and Diagnostics Guide*.

Brocade 6505 management

You can use the management functions built into the Brocade 6505 to monitor the fabric topology, port status, physical status, and other information to help you analyze switch performance and to accelerate system debugging.

The Brocade 6505 automatically performs power-on self-test (POST) each time it is turned on. Any errors are recorded in the system error log. For more information about POST, see "POST and boot specifications" on page 21.

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

You can manage the Brocade 6505 using any of the management options listed in Table 3. Refer to the *Fabric OS Command Reference Manual* for more information on the CLI commands.

TABLE 3   Management options for the Brocade 6505 switch

Management tool	Out-of-band support	In-band support
Command line interface (CLI) For more information, refer to the *Fabric OS Administrator's Guide* and the *Fabric OS Command Reference Manual*.	Ethernet or serial connection	IP over Fibre Channel
Brocade Web Tools For information, refer to the *Web Tools Administrator's Guide*.	Ethernet or serial connection	IP over Fibre Channel
Standard SNMP applications For information, refer to the *MIB Reference Manual*.	Ethernet or serial connection	IP over Fibre Channel
Management Server For information, refer to the *Fabric OS Administrator's Guide* and the *Fabric OS Command Reference Manual*.	Ethernet or serial connection	Native in-band interface (over HBA only)
Brocade Network Advisor For information, refer to the Brocade Network Advisor documentation set.	Ethernet or serial connection	IP over Fibre Channel

Removal and Replacement of Power Supplies and Fans

In this chapter

Introduction

NOTE
Read the "Installation and safety considerations" on page 5 before servicing.

The field-replaceable units (FRUs) in the Brocade 6505 can be removed and replaced without special tools. The Brocade 6505 can continue operating during the FRU replacement if the conditions specified in the procedure are followed.

Removing and replacing a power supply and fan assembly

The Brocade 6505 fans are fixed inside the combined power supply and fan assembly to provide necessary airflow to cool the entire system. There are two fans located in each power supply and fan assembly. The system software sets fan speed and measures the speed through the tachometer interface.

The base model Brocade 6505 has one power supply and fan assembly, as displayed in Figure 7. Fabric OS identifies the assemblies from right to left on the nonport side. Even though they are contained within a single unit, the power supply and fan components are identified separately. In the **chassisShow** command they are identified as Power Supply Unit:1 and Fan Unit:1.
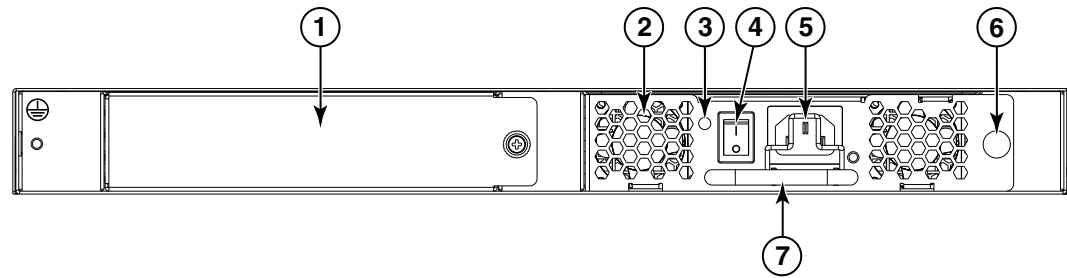
1	Filler panel	5	Power plug receptacle (with plug retainer)
2	Power supply and fan assembly 1	6	Thumbscrew
3	Power supply and fan assembly LED	7	Handle
4	On/off switch		

FIGURE 7 Nonport side of the Brocade 6505

CAUTION

Disassembling any part of the power supply voids the part warranty and regulatory certifications. There are no user-serviceable parts inside the power supply and fan assembly.

CAUTION

The cooling system relies on pressurized air; if you are using redundant power supply and fan assemblies, do not leave either of the power supply and fan assembly slots empty longer than two minutes when the Brocade 6505 is operating. If one power supply and fan assembly fails, leave the power supply and fan assembly in the Brocade 6505 until it can be replaced.
If you are using only one power supply and fan assembly, be sure that the slot filler panel is in place. If that power supply fails, the switch will turn off.

