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Brocade 48000

Hardware Reference Manual

Supporting Fabric OS v6.1.0

BROCADE

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How this document is organized

This document is a hardware reference manual written for system administrators and technicians experienced with networking, Fibre Channel, and SAN technologies to help them install, set up, configure, operate, maintain, and troubleshoot the Brocade 48000 Director (the "director").

This document presents information on setting-up and operating the director. It is organized in a loosely chronological order, beginning with an overview of the director and ending with removal and replacement procedures of field replaceable components.

The document contains the following sections:

- Chapter 1, "Overview," identifies the components of the director and provides a brief description of its features.
- Chapter 2, "Installation," describes how to install, set up, and power on the director.
- Chapter 3, "Log In and Configuration," provides the initial configuration information required to get the director established in a fabric.
- Chapter 4, "Monitor System Components," provides descriptions of the LEDs and their functions, and also lists Fabric OS commands required for monitoring.
- Chapter 5, "Removal and Replacement Procedures (RRPs)," describes how to remove and replace each of the FRUs in the director.
- Appendix A, "Specifications," provides information on the physical characteristics, environmental requirements, and regulatory certifications for the director.

- Appendix B, "Application Blades," provides information about application blades that are optionally available for the director.
- Appendix C, "Diagnostics and Troubleshooting," provides methods for receiving system-wide or component-level status, interpreting POST and boot activities and diagnostic tests; it also includes troubleshooting tips.
- Appendix D, "Port Numbering Template," contains templates where you can record the port numbering sequence for the port blades.

Supported hardware and software

This document includes information specific to the director running Brocade Fabric OS version 6.1.0.

What's new in this document

The following change has been made since this document was last released:

Addition of information for Brocade Fabric OS version 6.1.0.

Document conventions

This section describes text formatting conventions and important notices formats.

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
<i>italic</i> 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.

Additional information

This section lists additional Brocade and industry-specific documentation.

Brocade resources

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

NOTE

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

Fabric OS

- Fabric OS Administrator's Guide
- Fabric OS Command Reference
- Fabric OS MIB Reference
- Fabric OS Message Reference

Fabric OS Optional Features

- Web Tools Administrator's Guide
- Fabric Watch Administrator's Guide
- Fabric Manager Administrator's Guide
- Secure Fabric OS Administrator's Guide

Brocade 48000

- Port Blade and Filler Panel Replacement Procedure
- Control Processor Blade Replacement Procedure
- Blower Assembly Replacement Procedure
- Cable Management Tray and Guide Replacement Procedure
- Chassis Door Replacement Procedure
- WWN Bezel and Card Replacement Procedure
- Power Supply and Filler Panel Replacement Procedure
- 14U Rack Mount Kit Installation Procedure

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

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

http://www.amazon.com

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

http://www.brocade.com

Other industry resources

In addition to this manual, the following information about fabric security and the Secure Fabric OS product is available:

• White papers, online demos, and data sheets are available through the Brocade Web site at:

http://www.brocade.com/products/software.html

- Best practice guides, including the SAN Security Best Practice Guide, white papers, online demos, data sheets, and other documentation is available through the Brocade Partner Web site.
- The CERT[®] Coordination Center of Carnegie Mellon University provides industry-level information about certification at:

http://www.cert.org

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

http://www.t11.org

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

http://www.fibrechannel.org

Getting technical help

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

- 1. General information
 - Technical Support contract number, if applicable
 - Director model
 - Director operating system version
 - Error numbers and messages received
 - supportSave command output
 - Detailed description of the problem and specific questions
 - Description of any troubleshooting steps already performed and results
 - Serial console and Telnet session logs
 - syslog message logs
- 2. Director serial number

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

FT00X0054E9

The serial number label is located inside the front of the chassis, on the wall to the left of the ports.

3. License ID

Use the licenseldShow command to display the license ID.

Document feedback

Because quality is our first concern at Brocade, we have made every effort to ensure the accuracy and completeness of this document. However, if you find an error or an omission, or you think that a topic needs further development, we want to hear from you. Forward your feedback to:

documentation@brocade.com

Provide the title and version number and as much detail as possible about your comment, including the topic heading and page number and your suggestions for improvement.

General precautions

When installing or servicing the director, follow these practices:

- Use correct tools.
- Use correct replacement parts.
- Keep all installation and service-related paperwork up to date, complete, and accurate.

ESD precautions

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

- Wear a wrist grounding strap connected to chassis ground (if the director is plugged in) or a bench ground.
- Store ESD-sensitive components in antistatic packaging.

Attention notices

An attention notice indicates the possibility of damage to a program, device, or system, or to data. This is a sample of an attention notice:

ATTENTION

Do not bend a fibre cable to a radius less than 5 cm (2 in.); you can damage the cable. Tie wraps are not recommended for optical cables because they can be easily overtightened, causing damage to the cable.

Safety notices

ATTENTION

Translated safety notices are in the *Brocade Product Safety Notices* publication, which is on the CD-ROM that accompanies this product.

When using this product, observe the danger, caution, and attention notices in this manual. The notices are accompanied by symbols that represent the severity of the safety condition.

The danger and caution notices are listed in numerical order based on their IDs, which are displayed in parentheses, for example (D004), at the end of each notice. Use this ID to locate the translations of these danger and caution notices in the *Brocade Product Safety Notices* (620-000247).

Danger notices

A danger notice calls attention to a situation that is potentially lethal or extremely hazardous to people. A lightning bolt symbol accompanies a danger notice to represent a dangerous electrical condition. Read and comply with the following danger notice before installing or servicing this device.



DANGER

Use the supplied power cords. Ensure the facility power receptacle is the correct type, supplies the required voltage, and is properly grounded. (D004)

Caution notices

A caution notice calls attention to a situation that is potentially hazardous to people because of some existing condition.Read and comply with the following caution notice before installing or servicing this device.



CAUTION

Use safe lifting practices when moving the product. (C015)

Chapter

Overview

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Brocade 48000 Director features

The Brocade 48000 Director represents the next generation of advanced Fibre Channel directors used to intelligently interconnect storage devices, hosts, and servers in a Storage Area Network (SAN). The director is the highest-performance and highest-scalability director offered by Brocade. It satisfies the most demanding Reliability, Availability, and Serviceability (RAS), performance, and scalability requirements, while delivering investment protection, interoperability, and fabric-based intelligence advantages found only in the Brocade product family.

Key features of the director include:

- Up to 384 ports in a single chassis, providing high port density for a scalable solution to drive high-port-count SAN configurations.
- Support for high-performance port blades running at 1-, 2-, 4-, or 10-Gbps, enabling flexible system configuration:
- Support for 1-, 2-, and 4-Gbps auto-sensing Fibre Channel ports. Trunking technology groups up to eight ports to create high performance 64-Gbps ISL trunks between switches. (10 Gbps ports (FC10-6) are 10 Gbps only.)
- Dual-redundant control processor blades (CP4) that provide high availability and enable nondisruptive software upgrades.
- Redundant and hot-swappable CP4 blades, power supplies, and blower assemblies that enable a high availability platform for mission critical SAN applications.
- Universal ports that self-configure as E_ports, F_ports, FL_ports, Ex_ports, and M_ports (mirror ports).
 - 10 Gbps ports (FC10-6) are E-Ports only.

Hardware components

The director features a modular and scalable mechanical construction that allows a wide range of flexibility in installation, fabric design, and maintenance. The chassis may be mounted with the cables facing the front of the equipment rack or to the rear, and consists of the following:

- Up to eight hot-swappable port blade assemblies can be configured in a single chassis, delivering up to 384 Fibre Channel ports.
- Two slots for control processor blades (CP4):
 - A single active CP4 blade can control all 384 ports in the chassis.
 - The standby CP4 blade assumes control of the director if the active CP fails.
- Modular hot-swappable port blades:
 - 16-port, 4-Gbps blades (FC4-16)
 - 32-port, 4-Gbps blades (FC4-32)
 - 48-port, 4-Gbps blades (FC4-48)
 - 6-port, 10-Gbps blades (FC10-6)
- Modular hot-swappable application blades:
 - FA4-18: 18-port (16 FC + 2 10/100/1000 BaseT Ethernet copper interfaces), up to 2 blades per chassis, supporting Fibre Channel Application Services and blade management
 - FR4-18i: 18-port (16 FC + 2 GbE), up to 2 blades per chassis, supporting Fibre Channel Routing Services and FCIP
 - FC4-16IP: 16-port (8 FC + 8 GbE), up to 4 blades per chassis, supporting iSCSI bridging)
- Modular hot-swappable field replaceable units (FRUs):
 - Three blower assemblies
 - Up to 4 power supplies (four power supplies are required when using the FA4-18, FR4-18i, or FC4-16IP blade in the chassis).
 - Small Form-factor Pluggable (SFP) optical transceivers (1-, 2-, and 4-Gbps)
 - Extended Form-factor Pluggable (XFP) optical transceivers (10-Gbps)
- Cables, blades, and power supplies that are serviced from the port side of the director, and blowers that are serviced from the nonport side.
- Improved cable management using a redesigned cable management tray and chassis door.
- Constant intake and FRU temperature monitoring.
- World Wide Name (WWN) card on the nonport side, to maintain chassis-specific information such as WWNs, IP addresses, and summary status information of each port blade and power supply through LEDs.
- Redundant AC primary power connections to allow two primary power connections for high availability.

Port side of the director

NOTE

Airflow in the director is from the non-port (non-cable) side to the port (cable) side and out the exhaust vent.

Figure 1 displays a sample configuration of the port side of the director.





Nonport side of the director

Figure 2 displays a sample configuration of the nonport side view of the director.



FIGURE 2 Nonport side of the director (sample configuration)

Director blades

Table 1 summarizes the port, application, and control processor blades that are available for the director.

TABLE 1	Blades available for	director

Description	Name	Function
Brocade 48000 control processor blade	CP4	The blade that contains the control plane for the chassis. There are two CP4 blades for redundancy. This control processor blade is compatible only with the Brocade 48000.
16-port 8-Gbps port blade	FC8-16	A 16-port Brocade director port blade supporting 1, 2, 4, and 8 Gbps port speeds. This port blade is compatible only with the Brocade 48000 Director or Brocade DCX.
32-port 8-Gbps port blade	FC8-32	A 32-port Brocade director port blade supporting 1, 2, 4, and 8 Gbps port speeds. This port blade is compatible only with the Brocade 48000 Director or Brocade DCX.
48-port 8-Gbps port blade	FC8-48	A 48-port Brocade director port blade supporting 1, 2, 4, and 8 Gbps port speeds. This port blade is compatible only with the Brocade 48000 Director or Brocade DCX.
16-port 4-Gbps port blade	FC4-16	A 16-port Brocade director port blade supporting 1, 2, and 4 Gbps port speeds. This port blade is compatible only with the Brocade 48000.
32-port 4-Gbps port blade	FC4-32	A 32-port Brocade director port blade supporting 1, 2, and 4 Gbps port speeds. This port blade is compatible only with the Brocade 48000 Director.
48-port 4-Gbps port blade	FC4-48	A 48-port Brocade director port blade supporting 1, 2, and 4 Gbps port speeds. This port blade is compatible only with the Brocade 48000 Director.
6-port 10-Gbps port blade	FC10-6	A 6-port Brocade director port blade supporting 10 Gbps port speed. Blade provides 10-Gbps ISLs. This port blade is compatible only with the Brocade 48000 Director or Brocade DCX.
Fibre Channel application blade	FA4-18	A blade that has 16 (1-, 2-, and 4-Gbps) physical ports supporting Fibre Channel Application Services and 2 10/100/1000 BaseT Ethernet copper interfaces supporting blade management. This application blade is compatible only with the Brocade 48000 Director or Brocade DCX.
Fibre Channel router blade	FR4-18i	A blade that has 16 physical Fibre Channel SFP ports supporting Fibre Channel Routing Services and 2 physical Gigabit Ethernet (GbE) SFP ports supporting Fibre Channel Over IP (FCIP). The 2 physical GbE ports can support up to 16 virtual E_ports.
iSCSI bridge blade	FC4-16IP	A blade that enables bridging of iSCSI hosts to Fibre Channel fabrics. It has 8 Fibre Channel optical SFP ports and 8 Gigabit Ethernet (GbE) copper RJ-45 ports.

High availability

The following features contribute to the director high-availability design:

- Redundant, hot-swappable blades and FRUs
- Enhanced data integrity on all data paths
- Fabric Shortest Path First (FSPF) rerouting around failed links
- Integration with Simple Network Management Protocol (SNMP) managers
- Automatic control processor failover
- Nondisruptive "hot" software code loads and activation
- Easy configuration, save, and restore
- Hot-swappable World Wide Name (WWN) card

The high-availability software architecture of the director provides a common framework for all applications that reside on the system, allowing global and local states to be maintained through any component failure. High-availability elements consist of the High Availability Manager, the heartbeat, the fault/health framework, the replicated database, initialization, and software upgrade.

The High Availability Manager controls access to the standby control processor, facilitates software upgrades, prevents extraneous switchover activity, closes and flushes streams, provides flow control and message buffering, and supports a centralized active and standby state.

Reliability

The director uses the following error detection and correction mechanisms to ensure reliability of data:

- Data is protected by the Error Detection and Correction mechanism, which checks for encoder errors and fault isolation (EDFI), such as cyclic redundancy checking (CRC), parity checking, checksum, and illegal address checking.
- Power-on self-test (POST).
- Dual control processors that enable hot, nondisruptive fast firmware upgrades.
- Each control processor contains two serial ports and one Ethernet port for management and for service. Offline control processor diagnostics and remote diagnostics simplify troubleshooting. The standby control processor monitors diagnostics to ensure it is operational, should a failover be necessary.
- Bus monitoring and control of blades and other field-replaceable units (FRUs).

Serviceability

The director provides the following features to enhance and ensure serviceability:

- Modular design with hot-swappable components.
- Flash memory that stores two firmware images per control processor.
- Extensive diagnostics and status reporting, along with a serial port to support an external, country-specific modem for remote diagnostics and status monitoring.

