Brocade 6520

Hardware Reference Manual

BROCADE

Brocade Communications Systems, Incorporated

Document History

Document title	Publication number	Summary of changes	Date
Brocade 6520 Hardware Reference Manual	53-1002705-01	New document	December 2012
Brocade 6520 Hardware Reference Manual	53-1002705-02	Added port group information and changed data compression and encryption limits.	March 2013

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Chapter 3   **Brocade 6520 Operation**

Chapter 4   **Removal and Replacement of Power Supplies and Fans**

Appendix A   **Brocade 6520 Specifications**

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 6520 Introduction" provides an overview of the Brocade 6520 switch, a feature list, and a look at the appearance of the switch.

- Chapter 2, "Brocade 6520 Installation and Configuration" provides the information needed to install the switch into your network.

- Chapter 3, "Brocade 6520 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 6520 Specifications" provides tables of physical, environmental, and general specifications, helpful for quick lookup.

- Appendix B, "Caution and Danger Notices" contains a list of the translated Caution and Danger messages.

Supported hardware and software

Although many different software and hardware configurations are tested and supported by Brocade Communications Systems, Inc. for Fabric OS 7.1.0, documenting all possible configurations and scenarios is beyond the scope of this document.

This document includes information specific to the Brocade 6520 running Brocade Fabric OS version 7.1.0. and later.

What's new in this document

- The port group illustration has been added. Refer to "Brocade ISL Trunking."
- The number of ports on which in-flight data compression and encryption can occur has been updated. Refer to "Brocade 6520 features and capabilities."

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 in this document are as follows:

bold text	Identifies command names Identifies 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 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, refer to the *Fabric OS Command Reference*.

Notes, cautions, and warnings

The following notices and statements are used in this manual. They are listed here 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. Refer to *"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

Notice to the reader

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These references are made for informational purposes only.

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Oracle Corporation	Oracle, Java
Netscape Communications Corporation	Netscape
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

For information about the Ethernet industry, visit the Internet Engineering Task Force website:

http://www.ietf.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. Switch Serial Number

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

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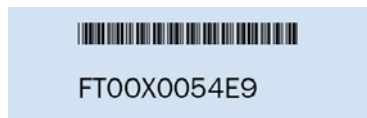
    The serial number label is located on the switch ID pull-out tab located inside the chassis on the port side on the left.

3. 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 6520 Introduction

In this chapter

Brocade 6520 overview

The Brocade 6520 is a 96-port auto-sensing 2, 4, 8, or 16 Gbps, as well as 10 Gbps, Fibre Channel (FC) switch that delivers the latest Brocade multi-chip architecture for Fibre Channel Storage Area Networks (SANs). The Brocade 6520 is an enterprise-class switch that is designed to handle the large-scale SAN requirements of an enterprise, and can also be used to address the SAN requirements of a small to medium-sized workgroup.

The Brocade 6520 provides up to 96 ports in a double height (2U) switch that enables the creation of very dense fabrics in a relatively small space.

The Brocade 6520 offers Ports on Demand (POD) licensing as well. "Base" models of the switch contain 48 ports, and up to two additional 24-port POD licenses can be purchased to fill all 96 ports.

Port activation works through a process called Dynamic Ports on Demand (DPOD). With DPOD, ports are licensed as they come online. For instance, if you have a base model with 48 port licenses, the first 48 ports to come online, regardless of their numbering, are licensed. Once all the licenses have been assigned, you can manually move those licenses from one port to another if you choose.

The first eight ports can be configured to run at 10 Gbps with the appropriate licensing.

The Brocade 6520 supplies Reliability, Availability, and Serviceability (RAS) performance and scalability requirements of an enterprise switch along with interoperability and ease-of-use advantages.

The Brocade 6520 is only 24 inches deep and has airflow direction options. You can order either port side exhaust (the default configuration) or non-port side exhaust airflow to accommodate specific installations.

Brocade 6520 features and capabilities

The Brocade 6520 offers the following features and capabilities:

- Up to 96 auto-sensing ports of high-performance 16 Gbps technology in a single domain.
- Ports on Demand scaling from 48 to 72 or 96 ports.
- Port licensing via DPOD

- 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.
- 10 Gbps manual set capability on FC ports (requires the optional 10 Gigabit FCIP/Fibre Channel license) on the first eight ports only.
    - Ports can be configured for 10 Gbps for metro connectivity.
    - 10 Gbps performance is enabled by 10 Gbps Fibre Channel SFP+ transceivers.
- FC ports will self-configure as E_ports and F_ports. EX_ports can be activated on a per-port basis with the optional Integrated Routing license.
    - Mirror ports (M_ports) and diagnostic ports (D_ports) must be manually configured.
    - The Brocade Diagnostic Port (D_port) feature provides physical media diagnostic, troubleshooting, and verification services.
- In-flight data compression and encryption on up to 16 ports (up to 8 ports at 16 Gbps) provides efficient link utilization and security.
- Options for port side exhaust (default) or non-port side exhaust airflow for cooling.
- Virtual Fabric (VF) support to improve isolation between different VFs.
- Fibre Channel Routing (FCR) service, available with the optional Integrated Routing license, provides improved scalability and fault isolation.
- Inter-Switch Link (ISL) Trunking (licensable), 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. There is no limit to how many trunk groups can be configured.
- 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) and Long Wavelength (LWL) or 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 data traffic types.
- Brocade Fabric OS, which delivers distributed intelligence throughout the network and enables a wide range of value-added applications including Brocade Advanced Web Tools and Brocade Zoning. Optional Fabric Services include Adaptive Networking with QoS, Brocade Extended Fabrics, Brocade Enhanced Group Management, Brocade Fabric Watch, ISL Trunking, and End-to-End Advanced Performance Monitoring (APM).
- 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).
- 10Gbps Fibre Channel integration on the same port provides for DWDM metro connectivity on the same switch (can be done on first eight ports only with appropriate licensing).
- 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.

- Local port latency minimized to 700 nanoseconds (ns) through the use of cut-through frame routing at 16 Gbps.
- Switch latency of 2100 ns (L2 latency without forward error correction)

Brocade 6520 components

- A system motherboard that features a primary CPU running at 1.20 GHz, with integrated peripherals.
- One 2 GB DDR2 running at 400 MHz.
- Boot memory of 8 MB.
- One 2 GB compact flash card.
- Up to 96 16 Gbps Fibre Channel ports.
- An RJ45 10/100/1000 BaseT Ethernet system management port (RJ45 connector), in conjunction with EZSwitchSetup, that supports switch IP address discovery and configuration, eliminating the need to attach a serial cable to configure the switch IP address.
- One RS-232 console (serial) port with an RJ45 connector for initial switch setup (if not using EZSwitchSetup) and factory default restoration.
- One USB 2.0 port that provides storage for firmware updates, output of the **supportSave** command, and storage for configuration uploads and downloads.
- Two hot-swappable, 80+ Platinum certified, redundant power supplies.
- Three hot-swappable fan FRUs.
- 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 LEDs (integrated with RJ45) for speed and activity status.
- Two LEDs per power supply: one green for AC line in status and one green/amber for DC power out.
- One LED (green/amber) per fan.
- SEEPROM for switch identification.
- Voltage monitoring.
- Fan monitoring including flow direction.
- Temperature monitoring.
- Real-time clock (RTC) with battery.

Port side of the Brocade 6520

The port side of the Brocade 6520 includes the system status LED, console port, Ethernet port and LEDs, USB port, and Fibre Channel ports and the corresponding port status LEDs.

Figure 1 shows the port side of the Brocade 6520.

1	System power LED	6	FC ports 48-95
2	System status LED	7	Switch ID pull-out tab
3	USB port	8	Management Ethernet port with LEDs
4	FC ports 0-7 (all LEDs above)	9	Serial console port
5	FC ports 8-47		
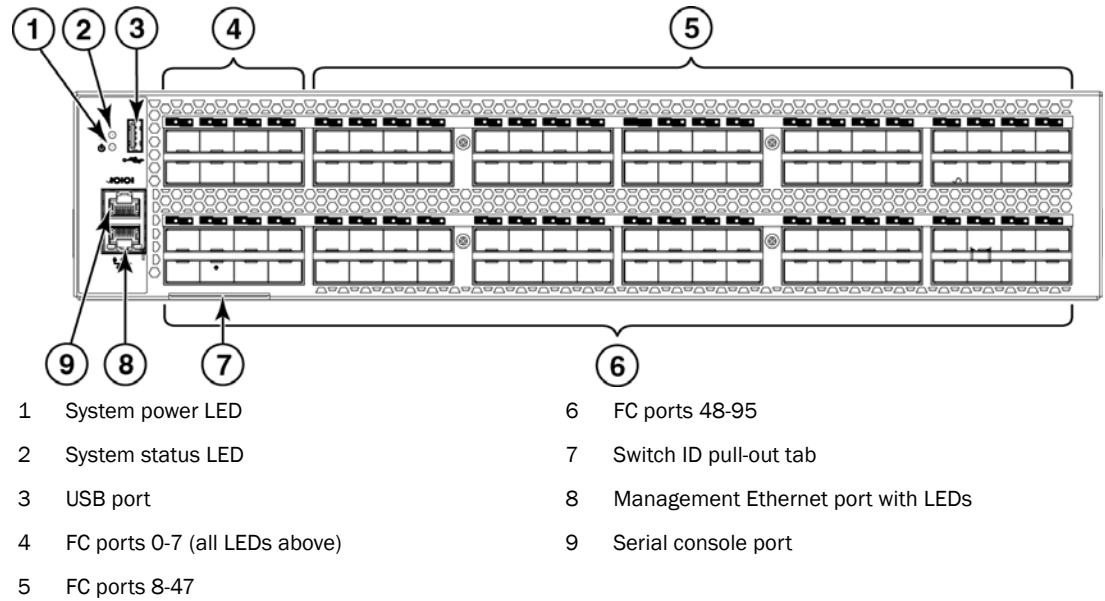
FIGURE 1   Port side view of the Brocade 6520

Non-port side of the Brocade 6520

Figure 2 shows the non-port side of the Brocade 6520, which contains the power supplies (including the AC power receptacle) and fans.

