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Brocade VDX 8770-4

Hardware Reference Manual

BROCADE

Brocade Communications Systems, Incorporated

Corporate and Latin American Headquarters
Brocade Communications Systems, Inc.
130 Holger Way
San Jose, CA 95134
Tel: 1-408-333-8000
Fax: 1-408-333-8101
E-mail: info@brocade.com

Asia-Pacific Headquarters
Brocade Communications Systems China HK, Ltd.
No. 1 Guanghua Road
Chao Yang District
Units 2718 and 2818
Beijing 100020, China
Tel: +8610 6588 8888
Fax: +8610 6588 9999
E-mail: china-info@brocade.com

European Headquarters
Brocade Communications Switzerland Sàrl
Centre Swissair
Tour B - 4ème étage
29, Route de l'Aéroport
Case Postale 105
CH-1215 Genève 15
Switzerland
Tel: +41 22 799 5640
Fax: +41 22 799 5641
E-mail: emea-info@brocade.com

Asia-Pacific Headquarters
Brocade Communications Systems Co., Ltd. (Shenzhen WFOE)
Citic Plaza
No. 233 Tian He Road North
Unit 1308 – 13th Floor
Guangzhou, China
Tel: +8620 3891 2000
Fax: +8620 3891 2111
E-mail: china-info@brocade.com

Document History

Title	Publication number	Summary of changes	Date
Brocade VDX 8770-4 Hardware Reference Manual	*53-1002563-01*	New document.	Sept 2012
Brocade VDX 8770-4 Hardware Reference Manual	*53-1002563-02*	NEBS GR-1089 installation requirements added including air filter replacement procedure.	Mar 2013
Brocade VDX 8770-4 Hardware Reference Manual	53-1002563-03	Additional NEBS requirement added for air filter replacement. Changed reference to availability of SX and LX transceivers. Changed LED indication for Ethernet management link on MM.	Aug 2013
Brocade VDX 8770-4 Hardware Reference Manual	53-1002563-04	Added information about 48x10G-T, 27x40 GbE, and 6x100 GbE line cards.	April 2014
Brocade VDX 8770-4 Hardware Reference Manual	*53-1002563-05*	Additional information on 100G Port Upgrade licensing, layer 3 licensing, and general corrections.	August 2014

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About This Document

In this chapter

How this document is organized

This document is a hardware reference manual written for system administrators and technicians experienced with networking and IP technologies to help them install, set up, configure, operate, maintain, and troubleshoot the Brocade VDX 8770-4. It is organized in loosely chronological order, beginning with an overview of the Brocade VDX 8770-4 and ending with removal and replacement procedures of field-replaceable units (FRUs).

The document contains the following sections:

- Chapter 1, "Brocade VDX 8770-4 Overview," identifies the components of the Brocade VDX 8770-4 and provides a brief description of its features.
- Chapter 2, "Installation of the Brocade VDX 8770-4," describes how to install, set up, and power on the Brocade VDX 8770-4.
- Chapter 3, "Configuring the Brocade VDX 8770-4," provides the initial configuration information required to get the Brocade VDX 8770-4 up and running.
- Chapter 4, "Monitoring System Components," provides descriptions of the LEDs and their functions, and also lists Network OS commands required for monitoring.
- Chapter 5, "Removal and Replacement Procedures," describes how to remove and replace each of the FRUs in the Brocade VDX 8770-4.
- Appendix A, "Specifications,"provides information on the physical characteristics, environmental requirements, and regulatory certifications for the Brocade VDX 8770-4.
- Appendix B, "Caution and Danger Notices," contains a list of the translated Caution and Danger messages.

Supported hardware and software

This document includes information specific to the Brocade VDX 8770-4 running Brocade Network OS version 4.1.0. and later.

What's new in this document

The following changes have been made since this document was last released:

- Added information about Layer 3 license to enable VRF to the "Brocade VDX 8770-4 Overview" chapter.
- Added information about the 100G Port Upgrade license to the "Brocade VDX 8770-4 Overview" chapter (supported by Network OS 5.0.0 and later).
- Removed mention of "cabinet" throughout document since the Brocade VDX 8770-4 installs in an EIA rack and not enclosed cabinet.
- Removed China RoHS statement in "Environmental regulation compliance" on page 95 and replaced with reference to RoHS document that ships with this product.

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
italic text	Provides emphasis Identifies variables Identifies paths and Internet addresses Identifies document titles
`code` text	Identifies CLI output Identifies syntax examples

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

Command syntax conventions

Command syntax in this manual follows these conventions:

Convention	Description
[ ]	Keywords or arguments that appear within square brackets are optional. For example: **command** [**active** | **standby** | **disabled**] = One (and only one) of this set of keywords may be used. **command** [**active**] [**standby**] [**disabled**] = Three independent options, and one or more may be used on the same command line.
{ x | y | z }	A choice of required keywords appears in braces separated by vertical bars. You must select one. For example: **command** {**active** | **standby** | **disabled**} = One (and only one) of this set of keywords/operands must be used.
`screen font`	Examples of information displayed on the screen.
< >	Nonprinting characters, for example, passwords, appear in angle brackets.
[ ]	Default responses to system prompts appear in square brackets.
italic text	Identifies variables.
bold text	Identifies literal command options and keywords.

Command examples

This book describes how to perform configuration tasks using the Network OS command line interface, but does not describe the commands in detail. You will enter these commands while in various configuration modes. Steps to enter specific modes are included in procedures in this publication.

The main modes for entering commands are privileged EXEC and global configuration modes:

- Privileged EXEC mode. You will enter this mode when you log into the switch. Following is an example of the privileged EXEC prompt when you log into the switch:

  ```
  switch#
  ```

- Global configuration mode. Enter this mode from the privileged EXEC prompt using the **configure terminal** command as follows.

  ```
  switch# configure terminal
  Entering configuration mode terminal
  switch(config)#
  ```

Move back to a preceding configuration mode by entering **exit**. Move back from any configuration mode to privileged EXEC mode by entering **end**.

```
switch(config)#exit
switch#
```

For complete descriptions of all Network OS commands, including syntax, operand description, and sample output, refer to the *Network OS Command Reference*.

Notes, cautions, and warnings

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

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

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

CAUTION

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

DANGER

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

Notice to the reader

This document may contain references to the trademarks of the following corporations. These trademarks are the properties of their respective companies and corporations.

These references are made for informational purposes only.