- Nonvolatile random-access memory (NVRAM), containing the OEM serial number, Brocade serial number, revision information, and part number information.
- Background health-check daemon.
- Memory scrubber, self test, and bus ping to determine if a bus is not functioning.
- RASlog messages.
- SMI-S compliant.
- Watchdog timers.
- Status LEDs.
- Predictive diagnostics analysis through Fabric Watch.
- SNMP (including version 3) integration with higher-layer managers.

Software features

The Fabric OS allows any Fibre Channel-compliant device to attach to the switches as long as it conforms to the device login, name service, and related Fibre Channel standards. Each operating environment requires that a Fibre Channel host bus adapter (HBA) be available with a standards-compliant driver for correct interface to the fabric.

Fabric OS consists of a set of embedded applications running on top of an embedded Linux operating system kernel. These applications include:

- Name server
- Alias server
- Zone server
- Simple Network Management Protocol (SNMP) agent
- SMI-S compliant API
- Syslog auditing
- RCS (Reliable Commit Service)
- NTP
- Tasks to manage address assignment, routing, link initialization, fabric initialization, link shutdown, director shutdown, and the user interface.

Security

Table 2 highlights some of the key security features available for the director and for other Brocade switches running Fabric OS 5.2.0 or later. For details, contact your switch supplier and refer to the Brocade White Paper, "The Growing Need for Security in Storage Area Networks".

Brocade Security Features	
DH-CHAP	Login banner
SSHv2 (using AES, 3DES, RSA)	Monitoring of attempted security breaches (through audit logging)
HTTPS (using AES)	Monitoring of attempted security breaches (through Fabric Watch Security Class)
SNPMv3	Fibre Channel security policies: DCC and SCC
FC-SP	Trusted Switch (FCS) for central security management
Secure RPC	Management access controls (SNMPv3, Telnet, FTP, serial port, front panel)
Secure file copy (SCP)	Hardware-enforced zoning by WWN, domain/port ID, or both
Telnet disable	Default zoning
Telnet timeout	RSCN suppression and aggregation
IP filters (block listeners)	Configurable RSCN suppression by port
Secure passwords (centralized control through RADIUS/CHAP)	NTPv3 (to synchronize timestamps)
Multiple user accounts (MUAs). Up to 255.	Event auditing
Role-based access controls (RBACs)	Change tracking
Administrative domains/Virtual fabrics	Firmware change alerts in Fabric Manager
Boot PROM password reset	Persistent port disable
Password hardening policies	Persistent domain ID
Upfront login in Web Tools	E_port disable

Network manageability

The director has a single domain and is managed as a single element with the Enterprise Fabric Connectivity Manager (EFCM)/Fabric Manager (FM). The director responds to its own IP address and appears as a separate entity to the Telnet protocol and SNMP.

All management interfaces, such as Telnet, Web Tools, standards compliant SMI-S, and Management Server, support a "port N within blade M" naming scheme.

The director supports SNMPv1 and SNPMv3. When SNMP devices send SNMP messages to a management console running SAN management software, the information is stored in a management information base (MIB). Fabric OS v6.0.0 supports the latest Fibre Alliance Fibre Channel Management (FCMGMT) and Storage Management Initiative (SMI) MIBs, which allow common information necessary for management software to provide information to a SAN administrator. Refer to the *Fabric OS MIB Reference* for additional MIB information.

Chapter

Installation

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Time and items required

You can set up and install the Brocade 48000 Director in the following ways:

- As a standalone unit on a flat surface.
- In a 19-in. Electronic Industries Association (EIA) cabinet, using the 14U Rack Mount Kit (provided).
- In a mid-mount (Telco) rack, using the Mid-Mount Rack Kit, available from your switch supplier.

This chapter describes how to set up the director as a standalone unit. For rack-mount installation instructions, refer to the 14U Rack Mount Kit Installation Procedure or the Mid-Mount Rack Kit Installation Procedure.

Table 3 describes the main installation and setup tasks and the estimated time required for each, based on a fully populated director (384 Fibre Channel ports). Configurations with fewer ports require less time. These time estimates assume a prepared installation site and appropriate power and network connectivity.

	•	
Installation task	Time estimate	Items required
Site preparation and unpacking director	30 minutes	 1/2-in. socket wrench (to remove pallet bolts) #2 Phillips screwdriver (for cable management tray) Pallet jack Hydraulic lift or assisted lift, able to raise to a minimum of 55 in. (140 cm), with a minimum capacity of 113 kg (250 lb). The director weighs 98 kg (216 lb) without media but can weigh considerably more depending on the media installed.
Installing rack mount kit	talling rack mount kit 30 minutes Refer to	
Mounting and securing director in rack	30 minutes	Procedure or the Mid-Mount Installation Procedure.

TABLE 3 Installation tasks, time and items required

,		,
Installation task	Time estimate	Items required
Installing power cables and powering on the director	20 minutes	Power cables and serial cable (provided in the director accessory kit)
Installing SFP and XFP (10-Gbps) optical transceivers	30 minutes	SFP and XFP (10-Gbps) optical transceivers
Attaching fiber optic cables, cable ties, and cable guides	60 minutes	Fiber optic cables, cable ties, and pillars
Establishing serial connection, logging on to director, and configuring IP addresses	10 minutes	Serial cable (provided in the director accessory kit) Workstation computer with a serial port or terminal server port and a terminal emulator application (such as HyperTerminal) Ethernet IP addresses for the switch (1) and for each control/core processor blade (2): total three addresses
Installing one or more Ethernet cables and configuring the director name, policies, domain ID, PIDs, or additional system parameters	20 minutes	Ethernet cabling (optional) for Telnet access All other configuration parameters optional Refer to the <i>Fabric OS Administrator's Guide</i> for PID information.

TABLE 3Installation tasks, time and items required (Continued)

Site preparation, unpacking the director, and safety

NOTE

Read the safety notices before installation ("Safety notices").

The following steps are required to ensure correct installation and operation.

- 1. Provide a space that is 14 rack units (14U) high, 73.7 cm (29 in.) deep, and 48.3 cm (19-in.) wide. 1U is equal to 4.45 cm (1.75 in.).
- 2. Plan to install the director with the nonport side facing the air-intake aisle. The director can be installed facing either direction, if serviceability and cooling requirements are met.
- 3. Plan for cable management before installing the chassis ("Cable management").

Cables can be managed in a variety of ways, such as by routing cables below the chassis, to either side of the chassis, through cable channels on the sides of the cabinet, or by using patch panels.

- 4. Ensure that two dedicated electrical branch circuits with the following characteristics are available:
 - 200-40 VAC, 50-60 Hz
 - Protected by a circuit breaker in accordance with local electrical codes
 - Supply circuit, line fusing, and wire size adequate to the electrical rating on the chassis nameplate
 - Location close to the chassis and easily accessible
 - Grounded outlets installed by a licensed electrician, compatible with the power cords

2

ATTENTION

To maximize fault tolerance, connect each power cord to a separate power source.

- 5. Ensure that the air intake and exhaust vents have a minimum of 2 in. of airspace.
- Ensure that the air temperature on the air intake side is less than 40 degrees Celsius (104 degrees Fahrenheit) during operation.



CAUTION

Use safe lifting practices when moving the product. (C015)

NOTE

A fully populated director (eight FC4-48 port cards, 384 ports) weighs approximately 96 kg (216 lbs) and requires a hydraulic or assisted lift to install it.

- 7. Unpack and install the director.
 - a. Cut the bands that encircle the packaging.
 - b. Remove the lid and the kits and foam from the top of the chassis.
 - c. Lift the cardboard box off the chassis and remove the plastic bag from around the chassis. Save the packing materials for use when returning the old chassis.
 - d. Leave the chassis on top of the plastic shipping tray if the chassis must be transported to the installation location.

NOTE

The director packaging does not incorporate wood pallet and pallet brackets. The chassis sits on top of plastic shipping tray.

- 8. Use a pallet jack or other assisted lift to transport the new chassis to the installation area. Doorways must be wider than 36 in. (91 cm) to accommodate the chassis.
- Remove the 14U rack mount kit, accessory kit, packing foam, and antistatic plastic from the chassis and set aside.
- 10. Remove the chassis door from the director.
- 11. Remove the cable management tray (Figure 4).
- 12. Use a lift to raise the chassis to the correct level. If installing the chassis in a cabinet, follow the instructions provided by the rack kit manufacturer.
- 13. If applicable, lock the wheels of the lift.
- 14. Gently slide the chassis onto the final installation surface, ensuring that it remains supported during the transfer.
- 15. Ensure that the chassis is oriented so that the nonport side has access to intake air (cool).
- 16. Reinstall the cable management tray.
- 17. Reinstall the door.

Items included with the director

The following items are included with the standard shipment of the director:

- Director chassis, populated with:
 - Control processor (CP4) blades
 - Port blades and application blades (included based on customer specification)
 - Blade slot filler panels (for slots not filled by a port blade or control processor blade)
 - WWN card
 - WWN bezel
 - Power supplies
 - Power supply filler panels (included if there are less than four power supplies)
 - Blower assemblies
 - Cable management tray
 - Chassis door
- Accessory kit containing the following items:
 - Brocade 48000 QuickStart Guide
 - Brocade Documentation CD (contains documents referred to in this manual)
 - ESD grounding strap
 - Power cords appropriate to the country of installation.
 - Power cord retainers
 - RS-232 serial cable. The RS-232 cable has an adapter at one end that can be removed to provide an RJ-45-style connector.
 - 32 serial cable
- 14U rack mount kit with instructions (includes rear brackets and bottom support rails)

Order the optical transceivers (SFP and XFP) from Brocade. The director supports SWL, LWL, and ELWL transceivers.

NOTE

For information about the SFP and XFP transceivers that are qualified for the director, go to http://www.brocade.com/products/interop_and_compatibility.jsp.

2

Providing power to the director



DANGER

Use the supplied power cords. Ensure the facility power receptacle is the correct type, supplies the required voltage, and is properly grounded. (D004)

- 1. Verify that the AC switch covers are installed over the AC switches. These clear plastic covers fit over the AC switches with their edges tucked underneath the outlet covers; they prevent the AC switches from being powered on or off accidentally (Figure 3).
- Connect the AC power cord retainers to the chassis. Orient a retainer against the AC panel (Figure 3), place the retainer tabs under the two jack screws on either side of the power receptacle, and tighten the screws. Repeat for the other retainer. The power cord retainers are oriented in the same direction as the power receptacles.



FIGURE 3 AC panel and power cord retainers

- 3. Loosen the clamping screw on each retainer, insert the power cords through the retainers into the power receptacles on the director, and tighten the clamping screws. The power cords are designed to bend to the left, so each should route to an opposite side of the chassis.
- 4. Ensure that the power cord has a minimum service loop of 6 in. available at the connection to the switch and is routed so that it is not exposed to stress.
- 5. Connect the power cords to a power source with voltage of 200 to 240 VAC, 47 to 63 Hz.

6. Flip both AC power switches to 1. The AC power switches light green when switched on and power is supplied.

The director performs a power-on self-test (POST) each time it is powered on. POST takes approximately 10 minutes and is complete when indicator light activity indicates the operational state. For information about LED patterns, see Chapter 4, "Monitor System Components".

You can bypass POST by using the **fastBoot** command. You can also disable POST for successive reboots on the director using the **diagDisablePost** command.

ATTENTION

To prevent a potential IP address conflict, do not connect the director to the network until the IP addresses are configured (Chapter 3, "Log In and Configuration").

NOTE

To power off the director, go to "Powering off the director".

Port numbering

The director uses the following port numbering method (Appendix D, "Port Numbering Template").

- FC8-16 port blade—ports are numbered from 0 through 15 from bottom to top.
- FC8-32 port blade—ports are numbered from 0 through 15 from bottom to top on the left set of
 ports and 16 through 31 from bottom to top on the right set of ports.
- FC8-48 port blade—ports are numbered from 0 through 23 from bottom to top on the left set of
 ports and 24 through 47 from bottom to top on the right set of ports.
- FC4-16 port blade—ports are numbered from 0 through 15 from bottom to top.
- FC4-32 port blade—ports are numbered from 0 through 15 from bottom to top on the left set of ports and 16 through 31 from bottom to top on the right set of ports.
- FC4-48 port blade—ports are numbered from 0 through 23 from bottom to top on the left set of ports and 24 through 47 from bottom to top on the right set of ports.
- FC10-6 port blade—ports are numbered from 0 through 5 from bottom to top.
- FA4-18 blade—the 16 physical Fibre Channel ports on this blade are numbered 0 through 15 from bottom to top. The two 10/100/1000 BaseT ports are numbered from the bottom as A0 and A1.
- FR4-18i blade—the 16 physical Fibre Channel ports on this blade are numbered 0 through 15 from bottom to top. The two GbE ports are numbered from the bottom as Ge0 and Ge1. These ports, when fully configured, enable 16 VE_Ports or VEX _Ports and appear in the **switchShow** command as ports 16 through 31.
- FC4-16IP blade—the port numbering is divided between the two types of ports. At the bottom of the blade are the Fibre Channel ports numbered from 0 through 7 bottom to top. The next eight ports are GbE ports and are numbered from GE0 through GE7 bottom to top.

Slots are numbered 1 through 10, from left to right when facing the port side of the director. Control processor blades (CP4) can be installed only in slots 5 and 6.

Cable management

The cable management tray (Figure 4) is attached to the chassis under the chassis door and allows for simple cable management. The tray can be installed without service disruption.

Route cables down in front of the blades to keep LEDs visible. Leave at least one meter of slack for each fiber optic cable to provide room to remove and replace blades.

ATTENTION

Do not route the cables in front of the air exhaust vent, which is located at the top of the port side of the chassis.

If ISL Trunking is in use, group the cables by trunking group. The ports are color-coded to indicate which ports can be used in the same ISL Trunking group: eight ports marked with solid black ovals alternate with eight ports marked with oval outlines. See Table 7 for a listing of supported cable speeds and distances.