1	Power supplies with integral fans	2	Fans
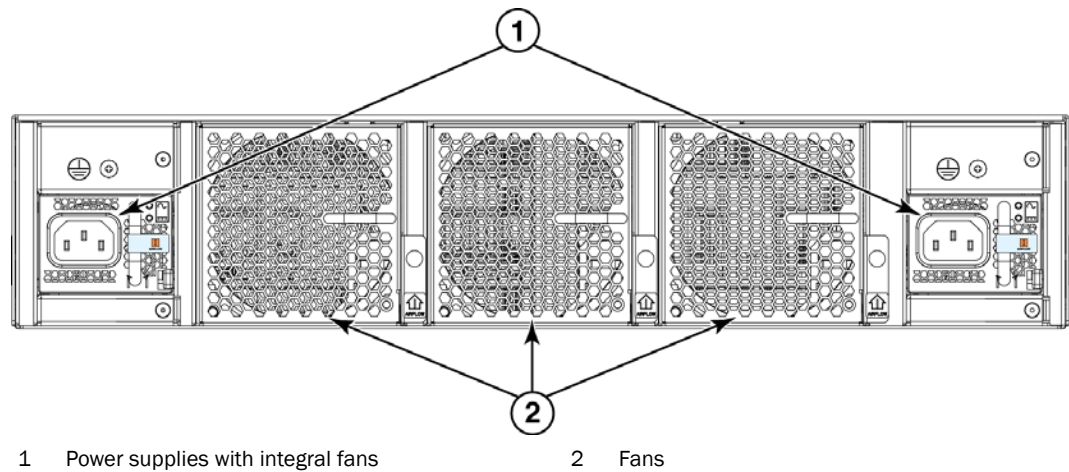
FIGURE 2   Non-port side of the Brocade 6520

Brocade 6520 Installation and Configuration

In this chapter

Items included with the Brocade 6520

The following items are included with the standard shipment of a fully-configured Brocade 6520. When you open the Brocade 6520 packaging, verify that these items are included in the package and that no damage has occurred during shipping:

- The Brocade 6520 switch, containing two power supplies and three fans (incorporating either non-port side exhaust or port side exhaust airflow as ordered)

- 16 Gbps, 10 Gbps, or 8 Gbps SFP+ transceivers for the Fibre Channel ports (speed and quantity as ordered)

- One accessory kit, containing the following items:
  - Serial cable with an RJ45 connector
  - Ground lug kit
  - Two 6 ft. power cords
  - Rubber feet, required for setting up the switch as a standalone unit
  - *Brocade 6520 QuickStart Guide*
  - EZSwitchSetup CD
  - China ROHS Hazardous Toxic Substance Content Chart
  - Brocade Network Advisor v12.0 Eval PRO Instruction Download
  - Family Doc CD card
  - Web Tools ReadMe First Guide

⚠ DANGER

The procedures in this manual are for qualified service personnel.

Installation and safety considerations

You can install the Brocade 6520 switch in the following ways:

- As a standalone unit on a flat surface.
- In an EIA rack using a four-post, fixed-position rack mount kit. The rack mount kit can be ordered from your switch retailer.
- In a two-post Telco rack using the mid-mount rack kit for switches. The mid-mount rack kit for switches can be ordered from your switch retailer.
- In an EIA rack using a four-post sliding rail rack mount kit. The sliding rail rack mount kit mount can be ordered from your switch retailer.

ESD precautions

The Brocade 6520 contains electrostatic discharge (ESD) sensitive FRUs. When working with any Brocade 6520 FRU, use correct ESD procedures.

- Attach ground to the indicated area on the chassis.
- Wear a wrist grounding strap connected to chassis ground (if the Brocade 6520 is plugged in) or a bench ground.
- Store ESD-sensitive components in antistatic packaging.

Electrical considerations

To install and operate the switch successfully, ensure the compliance with the following requirements:

- The primary outlets are 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 1, "Power supply specifications" are met.

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 built-in fans for cooling.

Table 1 lists the power supply specifications for the Brocade 6520.

TABLE 1   Power supply specifications

Specification	Value
Input voltage	Range: 90-264 VAC Auto-volt, Nominal: 100-240 VAC, ~12.0A - 5.0A; switch autosenses input voltage. Start-up: 80-87 VAC, Turn-off: 85-75 VAC
Input frequency	Range: 47-63 Hz; Nominal: 50-60 Hz.
Inrush current	Limited to 40A peak @ 240 VAC during cold start-up at 25ºC ambient
Input line protection	Both AC lines are fused.
Maximum power supply output (each)	1080 watts @ 12V DC

Table 2, Table 3, and Table 4 illustrate the power consumption of the switch as measured at idle, maximum, and typical states respectively.

TABLE 2   Power consumption - idle

IDLE, no Optics, C3 not initialzed, Fan Speed normal(3030RPM),Room Temp							
AC Voltage	Input Current (Amp)		Input Watts 1 PSU	Power Factor		BTU's/hr 1 PSU	Input Watts 2 PSU's	BTU's/hr 2PSU
	1 PSU	2 PSU	AC Measured	1 PSU	2 PSU		AC Measured	
100 VAC	1.78	1.85	179	0.998	0.993	610.94132	183	624.59364
120 VAC	1.49	1.59	178	0.996	0.968	607.52824	183	624.1764
200 VAC	0.92	1.08	174	0.949	0.847	593.87592	182	620.7656
240 VAC	0.79	1.04	174	0.917	0.739	593.87592	181	617.3548

TABLE 3   Power consumption - maximum

MAX: All ports configured with ELOAD, Traffic Running (mode 11), Fan Speed Max (8190 RPM),Room Temp							
AC Voltage	Input Current (Amp)		Input Watts 1 PSU	Power Factor		BTU's/hr 1 PSU	Input Watts 2 PSU's	BTU's/hr 2PSU
	1 PSU	2 PSU	AC Measured	1 PSU	2 PSU		AC Measured	
100 VAC	4.67	4.67	464	0.995	0.995	1582.6112	464	1582.6112
120 VAC	3.86	3.87	462	0.997	0.997	1575.7896	463	1579.2004
200 VAC	2.28	2.34	455	0.998	0.977	1551.914	457	1558.7356
240 VAC	1.92	1.99	453	0.998	0.953	1545.0924	456	1555.3248

TABLE 4   Power consumption - typical

Typical: All ports configured with 16G Avago optics, Traffic Running (mode 11), Fan Speed Nominal(3030 RPM), Room Temp							
AC Voltage	Input Current (Amp)		Input Watts 1 PSU	Power Factor		BTU's/hr 1 PSU	Input Watts 2 PSU's	BTU's/hr 2PSU
	1 PSU	2 PSU	AC Measured	1 PSU	2 PSU		AC Measured	
100 VAC	3.96	3.97	394	0.998	0.996	1343.8552	395	1347.266
120 VAC	3.26	3.29	391	0.997	0.995	1333.6228	394	1343.8552
200 VAC	1.94	2.02	387	0.997	0.963	1319.9796	390	1330.212
240 VAC	1.74	1.62	385	0.989	0.929	1313.158	388	1323.3904

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, as indicated by the airflow direction of the fan assemblies, facing the cool-air aisle.
  The **chassisshow** output indicates "Reverse" for non-port side intake and "Forward" for port side intake.

- All equipment in the rack should force air in the same direction to avoid intake of exhaust air.

- Airflow requirements outlined in Table 5 must be met. Note that the requirements differ based on the direction of the airflow.

- The ambient air temperature does not exceed 40° C (104° F) while the switch is operating.

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

TABLE 5   Environmental requirements

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

Air flow	Port side exhaust -
	    Maximum - 176.7 cmh (104 cfm)
	    Nominal - 52.7 cmh (31 cfm)
	Port side intake -
	    Maximum - 185.2 cmh (109 cfm)
	    Nominal - 56.1 cmh (33 cfm)
		N/A

Heat dissipation	1378.5 BTU/hr (no optics configuration) 1706.1 BTU/hr (fully populated port configuration)	N/A

Rack considerations

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

- The rack must be a standard EIA rack.

- A rack space that is two rack units (2U) high; 8.90 cm (3.50 inches) high and 48.3 cm (19 inches) wide.

- There are three rack kit options that accommodate the Brocade 6520, a four-post fixed rack kit, a two-post Telco rack kit, and a four-post sliding rail rack kit. See their respective installation manuals for details.

- The equipment in the rack 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 multirack assembly.

- The additional weight of the switch does not exceed the rack's weight limits or unbalance the rack in any way.

- The rack is secured to ensure stability in case of unexpected movement, such as an earthquake.