Corporation	Referenced trademarks and products
Microsoft Corporation	Windows, Windows NT, Internet Explorer
Oracle Corporation	Sun, Solaris
Netscape Communications Corporation	Netscape
Red Hat, Inc.	Red Hat, Red Hat Network, Maximum RPM, Linux Undercover
Velcro Industries B.V.	Velcro

Additional information

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

Brocade resources

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

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

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

For additional Brocade documentation, visit the Brocade website:

http://www.brocade.com

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

Other industry resources

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

http://www.t11.org

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

http://www.fibrechannel.org

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

http://www.ietf.org

Getting technical help

Contact your Brocade VDX 8770-4 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
    - Model name
    - Operating system version
    - Error numbers and messages received
    - **Copy support** 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. Brocade VDX 8770-4 serial number

The Brocade VDX 8770-4 serial number (Switch Serial No.) and corresponding bar code shown on the following illustration are located on a label located on the nonport side of the chassis, on the upper right side and directly above the fans.:

In addition, the **show chassis** command displays the Brocade VDX 8770-4 serial number, as well as information about the line cards and other field-replaceable units (FRUs).

3. License ID/World Wide Name (WWN)

   The License ID/World Wide Name (WWN) are located on the same label as the serial number.

   In addition, the **show license id** command displays the license ID/WWN.

Document feedback

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

documentation@brocade.com

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

Chapter

Brocade VDX 8770-4 Overview

1

In this chapter

Brocade VDX 8770-4 features

The Brocade VDX 8770-4 is part of the Brocade Next Generation Data Center Networks product line, a highly robust class of network switching platforms that combines breakthrough performance, scalability, and energy efficiency with long-term investment. These chassis are designed to address the data growth and application demands of evolving enterprise data centers.

The Brocade VDX 8770-4 features the Brocade CloudPlex™ architecture, a fabric-based Ethernet technology that can present virtual desktops over a global network that integrates both static and cloud-based resources.

The Brocade VDX 8770-4 requires Brocade Network Operating System (Network OS) v3.0.0 or later. For details about Network OS, refer to the *Brocade Network OS Administrator's Guide*.

A key, licensable feature of the Brocade VDX 8770-4 chassis is Brocade VCS® technology, which includes virtual cluster switching, a new set of technologies that allows users to create flatter, virtualized, and highly available data center networks. VCS fabrics are scalable, permitting users to expand at their own pace, and simplified, allowing users to manage the fabric as a single entity. VCS fabrics are convergence-capable, supporting technologies such as iSCSI and network access server (NAS) as well as Fibre Channel over Ethernet (FCoE) (licensable) for storage.

Key features of the Brocade VDX 8770-4 include:

- A variety of external port types and speeds in supported line card modules
- Dual, redundant management modules (MMs)
- Up to three switch fabric modules (SFMs)
- Up to four redundant, hot-swappable power supplies at 220 VAC or -48 VDC
- Two hot-swappable fan modules
- Serial (console), Ethernet, and USB connections for management modules

NOTE
USB support is for Brocade-branded USB devices only

- Support for short wavelength (SX) and long wavelength (LX) 1 Gbps SFP transceivers

- Support for (short range (SR) and (long range (LR) 10 Gbps SFP+ transceivers
- Support for 40 Gbps QSFP transceivers
- Support for 100 Gbps CFP2 (SR10 and LR4) optical transceivers
- Support for 10 GbE SFP+ optical transceivers
- Support for 1 GbE optical and copper SFP transceivers
- Support for SFP transceivers that enable you to adapt an SFP slot to a copper GbE interface.
- Support for fixed 10Base-T (RJ-45) copper transceivers
- Support for active twinaxial (twinax) cable at 1, 3, and 5 meters for 10 GbE ports
- Support for twinax and optical breakout cables for 40 GbE ports

NOTE
Support for the preceding optics depends on the installed line card. For details, refer to the "Brocade VDX 8770-4 hardware components" and "Brocade VDX 8770-4 line cards" sections of this chapter.

- NEBS-compliant chassis (certification in process)
- Support for in-band management
- 8U form factor for chassis (10U with Intake Air Duct Kit)
- Support for Brocade trunking through the 48x10 GbE and 48x10G-T line card modules
- Support for Fibre Channel over Ethernet (FCoE)

Brocade VDX 8770-4 hardware components

The Brocade VDX 8770-4 features a modular and scalable mechanical construction that allows a wide range of flexibility in installation, fabric design, and maintenance. The minimum chassis configuration is one MM, one SFM, and one line card. The chassis can be mounted with the cables facing the front of the equipment rack and consists of the following components:

- Four slots for hot-swappable line cards that can be configured in a single chassis. Depending on the line cards installed, the following ports are available:
  - Up to 192 1/10 Gbps ports for the 48x10 GbE line card.

    48x10 GbE line cards support 10 GbE SFP+ and 1 GbE SFP optical transceivers, as well as 1 GbE copper SFP transceivers. They also support direct-attach 10 GbE copper twinaxial (twinax) cables at 1, 3, or 5 meters.
  - Up to 192 1 Gigabit Ethernet (GbE) ports for the 48x1 GbE line card.

    48x1 GbE line cards support 1 GbE SFP optical and copper transceivers.
  - Up to 48 40 Gigabit Ethernet (GbE) ports for the 12x40 GbE line card. Up to 192 10 Gbps ports are supported in QSFP breakout mode.

    12x40 GbE line cards support 40 GbE QSFP optical transceivers.
  - Up to 24 100 Gigabit Ethernet (GbE) ports for the 6x100 GbE line card.

The 6x100 GbE line cards ship with two base 100 Gigabit ports enabled, but can be upgraded to enable six ports through the 100G Port Upgrade license. This upgrade license is supported by Network OS 5.0.0 and later. Ports support 100 GbE CFP2 (SR10 and LR4) optical transceivers.

  - Up to 192 1/10 Gigabit Base-T Ethernet ports for the 48x10G-T line card.

    48x10G-T line cards support fixed 10 GbE Base-T (RJ-45) copper transceivers.

  - Up to 108 40 Gigabit Ethernet (GbE) ports for the 27x40 GbE line card. Up to 288 10 Gigabit ports are supported in QSFP breakout mode.