ATTENTION

If you are using two power supply and fan assemblies, maintain both power supply and fan assemblies in operational condition to provide redundancy.

Table 4 describes the power supply and fan assembly status LED colors, behaviors, and actions required, if any.

TABLE 4   Power supply and fan assembly status LED behavior, description, and required actions

LED color	Description	Action required
No light	Power supply and fan assembly is not receiving power, or is off.	Verify that the power supply and fan assembly is on and seated and the power cord is connected to a functioning power source.
Steady green	Power supply and fan assembly is operating normally.	No action is required.
Flashing green (for more than 5 seconds)	Power supply and fan assembly is faulty for one of the following reasons: • The assembly is switched off - flashing for ~ 5 seconds, then off • The power cable is disconnected - flashing for ~ 5 seconds, then off • The power supply and fan assembly has failed NOTE: When the Brocade 6505 is first powered on, the power supply and fan assembly status LED will flash until POST has completed.	Try one of the following: • Check the power cable connection. • Verify that the assembly is powered on. • Replace the power supply and fan assembly.

Determining the need to replace a power supply and fan assembly

Use one of the following methods to determine the status of the power supplies:

- Check the power supply and fan assembly status LED next to the on/off switch (refer to "LED locations" on page 18).

- In Web Tools, click the **Power Status** icon.

- Enter the **psShow** command at the prompt to display power supply and fan assembly status in the following example:

```
br6505:admin> psshow

Power Supply #1 is OK
Power Supply #2 is absent
br6505:admin>
```

Alternatively, you can enter the **fanShow** or **chassisShow** commands to determine the status of the power supply and fan assembly:

```
br6505:admin> fanshow

Fan 1 is OK, speed is 8653 RPM
Fan 2 is absent
br6505:admin>



br6505:admin> chassisshow

FAN  Unit: 1
Fan Direction:          Forward
Time Awake:             0 days
```

```
POWER SUPPLY   Unit: 1
Power Source:          AC
Time Awake:            0 days

Power Supply #1 is OK
Power Supply #2 is absent

<additional output truncated>
br6505:admin>
```

Time required

Replacing a power supply and fan assembly in the Brocade 6505 should require less than two minutes to complete.

Items required

The following items are required to replace a power supply and fan assembly:

- New power supply and fan assembly
- A #1 Phillips screwdriver

Removing a power supply and fan assembly

Refer to Figure 8 for this procedure.

Complete the following steps to remove a combined power supply and fan assembly from a Brocade 6505.

1. If the Brocade 6505 has only one power supply and fan assembly, then the switch must be powered off prior to replacing the assembly. If the Brocade 6505 has two power supply and fan assemblies installed, verify that the other power supply and fan assembly (the one not being replaced) has been powered on for at least four seconds and has a steady green LED.

2. If the Brocade 6505 has two power supply and fan assemblies, skip to step 3. If the Brocade 6505 has only one power supply and fan assembly, enter the **sysShutDown** command before powering off the assembly to maintain the reliability of the system.

3. Power off the assembly to be replaced by switching the AC power switch to the **O** symbol.

   If the Brocade 6505 has two power supply and fan assemblies,the fans in the second power supply will automatically switch to high speed to maintain adequate cooling.