Recommendations for cable management

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

Cables can be organized and managed in a variety of ways; for example, using cable channels on the sides of the rack or patch panels to reduce potential tangling of the cables. The following list proveides some recommendations for cable management:

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-style straps to secure and organize fiber-optic cables.

Items required for installation

The following items are required for installing, configuring, and connecting the Brocade 6520 for use in a network and fabric:

- Workstation with an installed terminal emulator, such as HyperTerminal

- Unused IP address and corresponding subnet mask and gateway address

- Items from the accessory kit that accompanies the switch

- Ethernet cable

- Brocade-branded SFP+s transceivers and compatible cables (Brocade-branded 16 Gbps SFP+s transceivers 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 6520

Perform the following steps to install the Brocade 6520 as a standalone unit.

1. Unpack the Brocade 6520 and verify the items listed on "Items included with the Brocade 6520" 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 "Providing power to the switch" 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, refer to "Brocade 6520 configuration"

Rack installation for a Brocade 6520

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

- *Fixed Rack Mount Kit Installation Procedure*
- *Mid-Mount Rack Kit (Switch) Installation Procedure*
- *Slide Rack Mount Kit Installation Procedure*

Brocade 6520 configuration

Once you have set up the Brocade 6520 in a rack or as a standalone switch, it is time to give it power and a basic configuration. If you are going to use the Brocade 6520 in a single-switch setup, you can use EZSwitchSetup to complete the basic configuration.

Refer to the *EZSwitchSetup* CD, included with the Brocade 6520, for more information. You can also use the Brocade 6520 *EZSwitchSetup Quickstart Guide*.

If you do not want to use EZSwitchSetup, follow the instructions in the rest of this section.

Providing power to the switch

Perform the following steps to provide power to the Brocade 6520.

1. Connect the power cords first to both power supplies in the chassis 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.

    The power supplies power up as soon as they are plugged in. The power supply LEDs display green. The power LED on the front of the switch turn green as well. The system status LED on the front panel will be amber until POST completes and then it will turn green. If a second power supply is installed but NOT plugged into a power source, the AC status light on the power supply will be out and the DC status light will be amber. If the second power supply IS plugged into a power source, then both LEDs will be green.

    ATTENTION
    Power is supplied to the switch as soon as the first power supply is connected.

2. After POST is complete, verify that the switch power and status LEDs on the left of the port side of the switch are green. Refer to Figure 1 on page 4 for the specific location of these LEDs.

Creating a serial connection

You perform all configuration tasks in this guide using a serial connection. If you need to know the serial port pinouts, refer to "Serial port specifications" on page 41.

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 the following parameters:

        TABLE 6   Windows terminal emulator parameters

Parameter	Value
Bits per second	9600
Databits	8
Parity	None
Stop bits	1
Flow control	None

    *   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 6520 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 6520 supports both IPv4 and IPv6. If you are using IPv6, consult the *Fabric OS Command Reference* for details when issuing the **ipaddrset** command.

Using DHCP to set the IP address

When using DHCP, the Brocade 6520 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 6520, use a static IP address.

Setting a static IP address

Complete the following steps to set a static IP address.

1. Log in to the switch using the default password (the default passsword 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 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 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 or not.

   ```
   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 6520 maintains the current date and time inside a battery-backed real-time clock (RTC) circuit. Date and time are used for logging events. Switch operation does not depend on the date and time; a Brocade 6520 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 also set country, city, or time zone parameters.

If the time zone is not set with the new options, the switch retains the offset time zone settings. The **tsTimeZone** command includes an option to revert to the prior time zone format. For more information about the **--old** option, 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 Greenwich Mean Time (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 value in nonvolatile memory. By default, this value is the local clock server of the principal or primary FCS switch. Changes to the clock server value on the principal or primary FCS 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 FCS switch sends out the addresses of all existing clock servers and the time to the new switch. If a switch with Fabric OS 5.3.0 or later has entered the fabric, it will be able to store the list and the active servers; pre-Fabric OS 5.3.0 switches 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 same information in the fabric will not be possible to switches earlier than Fabric OS 5.3.0 because IPv6 is supported for Fabric OS 5.3.0 and later. The default value LOCL will be distributed to pre-Fabric OS 5.3.0 switches.

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 FCS switch synchronizes its time with the NTP server every 64 seconds.

Setting the date and time

Complete the following steps to set the date and time.

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

2. Enter the **date** *"mmddHHMMyy"* command (the double quotation marks are required):

   date *"mmddHHMMyy"*

   The following values are used in the **date** command:

   - *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). Refer to the following example to first show the date and time and then change them.

     ```
     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 using *timezonename* mode.

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

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

   ```
   switch:admin> tstimezone [--interactive]/ [, timezonename]
   ```

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

   The following example shows how to change the time zone to US/Central.

   ```
   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 using interactive mode to Pacific Standard Time.

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

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

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

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

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

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

5. At the prompt, enter the appropriate number to specify the time zone region from the list displayed 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 (the default password is *password*).

2. Enter the **tsClockServer** *"ntp1;ntp2"* command where *ntp1* is the IP address or DNS name of the first NTP server, which the switch must be able to access. The *ntp2* value 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 "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 ISL Trunking

Brocade Inter-Switch Link (ISL) Trunking is optional software requiring a license that allows you to create trunking groups of ISLs between adjacent switches. Up to eight ports within a port group on the Brocade 6520 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. Figure 3 shows the port groups for the Brocade 6520.

1	FC ports 0-7	7	FC ports 48-55
2	FC ports 8-15	8	FC ports 56-63
3	FC ports 16-23	9	FC ports 64-71
4	FC ports 24-31	10	FC ports 72-79
5	FC ports 32-39	11	FC ports 80-87
6	FC ports 40-47	12	FC ports 88-95
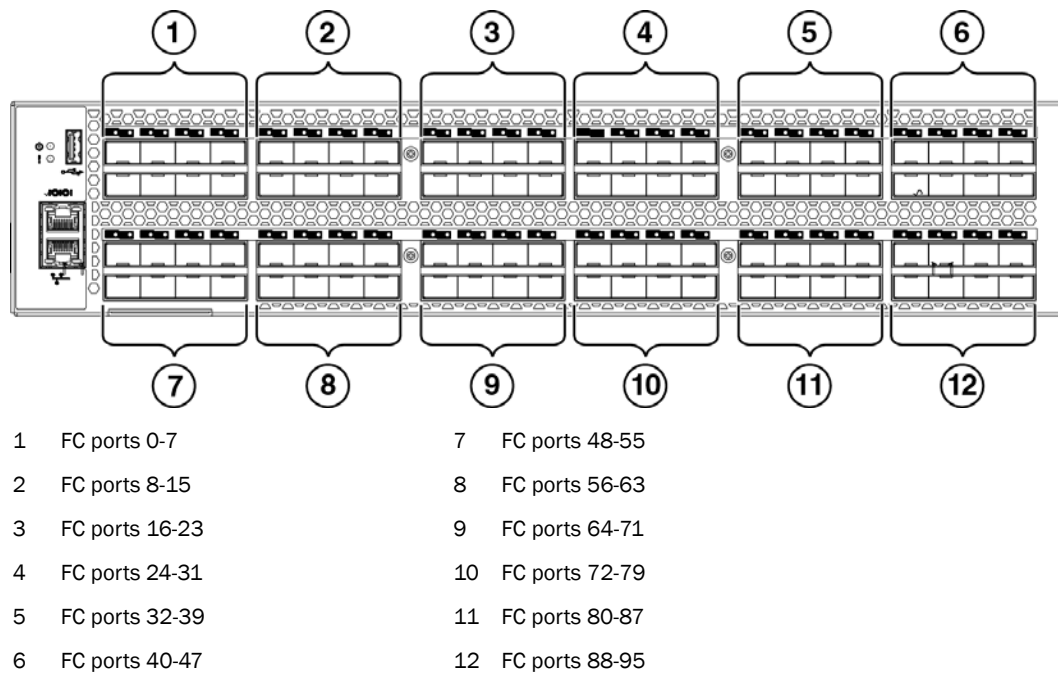
FIGURE 3   **Port groups of the Brocade 6520**

For more information about Brocade ISL Trunking, refer to the *Fabric OS Administrator's Guide*.

Brocade 6520 Operation

In this chapter

LED activity interpretation

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

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 6520 LEDs

The Brocade 6520 has the following LEDs:

- One system status LED (bicolor: green/amber).
- One power status LED (green).
- Two Ethernet port LEDs (green).
- One port status LED for each port on the switch (bicolor: green/amber). These LEDs are arrayed above each pair of Fibre Channel ports.
- Two power supply status LEDs per power supply (AC indicator is bicolor: green/amber and DC indicator is green).
- One fan status LED per fan (bicolor: green/amber).

NOTE
The serial console port LEDs do not light up at any time, even when a cable is inserted and the link is active.

LED locations

Figure 4 shows the port side of the Brocade 6520. The port status LEDs for the FC ports are arranged left and right to correspond to the upper and lower ports in each pair. Refer to Figure 1 for the locations of the FC ports.

1	System power LED	4	FC port status LED (port 4)
2	System status LED	5	Ethernet port activity LED
3	FC port status LED (port 0)	6	Ethernet port speed LED

FIGURE 4   **LEDs on port side of Brocade 6520**

Table 7 describes the port side LEDs and their behavior.