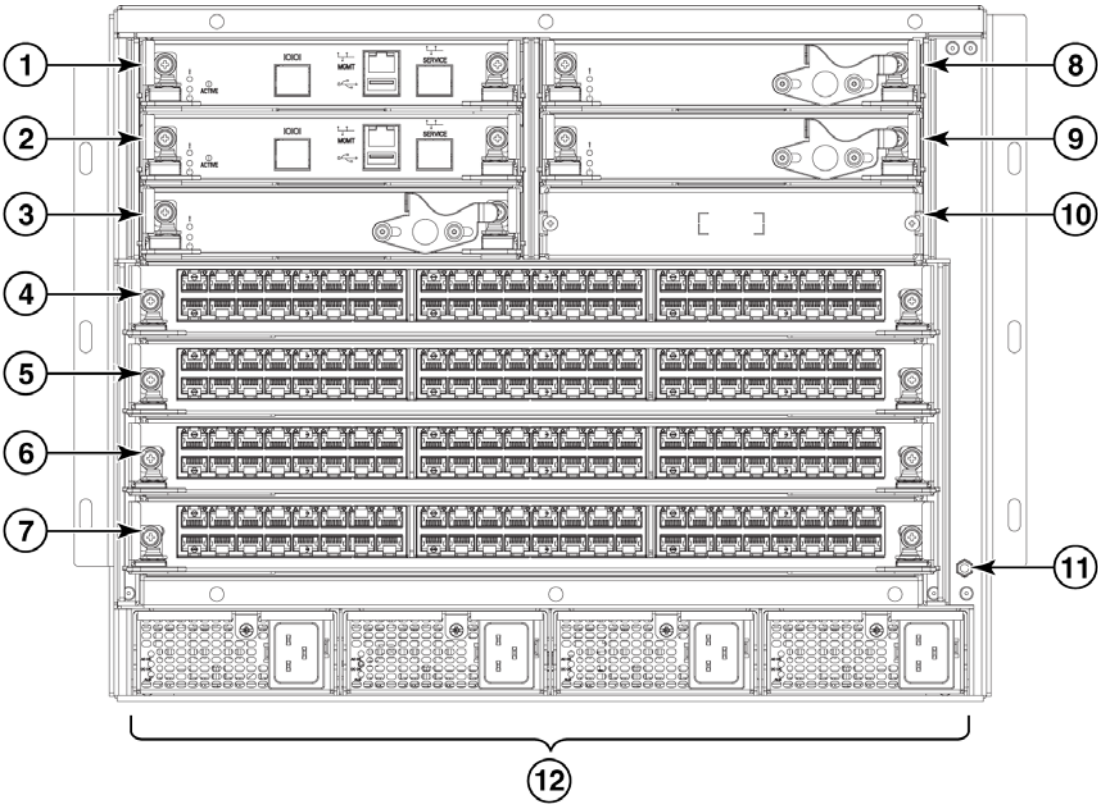
    27x40 GbE line cards support 40 GbE QSFP optical transceivers.

- Two slots for management modules:
  - A single active management module can control all ports in the chassis.
  - The standby management module takes control of the Brocade VDX 8770-4 if the active management module fails.
- Three slots for switch fabric modules that interconnect all line cards.
- Modular, hot-swappable field-replaceable units (FRUs):
  - 48x10 GbE line card
  - 48x1 GbE line card
  - 12x40 GbE line card
  - 6x100 GbE line card
  - 48x10G-T line card
  - 27x40 GbE line card
  - Two fan assemblies
  - Up to four 3000W power supplies, 200–240 VAC auto-sensing or -48 VDC (each power supply connection should be separately fused)
- Two vertical cable management finger assemblies

Port side of the Brocade VDX 8770-4

NOTE
Airflow in the Brocade VDX 8770-4 is from the port side and left side (viewed from the port side) to the rear (fan side) of the chassis.

Figure 1 displays a sample configuration of the port side of the Brocade VDX 8770-4.

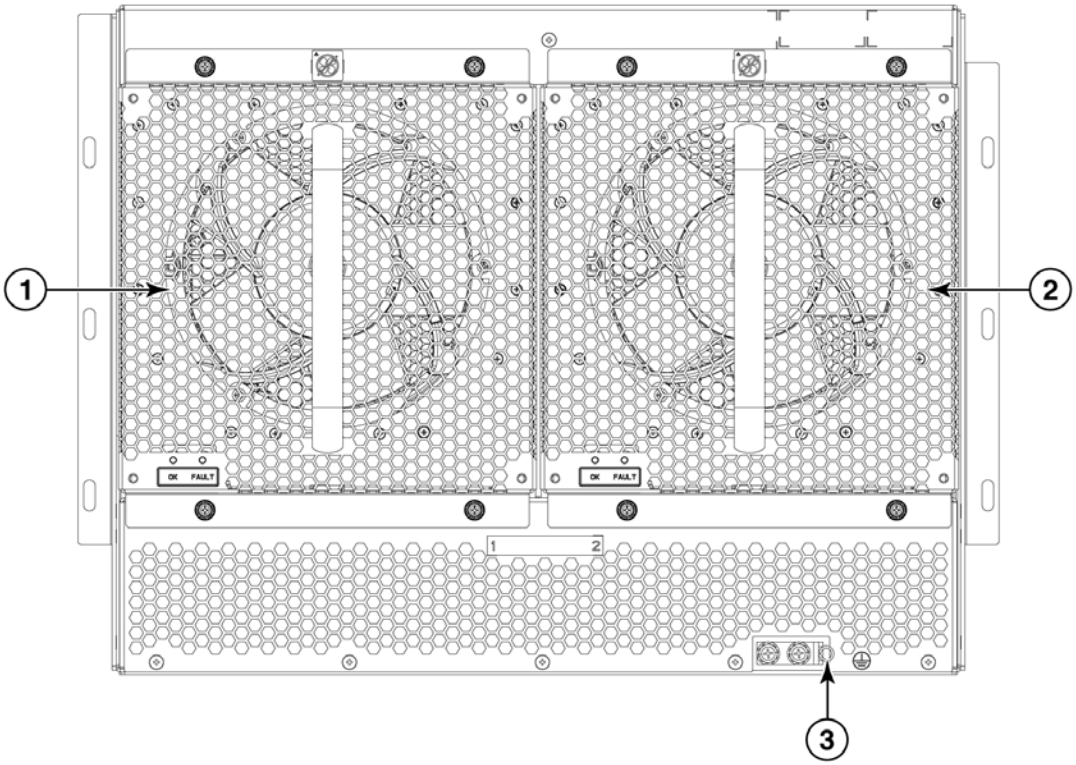


1	Management module slot 1	7	Line card slot 4
2	Management module slot 2	8	Switch fabric module slot 2
3	Switch fabric module slot 1	9	Switch fabric module slot 3
4	Line card slot 1	10	Blank slot - unused
5	Line card slot 2	11	ESD jack
6	Line card slot 3	12	Power supplies (1-4, left to right)

FIGURE 1 Port side of the Brocade VDX 8770-4 (sample configuration)

Nonport side of the Brocade VDX 8770-4

Figure 2 displays a sample configuration of the nonport side view of the Brocade VDX 8770-4.