FIGURE 4 Cable management tray

1

2

2 Cable management

Chapter

In this chapter

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Customizing a switch name	21
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• Verifying the PID mode and connecting to the fabric	21
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Configuration overview

The Brocade 48000 Director must be configured before it is connected to the fabric, and all of the configuration commands must be entered through the active CP blade. The director configuration includes the following parameters:

- IP address and subnet mask for the chassis
- IP addresses, host names, subnet masks, and gateway addresses for both CP blades
- Switch name
- Domain ID for the director (optional)
- WWN for the director

The director WWN is initially set by the factory to match the license ID (which is based on the chassis serial number). The WWN can be changed but the license ID cannot be modified.

The configuration information is mirrored to the standby CP blade, which allows the current configuration to remain available even if the active CP blade fails. The configuration information for the director is stored in the WWN card and the flash memory of the CP blades. The configuration can be backed up to a workstation (uploaded) and then downloaded to the active CP blade if necessary.

The basic steps required for the initial configuration are:

- 1. Establish a serial connection and log on to the director.
- 2. Set up IP addresses.
- 3. Establish an Ethernet connection.
- 4. Specify a switch name.

- 5. Specify a domain ID for the director.
- 6. Verify the PID mode and connect the director to the fabric.
- 7. Enable software licenses.
- 8. Back up the configuration.

Establishing a serial connection and logging on to director

- 1. Verify that the director is powered on and that POST is complete by verifying that all power LED indicators on the port and control processor blades display a steady green light.
- Remove the shipping cap from the CONSOLE port on the active CP. Use the serial cable provided with the director to connect the CONSOLE port on the active CP to a computer workstation. The active CP blade is indicated by an illuminated (blue) LED.

ATTENTION

The CONSOLE port is intended primarily for the initial setting of the IP address and for service purposes.

- 3. Access the director using a terminal emulator application (such as HyperTerminal in a Windows environment or TERM in a UNIX environment).
- 4. Disable any serial communication programs running on the workstation (such as synchronization programs).
- 5. Open the terminal emulator application and configure as follows:

For most MS Windows systems:

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

For most UNIX systems, type the following string at the prompt:

tip /dev/ttyb -9600

When the terminal emulator application stops reporting information, press **Enter**. You will receive the following login prompt:

CP0 Console Login:

6. Log in to the director as admin. The default password is "password". At the initial login, the user is prompted to enter new admin and user passwords. Make sure to write down the new passwords and keep this information in a secure location.

```
Fabric OS (swDir)
swDir login: admin
Password:
Please change your passwords now.
Use Control-C to exit or press 'Enter' key to proceed.
Password was not changed. Will prompt again at next login
until password is changed.
```

swDir:admin>

 (Optional) Modify passwords. Passwords can be 8 to 40 characters long. They must begin with an alphabetic character. They can include numeric characters, the dot (.), and the underscore (_). Passwords are case-sensitive, and they are not displayed when you enter them on the command line. To skip modifying the password, press Ctrl-C. For more information on passwords, refer to the Fabric OS Administrator's Guide.

Configuring IP addresses

The director requires three IP addresses, which are configured using the **ipAddrSet** command. IP addresses are required for both CP blades (CPO and CP1) and for the single logical switch (shown as SWITCH under the **ipAddrShow** command) in the director.

NOTE

The default IP addresses and host names for the director are: o 10.77.77.75 / CPO (the CP blade in slot 5 at the time of configuration), and o 10.77.77.74 / CP1 (the CP blade in slot 6 at the time of configuration)

NOTE

The default password is "password".

ATTENTION

Resetting an IP address while the director has active IP traffic such as Fabric Manager, Fabric Watch, SNMP, or other applications can cause traffic to be interrupted or stopped.

- 1. Log in to the active CP as admin using the serial cable connection.
- 2. Set up the director IP address by entering the ipaddrset -sw 0 command:

```
swDir:admin> ipAddrSet -sw 0
```

Enter the information at the prompts. Specify the **-sw 0** IP address. There is no **-sw 1** IP address.

NOTE

The addresses 10.0.0.0 through 10.0.0.255 are reserved and used internally by the director. External IPs must not use these addresses.

3. Set up the CPO IP address by entering the ipaddrset -cp 0 command:

swDir:admin> ipAddrSet -cp 0

Enter the information at the prompts.

4. Set up the CP1 IP address by entering the ipaddrset -cp 1 command:

swDir:admin> ipAddrSet -cp 1

Enter the information at the prompts.

This is a sample IP configuration:

```
swDir:admin> ipaddrset -sw 0
Ethernet IP Address [0.0.0.0]: 123.123.123.120
Ethernet Subnetmask [0.0.0.0]: 123.123.123.123
Fibre Channel IP Address [0.0.0.0]:
Fibre Channel Subnetmask [0.0.0.0]:
Issuing gratuitous ARP...Done.
Committing configuration...Done.
```

```
swDir:admin> ipaddrset -cp 0
Host Name [cp0]:
Ethernet IP Address [10.77.77.75]: 123.123.123.121
Ethernet Subnetmask [0.0.0.0]: 123.123.123.123
Gateway IP Address [0.0.0.0]: 123.123.123.124
IP address is being changed...Done.
Committing configuration...Done.
```

```
swDir:admin> ipaddrset -cp 1
Host Name [cp1]:
Ethernet IP Address [10.77.77.74]: 123.123.123.122
Ethernet Subnetmask [0.0.0.0]: 123.123.123.123
Gateway IP Address [0.0.0.0]: 123.123.123.124
IP address of remote CP is being changed...Done.
Committing configuration...Done.
```

swDir:admin> reboot

- 5. Type reboot to reboot the director.
- 6. If desired, use the serial port to monitor error messages through the serial connection. After using the port, remove the serial cable and replace the shipping cap on the CONSOLE port.

Establishing an Ethernet connection

NOTE

Connecting the CP blades to a private network/VLAN is recommended.

After using a serial connection to configure the IP addresses for the director ("Configuring IP addresses"), you can connect the active CP blade to the local area network (LAN).

By establishing an Ethernet connection, you can complete the director configuration using a serial session, Telnet, or management applications, such as Web Tools or Fabric Manager.

- 1. Remove the shipping plug from the Ethernet port on the active CP blade.
- 2. Insert one end of an Ethernet cable into the Ethernet port.
- 3. Connect the other end to an Ethernet 10/100/1000 Base-T LAN.

The director can be accessed by remote connection using any of the management tools, such as Telnet, Web Tools, or Fabric Manager.

4. To complete any additional director configuration procedures through a Telnet session, log in to the director by Telnet, using the admin login. The default password is "password".

Customizing a switch name

The switch name of the director can be up to 15 characters long; can include alpha, numeric, and underscore characters; and must begin with an alpha character.

NOTE

Changing the name causes a domain address format RSCN to be issued.

1. Type **switchName** followed by the new name in quotes.

```
swDir:admin> switchName "swDirector5"
Committing configuration...
Done.
swDirector5:admin>
```

2. Record the new name for reference.

Setting the Domain ID

Each switch in the fabric must have a unique Domain ID. The Domain ID can be manually set with the **configure** command or can be automatically set. The default Domain ID for the director is "1". Use the **fabricShow** command to view the already assigned domain IDs.

- 1. Type switchDisable to disable the director.
- 2. Type configure.
- 3. Type y at the "Fabric parameters" prompt:

Fabric parameters (yes, y, no, n): [no] y

4. Enter a unique Domain ID:

Domain: (1.239) [1] 3

- 5. Complete the remaining prompts or press Ctrl+D to accept the other settings and exit.
- 6. Type switchEnable to reenable the director.

Verifying the PID mode and connecting to the fabric

Before connecting the director to the fabric, verify that the port identifier (PID) mode on the director matches the other switches in the fabric. This parameter must be identical for all switches in the fabric and is set using the **configure** command.

1. Add SFP optical transceivers (or XFP optical transceivers with FC10-6 port card installed) and cables to the fibre channel ports.

The ports are color-coded to indicate which can be used in the same port group for trunking (trunking port groups can be up to 8 ports). The ports and cables used in trunking groups must meet specific requirements. Refer to the *Fabric OS Administrator's Guide*.

2. Position one of the optical transceivers 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.

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.

3. 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.

- 4. Repeat step 1 through step 3 for the remaining ports.
- 5. Organize the cables ("Cable management").
- 6. Verify director and port status using the **switchShow** command.
- 7. Verify fabric connectivity using the **fabricShow** command.

Software licenses

Depending on the vendor agreement, certain licenses are factory installed on the director. To determine which licenses are enabled, use the **licenseShow** command.

```
swDir:admin> licenseshow
AAbbccDDeeFFeeGG:
   Web license
   Zoning license
   Extended Fabric license
   Fabric Watch license
   Performance Monitor license
   Trunking license
   Security license
```

In this example, the license key is AAbbccDDeeFFeeGG. Keep a copy of the license key for reference.

The 64-bit chassis ID is required to obtain and activate licenses for the director. The chassis ID is available through the **licenseldShow** command. The **licenseShow** and **licenseldShow** commands must be typed through the active CP blade. Refer to the *Fabric OS Administrator's Guide*.

Configuration backup

Save all key configuration data for the director, including license key information, and upload it to a host for reference. Routine backups of the configuration are recommended to ensure the current configuration is available.

After zoning configurations and other changes are complete, back up the configuration by typing **configUpload** at the prompt. This command uploads the director configuration to the server so that it is available for downloading to a replacement director.

An easy way to back up configuration information is to enable logging on your Telnet session; then running the following commands and saving the output in a file on a secure host.
- configShow
- ipaddrShow
- licenseShow
- switchShow

Keep copies of key data such as passwords, license keys, and IP addresses in a secure location.

NOTE

Passwords are not saved in the configuration file, and are not uploaded during a configUpload.

3 Configuration backup

In this chapter

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• Determining the status of a port or application blade	25
• Determining the status of a control processor blade (CP4)	37
• Determining the status of a power supply	39
• Determining the status of a blower assembly	41
• Determining the status of the WWN card	42

Introduction

The Brocade 48000 Director is engineered for reliability and requires no routine operational steps or maintenance. This chapter provides information about determining the status of each component using LEDs and CLI commands. Refer to the *Web Tools Administrator's Guide* and the *Fabric OS Administrator's Guide* for additional information.

Determining the status of a port or application blade

- 1. Check the LEDs on the port or application blade.
 - Figure 5 illustrates the FC8-16 port blade
 - Figure 6 illustrates the FC8-32 port blade
 - Figure 7 illustrates the FC8-48 port blade.
 - Figure 8 illustrates the FC4-16 port blade
 - Figure 9 illustrates the FC4-32 port blade
 - Figure 10 illustrates the FC4-48 port blade.
 - Figure 11 illustrates the FC10-6 port blade.
 - Figure 12 illustrates the FC4-16IP application blade
 - Figure 13 illustrates the FR4-18i application blade.
 - Figure 14 illustrates the FA4-18 application blade.
- 2. The LED patterns may temporarily change during POST and other diagnostic tests; for information about how to interpret the LED patterns, see Table 4.
- 3. Check the blade status by typing **slotShow**.





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1

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2 Status LED



Fibre Channel port

4 Port Status LED



Status LED
 Fibre Channel port

Power LED





- Power LED 1
- 2 Status LED
- Fibre Channel port 3
- 4 Port Speed LED (left port)



FC4-32 Port blade

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Port Status LED (right port)7



Power LED 1

2 Status LED

FIGURE 10 FC4-48 Port blade

Fibre Channel port

4 Port Status LED



FIGURE 11 FC10-6 Port blade



FIGURE 12 FC4-16IP Application blade

1



FIGURE 13 FR4-18i Application blade



FIGURE 14 FA4-18 Application blade

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1

2

Power LED

Status LED

Table 4 describes the port blade LED patterns and the recommended actions for those patterns.

LED purpose	Color	Status	Recommended action
Power LED	Steady green	Port blade has valid power.	No action required.
ባ	No light (LED is off)	Port blade does not have incoming power.	Ensure blade is firmly seated and has power.
Status LED	No light (LED is off)	Port blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	Port blade is faulty.	Ensure blade is firmly seated and check status with slotShow command. If LED remains amber, consult switch supplier.
	Slow-flashing amber (on 2 seconds, then off 2 seconds)	Port blade is not seated correctly or is faulty.	Pull blade out and reseat it. If LED continues to flash, replace blade.
	Fast-flashing amber (on 1/2 second, then off 1/2 second)	Environmental range exceeded.	Check for out-of-bounds environmental condition and correct it.
Port Speed LED	No light (LED is off)	Port is either set to 1 Gbps mode, or it does not have incoming power.	Verify that the power LED is on. Type the portCfgSpeed command to change mode.
	Steady green	Port is set to 2 Gbps mode.	No action required.
	Steady amber	Port is set to 4 Gbps mode.	No action required.

 TABLE 4
 Port blade LED descriptions

LED purpose	Color	Status	Recommended action
Port Status	No light (LED is off)	Port has no incoming power, or there is no light or signal carrier detected.	Verify that the power LED is on, check the transceiver and cable.
		Polling is in progress.	Allow 60 seconds for polling to complete.
		Connected device is configured in an offline state.	Verify the status of the connected device.
	Steady green	Port is online (connected to an external device) but has no traffic.	No action required.
	Slow-flashing green (on 1 second, then off 1 second)	Port is online but segmented, indicating a loopback plug or cable or an incompatible switch.	Verify that the correct device is attached to the director.
	Fast-flashing green (on 1/4 second, then off 1/4 second	Port is in internal loopback (diagnostic).	No action required.
	Flickering green	Port is online, with traffic flowing through port.	No action required.
	Steady amber	Port is receiving light or signal carrier, but it is not online yet.	Reset port from workstation using the portEnable or portCfgPersistentEnable command.
	Slow-flashing amber (on 2 seconds, then off 2 seconds)	Port is disabled due to diagnostic tests or portDisable or portCfgPersistentEnable command.	Reset port from workstation using the portEnable or portCfgPersistentEnable command.
	Fast-flashing amber (on 1/2 second, then off 1/2 second)	Transceiver or port is faulty.	Change transceiver or reset switch from workstation.
	Alternating green/amber	Port is bypassed.	Reset port from workstation using the portEnable or portCfgPersistentEnable command.