4. Unplug the power cord from the power supply and fan assembly that is being replaced.

5. Using a Phillips screwdriver, unscrew the captive screw.

6. Remove the power supply and fan assembly from the chassis by pulling the handle out and away from the chassis.

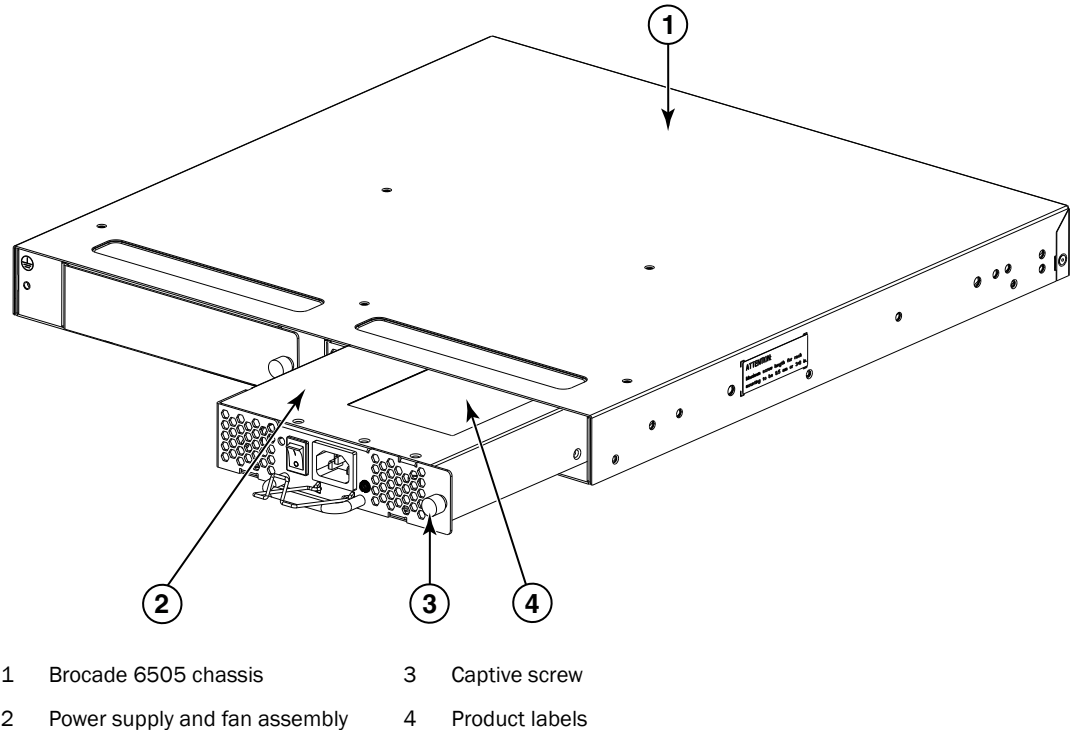7. Note the part number on the assembly just removed.

1	Brocade 6505 chassis	3	Captive screw
2	Power supply and fan assembly	4	Product labels

FIGURE 8   Inserting the power supply and fan assembly into the switch

Replacing a power supply and fan assembly

Refer to Figure 8 for this procedure.

Complete the following steps to replace a combined power supply and fan assembly in a Brocade 6505.

CAUTION

The power supply switch must be in the off position (on/off sawitch switched to the O symbol(when inserting it in the chassis. Damage to the switch could result if a live power supply is installed.

1. Ensure that the new power supply and fan assembly has the same part number as the power supply and fan assembly being replaced.

2. Orient the new power supply and fan assembly with the captive screw on the right, as shown in Figure 8.

CAUTION

Do not force the installation. If the FRU does not slide in easily, ensure that it is correctly oriented before continuing.

3. Gently push the power supply and fan assembly into the chassis until it is firmly seated.

4. Using the Phillips screwdriver, secure the power supply and fan assembly to the chassis by tightening in the captive screw.

5. Plug the power cord into the power supply and fan assembly and power on the unit by switching the AC power switch to the **I** symbol.

6. Verify that the LED on the new power supply and fan assembly displays a steady green light while the Brocade 6505 is operating. If the LED is not a steady green, ensure that the power supply is securely installed and seated properly.

7. Optionally, if using the command line interface (CLI), enter the **psShow** command at the command line prompt to display the status. You can also use the **fanShow** or **chassisShow** commands. Power supply and fan assembly status can also be viewed using the Web Tools application.

Brocade 6505 Specifications

In this appendix

Weight and physical dimensions

Table 5 lists the weight and dimensions of the Brocade 6505.