1 Fan #1
2 Fan #2
3 Ground lug

FIGURE 2 Nonport side of the Brocade VDX 8770-4 (sample configuration)

Brocade VDX 8770-4 line cards

This section provides general information on the line cards. For specific information on line card ports and port hardware, refer to Chapter 1, "Brocade VDX 8770-4 Overview". Table 1 summarizes the line cards that are available for the Brocade VDX 8770-4.

TABLE 1 Line cards available for the Brocade VDX 8770-4

Line card	Description
12x40 GbE	12 40 Gbps QSFP Ethernet ports.
48x10 GbE	48 1/10 Gbps Ethernet ports.
48x1 GbE	48 1 Gbps Ethernet ports.
6x100 GbE	Two or six 100 Gbps Ethernet ports depending on licensing.
48x10G-T	48 1/10 Gbps Base-T Ethernet ports
27x40 GbE	27 40 Gbps QSFP Ethernet ports

Breakout mode

Quad SFP (QSFP) 40 Gbps ports on 12x40 GbE and 27x40 GbE line cards can be configured in breakout mode to create four separate 10 Gbps interfaces. You can administer and operate these interfaces as any other SFP port. Special breakout cables provide a connection to the 40 Gbps QSFP port and to four 10 Gbps SFP ports on another switch. Twinax active copper cables at 1, 3, and 5 meters and fiber-optic breakout cables are supported.

NOTE
While 40 GbE ports are in breakout mode, port status (individual or as a group) cannot be determined from the port LED state color.

For more information on configuring breakout mode, refer to the *Network OS Administrator's Guide*.

Trunking

Network OS supports Brocade trunks (hardware-based link aggregation groups, or LAGs). These trunks are dynamically formed between two adjacent switches with connected interswitch link (ISL) ports unless trunking is disabled on connecting ports. Traffic is evenly distributed along all links in a trunk. For more information on Brocade Trunking and enabling and disabling trunking, refer to the "Configuring Brocade VCS Fabrics" chapter in the *Network OS Administrator's Guide*.

Trunking is supported on GbE interface ports of all line cards

Port groups

Port groups are established for trunking on supported line cards. To successfully form a trunk from line card ports to another switch, select ports from same line card port group and configure each port to operate at the same speed. Following are trunk and port group specifications for supported line cards:

- For the 48x10 GbE line card, up to 8 ports are allowed per trunk. Select ports from octet port groups consisting of ports 1-8, 9-16, 17-24, 25-32, 33-40, and 41-48.
- For the 48x10G-T line card, up to 16 ports are allowed per trunk. Select ports from three port groups consisting of ports 1-16, 17-32, and 33-48.
- For the 12x40 GbE line card, up to two 40GbE ports are allowed per trunk when these ports are configured in breakout mode to provide 10GbE interfaces. Select ports from six port groups consisting of 40GbE ports 1-2, 3-4, 5-6, and 7-8, 9-10, and 11-12.
- For the 27x40 GbE line card, 40GbE ports must be configured in breakout mode to provide 10GbE interfaces for trunking. There are nine port groups consisting of 40GbE ports 1-3, 4-6, 7-9, 10-12, 13-15, 16-18, 19-21, 22-24, and 25-27. The following rules apply to configuring breakout mode and trunking on ports in these groups:
  - You must configure a port group in Performance operating mode. Breakout mode is not supported on ports configured in Density (default) operating mode.
  - When the port group is in Performance mode, you can only configure the first two ports in the port group in breakout mode, since the third port in the group is disabled. Hence, trunking is only supported on the first two ports in the port group.

NOTE
For more information on Performance and Density operating modes, refer to "Configuring operating modes on 27x40 GbE line cards" on page 35.

27x40 GbE operating modes

The 27x40 GbE line card supports nine port groups of three ports each that you can configure for Performance or Density operating modes.

- Performance mode - Because the line card is oversubscribed and cannot support the 40 Gbps line rate on all 27 ports, you can configure Performance mode to achieve 40 Gbps rate for up to 18 ports. When a port group is configured In Performance mode, the third port in the port group is persistently disabled, but the remaining two ports operate at up to 40 Gbps to achieve the 80 Gbps maximum rate for the port group. QSFP breakout mode is only supported on ports configured in Performance mode.
- Density mode - This is the default mode for all the port groups. In this mode, all the three ports are enabled in each group, but cannot support the 40 Gbps maximum rate. If this mode is configured on all port groups, 27 total ports are available for use.

Configure Performance or Density mode for individual port groups using Network OS commands (refer to the *Network OS Command Reference*).

For configuring operation modes, ID numbers are assigned to each port group sequentially from port 1 through 27 as shown in the Table 2 and Figure 3.

TABLE 2 27x40 GbE line card port groups

Port Group ID	Port Numbers
1	1-3
2	4-6
3	7-9
4	10-12

TABLE 2 27x40 GbE line card port groups

5	13-15
6	16-18
7	19-21
8	22-24
9	25-27

Port groups for configuring operation modes are illustrated in Figure 3. If you configure a port group in Performance mode, the first two ports in a group are enabled for Performance mode. The third port is disabled as it can only be configured in density mode only. If you configure the port group in Density mode, all three ports are enabled for density mode. To identify the port group, use the format *rbridge-id/slot-id/port group-id*. For example, 1/3/9 denotes RBridge 1, slot 3, and port-group-id 9.

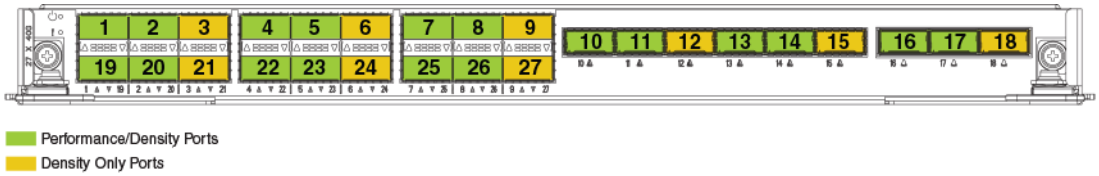


FIGURE 3 Port groups for configuring Performance and Density modes on 27x40 GbE line card

To configure Performance and Density modes for line card port groups using Network OS commands, refer to "Configuring operating modes on 27x40 GbE line cards" on page 35.