TABLE 4 Port blade LED descriptions (Continued)

Determining the status of a control processor blade (CP4)

- 1. Check the LED indicators on the CP blade (Figure 15). The LED patterns may temporarily change during POST and other diagnostic tests. For information about how to interpret the LED patterns, see Table 5.
- 2. Check port blade status by typing slotShow and haShow.

Figure 15 identifies the CP4 blade.



FIGURE 15 Control processor blade (CP4)

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Table 5 describes the CP blade LED patterns and the recommended actions for those patterns.

LED purpose	Color	Status	Recommended action
Power	Steady green	CP blade has valid power.	No action required.
ባ	No light (LED is off)	CP blade does not have incoming power.	Ensure blade is firmly seated and has power.
Status	No light (LED is off)	CP blade is either healthy or does not have power.	Verify that the power LED is on.
<u> </u>	Steady amber	CP blade is faulty or the switch is still booting.	Ensure blade is firmly seated and switch has completed booting. If LED remains yellow, consult switch supplier.
	Slow-flashing amber (on 2 seconds; then off 2 seconds)	CP blade is not seated correctly or is faulty.	Pull blade out and reseat it. If LED continues to flash, replace blade.
	Fast-flashing amber (on 1/2 second; then off 1/2 second)	Environmental range exceeded.	Check for out-of-bounds environmental condition and correct it.
Ethernet Link Status	No light (LED is off)	Either an Ethernet link is not detected, or it does not have incoming power.	Ensure the blade has power, Ethernet cable is firmly seated, and connected device is functioning.
	Flickering green/amber	Ethernet link is healthy and traffic is flowing through port.	No action required.
Ethernet Link Speed	No light (LED is off)	Ethernet link speed is 10 Mb/s or CP blade does not have incoming power.	Ensure CP has power. NOTE: To force a persistent Ethernet link speed, type the ifModeSet command.
	Steady green	Ethernet link speed is 100 Mb/s.	No action required.
Active CP	Steady blue	Active CP blade.	No action required.
	No light (LED is off)	Standby CP blade.	No action required.

TABLE 5CP blade LED descriptions

Determining the status of a power supply

- 1. Check the LED indicators on the power supply (Figure 16). The LED patterns may temporarily change during POST and other diagnostic tests; for information about how to interpret the LED patterns, see Table 6.
- 2. Check power supply status by typing psShow.

The power supply status displays OK, Absent, or Faulty. If a power supply is absent or faulty, contact the switch supplier to order replacement parts.

Figure 16 displays the power supply.



FIGURE 16 Power supply

Table 6 describes the power supply LED patterns and the recommended actions for those patterns.

TABLE 6	Power supply LED descriptions

LED purpose	Color	Status	Recommended action
Power	No light (LED is off)	Power supply does not have incoming power and is not providing power to the director.	Ensure power supply is firmly seated, director has incoming power, both power cables are connected, and AC power switches are on.
	Steady green	Power supply has incoming power and is providing power to the director.	No action required.
Predictive Failure	No light (LED is off)	Power supply is either healthy or does not have incoming power.	Check the power LED.
	Flashing amber	Power supply is about to fail due to a failing fan inside the power supply.	Replace power supply.

LED purpose	Color	Status	Recommended action
Failure	No light (LED is off)	Power supply is either healthy or does not have incoming power.	Check the power LED.
	Steady amber	Either the director has power but this power supply does not (AC switch may be off), or the power supply has failed.	Ensure that the correct AC power switch is on and power supply is seated. If amber light continues, replace power supply.
	Flashing amber	Power supply is unable to supply power.	Verify that the incoming power meets power requirements ("Power specifications" on page 76).

TABLE 6 Power supply LED descriptions (Continued)

Determining the status of a blower assembly

- 1. Check the LED indicators on the blower assembly (Figure 17). The LED patterns may temporarily change during POST and other diagnostic tests; for information about how to interpret the LED patterns, see Table 7.
- 2. Check the blower assembly status using the fanShow command.

The status for each blower assembly displays OK, Absent, or Faulty. The RPM of each fan in the assembly is also provided. If a blower assembly is absent or faulty, contact the switch supplier to order replacement parts.

Figure 17 displays the blower assembly.



- 1 Blower assembly
- 2 Captive screw
- 3 Fault LED

FIGURE 17 Blower assembly

TABLE 7 Blower assembly LED descriptions

LED purpose	Color	Status	Recommended action
Power	No light (LED is off)	Blower assembly does not have incoming power.	Ensure that the blower assembly is firmly seated and has power.
0	Steady green	Blower assembly has incoming power.	No action required.
Fault	No light (LED is off)	Blower assembly is either healthy or does not have incoming power.	Ensure that the blower assembly has incoming power.
	Steady amber	Blower assembly has a failure (full or partial).	Replace blower assembly.
	Slow-flashing amber (on 2 sec, then off 2 sec)	Blower assembly is not seated correctly or is faulty.	Pull unit out and reseat. If LED continues to flash, replace unit.
	Flashing amber (on 1/2 sec, then off 3.5 sec)	Fan is disabled.	Run fanEnable to enable the fan.
	Fast-flashing amber (on 1/2 sec, then off 1/2 sec)	Environmental range exceeded.	Check for out-of-bounds environmental condition, resolve any problems, and reseat unit. If LED continues to flash, replace unit.

4

5

Power LED

Handle

Determining the status of the WWN card

NOTE

The WWN bezel covers the WWN card. The LEDs on the WWN card are not visible unless the bezel is removed.

1. Enter the **chassisShow** command to display information about the WWN card. WWN units correspond to information specific to the WWN card.

Error messages that may indicate problems with a WWN card are summarized in Table 8.

TABLE 8 Messages that may indicate WWN card fa	ailure
---	--------

Type of message	Sample error message
WWN unit fails its FRU (field replaceable unit) header access.	0x24c (fabos): Switch: switchname, error EM-I2C_TIMEOUT, 2, WWN 1 I2C timed out: state 0x4
WWN unit is being faulted.	0x24c (fabos): Switch: switchname, Critical EM-WWN_UNKNOWN, 1, Unknown WWN #2 is being faulted

Type of message	Sample error message
WWN unit is not present or is not accessible.	0x24c (fabos): Switch: switchname, Error EM-WWN_ABSENT, 2, WWN #1 not present
Writing to the FRU history log (hilSetFruHistory) has failed.	0x24c (fabos): Switch: switchname, Error EM-HIL_FAIL, 2, HIL Error: hilSetFruHistory failed, rc=-3 for SLOT 3

TABLE 8 Messages that may indicate WWN card failure (Continued)

Figure 18 displays the WWN bezel.



FIGURE 18 WWN bezel

2. Check the WWN bezel LED patterns and perform the appropriate action indicated in Table 9.

TABLE 9 WWN bezel LED descriptions

LED purpose	Color	Status	Recommended action
Port blade/CP blade Power	Steady green	Power is OK.	No action required.
Port blade/CP blade	Steady amber	Blade is faulty.	Check blade.
Status	No light (LED is OFF)	Blade is OK.	No action required.
NOTE: If a blade slot or pot light up.	oower supply bay has a fille	r panel installed, the corre	esponding LEDs on the WWN blade do

Power supply Power/Status	Steady green	Power is OK.	No action required.
	Steady amber	Power supply is faulty.	Check power supply.

4 Determining the status of the WWN card

Removal and Replacement Procedures (RRPs)

In this chapter

• RRP: Chassis door
RRP: Cable management tray
• RRP: Port and application blade 48
• RRP: Port blade filler panel 54
• RRP: Control processor blade (CP4) 56
• RRP: Power supply
• RRP: Blower assembly
• RRP: WWN bezel and WWN card
• RRP: SFPs and XFPs

Introduction

NOTE

Read the safety notices before servicing ("Safety notices").

The field replaceable units (FRUs) in the Brocade 48000 Director can be removed and replaced without special tools. The director can continue operating during many of the FRU replacements if the conditions specified in the procedure are followed.

The following sections contain FRU removal and replacement procedures (RRPs).

RRP: Chassis door

NOTE

The chassis door must be installed to ensure the director meets EMI and other regulatory certifications.

ATTENTION

Do not open the chassis door more than 90 degrees.

Time and items required

The replacement procedure for the chassis door takes less than 5 minutes.

Removing a chassis door

- 1. Open the door to a 90 degree angle.
- 2. Push the lever on the spring-loaded pin on the upper hinge up and into the notch in the hinge (Figure 19).
- 3. Support the door to prevent it from falling and push the lever on the spring-loaded pin on the lower hinge down and into the notch in the hinge. Remove the door.



FIGURE 19 Upper door hinge

Replacing a Chassis Door

- 1. Ensure that the levers on the spring-loaded pins on both hinges are pushed into the notches.
- 2. Align the spring-loaded pins with the chassis portion of the hinges.
- 3. Release the pins by pushing the levers out of the notches.

RRP: Cable management tray

The director can continue to operate during the replacement of the cable management tray.

Time and items required

The replacement procedure for the cable management tray takes less than 5 minutes. A #1 Phillips screwdriver is required.

Removing a cable management tray

- 1. Perform the appropriate following action based on whether the director is operating:
 - If the director is not operating, remove the AC power connector cables. Go to step 2 and remove the cable management tray.
 - If the director is operating, remove any cables from the tray, *except* the AC power connector cables.

- 2. Unscrew and save the two screws holding the tray to the chassis (Figure 20).
- 3. With the AC power connector cables still plugged in, detach the cable management tray approximately 5 in. away from the chassis.
- 4. Switch one AC power switch off (for example, part 1 in Figure 20) and remove the corresponding AC power connector cable (for example, remove the cable from part 2 in Figure 20) from the chassis. Route the AC power connector cable through the tray.
- 5. Plug the AC power connector cable back in to the connector on the chassis, and switch the AC power switch on.
- 6. Repeat steps 4 and 5 for the other AC power switch and AC power connector cable. Remove the cable management tray.



FIGURE 20 RRP: Cable management tray

Replacing a cable management tray

- 1. Perform the appropriate following action based on whether the director is operating:
 - If the director is operating, go to Step 2.
 - If the director is not operating, remove any cables and orient the tray (Figure 20), aligning the holes on the tray with the holes on the chassis. Position and tighten the two screws.
- 2. Switch one AC power switch off and remove the corresponding AC power connector cable from the chassis. Route the AC power connector cable through the tray.
- 3. Plug the AC power connector cable back in to the connector on the chassis, and switch the AC power switch on.
- 4. Repeat steps 2 and 3 for the other AC power switch and AC power connector cable.
- 5. Arrange the cables along the cable management tray.

RRP: Port and application blade

This section describes how to remove and replace port and application blades.

ATTENTION

A filler panel should be removed only when being replaced with a port blade or new filler panel. Any slot that is not occupied by a port blade should be occupied by a filler panel to ensure correct cooling of the chassis and protection from dust.

Slots are numbered from 1 through 10, from left to right, when facing the port side of the director. Port blades can be installed in can be installed in slots 1 through 4 and 7 through 10.

Time and items required

The replacement procedure for each port blade or filler panel takes less than 10 minutes. The following items are required for the port blade and filler panel replacement procedure:

- ESD (electrostatic discharge) grounding strap
- Workstation computer
- Replacement port blade or filler panel
- Phillips screwdriver
- Small form-factor pluggable (SFP) or extended form-factor pluggable (XFP, FC10-6 port blade only) transceivers (as needed)
- Optical cables (as needed)

NOTE

For information about the SFP and XFP transceivers that are qualified for the director, go to http://www.brocade.com/products/interop_and_compatibility.jsp.

Blades with ejectors or ejectors and sliders

These blades have ejectors ("ejectors"):

- FC8-16 port blade (Figure 5)
- FC8-32 port blade (Figure 6)
- FC8-48 port blade (Figure 7)
- FC4-48 port blade (Figure 10).

Figure 21 illustrates how to remove or replace a sample port blade with ejectors.

These blades have ejectors and slider switches ("ejectors and slider switches"):

- FC4-16 port blade (Figure 8)
- FC4-32 port blade (Figure 9)
- FC10-6 port blade (Figure 11)
- FC4-16IP application blade (Figure 12)
- FR4-18i application blade (Figure 13)
- FA4-18 application blade (Figure 14).

Figure 22 illustrates how to remove or replace a sample port blade with ejectors and slider switches.

Removing a port blade

ATTENTION

Follow ESD precautions ("ESD precautions").

- 1. Remove the chassis door ("RRP: Chassis door").
- Check the power LED, status LED, and port status LED to identify any possible problems. A failed port blade can be identified by inspecting the LEDs on the front panel of each port blade. See Figure 5 to Figure 14 for LED locations.
- 3. Establish a Telnet or console session to determine a failure and verify operation after replacement. Use the **switchShow** command to view the status of blades. Refer to the *Fabric OS Administrator's Guide* for information about how to check the status of hardware components using the command line interface (CLI).
- 4. Check for adequate cable slack. Ensure there is plenty of cable slack to remove a port blade without optical, power, or Ethernet cable obstruction.
- 5. Ensure that you have the correct spare part (port blade or filler panel).

Ensure that the part number on the unit being replaced matches the replacement part number. The **chassisShow** command displays information about the port blades, including part numbers (*xx*-000*xxxx*-*xx*), serial numbers, and additional status.

- 6. Ensure that traffic is not flowing through the port blade (port speed and port status LEDs should be off).
- 7. Note cable order. Identify each cable by its physical port.

- 8. Disconnect all cables and SFP or XFP transceivers from the port blade.
- 9. Perform the appropriate following action based on the type of blade:
 - For Ejectors Adjust the ejectors to the open position (Figure 21). Unscrew the two thumb screws from the top and bottom ejectors on the port blade using the Phillips screwdriver. Unscrew the top thumb screw until it pops out. This initiates a hot-swap request.
 - For Ejectors and slider switches Turn the port blade off by sliding the slider switch in the top ejector down, to the off position (Figure 22). This initiates a hot-swap request.