TABLE 7   Port side LED patterns during normal operation

LED name	LED color	Status of hardware	Recommended action
Power Status (green)	No light	The switch is off or there is an internal power supply failure.	Verify that the system is powered on, the power cables are attached, and your power source is live. The unit may be faulty. Contact your switch service provider.
	Steady green	The switch is on.	No action required.
System Status (bicolor - amber/green)	No light	The switch is off or there is no power.	Verify that the system is on and has completed booting.
	Steady green	The switch 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.	Power cycle the switch. Check the failure indicated on the system console. Contact your switch service provider.
	Blinking amber	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 been exceeded.	Check the management interface and the error log for details on the cause of status. Contact your switch service provider.

TABLE 7   Port side LED patterns during normal operation (Continued)

LED name	LED color	Status of hardware	Recommended action
Ethernet Speed (green)	No light	Port speed is 10 Mbps.	No action required.
	Steady green	Port speed is 100 or 1000 Mbps.	No action required.
Ethernet Activity/Link (green)	No light	There is no link.	Verify that the Ethernet cable is connected correctly.
	Steady green	There is a link.	No action required.
	Blinking green	There is link activity (traffic).	No action required.
Optical media port status (one bi-color LED for each FC port)	Off	There is no light or signal carrier (module or cable).	Verify that the transceiver is installed correctly and that the cable is connected correctly.
	Steady amber	The port is receiving light or carrier, but is not online.	No action required.
	Slow blinking amber (2 sec)	The port is 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)	The port has failed.	Check the management interface and the error log for details on the cause of the failure. Contact Technical Support if necessary.
	Steady green	The port is online.	No action required.
	Slow blinking green (2 sec)	The port is online but is segmented (loopback cable or incompatible switch).	Check the firmware level of the attached switch.
	Fast blinking green (1/2 sec)	There is an internal loopback (diagnostic).	No action required.
	Flickering green	The port is online and frames are flowing through the port.	No action required.

Figure 5 shows the LEDs on the non-port side of the switch.

| 1 | Power supply DC status LED | 3 | Fan status LED |
| 2 | Power supply AC status LED | | |
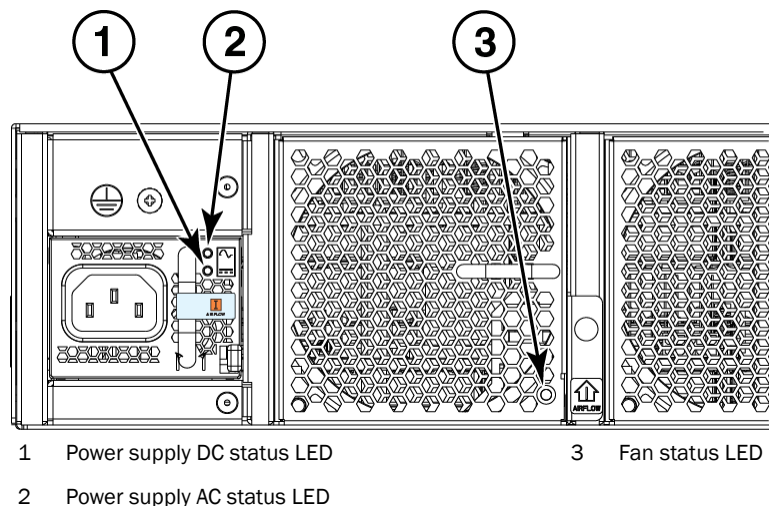
FIGURE 5 **LEDs on non-port side of Brocade 6520**

Table 8 describes the LEDs on the non-port side of the switch.

TABLE 8 Non-port side LED patterns during normal operation

LED name	LED color	Status of hardware	Recommended action
Power supply AC input status (one green LED)	No light	Power supply is not receiving AC input voltage or AC input voltage is below operational limit.	Verify that the power supply is properly seated and the power cord is connected to a functioning AC power source.
	Steady green	AC input voltage is within operational range.	No action required.
Power supply DC output status (one bi-color LED)	Flashing amber (1:1)	Output voltage is not enabled.	Verify that the power supply is fully seated and that the captive screw is secured.
	Flashing amber/green (2:1)	Over temperature warning.	Verify that ambients temperature is less than 40C and check for intake airflow blockage.
	Flashing amber/green (1:1)	Internal fan is out of regulation.	Replace the power supply.
	Steady amber	Power supply is faulty or not plugged in completely.	Check the power cord, current, voltage, and temperature to determine the problem.
	Steady green	DC output OK.	No action required.

TABLE 8   Non-port side LED patterns during normal operation (Continued)

LED name	LED color	Status of hardware	Recommended action
Fan assembly status (one bi-color LED)	No light	Fan assembly is not receiving power.	Verify that the fan FRU is seated correctly.
	Steady green	Fan assembly is operating normally.	No action required.
	Steady amber (for more than 5 seconds)	Fan fault for one of the following reasons: • A fan assembly with mismatched airflow is present. • One or more of the fans in the fan assembly has failed.	Try one of the following: • Replace the mismatched fan assembly with one that has the correct airflow direction. • Replace the faulty fan assembly.

POST and boot-up specifications

When the switch is turned on or rebooted, the switch performs power-on self-test (POST). Total boot-up 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*.

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-up

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.

   Refer to Table 7 and Table 8 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 support.

3. Review the switch system log for errors. Any errors detected during POST are written to the system 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*.

Brocade 6520 maintenance

The Brocade 6520 is designed for high availability and low failure; it does not require any regular physical maintenance. It includes diagnostic tests and field-replaceable units, described in the following sections.

Installing an SFP+ transceiver

The Brocade 6520 supports only Brocade-branded 8 Gbps and 16 Gbps SFP+ optical transceivers. For the Fibre Channel connections, the Brocade 6520 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 task, refer to Figure 6 or Figure 7.

Complete the following steps to install 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.

   The 16 Gbps SFP+ transceivers do not have bails. Use the pull tab on the 16 Gbps SFP+ transceivers to help push the transceiver into the port. Do not push too hard on the tab itself becasue it can bend.

   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.

NOTE
Each SFP+ transceiver has a 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.
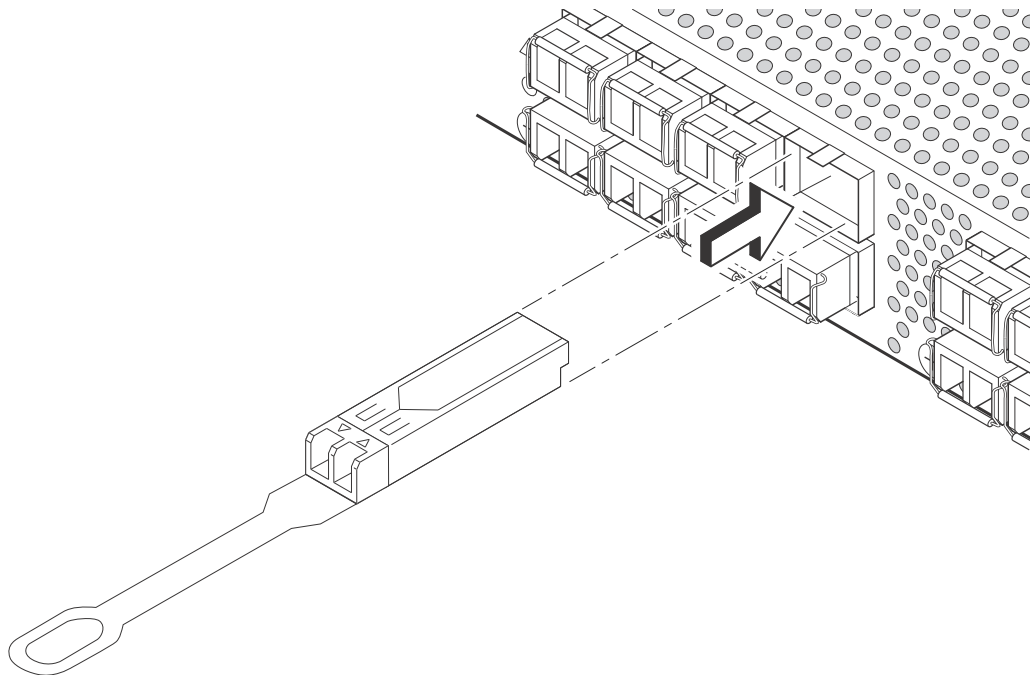
FIGURE 6   Installing a 16 Gbps SFP+ in the upper row of port slot
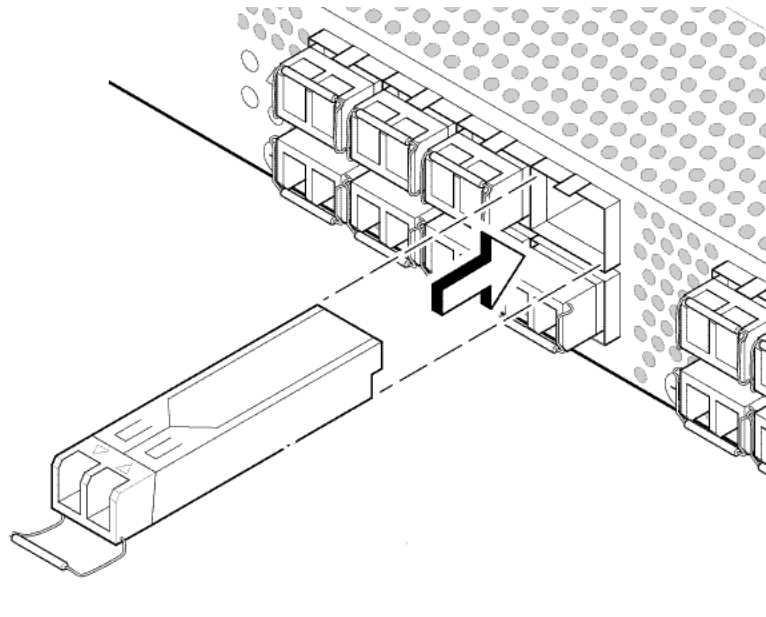
FIGURE 7   Installing an 8 Gbps SFP+ in the upper row of port slot

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 serial console 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, 10, 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, refer to the *Fabric OS Troubleshooting and Diagnostics Guide*.