High availability

High availability is currently limited to management module configuration synchronization. Failover to the standby module will occur in case of active module failure, but the standby module will go through a cold recovery in which all system components are reset. This will disrupt traffic on the chassis. The reset could take up to eight minutes depending on chassis configuration and traffic load.

The Brocade VDX 8770-4 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.
- USB port on management module for most tasks that formerly required an FTP/SCP server, including software and firmware upgrades.
- 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.

- Hardware and software watchdog timers.
- Status LEDs.
- Predictive diagnostics analysis through Fabric Watch.
- SNMP (including version 3) integration with higher-layer managers.
- Cable management using vertical finger assemblies to accommodate the horizontal orientation of the blades.

Software features

The following is a partial list of the features supported in the software. Refer to the *Brocade Network OS Administrator's Guide* for details on software and supported features.

Layer 2

- Layer 2 data forwarding
- MAC learning and aging
- Brocade Trunking
- Priority Flow Control (PFC)
- Enhanced Transmission Selection (ETS)
- Terminal Access Controller Access-Control System Plus (TACACS+)
- Link Aggregation Control Protocol (LACP)
- Link Layer Discovery Protocol/ Data Center Bridging eXchange (LLDP/DCBX)
- 802.1x
- Brocade Link Discovery Protocol (BLDP)

Layer 3

- Open Shortest Path First (OSPF) v2
- Static routes
- Virtual Router Redundancy Protocol (VRRP and VRRP-E)
- Internet Group Management Protocol (IGMP) v1 and v2 and snooping
- Address Resolution Protocol (ARP)
- Virtual Routing and Forwarding (VRF)

Virtualization

- Automatic Migration of Port Profiles (AMPP)
- Support for VLAN, QoS, security, and FCoE port profiles
- VMware vCenter and Brocade Network OS integration

FCoE

- Pause Frames (Tx and Rx)
- Priority Flow Control (PFC)
- Enhanced Transmission Selection (ETS)
- End-to-end, multi-hop FCoE (with proper licensing)
- FCoE and FC zoning and RSCN suppression (name server-based zoning)
- FIP version 1
- FC Fabric Services for FCoE VN-port devices
- Multipath support for FCoE traffic
- FCoE over standard LAGs
- Soft zoning support

Link aggregation

- 802.3ad LACP support
- Virtual Link Aggregation Group (vLAG). A VLAG is a LAG that spans multiple physical switches.

QoS

- 802.1p marking
- Scheduling: Strict priority (SP), Shaped Deficit Weighted Round-Robin (SDWRR)
- CEE provisioning and classification
- Rewrite/marking, queuing
- Congestion control
- Multicast rate limit scheduling
- Port-based SPAN
- Layer 2 and Layer 3 ACLs (ingress and egress)
- Port-based sFLOW

Management

- IPv4 or IPv6 management
- CLI management utilities
- sFlow
- TRILL Operations, Administration, and Management (OAM)
- Distributed configuration management (DCMd)

Licensing

- FCoE licensing: enables FCoE feature set
- Layer 3 licensing: enables VRF and IPv4 protocols, such as OSPF, VRRP, and VRRP-E

- 100G Port Upgrade license: enables all six 100 GbE ports on the 6x100 GbE line card. This upgrade license is supported by Network OS 5.0.0 and later. Two base ports are enabled without a license.

1 Software features

Chapter

Installation of the Brocade VDX 8770-4

2

In this chapter

Time and items required

You can set up and install the Brocade VDX 8770-4 in the following ways:

- As a standalone unit on a flat surface
- In a four-post rack using the VDX 8770-4 Four-Post Flush and Recessed Mount Intake Air Duct Rack Kit. This kit is required for the 48x10G-T, 6x100 GbE, and 27x40 GbE and later line cards.
- In a four-post rack
- In a two-post telecommunications (Telco) rack

This chapter describes how to set up the Brocade VDX 8770-4 as a standalone unit. For rack mount installation instructions, refer to the manual that comes with the separately ordered rack kit.

Table 3 describes the main installation and setup tasks, the estimated time required for each, and the items required to complete the task based on a fully populated Brocade VDX 8770-4 (192 10 GbE ports). Configurations with fewer ports require less time. These time estimates assume a prepared installation site and appropriate power and network connectivity.

DANGER

Installation and removal of the unit must be carried out by qualified personnel only.

TABLE 3 Installation tasks, time, and items required

Installation task	Time estimate	Items required
Site preparation and unpacking Brocade VDX 8770-4	30 minutes	#2 Phillips screwdriver. Pallet jack. Hydraulic lift or assisted lift, able to raise to a *minimum* of 140 cm (55 in.), with a *minimum* capacity of 113 kg (250 lb). A fully loaded version of the Brocade VDX 8770-4 weighs 86.18 kg (190 lbs).
Installing the rack mount kit or the VDX 8770-4 Four-Post Flush and Recessed Mount Intake Air Duct Rack Kit	30 minutes	Refer to the proper rack mount kit instructions for your specific rack.
Mounting and securing Brocade VDX 8770-4 in the rack	30 minutes	
Inserting modules and power supplies	5-10 minutes per unit	Management modules, switch fabric modules, line cards, power supplies (AC or DC).
Installing power cables and powering on the Brocade VDX 8770-4	20 minutes	Power cables (provided in the Brocade VDX 8770-4 accessory kit).
Establishing a serial connection, logging on to the Brocade VDX 8770-4, and configuring the IP addresses	20 minutes	Serial cable (also called the console cable - provided in the accessory kit). Workstation computer with a serial (console) port or terminal server port and a terminal emulator application (such as HyperTerminal). Ethernet IP addresses for the Brocade VDX 8770-4 switch and for management modules: total two or three addresses, depending on the number of management modules installed.
Installing an Ethernet cable, opening a Telnet session, and configuring the Brocade VDX 8770-4 date and time and additional system parameters. Verify and back up configuration.	20 minutes	Ethernet cabling (optional) for Telnet access. Refer to the *Network OS Administrator's Guide*.
Installing transceivers as needed	30-60 minutes (up to 30 seconds per transceiver)	Copper and optical transceivers and direct-attach cables as needed.
Attaching cables, cable ties, and cable guides	2-3 hours	Cables, cable ties, and cable management finger assemblies.