Wait for the power LED to turn off in response to the hot-swap request before removing the port blade.

- 10. Perform the appropriate following action based on the type of blade:
 - For Ejectors Open the ejectors. Pull the port blade out of the chassis using the ejectors.
 - For Ejectors and slider switches Unscrew the two thumb screws from the top and bottom ejectors on the port blade using the Phillips screwdriver. Lever both ejectors open simultaneously to approximately 45 degrees and pull the port blade out of the chassis.

ATTENTION

If the port blade is not being replaced by another port blade, install a filler panel to ensure correct cooling of the chassis and protection from dust.



- 1 Director chassis
- 2 Port blade (an FC4-48 blade is shown)
- 3 Upper ejector
- 4 Lower ejector





- 1 Director chassis
- 2 Port blade (an FC4-16 blade is shown)
- 3 On/Off Slider switch (in the Off position)
- 4 Ejector

FIGURE 22 RRP: Port blade with ejector and slider switch (FC4-16 shown)

Replacing a port blade

ATTENTION

Follow ESD precautions ("ESD precautions").

NOTE

A FA4-18i application blade and the director must have the same version of firmware. To upgrade firmware versions, refer to the *Fabric OS Administrator's Guide*.

- 1. Orient the port blade so that the ports are at the front of the chassis and the flat side of the port blade is on the left.
- 2. Perform the appropriate following action based on the type of blade:
 - For Ejectors Adjust the ejectors to the open position, align the flat side of the port blade inside the upper and lower rail guides in the slot, and slide the port blade into the slot until it is firmly seated (Figure 21).
 - For Ejectors and slider switches Open the ejectors to approximately 45 degrees, align the flat side of the port blade inside the upper and lower rail guides in the slot, and slide the port blade into the slot, with *slight* pressure to the left, until it is firmly seated (Figure 22).
- 3. Perform the appropriate following action based on the type of blade:
 - For Ejectors Adjust the ejectors to the closed position by pulling them away from the center of the port blade.
 - For Ejectors and slider switches Close the ejectors by pushing the handles toward the center of the port blade until the ejectors lock. The levering action of the handles seats the port blade in the slot.
- 4. Perform the appropriate following action based on the type of blade:
 - For Ejectors Adjust the ejectors to the closed position by pulling them away from the center of the port blade.
 - For Ejectors and slider switches Tighten the thumb screw inside each handle using the Phillips screwdriver.
- 5. Perform the appropriate following action based on the type of blade:
 - For Ejectors Skip to Step 6.
 - For Ejectors and slider switches Turn the port blade on by sliding the slider switch in the top ejector up, covering the thumb screw.
- 6. Verify that the power LED on the port blade is displaying a steady green light. If it does not turn on, ensure that the port blade is firmly seated.
- 7. Install the SFP or XFP (FC10-6 only) transceivers and cables in the port blade.
- 8. Group and route the cables.

RRP: Port blade filler panel

This section describes how to remove and replace port blade filler panels (Figure 23)

ATTENTION

A filler panel should be removed only when being replaced with a port blade or new filler panel. Any slot that is not occupied by a port blade should be occupied by a filler panel to ensure correct cooling of the chassis and protection from dust.

Removing a filler panel with a handle

- 1. Unscrew the two captive screws from the face of the filler panel.
- 2. Grasp the handle in the middle of the filler panel faceplate.
- 3. Pull the filler panel out of the chassis using the handle.

Removing a filler panel with ejectors

- 1. Push in the tab on each ejector.
- 2. Lever both ejectors all the way open.
- 3. Pull the filler panel out of the chassis.

Removing a filler panel with pull tabs

- 1. Unscrew the top and bottom captive screws on the filler panel.
- 2. Pull on the top and bottom pulling tabs to slide the filler panel out of the chassis.



FIGURE 23 RRP: Port blade filler panel

Replacing a filler panel with a handle

- Align the flat side of the filler panel inside the upper and lower rail guides in the slot (Figure 23); then, slide the filler panel into the slot (with *slight* pressure to the left) until it is firmly seated.
- 2. Tighten the two captive screws using the Phillips screwdriver.

Replacing a filler panel with ejector handles

- 1. Orient the filler panel so that the ejectors are at the front of the chassis and the flat side of the filler panel is on the left.
- 2. Open the ejectors to approximately 45 degrees, align the flat side of the filler panel inside the upper and lower rail guides in the slot, and slide the filler panel into the slot, with slight pressure to the left, until it is firmly seated.
- 3. Close the ejectors by pushing the black handles toward the center of the filler panel until the ejectors lock (slight audible click). The levering action of the handles seats the filler panel in the slot.

Replacing a filler panel with pull tabs

- 1. Orient the filler panel so that the captive screws are at the front of the chassis and the flat side of the filler panel is on the left.
- 2. Screw the captive screws in place, fastening the filler panel in the chassis.

RRP: Control processor blade (CP4)

This section describes how to remove and replace a control processor (CP4) blade. Each director has two CP4 blades located in slot 5 and slot 6.

NOTE

If the new CP blade does not have the same firmware as the active CP blade, the new blade must be upgraded to the same firmware version. Refer to the *Fabric OS Administrator's Guide* for information.

Time and items required

The replacement procedure for the CP blade takes approximately 30 minutes. The following items are required for the CP blade replacement:

- ESD (electrostatic discharge) grounding strap
- Workstation computer
- Serial cable
- IP address of an FTP server for backing up the director configuration
- Phillips #2 screwdriver
- Replacement CP blade. Director requires the Brocade 48000 CP blade (CP4)

Verifying the necessity of replacement

Confirm that you need to replace the CP blade. The following events might indicate that a CP blade is faulty:

- The status LED on the CP blade is lit amber, or the power LED is not lit.
- The CP blade does not respond to Telnet commands, or the serial console is not available.
- The slotShow command does not show that the CP blade is enabled.
- The haShow command indicates an error.
- The calendar clock is inaccurate, or the CP blade does not boot up or shut down normally.
- Any of the following messages display in the error log:
 - "Slot unknown" message relating to a CP slot
 - CP blade errors or I²C timeouts
 - FRU: FRU_FAULTY messages for a CP blade
 - Configuration loader messages or "Sys PCI config" messages
 - Generic system driver messages ("FABSYS")
 - Platform system driver messages ("Platform")
 - EM messages that indicate a problem with a CP blade
 - Function fail messages for the CP master

For more information about error messages, refer to the Fabric OS Message Reference.

Recording critical director information

Back up the director configuration before you replace a CP blade. Refer to the *Fabric* OS *Administrator's Guide* for backup information.

- 1. Log in to the functioning CP blade as admin, using either a Telnet or a serial console connection.
- 2. Type haShow to determine which CP blade is active:

```
swDir:admin> haShow
Local CP (Slot 6, CP1) : Active
Remote CP (Slot 5, CP0) : Standby, Healthy
HA Enabled, Heartbeat Up, HA State Synchronized
```

- 3. Enter all remaining commands from the serial console for the *active* CP blade, unless otherwise indicated. For more information about commands, refer to the *Fabric OS Command Reference*
- 4. If the functioning CP blade is performing as the active CP blade, go to step 5. If the faulty CP blade is performing as the active CP blade, failover the blades:
 - a. Log in to the faulty CP blade as admin, using either a Telnet or a serial console connection.

If you connect successfully to the faulty CP continue to step b.

If you cannot connect to the faulty CP, remove the faulty CP blade for repair as follows:

- Turn the CP blade off and notify the director of a hot swap request by sliding the slider switch in the top ejector down to the off position (Figure 24).
- Wait until the active CP LED on the functioning CP blade is lit. Remove the CP blade.

- b. Type haFailover. The functioning CP blade becomes the active CP blade.
- c. Wait until the status LED on the functioning CP blade is no longer lit.
- d. Type **haShow** from the functioning CP blade (the new active CP blade) to verify the failover.

This is an example of failing over a CP blade:

Fabric OS (cp1)

cpl login: admin Password: swDir:admin> hashow Local CP (Slot 6, CPl): Active Remote CP (Slot 5, CPO): Standby, Healthy HA enabled, Heartbeat Up, HA State synchronized swDir:admin> hafailover Local CP (Slot 6, CPl): Active Remote CP (Slot 5, CPO): Standby, Healthy HA enabled, Heartbeat Up, HA State synchronized

Warning: This command is being run on a redundant control processor(CP) system. If the above status does not indicate 'HA State synchronized', then the CPs are not synchronized and this operation will cause the active CP to reset. This will cause disruption to devices attached to both switch 0 and switch 1 and will require that existing Telnet sessions be restarted. To reboot a single logical switch on this system, use the switchreboot command while logged in to that logical switch.

Are you sure you want to fail over to the standby CP [y/n]? swDir:admin> haShow Local CP (Slot 6, CP1) : Standby, Healthy Remote CP (Slot 5, CP0) : Active HA Enabled, Heartbeat Up, HA State Synchronized

- 5. Type firmwareShow to note the firmware version of the active CP blade.
- Type haDisable from the active CP blade to prevent failover or communication between the CP blades during the replacement.
- 7. Logged into the active CP, use the **configUpload** command to upload the director configuration to a specified FTP server. Enter the requested information at the prompts.

This is a sample of backing up the configuration files:

```
swDir:admin> configUpload
Protocol (scp or ftp) [ftp]: ftp
Server Name or IP Address [host]: 123.456.78.90
User Name [None]: user
File Name [config.txt]: config.txt
Password: xxxxxxxx
upload complete
```
Removing a control processor blade (CP4)

The director continues to operate while a CP blade is being replaced if the redundant CP blade is active and a failover does not occur. You can prevent failover by entering the **haDisable** command.

ATTENTION

Follow ESD precautions ("ESD precautions").

- 1. Remove the chassis door ("RRP: Chassis door").
- 2. Log in to the active CP as the admin user. You can use a serial cable or Telnet, Web Tools, or Fabric Manger. Determine which CP is active using the **haShow** command or view the active LED on the front of the CP.
- 3. If the faulty CP is the active CP, issue the **haFailover** command. Wait until the failover has completed. Use the **haShow** command to verify the CPs are synchronized and the failover is complete.
- 4. Power off the blade by sliding the slider switch in the top ejector down to the off position (Figure 24).
- 5. Disconnect all cables from the faulty (standby) CP.
- 6. Unscrew the thumb screw from both ejectors using the Phillips screwdriver.
- 7. Lever open both ejector handles simultaneously to approximately 45 degrees and pull the CP blade out of the chassis (Figure 24).



- 3 On/Off slider switch (in the Off position)
- 4 Ejector

FIGURE 24 RRP: Control processor blade (CP4)

Replacing a control processor blade (CP4)

ATTENTION

Follow ESD precautions ("ESD precautions").

- 1. Open the ejector handles to approximately 45 degrees. Orient the CP blade so that the handles are toward you and the flat metal side is on your left.
- 2. Align the flat metal side of the CP blade inside the lower and upper blade guides in the slot. Slide the CP blade into the slot until it is firmly seated.
- 3. Tighten the thumb screw inside each handle using the Phillips screwdriver.

- 4. Turn the CP blade on by sliding the ON/OFF switch in the top handle up, to cover the thumb screw.
- 5. Verify that the power LED is green. If not, ensure that the CP blade has power and is firmly seated and that the ejectors are in the locked position.
- 6. Connect the cables to the new CP blade.
- 7. Verify the installation ("Verifying operation of the new CP blade").
- 8. Replace the chassis door ("RRP: Chassis door").

Verifying operation of the new CP blade

To verify that boot and POST are complete on the new CP blade and that the CP blade has achieved failover redundancy:

- 1. Log in to the active CP as admin.
- 2. Enable the redundancy feature using the haEnable command.
- 3. Verify HA is enabled using the **haShow** command. The command output includes "HA Enabled Heartbeat Up" and "HA-state in sync."

If HA is not enabled, POST is not complete or the CP blades have not achieved redundancy. Wait one or two minutes and re-enter the command until you can verify that redundancy has been achieved.

4. Type slotShow. The command output shows the new CP blade as "enabled":

swDir:admin> slotShow

Slot	Blade Type	ID	Status
1	SW BLADE	17	ENABLED
2	SW BLADE	17	ENABLED
3	SW BLADE	17	ENABLED
4	SW BLADE	17	ENABLED
5	CP BLADE	16	ENABLED
6	CP BLADE	16	ENABLED
7	SW BLADE	17	ENABLED
8	SW BLADE	17	ENABLED
9	SW BLADE	17	ENABLED
10	SW BLADE	17	ENABLED

swDir:admin>

5. Determine the version by typing firmwareShow.

This example shows sample output for the firmwareShow command:

```
swDir:admin> firmwareShow
Local CP (Slot 6, CP1): Active
    Primary partition: v5.3.0
    Secondary Partition: v5.3.0
Remote CP (Slot 5, CP0): Standby
    Primary partition: v5.3.0
    Secondary Partition: v5.3.0
Note: If Local CP and Remote CP have different versions
of firmware, please retry firmwaredownload command.
```

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swDir:admin>

- 6. If the firmware version on the replacement blade does not match that on the active CP blade, bring the replacement blade to the same firmware level as the active blade.
- 7. Type **firmwareDownload -s** to download the firmware to one of the CP blades. Enter all requested information (use default values):

```
swDir:admin> firmwaredownload -s
Server Name or IP Address: 192.168.100.1
User Name: user
File Name: /software/v6.0.0/release.plist
Password: *******
Do Auto-Commit after Reboot [Y]:
Reboot system after download [N]:
Firmwaredownload has started.
2007/07/03 -14:59:21, [SULB-1001], 923,, WARNING, Brocade 48000, Firmwaredownload
command has started.
Start to install packages.....
                *****
dir
ldconfig
                *****
glibc
bash
                *****
readline
                *****
                *****
terminfo
                *****
termcap
                *****
setup
```

<output truncated>

All packages have been downloaded successfully. Firmwaredownload has completed successfully. 2007/07/03-15:05:56, [SULB-1002], 924,, INFO, Brocade 48000, Firmwaredownload command has completed successfully.