TABLE 5   Physical specifications

Dimension	Value
Height	1U or 4.3 cm (1.7 in.)
Depth	44.3 cm (17.4 in.)
Width	43.8 cm (17.2 in.) (note the slightly increased width which requires a slim rail rack mount kit for mounting)
Weight (with one power supply and fan assembly, and no SFP+ transceivers installed)	7.82 kg (17.25 lb)

Facility requirements

Table 6 provides the facilities requirements that must be met for the Brocade 6505.

TABLE 6   Facility requirements

Type	Requirements
Electrical	• Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate. • Circuit protected by a circuit breaker and grounded in accordance with local electrical codes. Refer to Table 7 on page 34 for complete power supply specifications.
Thermal	• A minimum airflow of 79.8 cubic meters/hour (47 cubic ft/min.) available in the immediate vicinity of the switch.??? • Ambient air temperature not exceeding 40°C (104°F) while the switch is operating.
Cabinet (when rack-mounted)	• One rack unit (1U) in a 48.3 cm (19-inch) cabinet. • All equipment in cabinet grounded through a reliable branch circuit connection. • Additional weight of switch not to exceed the cabinet's weight limits. • Cabinet secured to ensure stability in case of unexpected movement.

System power 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 built-in fans for cooling.

Table 7 lists the system power specifications for the Brocade 6505.

TABLE 7   System power specifications

Specification	Value
Maximum output (per power supply)	150 watts, 12 VDC
AC input power draw	Idle, no optics: 60 W Maximum, fully populated with 16 Gbps SWL optics: 80 W
AC input voltage	85-264 VAC, nominal 100-240 VAC
AC input line frequency	47-63 Hz, nominal 50-60 Hz
AC inrush current	Maximum of 35A @ 240 VAC for 10 ms or less
Input line protection	AC lines are fused.

Environmental requirements

Table 8 lists the acceptable environmental ranges for both operating and nonoperating (such as during transportation or storage) conditions.

TABLE 8   Environmental requirements

Condition	Acceptable during operation	Acceptable during nonoperation
Ambient Temperature	0° to 40°C (32° to 104°F)	-25° to 70°C (-13° to 158°F)
Humidity	10% to 85% RH non-condensing, at 40°C (104°F)	10% to 90% RH non-condensing, at 70°C (158°F)

TABLE 8   Environmental requirements (Continued)

Condition	Acceptable during operation	Acceptable during nonoperation
Altitude	0 to 3 km (9,842 feet) above sea level	0 to 12 km (39,370 feet) above sea level
Shock	20 G, 6 ms, half-sine wave	33 G, 11 ms, half-sine wave, 3/eg Axis
Vibration	0.5 G sine, 0.4 gms random, 5-500 Hz	2.0 G sine, 1.1 gms random, 5-500 Hz
Airflow	Maximum - 71.36 cmh (42 cfm)??? Nominal - 59.47 cmh (35 cfm)??? NOTE: Airflow is port side exhaust.	N/A
Heat dissipation	338 BTU/hr (24 port configuration)	N/A

General specifications

Table 9 lists the general specifications for the Brocade 6505.

TABLE 9   General specifications

Specification	Description
Configurable port types	F_Port, E_Port, M_Port, EX_Port, D_Port
System architecture	Nonblocking shared-memory switch
System processor	PowerPC 440EPx @ 667 MHz
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	384 Gbps
FC Port-to-port latency	800 nanoseconds with no contention (destination port is free)
Switching capacity	An aggregate switching capacity of 210??? million frames per second (for Class 2, Class 3, and Class F frames for the 24 port chassis)

Data transmission ranges

Table 10 provides the data transmission ranges for different transceivers, port speeds, and cable types.