Brocade 6520 management

You can use the management functions built into the Brocade 6520 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 6520 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, refer to "POST and boot-up specifications" on page 21.

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

You can manage the Brocade 6520 using any of the management options listed in Table 9. Refer to the *Fabric OS Command Reference* for more information on the CLI commands.

TABLE 9   Management options for the Brocade 6520

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 *Fabric OS Administrator's Guide* and the *Fabric OS Command Reference*.	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 *Fabric OS MIB Reference*.	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*.	Ethernet or serial connection	Native in-band interface (over HBA only)
Brocade Network Advisor (option to purchase) 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

Removal and replacement introduction

NOTE
Read the "Installation and safety considerations" before servicing.

The field-replaceable units (FRUs) in the Brocade 6520 can be removed and replaced without special tools. The Brocade 6520 can continue operating during the FRU replacement if the conditions specified in the procedures are followed.

DANGER
The procedures in this manual are for qualified service personnel.

Before beginning replacement

CAUTION
This document describes how to change field-replaceable units (FRUs) for units with either a port-side air exhaust or a port-side air intake. You must replace a failed unit with the same type of unit.
This applies to both power supplies and fans.
A new FRU must have the same part number (P/N) as the FRU being replaced. The manufacturing P/N is located on the top of the FRU.

You can use external labels as a guide. Refer to Figure 8. Both the power supply and fan FRUs are labeled with an airflow symbol on the faceplate to indicate whether the assembly takes in or exhausts air. The label also appears on the top of the assembly.

ATTENTION
All fans and power supplies must have the same airflow symbol (**E** or **I**) to be compatible with each other.
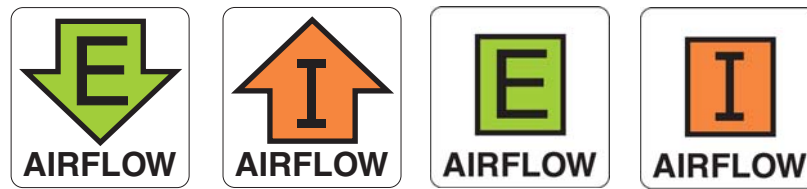
FIGURE 8 Examples of airflow symbols

The green E symbol indicates an exhaust unit. This unit pulls air in from the port side of the switch and exhausts it out the non-port side. This is also called front-to-back airflow or forward airflow. This symbol should appear on FRUs with part numbers ending with **-F.**

The orange I symbol indicates an intake unit. This unit pulls air in from the non-port side of the switch and exhausts it out the port side. This is also called back-to-front airflow or reverse airflow. This symbol should appear on FRUs with part numbers ending with **-R**.

The **chassisShow** command will indicate either "forward" or "reverse" airflow.

If one fan fails, the remaining fans go to high speed to maintain proper cooling until the failed fan is replaced.

If a mismatched power supply or fan is installed by mistake, a critical error message is sent to the console. The message will be similar to the following:

CRITICAL HIL-1611 MISMATCH in PSU/FAN Air Flow direction. Replace PSU with fan air flows in same direction. System will be shut down in 2 minutes.

Power supply removal and replacement

The Brocade 6520 has two power supplies, as displayed in Figure 2. The Fabric OS identifies the power supplies from left to right on the non-port side as power supply #2 and power supply #1.

> ⚠️ **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. Because the cooling system relies on pressurized air, do not leave either of the power supply slots empty longer than two minutes while the switch is operating. If a power supply fails, leave it in the switch until it can be replaced. Maintain both power supplies in operational condition to provide redundancy.**

Refer to Table 8 on page 20 for the power supply status LED colors, behaviors, and actions required, if any.

Determining the need to replace a power supply

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

- Check the power supply AC status and DC status LEDs. Both should be green (refer to "LED locations" on page 17). If the DC status LED is amber, there is no power on the cord.
- In Web Tools, click the **Power Status** icon.

- At the command prompt, enter the **psShow** command to display power supply status:

```
br6520:admin> psshow

Power Supply #1 is OK
Airflow Direction : Portside Intake (Forward)
Power Supply #2 is OK
Airflow Direction : Portside Intake (Forward)
br6520:admin>
```

DANGER

Disconnect the power cords from all power sources to completely remove power from the chassis.

Time and items required

Replacing a power supply in the Brocade 6520 should require less than two minutes to complete.

To replace a power supply in a Brocade 6520 you need a new power supply that has the same part number and airflow indicator as the power supply being replaced. Refer to Figure 9 for the location of the airflow label.

1	Power supply #2	5	Locking tab
2	Grounding screw	6	Airflow label
3	Handle	7	DC output status LED
4	AC input status LED	8	Power cord receptacle
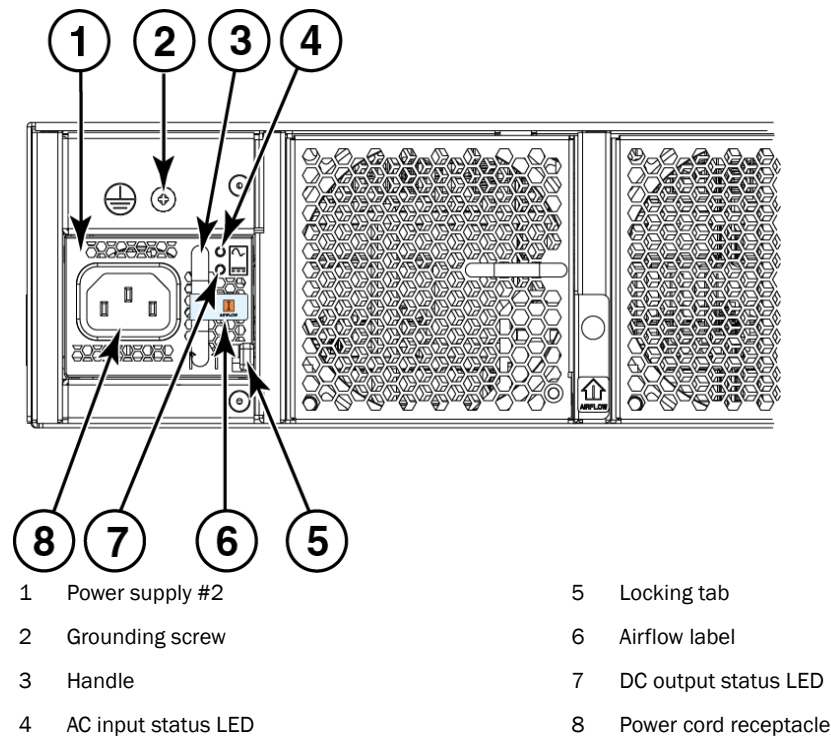
FIGURE 9 Brocade 6520 power supply

Replacing a power supply

Complete the following steps to replace a power supply in a Brocade 6520. Refer to Figure 10 for this procedure.

1. To leave the Brocade 6520 in service while replacing a power supply, verify that the other power supply (the one not being replaced) has been powered on for at least four seconds and has a steady green status LED.

2. Unplug the power cord from the power supply that is being replaced.

3. Push the locking tab to the left and hold it there while using the handle on the power supply to pull it straight out and away from the chassis. Pull the power supply out slowly to avoid catching a finger on the locking tab.

4. Slide the new power supply into the chassis until the locking tab engages.

> ⚠️ **CAUTION**
>
> **Do not force the installation. If the power supply does not slide in easily, ensure that the power supply is correctly oriented before continuing.**

> ⚠️ **CAUTION**
>
> **If you observe that the switch has powered down after two minutes after a power supply replacement, it is likely because the new power supply has a mismatched airflow.**