- 8. Type firmwareDownloadStatus to verify that the firmware has been updated.
- 9. Type **haEnable** to re-enable HA on the active CP blade.
- 10. Type reboot.

11. Verify that the reboot is complete and the CP blades have achieved failover redundancy:

- a. Wait until the status LEDs on both CP blades are not lit.
- b. Type **haShow** and verify that the command output includes "HA Enabled Heartbeat Up". If not, reenter the command until you have verified that redundancy is achieved.
- 12. Type **firmwareShow** to verify that the firmware version has been updated.
- 13. Pack the faulty CP blade in the packaging provided with the new CP blade, and contact the switch supplier to determine the return procedure.

14. Replace the chassis door ("RRP: Chassis door").

RRP: Power supply

Use this procedure to remove and replace a power supply. The director can continue operating during the replacement if at least one power supply continues operating.

ATTENTION

To protect against AC failure on the director, Brocade recommends a minimum of two power supplies. Additional power supplies might be required depending on how many blades are installed. Consult your switch supplier.

Time and items required

The replacement procedure for each power supply takes less than 5 minutes. A power supply unit or filler panel is required for the power supply replacement.

Removing a power supply

- 1. Remove the chassis door ("RRP: Chassis door").
- 2. Perform the appropriate following action based on whether the director is operating:
 - If the director is not operating during the replacement procedure, skip to step 2.
 - If the director is operating and will to continue to operate during the replacement, check the power LEDs to verify that the minimum number of power supplies is functioning. A fully populated director requires a minimum of one power supply slot at all times to ensure power to the director.
- 3. Push the locking tab toward the power supply and pull the handle out and down (Figure 25).
- 4. Support the power supply from beneath. Use the handle to remove the power supply out of the chassis.
- 5. If you are not replacing the power supply, insert a filler panel into the slot.



FIGURE 25 RRP: Power supply

Replacing a power supply

- 1. Remove any filler panel.
- 2. Orient the power supply with the handle toward the front of the chassis and the LEDs on the left.
- 3. Unlock the handle by pressing the locking tab.
- 4. Insert the power supply into the slot and push the handle up. Verify that the power supply is seated by gently pulling on the handle.
- 5. Verify that the power LED on the power supply displays a steady green light. If it does not, ensure that both AC power connector cables are plugged in (Figure 26) and both AC power switches are set to 1 (AC switch lights up green).

6. Replace the chassis door ("RRP: Chassis door").



FIGURE 26 AC power connectors and AC power switches on the director chassis

RRP: Blower assembly

This procedure provides instructions for removing and replacing a blower assembly.

ATTENTION

To ensure continuous adequate cooling, maintain three operating blower assemblies at all times except for the brief period when replacing a blower assembly.

Time and items required

The replacement procedure for each blower assembly takes less than 5 minutes. The following items are required for the blower assembly replacement:

- Replacement blower assembly
- Phillips #2 screwdriver

Removing a blower assembly

To remove a blower assembly

- Before removing a blower assembly, verify that the other blower assemblies are functioning correctly. The power LEDs should be steady green and the attention/fault LEDs should not be lit.
- 2. Use the screwdriver to loosen the captive screws at the top and bottom of blower assembly (Figure 27).
- 3. Support the blower assembly from beneath. Push in the top of the handle; then pull out the lower part of the handle to remove the blower assembly.



- 1 Director chassis
- 2 Captive screws (two per blower assembly unit)
- 3 Blower assembly

FIGURE 27 RRP: Blower assembly

Replacing a blower assembly

- 1. Orient the blower assembly and slide it into the chassis, pushing firmly to ensure that it is seated.
- 2. Verify that the power LED displays a green light.
- 3. Push the top of the handle into the recess.
- 4. Use the screwdriver or your fingers to tighten the captive screws

RRP: WWN bezel and WWN card

NOTE

The World Wide Name (WWN) card contains fully redundant circuits and normally does not require replacement. The WWN card is located beneath the WWN bezel.

Time and items required

Allow approximately 20 minutes to replace the WWN card. The following items are needed to replace the WWN card:

- Electrostatic discharge (ESD) grounding strap
- #2 Phillips screwdriver (required only for some versions of the WWN card)
- If a serial console session is used: serial cable and a workstation computer with a terminal emulator application (such as HyperTerminal for Windows systems or TIP for Solaris systems)

Verifying necessity of replacement

Before replacing the WWN card, verify that the replacement is necessary. Any of the following events can indicate that the card requires replacement:

- Status LEDs on the WWN bezel not reflecting the actual status of the components
- Power or Status LEDs on WWN card (beneath WWN bezel) indicate a problem
- Problems viewing or modifying the data stored on the WWN card (Table 11)
- Error messages regarding WWN units #1 or #2 (Table 12)

Determining the status of the WWN card

1. Check the LED indicators on the WWN bezel (Figure 1) and verify that they reflect the actual status of the components. The WWN bezel covers the WWN card and allows its LEDs to shine through. The LEDs on the WWN bezel provide a consolidated view of the port and CP blade status, as outlined in Table 10.

LED location/purpose	Color	Status	Recommended action
Port blade/CP blade power	Steady green	Power is okay.	No action required.
Port blade/CP blade status	Steady amber	Card is faulty.	Check card.
	No light (LED is off)	Card is okay.	No action required.
NOTE: If a blade slot or power s card do not light up.	upply bay has a filler pane	l installed, the correspondin	ng LEDs on the WWN
Power supply	Steady green	Power is okay.	No action required.
power/status	Steady amber	Power supply is faulty.	Check power supply.
NOTE: If a status LED on the WWN bezel flashes, the power LED on the WWN bezel also flashes, for increased visibility.			

TABLE 10 WWN LED patterns

2. Check the WWN card status using the commands listed in Table 11. Difficulty retrieving or modifying this data could indicate a WWN card failure.

Data	Related commands
WWN values	wwn, chassisShow
Data about the chassis and WWN card	chassisShow
Ethernet and Fibre Channel IP address information for the CP blades	ipAddrShow, ipAddrSet
History log information	historyShow, historyLastShow
Name of switch	switchName

TABLE 11 Commands identifying the WWN card status

3. Enter the **chassisShow** command to display information about the WWN card. (WWN units correspond to information specific to the WWN card. An error message is logged that indicates the status of the WWN unit (Table 12).)

Type of message	System message (errshow or errdump)
WWN unit removal was detected	<timestamp>, [EM-1050], <sequence-number>,, INFO, <system-name>, FRU WWN # removal detected.</system-name></sequence-number></timestamp>
WWN unit insertion was detected	<timestamp>, [EM-1049], <sequence-number>,, INFO, <system-name>, FRU WWN # insertion detected.</system-name></sequence-number></timestamp>
WWN unit fails to power on	<timestamp>, [EM-1004], <sequence-number>,, CRITICAL, <system-name>, WWN # failed to power on</system-name></sequence-number></timestamp>
WWN unit is being faulted	<timestamp>, [EM-1034], <sequence-number>,, ERROR, <system-name>, WWN # set to faulty, rc=<return code=""></return></system-name></sequence-number></timestamp>

 TABLE 12
 WWN card related system log messages

Removing the WWN bezel and WWN card

ATTENTION

Follow ESD precautions ("ESD precautions").

- 1. Open a Telnet session to the director and log in to the active CP as admin. The default password is "password".
- 2. Verify you are logged into the active CP. Run the haShow command to determine the active CP.
- 3. Type **fruReplace wwn** from the active CP blade and wait for the phrase "Do you wish to continue [y/n]?" to display; then type **y**.
- 4. Wait until the WWN card data is backed up. Do *not* type **continue** until the mechanical replacement is complete ("Replacing a WWN bezel and WWN card").

```
switch:admin> frureplace wwn
This is the WWN card hot swap interface.
Continuing from this point will require
the whole process to be completed.
If this process is not complete due to a
power cycle, or CP failover, please follow
the recovery procedure in
```

Core Switch WWN Card Removal and Replacement document. Do you wish to continue [y/n]? Backing up WWN card data, please wait about 25 seconds for further instruction. Please install the new FRU now. If this session lost for any reason, please re-enter the frureplace command and follow the instructions to complete the operation. Please enter the word `continue' after the new WWN card has been installed:

- 5. Wait until all the LEDs on the WWN bezel turn off.
- 6. Unscrew both captive screws on the WWN bezel (Figure 28). Pull the bezel away from chassis and set it aside. The WWN card is visible.
- 7. Remove the WWN card as follows:
 - To remove a WWN card that has handles: Use the handles to remove the card.
 - To remove a WWN card that does not have handles: Use a Phillips screwdriver to unscrew the two screws which secure the WWN card to the chassis. Hold the card by the edges and remove it.
- 8. Set the WWN card on a static-free surface, such as a grounding pad.



FIGURE 28 RRP: WWN bezel and WWN card

Replacing a WWN bezel and WWN card

ATTENTION

Follow ESD precautions ("ESD precautions").

- 1. Unpack the new WWN card and save the packaging for the faulty WWN card.
- 2. Install the WWN card as follows:

- To install a WWN card that has handles: Hold the card by the handles and orient with the LEDs at the top. Align the connector on the card with the connector on the chassis (the connectors are keyed to ensure correct installation) and use the "push pad" to press the card onto the connector until it is fully seated.
- To install a WWN card that does not have handles: Hold the card by the edges and press the card onto the connector until it is fully seated. Use the Phillips screwdriver and the two screws to attach the WWN card to the chassis.
- 3. Install the WWN bezel:
 - a. Orient the bezel on the chassis (Figure 28). Insert and tighten the two screws.

NOTE

If a serial console session is active, several "removal detected" and "insertion detected" messages display on the console because of the replacement.

b. In the CLI session, type continue to indicate that the replacement has been completed.

Please enter the word `continue' after the new WWN card has been installed: continue

Restoring the information to the replacement FRU now, please wait about 20 seconds to complete Verifying the replacement FRU now... WWN card hot swap is now complete. FRU replacement completed successfully!

4. Verify that the WWN card is correctly connected by checking the LEDs on the WWN card to see if they reflect the status of the components.

NOTE

The LEDs might take up to 2 minutes after WWN card installation to begin functioning.

5. Pack the faulty WWN card in the packaging provided with the new card and return it to the switch supplier.

RRP: SFPs and XFPs

To remove an SFP or XFP (FC6-10 blade only) transceiver, pull the bale down and out, sliding the transceiver out of the port blade.

To install an SFP or XFP, position one of the transceivers 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. 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.

The director comes with a transceiver extraction tool (Figure 29) and holster. The extraction tool is designed to remove transceivers from port blades where the space is limited. To use the extraction tool, slide the tool on to the bale of the transceiver and pull it out.



FIGURE 29 Optical transceiver (SFP and XFP) extraction tool

Appendix

Specifications

In this appendix

• System architecture. 73
• System size and weight
• System blade and FRU weights
• Facility requirements
Power specifications
• Power cords
Power cords (Japan, Denan)
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• Fibre Channel port specifications
Data transmission ranges
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Regulatory compliance
• Environmental regulation compliance

Introduction

This appendix provides product specifications and compliances for the Brocade 48000 Director.

System architecture

INDEL I System a	architecture
Fibre Channel Ports	Up to 384 ports, universal (E_Port, F_Port, and the FL_port is blade dependent)
Control Processor	Redundant (active/standby) control processor modules
Scalability	Full fabric architecture: 239 switches maximum
Performance	1.063 Gbps line speed, full duplex
	2.125 Gbps line speed, full duplex
	4.25 Gbps line speed, full duplex
	10.063 Gbps line speed, full duplex (with FC10-6 blade)
	Autosensing of 1, 2, and 4 Gbps port speeds optionally programmable to fixed port speed, speed matching between 1, 2, and 4 Gbps port speeds
ISL Trunking	Can use up to 8 ports in a trunk group to form a 64 Gbps trunk
Aggregate bandwidth	3072 Gbps, end-to-end, when using eight FC4-48 port blades

TABLE 1 System architecture

Switch latency	 FC4-16 blade: <1.2 µsec any port to any port at 4 Gbps, cut-through routing, within the same blade. For the FC4-32 blade: <3.6 µsec any port to any port at 4 Gbps, cut-through routing. For the FC4-48 blade: <3.6 µsec any port to any port at 4 Gbps, cut-through routing. For the FA4-18 blade: <3.6 µsec any port to any port at 4 Gbps, cut-through routing. For the FR4-18 blade: <3.6 µsec any port to any port at 4 Gbps, cut-through routing. For the FR4-18 blade: <3.6 µsec any port to any port at 4 Gbps, cut-through routing. For the FC4-16 blade: <3.6 µsec any port to any port at 4 Gbps, cut-through routing. For the FC4-16 blade: <3.6 µsec any port to any port at 4 Gbps, cut-through routing.
Maximum frame size	2112-byte payload
Frame buffers	1024 per ASIC, dynamically allocated
Classes of service	Class 2, Class 3, Class F (interswitch frames)
Port types	The FC4-16 and FC4-32 supports these port types: FL_Port, F_Port, and E_Port FC-48 supports these port types: E_Port and F_Port FC10-6 supports this port type: E_Port FA4-18 supports these port types: FL_Port, F_Port, and E_Port FR4-18i supports these port types: FL_Port, F_Port, E_Ports, VE_Port, EX_Port, and VEX_Port FC4-16IP supports these port types: FL_Port, F_Port, and E_Port NOTE: Self-discovery is based on switch type (U_Port) with an optional port type control.
Data traffic types	Fabric switches supporting unicast, multicast (255 groups), and broadcast
Media types	 Hot-pluggable, industry-standard small form factor pluggable (SFP) or extended form factor pluggable (XFP, FC10-6 only), LC connector; short-wave laser (SWL), up to 500 m (1,640 ft.); long-wave laser (LWL), up to 10 km (6.2 mi); extended long-wave laser (ELWL), up to 80 km (49.6 mi); distance depends on fiber optic cable and port speed Copper 1GbE connections on the FC4-16IP blade
Fabric services	Simple Name Server; Registered State Change Notification (RSN); Brocade Advanced Zoning; Web Tools; Fabric Watch; Extended Fabrics; Remote Switch; ISL Trunking; End-to-End Performance Monitoring, FICON CUP, ACL (Access Control Lists), Admin Domains

TABLE 1 System architecture (Continued)

System size and weight

The weight of the director can vary considerably depending on the combination of blades installed. Use Table 2 and Table 3 to determine the weight of the director with your combination of port and application blades.