CAUTION

The Brocade VDX 8770-4 with DC power sources are intended for installation in restricted access areas only. A restricted access area is a location where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

Items included with the Brocade VDX 8770-4

The basic Brocade VDX 8770-4 (SKUs BR-VDX8770-4-BND-AC or BR-VDX8770-4-BND-DC depending on whether you order AC or DC power supplies) ships with the following items:

- Brocade VDX 8770-4 chassis, populated with:
  - Management modules (one)
  - Switch fabric modules (three)
  - Filler panels for unoccupied slots for all modules
  - Power supplies (up to two)
  - Power supply filler panels for unoccupied bays
  - Fan modules (two)
- Accessory kit containing the following items:
  - Console cable (RJ-45 serial cable: There is also an adapter that can be used to provide a DB9-style connector.)
  - Wrist strap (ESD grounding strap)
  - Ground lug kit
  - SFP extraction tool kit
  - China RoHS guide
  - Cable management finger assemblies
  - Brocade-branded USB device
  - Power cord retainer kit
  - Hardware for securing the switch in a rack
  - Web pointer document
  - Air filter
- Line cards (up to four) and additional power supplies must be ordered separately.

The rack mount kits must be ordered separately.

Brocade-branded transceivers (SFP, SFP+, CFP2, QSFP, or 10Base-T) and cables or direct-attach cables must also be ordered separately. The Brocade VDX 8770-4 supports SR and LR SFP, SFP+, and CFP2 transceivers. QSFP transceivers are SR transceivers only. Twinax active copper and fiber-optic breakout cables are supported.

NOTE
For information about the transceivers that are qualified for the Brocade VDX 8770-4, refer to *http://www.brocade.com/downloads/documents/matrices/Brocade_Compatibility_Matrix.pdf*.

Preparing for the Brocade VDX 8770-4 installation

NOTE
Refer to Appendix B, "Caution and Danger Notices" before installation.
Refer to "NEBS requirements" to ensure compliance with NEBS-GR-1089 standards.
Refer to "Power specifications" to plan for meeting power supply standards before installing the chassis.
Refer to "Environmental requirements" to plan for your environmental needs.
Refer to "Managing cables" to plan for cable management.

DANGER

Installation and removal of the unit must be carried out by qualified personnel only.

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

NOTE
Brocade strongly recommends that devices be installed in environments that have minimal dust and airborne contaminants.

1. Ensure that doorways are wider than 91 cm (36 in.) to accommodate the switch.
2. Provide a space that is 8 rack units (8U) high, 61.19 cm (24.09 in.) deep, and 43.74 cm (17.22 in.) wide. One rack unit is equal to 4.45 cm (1.75 in.). If you are using the VDX 8770-4 Four-Post Flush and Recessed Mount Intake Air Duct Rack Kit, you will need a space that is 10U high to accommodate both the Intake Air Duct Rack Kit and the switch.

   Plan to install the Brocade VDX 8770-4 with the port side facing the air-intake aisle. Airflow is from the left side of the switch to the fan side. If you are using the Intake Air Duct Rack Kit for mounting the Brocade VDX 8770-4, then the airflow is from the port side to the fan side.

   Ensure that the rack is balanced and mechanically secured to provide stability in the event of an earthquake and that the equipment does not exceed the rack's weight limits.
3. Ensure that dedicated electrical branch circuits with the following characteristics are available:
   - Up to four dedicated fused 200–240 VAC, 50–60 Hz feeds or -48 VDC (one per power supply)
   - One cable for each power supply

CAUTION

Use a separate branch circuit for each AC power cord, which provides redundancy in case one of the circuits fails.

   - 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 switch nameplate
   - Location close to the switch and easily accessible

- Grounded outlets installed by a licensed electrician and compatible with the power cords

DANGER

If the installation requires a different power cord than the one supplied with the device, make sure you use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the switch.

4. Plan for cable management before installing the switch.

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

5. Ensure that the following items are available for configuration of the Brocade VDX 8770-4:
   - Workstation with an installed terminal emulator, such as HyperTerminal
   - Console (serial) cable (provided)
   - Ethernet cables (not provided)
   - Either access to an FTP server or a Brocade USB device for backing up the switch configuration or collecting **supportsave** output data (optional)
   - Transceivers (copper and optical) and compatible cables and direct-attach cables if needed
6. Ensure that the air intake and exhaust vents have a minimum of 5.1 cm (2 in.) of airspace.
7. Ensure that the air temperature on the air intake side is less than 40°C (104°F) during operation.

Power specifications

Power for the Brocade VDX 8770-4 can be supplied with either AC- or DC-based 3000 watt power supplies. The Brocade VDX 8770-4 has room for up to four power supplies.

Table 4 shows the basic power specifications for each power supply.

TABLE 4 Power specifications

Specification	Value for 3000W AC power supply	Value for 3000W DC power supply
Input rating	16A	70A
Input voltage	200–240 VAC, 50-60 Hz, 16.0 Amp maximum	-48 VDC
Operating range	180 ot 264 VAC	-40 to -60 VDC
Inrush current	Limited to 60 Amp peak for any initial current surge or spike of 10 ms or less at either cold or warm start. Any additional inrush current surges or spikes in the form of AC cycles or multiple AC cycles greater than 10 ms and less than 150 ms, must not exceed 25 Amp peak.	Limited to 70 Amp peak for any initial current surge or spike of 10 ms or less at either cold or warm start.
Output	12 VDC, 245 Amps	12 VDC, 245 Amps

CAUTION

For the DC input circuit to the system of a Brocade VDX 8770-4 (3000W supply), make sure there is an 80 Amp circuit breaker, minimum -48VDC, double pole, on the input lugs to the power supply. The input wiring for connection to the product should be copper wire, 2 AWG, marked VW-1, and rated minimum 90°C.

The power requirements for a given switch configuration depend on which modules have been installed in the switch. Table 5 shows the power consumption for the modules that can be used in the Brocade VDX 8770-4 switch along with the power consumption for the cooling fans.

All numbers for the line cards assume that the card is fully populated with transceivers, including QSFPs for the 12x40 GbE and 27x40 GbE line cards. All ports are Ethernet.

You can calculate your power requirements by combining the power demands for the various modules and fan units in your configuration. While you may use fewer ports in a given line card, it is always safer to use the power requirement of a fully populated card.