5. Plug the power cord into the power supply to power on the unit.

   If the power circuit was on before the replacement, the power supply will immediately attempt to power up.
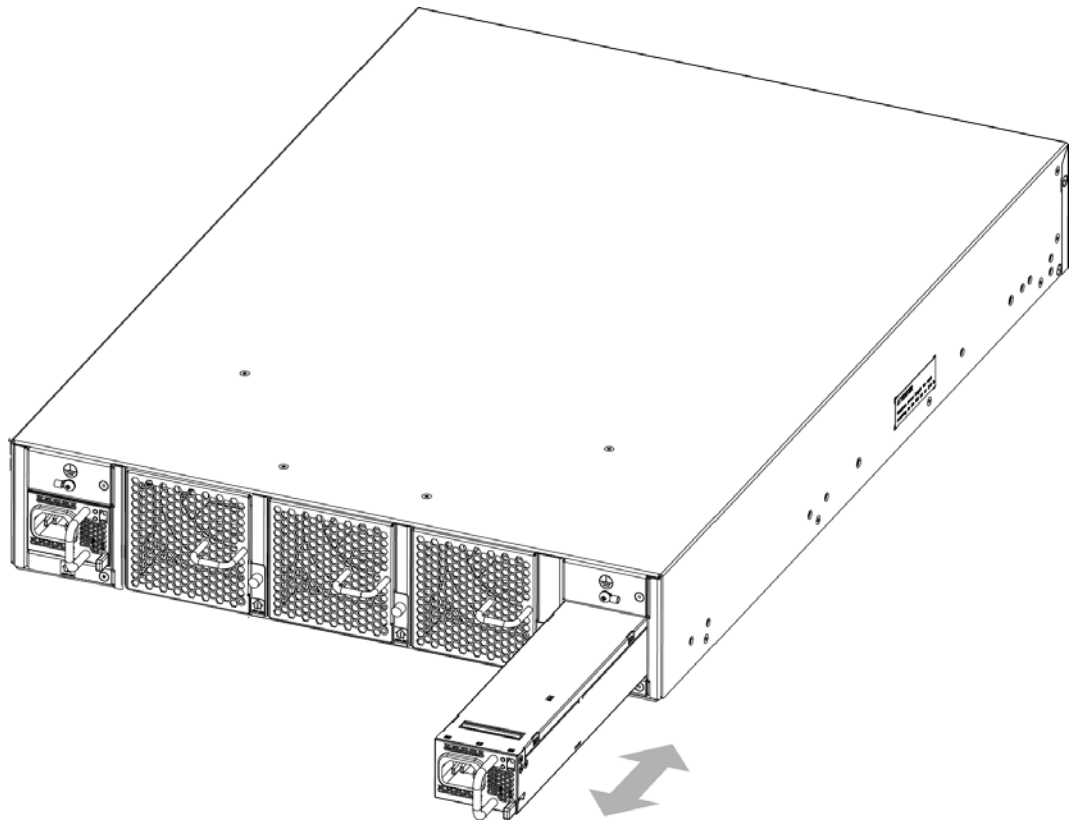
FIGURE 10   Inserting the power supply in the Brocade 6520

6. Verify that the LEDs on the new power supply display steady green while the Brocade 6520 is operating (refer to Table 8). If the LEDs are not steady green, ensure that the power supply is securely installed and seated properly.

    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 **chassisShow** command. The power supply status can also be viewed using the Web Tools application.

Fan removal and replacement

The Brocade 6520 has three fans as displayed in Figure 2. The Fabric OS identifies the fan locations from left to right as fan #3, fan #2, and fan #1.

> ⚠ **CAUTION**
>
> **Disassembling any part of the fan voids the part warranty and regulatory certifications. There are no user-serviceable parts inside the fan. Because the cooling system relies on pressurized air, do not leave any of the fan slots empty longer than two minutes while the switch is operating. If a fan fails, leave it in the switch until it can be replaced.**
> **Maintain all three fans in operational condition to provide redundancy.**

Refer to Table 8 on page 20 for the power supply status LED colors, behaviors, and actions required, if any.

Determining the need to replace a fan

Use one of the following methods to determine the status of the fans:

- Check the fan status LED (refer to "LED locations" on page 17).
- In Web Tools, click the **Power Status** icon.
- Enter the **fanShow** command at the prompt to display fan status.

> **NOTE**
> Fans 4 and 5 are the fans that are integral to the power supplies. These two fans normally operate at around 12000 RPM while the system fans typically operate around 2000 RPM. Refer to "Power supply removal and replacement" if there are any issues with those two fans.

```
br6520:admin> fanshow

Fan 1 is Ok, speed is 1965 RPM
Fan 2 is Ok, speed is 2011 RPM
Fan 3 is Ok, speed is 2011 RPM
Fan 4 is Ok, speed is 12001 RPM
Fan 5 is Ok, speed is 11995 RPM

br6520:admin>
```

Time and items required

Replacing a fan in the Brocade 6520 should require less than two minutes to complete.

You need the following items to replace a fan in the Brocade 6520:

- A new fan that has the same part number and airflow indicator as the fan being replaced. Refer to Figure 11 for the location of the airflow label
- A #1 Phillips screwdriver

1	Fan #3	4	Airflow label
2	Handle	5	Status LED
3	Captive screw		
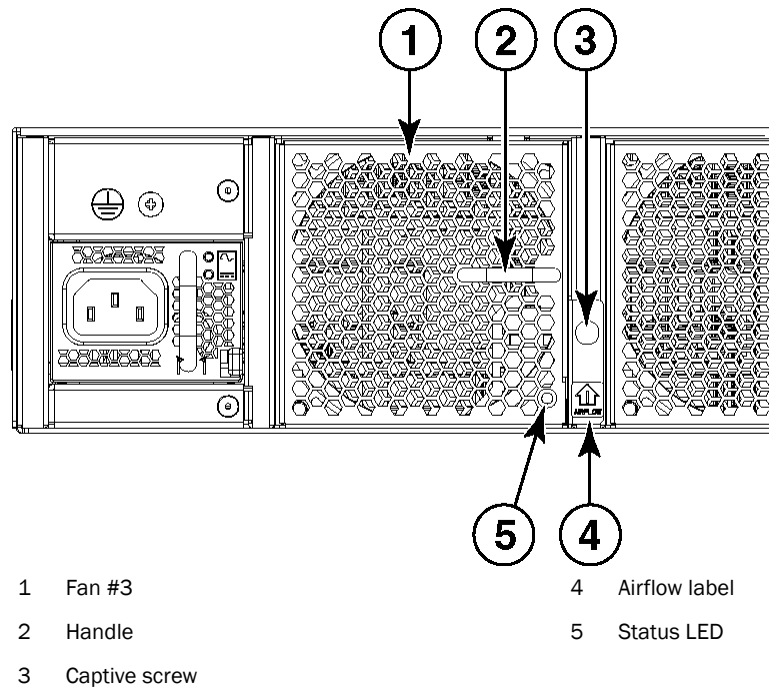
FIGURE 11   Brocade 6520 fan

Replacing a Brocade 6520 fan

Complete the following steps to replace a fan in a Brocade 6520. Refer to Figure 12 for this procedure.

1. Using the Phillips screwdriver, unscrew the captive screw on the fan.

⚠ **DANGER**

Be careful not to insert your fingers into the fan while removing it from the device. The fan may still be spinning at high speed.

2. Remove the fan from the chassis by using the handle on the fan to pull it straight out and away from the chassis.

3. Install the new fan in the chassis:

    a. Check to see that the airflow direction is the same as the fan you are replacing.

    b. Orient the new fan with the captive screw on the right, as shown in Figure 11.

⚠ **CAUTION**

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

> ⚠️ **CAUTION**
>
> **If you observe that the switch has powered down after two minutes after a fan replacement, it is likely because the new fan has a mismatched airflow.**

    c.   Gently push the fan into the chassis until it is firmly seated.

    d.   Using the Phillips screwdriver, secure the fan to the chassis by tightening the captive screw.
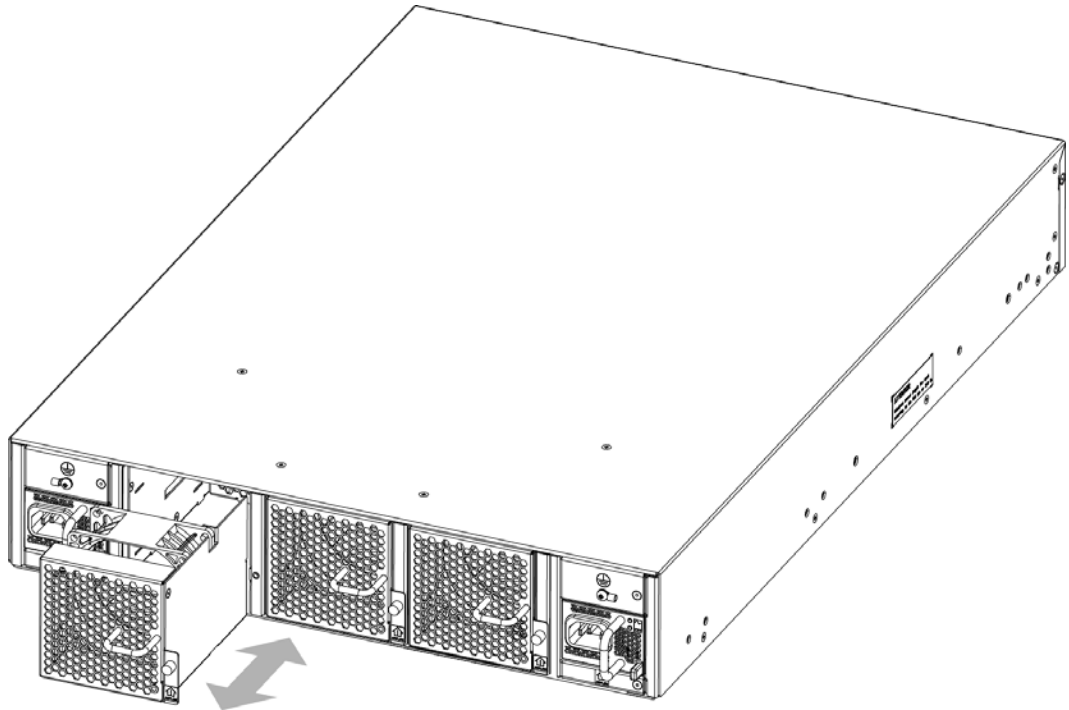
FIGURE 12   Inserting the fan in the Brocade 6520

4.   Verify that the fan status LED is steady green to indicate normal operation (refer to Table 8).

    Optionally, if using the command line interface (CLI), enter the **fanShow** command at the command line prompt to display the status. You can also use the **chassisShow** command. The fan status can also be viewed using the Web Tools application.