TABLE 2 System size and weight	
System	Size and weight
Width	43.74 cm (17.22 in.)
Height	61.24 cm (24.11 in./14U)
Depth	70.90 cm (27.90 in.)
Depth (with door)	74.20 cm (29.11 in.)
Director: • with four power supplies • three fans • two CPs • no port or application blades	95 kg (175.6 lb) without media
Director: 128-port configuration with eight FC4-16 port blades	95 kg (210 lb) without media
Director: 256-port configuration with eight FC4-32 port blades	98 kg (216 lb) without media
Director: 384-port configuration with eight FC4-48 port blades	98 kg (216 lb) without media
Empty chassis: • No blades • No CPs • No power supplies • No fan assemblies	49 kg (108 lb)

System blade and FRU weights

TABLE 3System FRU weights

FRU	Weight
CP blade (CP4)	3.1 kg (6.8 lb)
FC4-16 port blade	2.7 kg (6.0 lb) without media
FC4-32 port blade	3.1 kg (6.8 lb) without media
FC4-48 port blade	3.1 kg (6.8 lb) without media
FC10-6 port blade	3.1 kg (6.8 lb) without media
FA4-18 application blade	3.36 kg (7.4 lb) without media
FR4-18i application blade	3.36 kg (7.4 lb) without media
FC4-16IP application blade	3.18 kg (7.0 lb) without media
Port card filler panel	1.5 kg (3.2 lb)

FRU	Weight		
Power supply	3.2 kg (7.0 lb)		
Blower assembly	4.0 kg (8.8 lb)		
Chassis door	3.5 kg (7.6 lb)		
Cable management tray	0.3 kg (0.6 lb)		
WWN bezel	0.3 kg (0.6 lb)		

TABLE 3 System FRU weights (Continued)

Facility requirements

The facility where the director is in use must meet the following requirements to provide for correct operation:

- Power requirements for a physical inlet:
 - Input power requirements: 200-240 VAC, 12A, 50-60 Hz
 - Recommended power connector: IEC 320, EN60320 C19-Angled, 16A/250VAC
- Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the chassis nameplate
- An air flow of at least 350 cubic feet per minute (595 cubic meters per hour), available in the immediate vicinity of the director
- The power specifications listed in Table 4
- The environmental specifications listed in Table 6
- Electrical interference less than the levels stated in the standards listed in Table 8

Furthermore, if the director will be installed in an EIA rack, ensure the following:

- All equipment installed in the rack has a reliable branch circuit ground connection, and does not rely on a connection to a branch circuit, such as a power strip.
- The rack is balanced and mechanically secured to provide stability in the event of an earthquake.
- Additional equipment does not exceed the rack's weight limits.

Power specifications

The power subsystem is a redundant +48V DC power distribution system with a provision for up to four 1000-watt, 48V DC bulk power supplies. Four bulk power supplies produce the intermediate distribution voltage in the distributed power system.

The power specifications in Table 4 are calculated for fully loaded systems with four power supplies. A fully loaded system has eight FC4-32 port blades, two CP4 blades, and three blower assemblies.

Specification	Value
Input voltage	A fully loaded switch requires a maximum of 750 Volt-Amps. This results in a main current of 3.2 amps at 240V AC line voltage or 3.6 amps at 208V AC line voltage. The rated AC input range is 180 to 264V AC.
Supported power range	Nominal: 200 to 240 VAC, single phase
Input frequency range	47-63 Hz
Power supplies (each)	Output voltages: 48V at 20 amps; 12V at 4 amps Maximum output power: 1000 watts
AC inrush current	40A maximum, peak
Ride through	The supply outputs remain within specified regulation for a minimum of 20 msec after the AC mains are disconnected.
Under voltage protection	The director power supply self-protects from any input voltage, static or dynamic, from zero volts to its operating ranges. It recovers to normal operation upon returning to its operating range.

TABLE 4Power specifications

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。

ATTENTION

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

Power cords

The types of power cords provided with the director are specific to the country where it is installed. For each of these types of power cords (Table 5), the end that connects to the director chassis has an IEC 60320/C19 cable connector. The two AC power receptacles on each director chassis are equipped with IEC 60320/C20 power connectors.

To order a power cord, contact your switch supplier.

Country	Plug style				
	NEMA L6-20 USA, Canada, Mexico, other North American locations	CEE-7/7 "Schuko" Continental Europe/Ireland	BS-1363A United Kingdom/ Hong Kong	AS 3112 Australia/New Zealand	IEC-60309 16A-6h, 230 V~
Argentina					Х
Australia				Х	
Austria		Х			
Bahrain			Х		
Belgium		Х			
Brazil	Х				
Chile	Х				
China, People's Rep.				X	
Czech, Rep. of					Х
Denmark					Х
Egypt					Х
England					Х
Finland					Х
France		Х			
Germany		Х			
Greece		Х			
Hong Kong		Х			
Hungary			Х		
India		Х			
Indonesia					Х
Ireland, North				Х	
Ireland, South		Х			
Israel			Х		
Italy					Х
Japan					Х
Korea, South					Х
Malaysia		Alternate			Recommended

Dower cord types (international)

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Country	Plug style							
	NEMA L6-20 USA, Canada, Mexico, other North American locations	CEE-7/7 "Schuko" Continental Europe/Ireland	BS-1363A United Kingdom/ Hong Kong	AS 3112 Australia/New Zealand	IEC-60309 16A-6h, 230 V~			
Mexico	Х							
Monaco		Х						
Netherlands					Х			
New Zealand				Х				
Norway					Х			
Poland					Х			
Portugal		Х						
Puerto Rico	Х							
Russia		Х						
Saudi Arabia					Х			
Scotland					Х			
Singapore			Х					
South Africa			Х					
Spain					Х			
Sweden					Х			
Switzerland					Х			
Taiwan	Х							
Turkey					Х			
United Arab Emirate		Х						
United Kingdom / Ireland					Х			
United States	Х							
Venezuela	Х							
Yugoslavia					x			

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Environmental requirements

Table 6 lists the environmental operating ranges for the director. The requirements for non-operating conditions are also provided for acceptable storage and transportation environments.

	Acceptable range during operation	Acceptable range during nonoperation
erature	10° to 40° C outside switch (50° to 104° F)	-40° to $+70^{\circ}$ C outside switch (-40° to 158° F)
	20% to 85% RH noncondensing, at 40° Celsius, with maximum gradient of 10% per hour	10% to 93% RH noncondensing, at 70° Celsius
	Up to 3 km (10,000 ft.) above sea level	0 to 12 km (40,000 ft.) above sea level
	20G, 11ms duration, half-sine wave	33G, 11ms duration, half-sine wave
	1G p-p, 5-500 Hz at 1.0 octave/minute	2.4G p-p, 5-500 Hz at 1.0 octave/minute
	350 cu ft/min. (0.00059 cu m/hr)	None required.
on	720 Watts or 2457 BTU (Eight FC4-32 blades and two CP4 blades)	Not applicable.
	on	erature 10° to 40° C outside switch (50° to 104° F) 20% to 85% RH noncondensing, at 40° Celsius, with maximum gradient of 10% per hour Up to 3 km (10,000 ft.) above sea level 20G, 11ms duration, half-sine wave 1G p-p, 5-500 Hz at 1.0 octave/minute 350 cu ft/min. (0.00059 cu m/hr) 0n 720 Watts or 2457 BTU (Eight FC4-32 blades and two CP4 blades)

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NOTE

The 10° to 40° Celsius range applies to the ambient air temperature at the air intake vents on the nonport side of the director.

The temperature inside the director can be up to 75° Celsius during director operation. If the internal temperature range exceeds the operating ranges of the components, the LEDs, error messages, and Fabric Watch alerts will indicate a problem. Use the tempShow command or Fabric Watch commands to view temperature status.

Fibre Channel port specifications

The Fibre Channel ports in the director support full duplex link speeds at 10.51875, 4.25, 2.125, or 1.0625 Gbps inbound and outbound, automatically negotiating to the highest common speed of all devices connected to the port.

The ports are compatible with optical SWL (short wavelength: 780-850 nm), optical LWL (long wavelength: 1270-1350 nm), and Extended Long Wavelength (ELWL) laser transmitter SFPs and XFPs (FC10-6 only). The strength of the signal is determined by the type of SFP or XFP in use.

The ports are universal and self-configuring, capable of becoming F_Ports (fabric ports), FL_Ports (fabric loop enabled), or E_Ports (expansion ports).

The ports meet all required safety standards. For a listing of these standards, see "Regulatory compliance".

Α

Data transmission ranges

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

Cable type		Speed	Minimum distance	Maximum distance
Single Mode	9 microns	2 Gbps	2 m	10,000 m
		4 Gbps	2 m	10,000 m
		8 Gbps (Brocade DCX)	2 m	1, 000 m
Multi Mode	50 microns	2 Gbps	0.5 m	300 m (OM2) 500 m (OM3)
		4 Gbps	0.5 m	150 m (OM2) 380 m (OM3)
		8 Gbps (Brocade DCX)	0.5 m	50 m (OM2) 150 m (OM3)
	62.5 microns	2 Gbps	0.5 m	150 m
		4 Gbps	0.5 m	70 m
		8 Gbps (Brocade DCX)	0.5 m	21 m

 TABLE 7
 Supported cable speeds and distances

General specifications

The director is compliant with United States and International safety and EMC (Electromagnetic Compatibility) standards. Table 8 lists the general specifications for the director.

TABLE 8	General specifications
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Specification	Description
Configurable port types	F_Port, FL_Port, E_Port, EX_Port, and VEX_Port
System architecture	Nonblocking shared memory
System processor	IPowerPC 440GX, 800MHz CPU
ANSI fibre channel protocol	FC-PH (Fibre Channel Physical and Signalling Interface standard)
Modes of operation	Fibre Channel Class 2, Class 3, and Class F
Fabric initialization	Complies with FC-SW 5.0
FC-IP (IP over fibre channel)	Complies with FC-IP 2.3 of the FCA profile
Aggregate I/O bandwidth	2048 Gbps, end-to-end
Port to port latency	Less than 2 microseconds with no contention (destination port is free)
Routing capacity	A minimum aggregate routing capacity of four million frames per second (for Class 2, Class 3, and Class F frames in a 64-port switch)

Regulatory compliance

This section describes the regulatory compliance requirements for the Product Name. It contains:

- "FCC warning (US only)" on page 82
- "MIC statement (Republic of Korea)" on page 82
- "VCCI statement (Japan)" on page 82
- "CE statement" on page 83
- "Canadian requirements" on page 83
- "Laser compliance" on page 83
- "Regulatory compliance standards" on page 83

FCC warning (US only)

This equipment has been tested and complies with the limits for a Class A computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

MIC statement (Republic of Korea)

사용자 안내문 : A 급기기

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

VCCI statement (Japan)

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 action.

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。

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 Name contains the CE mark which indicates that this system conforms to the provisions of the following European Council directives, laws, and standards:

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

Canadian requirements

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

Laser compliance

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

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.

Regulatory compliance standards

Table 9 lists the regulatory compliance standards for which the director is certified.

TABLE 9Regulatory compliance standards

Country	Standards		Agency Certification	Agency Certifications and Markings		
	Safety	EMC	Safety	EMC		
United States	Bi-Nat UL/CSA 60950-1 1st Ed or latest	ANSI C63.4	cCSAus	FCC Class A and Statement		
Canada	Bi-Nat UL/CSA 60950-1 1st Ed or latest	ICES-003 Class A	cCSAus	ICES A and Statement		

Α

Country	Standards		Agency Certifications and Markings		
	Safety	EMC	Safety	EMC	
Japan		CISPR22 and JEIDA (Harmonics)		VCCI-A and Statement	
European Union	EN60950-1 or latest	EN55022 and EN55024	TUV-GS, N	CE marking	
Australia, New Zealand		EN55022 or CISPR22 or AS/NZS CISPR22		C-Tick mark	
Argentina	IEC60950-1 or latest		"S" mark		
Russia	IEC60950-1 or latest	51318.22-99 and 51318.24.99 or latest	GOST mark	GOST mark	
Korea		KN22 and KN24		MIC mark Class A	
China (PS only)	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	

TABLE 9 Regulatory compliance standards (Continued)

Environmental regulation compliance

This section describes the China ROHS environmental regulatory compliance requirements for the director.

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.

Α

环保使用期限 (EPUP) 免责声明:

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

EPUP 假设在"产品操作手册"中注明的常规条件下使用该产品。

TS/HS Dual Language Sheet

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

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

Name of the Component	Hazardous/Toxic Substance/Elements							
	Lead (PB)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)		
Fibre Channel Switch	Х	0	0	0	0	0		
Fan, Blower assemblies	Х	0	0	0	0	0		
PCBA cards	Х	0	0	0	0	0		
Power Supply kit	Х	0	0	0	0	0		
SFPs (optical cable connectors)	Х	0	0	0	0	0		
Sheet Metal	Х	0	0	0	0	0		
Chassis Assembly	Х	0	0	0	0	0		
Mechanical brackets and Slides	Х	0	0	0	0	0		
Slot Filler	Х	0	0	0	0	0		
Cable management tray	Х	0	0	0	0	0		

Name of the Component	Hazardous/Toxic Substance/Elements						
	Lead (PB)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)	
Cable Comb	0	0	0	0	0	0	
Cables and power cords	0	0	0	0	0	0	
Replacement Doors	Х	0	0	0	0	0	
Software/ Documentation CDs	0	0	0	0	0	0	

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

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.