TABLE 10   Supported optics, speeds, cables, and distances

Transceiver type	Form factor	Speed	Multimode media (62.5 microns) (OM1)	Multimode media (50 microns) (OM2)	Multimode media (50 microns) (OM3)	Multimode media (50 microns) (OM4)	Single mode media (9 microns)
SWL	SFP+	4 Gbps	70 m (229 ft.)	150 m (492 ft.)	380 m (1264 ft.)	400 m (1312 ft.)	N/A
	SFP+	8 Gbps	21 m (68 ft.)	50 m (164 ft.)	150 m (492 ft.)	150 m (492 ft.)	N/A
	SFP+	16 Gbps	15 m (49 ft.)	35 m (115 ft.)	100 m (328ft.)	125 m (410 ft.)	N/A

TABLE 10   Supported optics, speeds, cables, and distances (Continued)

Transceiver type	Form factor	Speed	Multimode media (62.5 microns) (OM1)	Multimode media (50 microns) (OM2)	Multimode media (50 microns) (OM3)	Multimode media (50 microns) (OM4)	Single mode media (9 microns)
LWL	SFP+	4 Gbps	N/A	N/A	N/A	N/A	30 km (18.6 mi.)
	SFP+	8 Gbps	N/A	N/A	N/A	N/A	10 km (6.2 mi.) or 40 km (24.8 mi.)
	SFP+	16 Gbps	N/A	N/A	N/A	N/A	10 km (6.2 mi.)

Up to 7500 km at 2 Gbps is supported when using a long distance transport system such as DWDM.

Memory specifications

The Brocade 6505 has three primary types of memory devices: boot flash, compact flash, and main memory. The size of each is listed in Table 11.

TABLE 11   Brocade 6505 memory specifications

Memory type	Amount
Boot flash	4 MB (expandable to 8 MB)
Compact flash	1 GB
Main memory (SODIMM DDR2)	1 GB, 64-bit bus operating at 166 MHz with 8-bit ECC

Fibre Channel port specifications

The Fibre Channel ports in the Brocade 6505 are compatible with SWL, LWL, and ELWL SFP+ transceivers (for 16 Gbps performance). 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 37.

The ports are capable of operating at 2, 4, 8, or 16 Gbps depending on SFP+ transceiver models and are able to autonegotiate to the maximum link speed.

Serial port specifications

The serial port is located on the port side of the switch. The Brocade 6505 uses an RJ45 connector for the serial port. An RJ45-to-DB9 adapter is also provided with the switch.

NOTE
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.

Table 12 lists the serial cable pinouts.

TABLE 12   Serial cable pinouts

PIN	Signal	Description
1	Not supported	N/A
2	Not supported	N/A
3	UART1_TXD	Transmit data
4	GND	Logic ground
5	GND	Logic ground
6	UART1_RXD	Receive data
7	Not supported	N/A
8	Not supported	N/A

Access Gateway default port mapping

Table 13 lists the port mappings of F_Ports to N_Ports.

TABLE 13   Access Gateway default port mapping

Total ports	F_Ports	N_Ports	Default port mapping
24	0-15	16-23	0,1 mapped to 16 2,3 mapped to 17 4,5 mapped to 18 6,7 mapped to 19 8,9 mapped to 20 10,11 mapped to 21 12,13 mapped to 22 14,15 mapped to 23

Regulatory compliance

This section describes the following regulatory compliance requirements for the Brocade 6505: It contains:

- *"FCC warning (US only)"* on page 38
- *"German statement"* on page 38
- *"KCC statement (Republic of Korea)"* on page 38
- *"VCCI statement (Japan)"* on page 38
- *"Power cords (Japan DENAN)"* on page 39
- *"Chinese statement"* on page 39
- *"BSMI statement (Taiwan)"* on page 39
- *"CE statement"* on page 39

- "Canadian requirements" on page 40
- "Laser compliance" on page 40

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.

German statement

Maschinenlärminformations-Verordnung – 3 GPSGV, der höchste Schalldruckpegel beträgt 70.0 dB(A) gemäss EN ISO 7779.

Machine noise information regulation – 3. GPSGV, the highest sound pressure level value is 70.0 dB(A) in accordance with EN ISO 7779.

KCC statement (Republic of Korea)

A급 기기 (업무용 방송통신기기): 이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Class A device (Broadcasting Communication Device for Office Use): This device obtained EMC registration for office use (Class A), and may be used in places other than home. Sellers and/or users need to take note of this.

VCCI statement (Japan)

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。

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.

Power cords (Japan DENAN)

Chinese statement

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 adequate measures.