SFP+ transceiver removal and replacement

Use the following procedure to remove and replace an 8 Gbps, 10 Gbps, or 16 Gbps SFP+ transceiver.

⚠️ **DANGER**

All fiber-optic interfaces use Class 1 lasers.

⚠️ **DANGER**

Laser radiation. Do not view directly with optical instruments. Class 1 laser products.

Time and items required

The replacement procedure for one transceiver takes less than five minutes.

You should have the following items available:

- Replacement SFP+ transceiver
- Optical transceiver extraction tool (for 8 or 10 Gbps transceiver only)

Most Brocade switches and backbones come with a transceiver extraction tool (Figure 13) and holster. The extraction tool is designed to remove transceivers from modules where the space is limited.
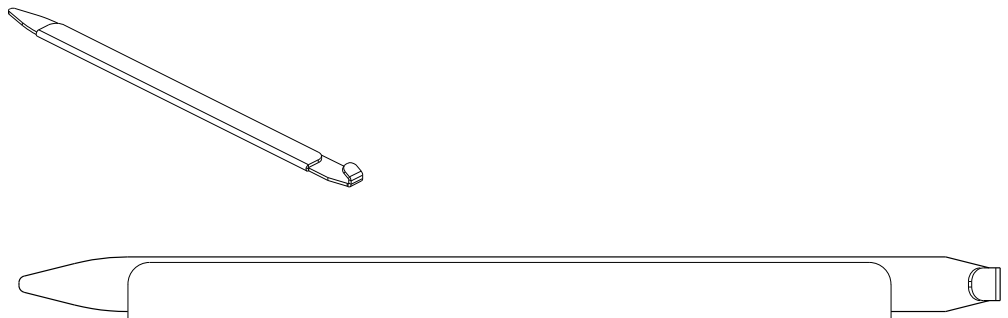
FIGURE 13   Optical transceiver extraction tool

Removing an SFP+ transceiver

For the following procedure refer to Figure 14 and Figure 15.

Complete the following steps to remove an SFP+ transceiver.

1. Remove any cables that are inserted into the transceiver. Use the extraction tool to open the cable latching mechanism.

2. Using the hooked end of the tool, pull the bail (wire handle) away from its pivot point and out, sliding the transceiver out of the switch or module.

   The 16 Gbps SFP+ transceivers have an attached pull tab. Instead of using the tool, simply grasp the pull tab and pull straight out to remove the 16 Gbps SFP+ transceiver from the switch.
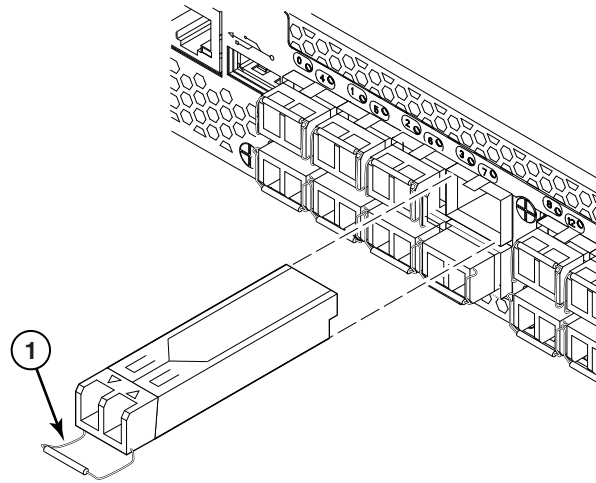
| 1 | SFP+ bail |

FIGURE 14 Replacing an 8 Gbps or 10 Gbps SFP+ optical transceiver
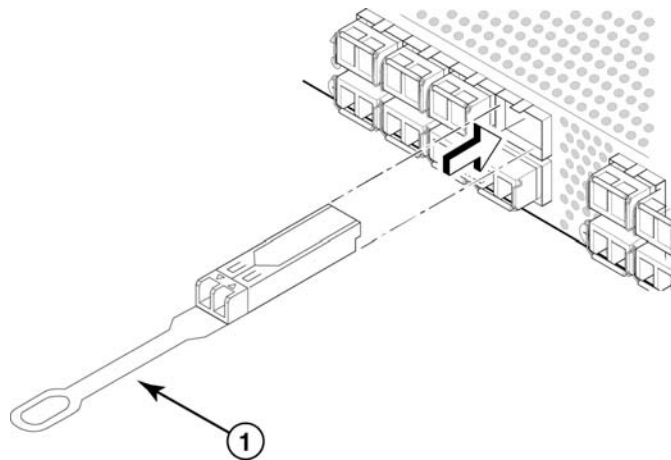
| 1 | 16 Gbps SFP+ pull tab |

FIGURE 15 Replacing a 16 Gbps SFP+ optical transceiver

Replacing an SFP+ transceiver

For the following procedure refer to Figure 14 and Figure 15.

Complete the following steps to replace an SFP+ transceiver.

1. Making sure that the bail (wire handle) on an 8 or 10 Gbps transceiver is in the unlocked or open 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.

   The 16 Gbps SFP+ transceivers do not have bails. Use the pull tab on the 16 Gbps SFP+ transceivers to carefully push the transceiver into the port. Grasp the tab near the body of the transceiver to reduce the chances of bending the tab.

   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.

Brocade 6520 Specifications

In this appendix

Weight and physical dimensions

Table 10 lists the weight and physical dimensions of the Brocade 6520.

TABLE 10   Physical specifications

Dimension	Value
Height	86.74 mm (3.415 in.)
Depth	609.75 mm (24.006 in.)
Width	429.25 mm (16.900 in.)
Weight (with two power supplies and three fan assemblies, but no transceivers installed)	16.9 kg (37.3 lb)

General specifications

Table 11 lists the general specifications for the Brocade 6520.

TABLE 11   General specifications

Specification	Description
Configurable port types	E_Port, F_Port, M_Port, and D_Port; EX_Port with license
System architecture	Nonblocking shared-memory switch
System processor	PowerPC family CPU @ 1.20 GHz
ANSI Fibre Channel protocol	FC-PH (Fibre Channel Physical and Signalling Interface standard)

TABLE 11   General specifications (Continued)

Specification	Description
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	1,536 Gbps end-to-end full duplex
Local port latency	700 nanoseconds
Switch latency	2100 nanoseconds (2.1 µs with no Forward Error Correction

Data transmission ranges

Table 12 provides the data transmission ranges for different transceivers, port speeds, and cable types.

TABLE 12   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+	2 Gbps	150 m (492 ft.)	300 m (984 ft.)	500 m (1640 ft.)	N/A	N/A
	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+	10 Gbps	33 m (108 ft.)	82 m (269 ft.)	300 m (984 ft.)	550 m (1804 ft.)	N/A
	SFP+	16 Gbps	15 m (49 ft.)	35 m (115 ft.)	100 m (328 ft.)	125 m (410 ft.)	N/A
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+	10 Gbps	N/A	N/A	N/A	N/A	10 km (6.2 mi.)
	SFP+	16 Gbps	N/A	N/A	N/A	N/A	10 km (6.2 mi.)
ELWL	SFP+	16 Gbps	N/A	N/A	N/A	N/A	25 km (15.5 mi.)

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

Memory specifications

The Brocade 6520 has three primary types of memory devices: boot flash, compact flash, and main memory. The size of each is listed in Table 13.

TABLE 13   Brocade 6520 memory specifications

Memory type	Amount
Boot flash	4 MB
Compact flash	2 GB
Main memory (DDR2 SODIMM)	2 GB, 400 MHz, 72-bit bus

Fibre Channel port specifications

The Fibre Channel ports in the Brocade 6520 are compatible with SWL, LWL, and ELWL SFP+ (for 16 Gbps performance) 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, refer to "Regulatory compliance" on page 42.

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.

The first eight ports on the switch can be configured to run at 10 Gbps with the appropriate license and transceivers.

Serial port specifications

The serial port is located on the port side of the switch. The Brocade 6520 uses an RJ45 connector for the serial port. An RJ45-to-RS-232 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 14 lists the serial cable pinouts.

TABLE 14   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

TABLE 14   Serial cable pinouts (Continued)

PIN	Signal	Description
6	UART1_RXD	Receive data
7	Not supported	N/A
8	Not supported	N/A

Regulatory compliance

This section describes the regulatory compliance requirements for the Brocade 6520. It contains the following standards:

- "FCC warning (US only)" on page 42
- "KCC statement (Republic of Korea)" on page 42
- "VCCI statement (Japan)" on page 43
- "Power cords (Japan DENAN)" on page 43
- "China" on page 44
- "BSMI statement (Taiwan)" on page 45
- "CE statement" on page 45
- "Canadian requirements" on page 45
- "German statement" on page 45
- "Laser compliance" on page 45
- "RTC battery" on page 46
- "Electrical safety" on page 46

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.