Α

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	ī害/有毒物质或	元素	
	铅(Pb	汞(Hg	镉(Cd	六价铬(C	多溴联苯 (多溴二苯醚(PB
)))	R6+)	PBB)	DE)
光纤通道交换机	Х	0	0	0	0	0
风扇/冷却组装件	Х	0	0	0	0	0
线路板部件	Х	0	0	0	0	0
电源	Х	0	0	0	0	0
▲ SFP(光纤接)	Х	0	0	0	0	0
🔮 头)						
钣金件	Х	0	0	0	0	0
机箱部件	Х	0	0	0	0	0
机械支架及滑轨	Х	0	0	0	0	0
插槽填充物	Х	0	0	0	0	0
电缆整理盘	Х	0	0	0	0	0
梳状线缆	0	0	0	0	0	0
👧 线束及电源	0	0	0	0	0	0
び线						
替换门	Х	0	0	0	0	0
软件/文档光盘	0	0	0	0	0	0

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。

A Environmental regulation compliance

Appendix

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Introduction

This appendix provide details about the application blades that are optionally available for the Brocade 48000 Director. Contact your switch supplier for additional information.

FA4-18 blade

The FA4-18 blade has 16 physical Fibre Channel SFP ports supporting the Fibre Channel Application Services, and 2 physical Gigabit 10/100/1000 BaseT Ethernet copper ports supporting blade management.

The FA4-18 blade is intended as a platform for Fibre Channel Application Services and blade management. Refer to the *Fabric OS Administrator's Guide* for information on configuring these features.

FR4-18i blade

The FR4-18i blade has 16 physical Fibre Channel SFP ports supporting the Fibre Channel Routing Services, and 2 physical Gigabit Ethernet (GbE) SFP ports supporting the Fibre Channel Over IP (FCIP) feature. It operates with the Brocade Fabric Operating System and can communicate with another FR4-18i or a Brocade 7500 for both Fibre Channel Routing services and FCIP, or a Brocade AP7420 for Fibre Channel Routing Services.

The FR4-18i blade is intended as a platform for Fibre Channel Routing Services and FCIP. Refer to the *Fabric OS Administrator's Guide* for information on configuring these features.

The FR4-18i blade provides the following features:

• 16 Fibre Channel SFP ports supporting the Fibre Channel Routing Services with link speeds up to 1-, 2-, or 4-Gbps.

- 2 GbE ports supporting the FCIP and Fibre Channel Routing Services with link speeds up to 1 Gbps:
 - Each GbE port can support up to 8 FCIP tunnels.
 - Each FCIP tunnel is represented and managed as a virtual Fibre Channel E_Port.
 - Fibre Channel Routing Services can be used over the FCIP link.
 - Fabrics connected through FCIP merge if the ports are configured as VE_Ports, and do not merge if they are configured as VEX_Ports. If VE_Ports are used in a Fibre Channel Routing Services backbone fabric configuration, then the backbone fabric merges, but the EX_Port-attached edge fabrics do not merge. For more information, refer to the *Fabric OS Administrator's Guide*.

FC4-16IP blade

The FC4-16IP blade enables bridging of iSCSI hosts to Fibre Channel Fabrics. It has eight Fibre Channel optical SFP ports and eight Gigabit Ethernet (GbE) copper RJ 45 ports.

NOTE

The number of initiators per port, blade, or chassis, depends on the version of Fabric OS and is subject to change from release to release.

The FC4-16IP blade provides the following features:

- Compatible with FC4-16, FC4-32, FC4-48, FA4-18, and FR4-18i in the same chassis.
- Eight Fibre Channel SFP ports supporting link speeds of 1-, 2-, or 4-Gbps.
- Eight GbE ports for bridging iSCSI hosts:
 - Support distances up to 100 m over Category 5e and Category 6 copper cabling.
 - Support 1-Gbps operation.
 - Support external electrical loopback plug.

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Introduction

For information about troubleshooting the entire fabric, refer to the *Fabric OS Administrator*'s *Guide*.

The Brocade 48000 Director includes a number of diagnostic aids to assist with troubleshooting, including LEDs on the hardware, commands that display current status, diagnostic tests for hardware and software, and error messages. In addition, a number of managing and monitoring features are available, such as Fabric Manager, Web Tools, Fabric Watch, and Advanced Performance Monitoring.

If the director does not operate as expected, the following steps can be taken to diagnose the problem:

- Check the LEDs and see the LED tables (Chapter 4, "Monitor System Components") for interpretation and recommended actions.
- Review the results of the last POST run by the director ("Interpreting POST and boot results").
- Review the error logs. (Refer to the Fabric OS Message Reference and the Fabric OS Administrator's Guide for more information).
- Review RASlog entries.
- Type the **sensorShow** command to determine the status of the hardware components.
- Run diagnostic tests ("Diagnostics").
- Reboot the director or power the entire chassis off and then on ("Powering off the director" and "Providing power to the director").

If the problem is still unresolved after these steps, contact your support provider. The information required by your support provider in order to provide assistance is listed under "Getting technical help".

Obtaining chassis and component status

The CLI commands listed in Table 10 provide status and environmental information about the chassis and its components. These commands provide information only, and they do not interrupt traffic flow. For more information about these commands, refer to the *Fabric OS Command Reference*.

Command	Information displayed	
sensorShow	Temperature readings for the port blades.	
	Temperature readings for the CP blades.	
	Status and RPM of all operational fans.	
	Status of all operational power supplies.	
tempShow	Temperature readings for the port blades.	
	Temperature readings for the CP blades.	
psShow	Status of all operational power supplies.	
fanShow	Status and RPM of all operational fans.	
chassisShow	Serial number, time awake, and additional information about each component.	
slotShow	Slot occupancy.	
errShow errDump	System error log. Refer to the <i>Fabric OS Message Reference</i> for more information on the messages in this log.	

TABLE 10 Environmental status and maintenance commands

Interpreting POST and boot results

The director performs Power On Self Test (POST) each time the chassis is powered on or the director is rebooted or reset. The director can be rebooted using the **reboot** (to reboot each CP individually) or **fastBoot** commands. The **fastBoot** command reboots the switches without running POST. If the active CP blade is rebooted, it fails over to the standby CP blade.

POST

Each time the director is powered on or reset, the director automatically performs POST, a system check during which LED patterns might vary.

To verify that POST has completed without error:

 Verify that all LEDs return to a normal state after POST completes (Chapter 4, "Monitor System Components").

If one or more LEDs do not return to a normal state, and this is not due to the director being set to beacon, refer to the relevant LED table to identify and correct the problem. For port blades and CP blades, the **slotShow** command can be used to check the status of the slots. For information about turning beaconing on and off, refer to the *Fabric OS Administrator's Guide*.

 Verify that the switch prompt displays when POST completes. If it does not display, POST was not successfully completed. Contact the switch supplier for support. • Review the system error log using the errShow or errDump commands.

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

POST includes the following steps:

- 1. Preliminary POST diagnostics are run.
- 2. Operating system is initialized.
- 3. Hardware is initialized.
- 4. Diagnostic tests are run on several functions, including circuitry, port functionality, ability to send and receive frames, all aspects of memory, parity, statistics counters, and serialization.

Boot

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

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

Diagnostics

Diagnostic tests are automatically run during POST to check the status of the director. Any error messages generated during POST are sent to the error logs and to the serial console, if connected.

Diagnostic tests can also be run manually to test and troubleshoot the hardware and the firmware, including internal connections and circuitry, transceivers, and port cables. However, diagnostic tests are generally intended for use by support personnel.

NOTE

Error messages do not necessarily indicate that the director requires maintenance.

Each diagnostic test can be implemented by entering the related command through a Telnet or serial session. For a list of diagnostic tests and commands, refer to the *Fabric OS Administrator's Guide*.

All diagnostic tests are run at link speeds of 1, 2 and 4 Gbps. They might temporarily lock the transmit and receive speeds to a specific speed. Some diagnostic tests require interconnecting the ports to each other or using loopback plugs. If ports are interconnected, the media (cables and transceivers) at each end of the connection must be of the same type. For example, short wavelength media must be connected to short wavelength media, and likewise with long wavelength media and copper media.

For more information about diagnostic tests and how to run them, refer to the *Fabric* OS *Administrator's Guide* and the *Fabric* OS *Command Reference*. For information about system error messages (**errShow** or **errDump**), refer to the *Fabric* OS *Message Reference*.

Troubleshooting

Table 11 provides a list of issues, possible causes, and recommended actions.

TABLE 11	Troubleshooting the director
----------	------------------------------

Issue	Possible cause	Recommended action
Entire chassis powers off automatically.	Power supplies are inadequate to support the installed components.	Add an additional power supply.
Several or all components are not operating.	One or both power cables may not be connected to a live source.	Ensure that both power cables are connected to live outlets.
	One or both AC power switches might be off.	Ensure that both AC power switches are on (AC switches light up green when on).
Serial connection is faulty or serial port logs have incorrect or missing	Serial cable is not connected correctly.	Ensure that the cable is firmly connected to workstation computer and to the director.
information.	Terminal emulator application parameters are not set correctly.	Ensure that the terminal emulator application is configured as follows: 9600 bits per second, 8 databits, no parity, 1 stop bit, no flow control.
	Serial port might be incompatible (only RS-232 is supported).	Ensure that the director is connected to an RS-232 port. RS-423 serial ports might experience difficulties due to corner-case incompatibilities of the standards.
	Pins on the serial cable or serial port might be damaged.	Remove the cable and inspect the pins on the cable and in the serial port. Do not reinstall if the pins on either component have any visible damage, as this could damage the pins on the other component. Replace components as required.
CP Ethernet link speed is different than expected or a link cannot be established.	There might be a conflict with the CP Ethernet link speed negotiation set up by the network.	Specify the CP Ethernet link speed by typing the ifModeSet command. For more information about Ethernet connectivity to the director, refer to the LAN guidelines provided through the Brocade Connect Web site.
Configuration data is inaccurate or cannot be accessed.	Chassis was powered off/on while the WWN card was uninstalled or failed.	Install an operational WWN card and power the system off/on again.
	The director was rebooted while the WWN card was uninstalled or failed.	
Initial set up results in IP address/Domain ID conflict.	The director was connected to the fabric before being configured.	See Chapter 3, "Log In and Configuration" and the <i>Fabric OS Administrator's Guide</i> for configuration information.
Issue	Possible cause	Recommended action
---	---	---
LEDs on one or more components are changing rapidly or do not indicate a healthy state.	The director might be booting or running POST.	Verify that boot and POST are complete. The director requires a minimum of 3 minutes, usually, after power-on to complete POST.
	Beaconing might be on for the entire director or for individual components.	Determine whether beaconing is on by typing the switchShow command and determine whether switch beaconing or blade beaconing are on.
	Individual components might have failed.	See the LED tables in Chapter 4, "Monitor System Components" for interpretation and recommended actions.
	Pins on the components might be damaged.	Remove component from chassis and inspect pins on component and inside chassis. Do not reinstall if pins on either component are visibly damaged, as this could damage pins on other component. Replace parts as required.
None of the LEDs on an individual component are on.	Component might not be seated correctly.	Ensure that the director has power and component is firmly seated. If problem continues, type the sensorShow command to determine component status. If component is a CP blade or port blade, type the slotShow command to determine status.
	Component might have failed.	Replace component as necessary.
CP blades are failing over frequently.	A third-party application has a memory leak.	Check application for memory leaks.
	There is excessive serial port activity.	Ensure that serial port activity remains below specified amount.
	CP blade is attached to an ethernet with high traffic loads.	Ensure that ethernet traffic remains below specified amount
	Chassis is overheated.	Type the sensorShow command to check internal temperature. If components are overheating, shut down port blades as necessary to return the temperature to operating range.
One or more port blades have either shut down or failed POST as indicated by the error log.	Blades might be overheated.	Type the sensorShow command to check the internal temperature readings. If components are overheating, shut down port blades as necessary to return the temperature readings to the operating ranges.
	Blades might be faulty.	Type the slotShow command to determine status. For more information, type the diagDisablePost command; then, use the slotPowerOff [slot number] and slotPowerOn [slot number] command. Resolve the source of the problem or replace the blade as required.
	Pins on the blade or on the backplane (inside the slot) might be damaged.	Remove blade from chassis and inspect pins on blade and on backplane inside slot. Do not reinstall if pins on either component are visibly damaged, as this could damage pins on other component. Replace components as required.

TABLE 11 Troubleshooting the director (Continued)

Issue	Possible cause	Recommended action
An individual component is not operating as expected.	Component may not have power or may not be firmly seated.	Ensure component is receiving power (power LED should be on) and component is firmly seated.
	Pins on the component or the backplane might be damaged.	Remove component from chassis and inspect pins on blade and inside chassis. Do not reinstall if pins on either component are visibly damaged, as this could damage pins on other component. Replace parts as required.
	The component might have failed.	Type the sensorShow command to determine component status. If component is a CP blade or port blade, type the slotShow command to determine status. Replace component as necessary

TABLE 11 Troubleshooting the director (Continued)

Powering off the director

1. Shut down the director using the sysShutdown command.

```
swDir::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
HA is disabled
Stopping blade 1
Shutting down the blade....
Stopping blade 4
Shutting down the blade....
Stopping blade 10
Shutting down the blade....
Broadcast message from root (pts/1) Tue Jul 18 14:23:06 2006...
The system is going down for system halt NOW !!
```

2. Power off the chassis by flipping both AC power switches to "0" (LEDs inside AC power switches should turn off). To maintain the ground connection, leave both power cords connected to the chassis and to an electrical outlet.

Appendix

Port Numbering Template

Print or copy the following templates in this appendix and use them to document the port numbering pattern for the Brocade 48000 Director.

- Port side populated with eight FC4-48 port blades and two CP4 blades
- Port side populated with eight FC4-32 port blades and two CP4 blades (for FC4-16 port blades cross out the extra 16 ports)
- FC10-6 port blade
- FC4-16IP application blade
- FR4-18i application blade
- FA4-18 application blade





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