BSMI statement (Taiwan)

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。

Warning:

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

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 Brocade 6505 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 2004/108/EEC
- Low Voltage Directive (LVD) 2006/95/EC
- 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.

Electrical cautions

RTC battery

DANGER

Do not attempt to replace the real-time clock (RTC) battery. There is a 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 14 lists the regulatory compliance standards for which the Brocade 6505 is certified.

TABLE 14   Regulatory compliance standards

Country	Standards		Agency Certifications and Markings	
	Safety	EMC	Safety	EMC
United States	Bi-Nat UL/CSA 60950-1 2nd Ed or latest	ANSI C63.4	cCSAus	FCC Class A and Statement
Canada	Bi-Nat UL/CSA 60950-1 2nd Ed or latest	ICES-003 Class A	cCSAus	ICES A and Statement
Japan		CISPR22 and JEIDA (Harmonics)		VCCI-A and Statement
European Union	EN60950-1 2nd Ed or latest	EN55022 and EN55024	TUV-GS	CE marking
Australia, New Zealand		EN55022 and CISPR22 or AS/NZS CISPR22		C-Tick mark
Argentina	IEC60950-1 2nd Ed or latest		"S" mark	
Russia	IEC60950-1 2nd Ed or latest	51318.22-99 and 51318.24-99 or latest	GOST mark	GOST mark
Korea		KN22 and KN24		KCC mark Class A
China	GB4943-2001 and GB9254-1998 or latest	GB17625.1-2003 or latest	CCC logo	CCC logo
Taiwan	CNS 14336-1 (99) or latest	CNS 13438(95) or latest	BSMI mark	BSMI mark

Environmental regulation compliance

This section describes the "China RoHS" environmental regulatory compliance requirements for the Brocade 6505 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.

遵守环境法规
中国 **RoHS**
本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》的要求。

Environmental protection use period (EPUP) disclaimer

In no event do the EPUP logos shown on the product and FRUs 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), Figure 9 is provided regarding the names and concentration level of hazardous substances (HS) which may be contained in this product.

有毒有害物质或元素名称及含量标识
Toxic / Hazardous Substances and Elements Table

部件名称	有毒有害物质或元素					
	铅（Pb）	汞（Hg）	镉（Cd）	六价铬 (Cr (VI))	多溴联苯 （PBB）	多溴二苯醚 （PBDE）
光纤通道交换机 Fiber Channel Switch	✗	○	○	○	○	○
风扇/冷却组装件 Fan, Blower Assemblies	✗	○	○	○	○	○
线路板部件 PCBA Cards	✗	○	○	○	○	○
主机总线适配 (HBA) Host Bus Adapter (HBA)	✗	○	○	○	○	○
USB 闪存器 USB Flash Drive	○	○	○	○	○	○
电源 Power Supply Kit	✗	○	○	○	○	○
光纤模块　㉒ SFP Optics	✗	○	○	○	○	○
钣金件 Sheet Metal	✗	○	○	○	○	○
机箱部件 Chassis Assembly	✗	○	○	○	○	○
机械支架及滑轨 Mechanical Brackets & Slides	✗	○	○	○	○	○
插槽填充物 Slot Filler	✗	○	○	○	○	○
电缆整理盘 Cable Management Tray	✗	○	○	○	○	○
梳状线缆 Cable Comb	✗	○	○	○	○	○
线束及电源线 Cables and Power Cords	○	○	○	○	○	○
替换门 Replacement Doors	✗	○	○	○	○	○
电池 Battery	○	○	○	○	○	○
软件/文档光盘 Software/Documentation CDs	○	○	○	○	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363—2006规定的限量要求以下。

○: Indicates that the content of the toxic and hazardous substance in all the homogeneous materials of the part is below the concentration limit requirement as described in SJ/T 11363-2006.

✗：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363—2006规定的限量要求。

✗: Indicates that the content of the toxic and hazardous substance in at least one homogeneous material of the part exceeds the concentration limit requirement as described in SJ/T 11363-2006.

FIGURE 9   **Toxic/hazardous substances and elements table**

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