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)

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。

China

⚠ China-CCC Warning statements

在维修的时候一定要断开所有电源 (English translation"disconnect all power sources before service")

For non tropical use:

安全说明和标记	汉文	"仅适用于非热带气候条件下安全使用。"
	藏文	《ༀༀ་ༀ་ༀ་ ༀ ༀༀ ༀ ༀༀༀ་ ༀ ༀ ༀ ༀ ༀ ༀ ༀ ༀ ༀ ༀ ༀ / ༀ ༀ》
	蒙古文	"ཚ་བའི་ས་ཁུལ་གྱི་གན་མ་ག་ཤིས་མིན་པའི་ས་ཁུལ་ཡོ་ན་ར་ཉེན་མེད་བེད་སྤྱོད་བྱས་འཐུས།"
	壮文	Dan hab yungh youq gij dienheiq diuzgen mbouj dwg diegndat haenx ancienz sawjyungh.
	维文	غەيرى ئىسسىق بەلباغ ھاۋا كلىماتى شارائتىتىندىلا بىخەتەر، ئىشلەتكىلى بولىدۇ

For altitude 2000 meter and below:

安全说明和标记	汉文	仅适用于海拔2000m以下地区安全使用。
	藏文	《2000m ༀ ༀ ༀ ༀ ༀ ༀ ༀ ༀ ༀ ༀ ༀ ༀ ༀ / ༀ ༀ》
	蒙古文	"རྒྱ་མཚོའི་ངོས་ལས་མཐོ་ཚད་སྐྱེ2000མན་གྱི་ས་ཁུལ་ཡོ་ན་ར་ཉེན་མེད་བེད་སྤྱོད་བྱས་འཐུས།"
	壮文	Dan hab yungh youq gij digih haijbaz 2000m doxroengz haenx ancienz sawjyungh.
	维文	دېڭىز يۈزىدىن 2000 مېتر تۆۋەن رايونلاردىلا بىخەتەر، ئىشلەتكىلى بولىدۇ

Warning for Class A:

声 明

此为 A 级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

English translation of above statement

This is a Class A product. In a domestic environment this product may cause radio interference, i 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

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 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.

German statement

Maschinenlärminformations-Verordnung – 3 GPSGV, der höchste Schalldruckpegel beträgt 80 dB(A) gemäss EN ISO 7779.

Machine noise information regulation – 3. GPSGV, the highest sound pressure level value is 80 dB(A) in accordance with EN ISO 7779.

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.

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 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 15 lists the regulatory compliance standards for which the Brocade 6520 is certified.

TABLE 15   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 + Amendment 1	ANSI C63.4	cCSAus	FCC Class A and Statement

TABLE 15   Regulatory compliance standards   (Continued)

Country	Standards		Agency Certifications and Markings	
Canada	Bi-Nat UL/CSA 60950-1 2nd Ed or latest + Amendment 1	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 + Amendment 1 and Amendment 12	EN55022 and EN55024	TUV-GS, N	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 (PS only)	CNS 14336(94) 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 6520.

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 document 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，Br
ocade 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。

China ROHS hazardous/toxic substances (HS/TS) concentration chart

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.

TABLE 16　　　China ROHS hazardous/toxic substances (HS/TS) concentration chart

Name of the Component	Hazardous/Toxic Substance/Elements					
	Lead (PB)	Mercury (Hg)	Cadmium (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 (SFP+ 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
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

TABLE 16   China ROHS hazardous/toxic substances (HS/TS) concentration chart (Continued)

Name of the Component	Hazardous/Toxic Substance/Elements					
	Lead (PB)	Mercury (Hg)	Cadmium (CD)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Replacement Doors	X	O	O	O	O	O
Software/ Documentation CDs	O	O	O	O	O	O

X indicates that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/T11363-2006 Requirements for Concentration Limits.

O indicates that no such substances are used or that the concentration is within the aforementioned limits.

CHINA ROHS 有害物质/有毒物质(HS/TS)限量列表

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)	六价铬 (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
USB 闪存器	O	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。

Caution and Danger Notices

In this appendix

Caution notices

The cautions and dangers that appear in this manual are listed below in English, German, French, and Spanish.

A caution calls your attention to a possible hazard that can damage equipment.

"Vorsicht" weist auf eine mögliche Beschädigung des Geräts hin. Sie finden die folgenden Vorsichtshinweise in diesem Handbuch.

Une mise en garde attire votre attention sur un risque possible d'endommagement de l'équipement. Ci-dessous, vous trouverez les mises en garde utilisées dans ce manuel.

Un mensaje de precaución le advierte sobre un posible peligro que pueda dañar el equipo. Las siguientes son precauciones utilizadas en este manual.

CAUTION	Do not install the device in an environment where the operating ambient temperature might exceed 40° C (104° F).
VORSICHT	Das Gerät darf nicht in einer Umgebung mit einer Umgebungsbetriebstemperatur von über 40° C (104° F) installiert werden.
MISE EN GARDE	N'installez pas le dispositif dans un environnement où la température d'exploitation ambiante risque de dépasser 40° C (104° F).
PRECAUCIÓN	No instale el instrumento en un entorno en el que la temperatura ambiente de operación pueda exceder los 40° C (104° F).

CAUTION	Use a separate branch circuit for each AC power cord, which provides redundancy in case one of the circuits fails.
VORSICHT	Es empfiehlt sich die Installation eines separaten Stromkreiszweiges für jede Wechselstrom-Elektroschnur als Redundanz im Fall des Ausfalls eines Stromkreises.
MISE EN GARDE	Utilisez un circuit de dérivation différent pour chaque cordon d'alimentation C.A. Ainsi, il y aura un circuit redondant en cas de panne d'un des circuits.
PRECAUCIÓN	Use un circuito derivado separado para cada cordón de alimentación de CA, con lo que se proporcionará redundancia en caso de que uno de los circuitos falle.

CAUTION	Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.
VORSICHT	Es besteht Explosionsgefahr, wenn ein unzulässiger Batterietyp eingesetzt wird. Verbrauchte Batterien sind entsprechend den geltenden Vorschriften zu entsorgen.
MISE EN GARDE	Risque d'explosion en cas de remplacement de la pile par un modèle incorrect. Débarrassez-vous des piles usagées conformément aux instructions.
PRECAUCIÓN	Riesgo de explosión si se sustituye la batería por una de tipo incorrecto. Deshágase de las baterías usadas de acuerdo con las instrucciones.

Danger notices

A danger calls your attention to a possible hazard that can cause injury or death. The following are the dangers used in this manual.

"Gefahr" weist auf eine mögliche Gefährdung hin, die zu Verletzungen oder Tod führen können. Sie finden die folgenden Warnhinweise in diesem Handbuch.

Un danger attire votre attention sur un risque possible de blessure ou de décès. Ci-dessous, vous trouverez les dangers utilisés dans ce manuel.

Una advertencia le llama la atención sobre cualquier posible peligro que pueda ocasionar daños personales o la muerte. A continuación se dan las advertencias utilizadas en este manual.

DANGER	The procedures in this manual are for qualified service personnel.
GEFAHR	Die Verfahren in diesem Handbuch sind nur für qualifiziertes Wartungspersonal gedacht.
DANGER	Les procédures décrites dans ce manuel doivent être effectuées par le personnel de service qualifié uniquement.
PELIGRO	Los procedimientos de este manual se han hecho para personal de servicio cualificado.

DANGER	All fiber optic interfaces use Class 1 lasers.
GEFAHR	Alle Glasfaser-Schnittstellen verwenden Laser der Klasse 1.
DANGER	Toutes les interfaces en fibres optiques utilisent des lasers de classe 1.
PELIGRO	Todas las interfaces de fibra óptica utilizan láser de clase 1.

DANGER	Installation and removal of the unit must be carried out by qualified personnel only.
GEFAHR	Die Installation und Entfernung der Einheit dürfen nur von qualifiziertem Personal ausgeführt werden.
DANGER	L'installation et la dépose de l'unité doivent être confiées uniquement à du personnel qualifié.
PELIGRO	La instalación y desinstalación de la unidad debe llevarse a cabo solamente por personal cualificado.

DANGER	Disconnect the power cord from all power sources to completely remove power from the device.
GEFAHR	Ziehen Sie das Stromkabel aus allen Stromquellen, um sicherzustellen, dass dem Gerät kein Strom zugeführt wird.
DANGER	Débranchez le cordon d'alimentation de toutes les sources d'alimentation pour couper complètement l'alimentation du dispositif.
PELIGRO	Para desconectar completamente la corriente del instrumento, desconecte el cordón de corriente de todas las fuentes de corriente.

DANGER	If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the device.
GEFAHR	Falls für die Installation ein anderes Stromkabel erforderlich ist (wenn das mit dem Gerät gelieferte Kabel nicht passt), müssen Sie sicherstellen, dass Sie ein Stromkabel mit dem Siegel einer Sicherheitsbehörde verwenden, die für die Zertifizierung von Stromkabeln in Ihrem Land zuständig ist. Das Siegel ist Ihre Garantie, dass das Stromkabel sicher mit Ihrem Gerät verwendet werden kann.
DANGER	Si l'installation nécessite un cordon d'alimentation autre que celui fourni avec le dispositif, assurez-vous d'utiliser un cordon d'alimentation portant la marque de l'organisation responsable de la sécurité qui définit les normes et régulations pour les cordons d'alimentation dans votre pays. Cette marque vous assure que vous pouvez utiliser le cordon d'alimentation avec le dispositif en toute sécurité.
PELIGRO	Si la instalación requiere un cordón de corriente distinto al que se ha suministrado con el instrumento, verifique que usa un cordón de corriente que venga con la marca de la agencia de seguridad que defina las regulaciones para cordones de corriente en su país. Esta marca será su garantía de que el cordón de corriente puede ser utilizado con seguridad con el instrumento.

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