TABLE 5 Power demands per component

Module or fan units	Power demand at idle - blades enabled, no optics, ports disabled (Watts)	Nominal power demand - blades enabled, optics, 50% line rate, random packets (Watts)	Maximum power demand - blades enabled, optics, traffic present, full line rate, 64 byte smallest packet, 40°C ambient temp., maximum power for all supported optics (Watts)
Management module	46	46	50
Switch fabric module	120	120	132
48x1 Gbe line card	245	310	460
48x10 GbE line card	245	310	460
12x40 GbE line card	247	290	440
48x10G-T line card	450	665	700
27x40 GbE line card	429	489	580
6x100 GbE line card	570	611	700
Fan unit	25	25	268

CAUTION

For the NEBS-compliant installation of a Brocade VDX 8770-4 with AC or DC systems, use a ground wire of at least 2 AWG. The ground wire should have an agency-approved crimped connector (provided with the device) attached to one end, with the other end attached to building ground. The connector must be crimped with the proper tool, allowing it to be connected to both ground screws on the enclosure. Before crimping the ground wire into the provided ground lug, ensure that the bare copper wire has been cleaned and antioxidant is applied to the bare wire. In addition, anti-rotation devices or lock washers must be used with all screw connections for the grounding wire.

Environmental requirements

DANGER

Do not install the device in an environment where the operating ambient temperature might exceed 40 °C (104 °F).

Table 6 lists the environmental operating ranges for the Brocade VDX 8770-4. The requirements for non-operating conditions are also provided for acceptable storage and transportation environments.

TABLE 6 Environmental requirements

Condition	Acceptable range during operation	Acceptable range during non-operation
Ambient temperature	0° to 40° C (32° to 104° F) outside switch	-25° to +70° C (-13° to 158° F) outside switch
Humidity	5% to 90% RH noncondensing, at 40° C (104° F), with maximum gradient of 10% per hour	10% to 90% RH noncondensing, at 70°C (158°F)
Altitude	0 to 3 km (10,000 ft.) above sea level	0 to 12 km (40,000 ft.) above sea level
Shock	20G, 6 ms duration, half-sine wave	33G, 11 ms duration, half-sine wave
Vibration	0.5G p-p, 5-500 Hz at 1.0 octave/minute	2.0G p-p, 5-500 Hz at 1.0 octave/minute
Airflow	Maximum: 675 cu ft/min. (1147 cu m/hr) Nominal: 200 cu ft/min. (340 cu m/hr)	None required
Maximum heat dissipation	Up to 6000W or 20,500 BTU/hr	Not applicable

NOTE

The 0° to 40°C (32° to 104°F) range applies to the ambient air temperature at the air intake vents on the left side (as you face the port side) and port side of the Brocade VDX 8770-4.

The temperature inside the Brocade VDX 8770-4 can be up to 90 °C (194°F) for some modules during operation. Brocade recommends that the internal temperature not exceed 75 °C (167°F). Cooling policy is based on a combination of ambient temperature and measured temperature on the modules. Various combinations will result in an increase in fan speed to create more cooling in the switch.

If a component approaches a critical temperature that will trigger a module shutdown, there will be a WARNING message in the RASlog, followed by a CRITICAL message saying that the module will shut down in two minutes.

Use the **show environment** command to view temperature status.

Chassis slots

Switch slots are coded and numbered to differentiate between management module slots, switch fabric module slots, and line card slots. Management modules (MMs) must be installed only in slots M1 and M2. Switch fabric modules (SFMs) must be installed only in slots S1 through S3. There must be at least one SFM installed in either slot S1 or slot S2. The line card slots, L1 through L4, can be filled with any supported line cards. Unused slots must be filled with the correct filler panels to maintain adequate cooling.

Unpacking and installing the Brocade VDX 8770-4

Use the following procedure to unpack and install your Brocade VDX 8770-4.

NOTE
A fully populated Brocade VDX 8770-4 weighs approximately 86.18 kg (190 lb) and requires a hydraulic or assisted lift to install it. Use safe lifting practices when moving this product.

1. Unpack the Brocade VDX 8770-4.
   a. Cut the bands that encircle the packaging.
   b. Slide the upper portion of the cardboard shipping box up off the pallet and shipping tray.

   NOTE
   The Brocade VDX 8770-4 packaging incorporates a wood pallet and brackets. The switch sits on top of a corrugated cardboard shipping tray.

   c. Save the packing materials for use when returning a switch.
   d. Leave the switch on top of the shipping tray and pallet if the switch must be transported to the installation location.
2. Use a pallet jack or other assisted lift to transport the new switch to the installation area.
3. Using the rack mount instructions, install the rack components in the rack and mounting flanges on the switch. The rack mount kit and instructions are shipped separately from the switch.
4. Remove the accessory kit (cardboard box), packing foam, and anti-static plastic from the switch and set them aside.
5. Remove the foam inserts around the base of the switch.
6. Use a lift to raise the switch to the correct level. If installing the switch in a rack, follow the instructions provided by the rack kit manufacturer.
7. If applicable, lock the wheels of the lift.
8. Ensure that the switch is oriented so that the left side and port side (front) have access to intake air.
9. Gently slide the switch onto the final installation surface, ensuring that it remains supported during the transfer.
10. Before you apply power to the switch, you can install the MM, SFM, and line card modules as well as power supplies to speed up your installation.

Port numbering

The Brocade VDX 8770-4 uses the following port numbering method:

- 12x40 GbE line card modules — Ports are numbered from 1 through 12 from left to right when installed in the switch. Refer to Figure 4.

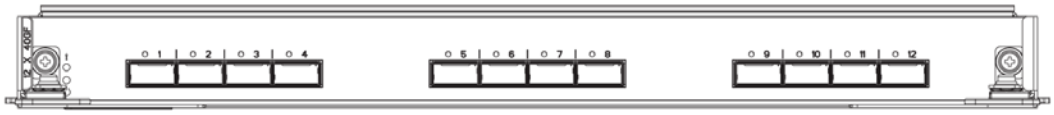


FIGURE 4 12x40 GbE line card

- 48x1 GbE and 48x10 GbE line card modules — Ports are numbered from 1 through 48, from left to right, with the odd-numbered ports on the upper row and the even-numbered ports on the lower row when installed in the switch. Refer to Figure 5.

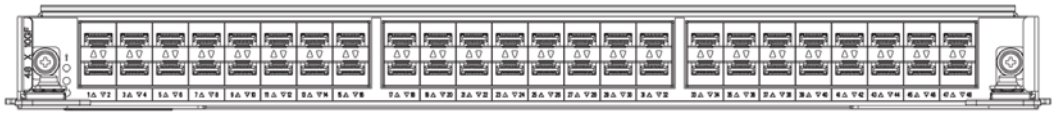


FIGURE 5 48x10 GbE line card (48x1 GbE line card is similar)

- 48x10G-T line card modules — Ports are numbered from 1 through 48, from left to right, with the odd-numbered ports on the upper row and the even-numbered ports on the lower row when installed in the switch. Refer to Figure 6.

FIGURE 6 48x10G-T line card

- 27x40 GbE line card modules — In the dual-port section, the top row of ports is numbered from 1 through 9 and the lower row of ports is numbered 19 through 27 from left to right when installed on the switch. The single ports on the right of the switch are numbered 10 through 18 from left to right. Refer to Figure 7.

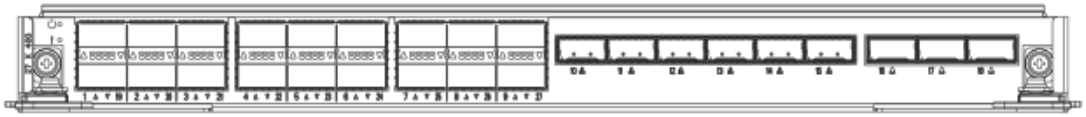


FIGURE 7 27x40 GbE line card

- 6x100 GbE line card modules — Ports are numbered from 1 through 6, from left to right when installed in the switch. Refer to Figure 8.

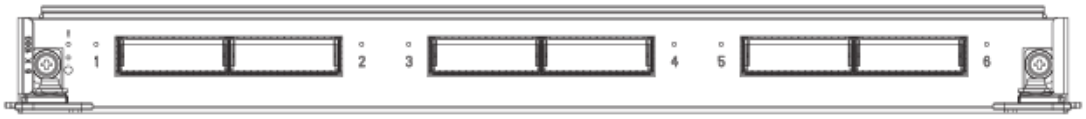


FIGURE 8 6x100 GbE line card

Providing power to the Brocade VDX 8770-4

Complete the following steps to provide power to the chassis. Each power supply has one power cord.

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

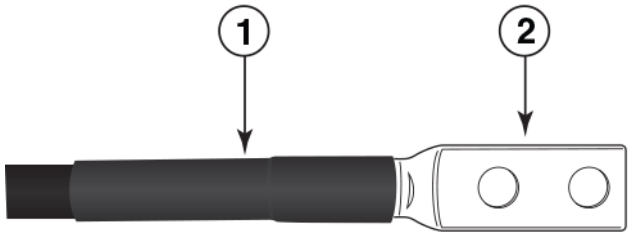
Connecting an AC power cord

1. Plug the power cord into the power supply.
2. Route the cable so it will be out of the way when connected to the power source.
3. Plug the other end of the cable into the power source.

Connecting a DC power cord

1. Use a #1 Phillips screwdriver to remove the screw that secures the safety cover over the power lugs and remove the safety cover.
2. Use a #2 Phillips screwdriver to unscrew the power lugs.
3. Obtain heat shrink tubing with the following specifications to install on the #2 AWG power supply input wire:
   - Inside diameter: 1.27 cm (.5 in.)
   - Minimum 2:1/50% shrink ratio
   - Nominal Rec. Wall Thickness: 30480 mm (.012 in.) minimum
   - Dielectric strength: 800V/mil
   - Tensile strength: greater than or equal to 5000 psi
   - Operating temperature: -40°C to +150°C (-40°F to 302°F) minimum
   - RoHS compliant
4. Cut off a 5.08 cm (2 in) lengths for each #2 AWG power supply wire.
5. Slide the tubing over the #2 AWG power supply wire.
6. Crimp the #2 AWG power supply wire into the power lug.
7. Slide the tubing over the lug to the brown strip closest to the lug holes.
8. Apply heat to shrink the tubing over the lug and wire insulation.

Installed tubing and lugs on power supply wire should conform to Figure 9.



1 Heatshrink tubing 2 Power lug

FIGURE 9 Heat shrink tubing and lug on DC power supply cable

9. Connect the power lugs to the power supply unit.

   Connect the -48V wire to the negative terminal and the 0V wire to the positive terminal.

NOTE
The DC return must be isolated from the chassis ground (DC-I) when making connections to the power supply.

10. Replace the safety cover.
11. Plug the other end of the cable into the power source.

ATTENTION
Do not connect the switch to the network until the IP addresses are configured.

For information about LED patterns, refer to Chapter 4, “Monitoring System Components”.

Chapter

Configuring the Brocade VDX 8770-4

3

In this chapter

Preparing to configure the Brocade VDX 8770-4

The Brocade VDX 8770-4 must be configured before it is connected to the fabric, and all of the configuration commands must be entered through the active MM. The Brocade VDX 8770-4 configuration includes the following parameters:

- RBridge ID, if you are going to have more than one switch in a fabric.
- IP address and gateway address for the switch
- IP addresses, host names, and gateway addresses for one or two MMs, as needed
- Host name

You also need to change passwords from their default values and set the time and date, either by the way of NTP or manually.

The configuration information is mirrored to the standby MM, if you have installed one, which allows the current configuration to remain available even if the active MM fails. The configuration information for the Brocade VDX 8770-4 is stored in the CID cards and the flash memory of the MMs. The configuration can be backed up to a workstation (uploaded) and then downloaded to the active MM if necessary.

The Brocade VDX 8770-4 boots up in VCS™ fabric cluster mode and will attempt to form ISLs with connected VCS-enabled switches,. If the chassis is not connected to another switch, it forms a "single node VCS fabric." This means that the chassis operates as a standalone system, but the operational mode is always VCS-enabled.The switch does not support standalone mode.

Fabric cluster mode is defined as a fabric in which the data path for nodes is distributed each member switch in the fabric, but the configuration path is not distributed. Each node keeps its configuration database independently. Fabric cluster mode has three major characteristics:

- The fabric is self-forming. When two or more VCS-enabled switches with unique RBridge IDs are connected to form a VCS fabric, the fabric is automatically created and the switches discover the common fabric configuration.
- The fabric is masterless. No single switch stores configuration information or controls fabric operations. Any switch can fail or be removed without causing disruptive fabric downtime or delayed traffic.
- The fabric is aware of all members, devices, and Virtual Machines (VMs). Automatic Migration of Port Profiles (AMPP) supports VM migration to another physical server. If the VM moves, it is automatically reconnected to all of its original resources.

When the switch connects with a VCS cluster, negotiation protocols determine which switch in the fabric is the principal switch an makes sure that all domain IDs, and therefore RBridge IDs, are unique. Once the domain IDs are determined to be unique, they are equated to the RBridge IDs. The switch with the lowest World Wide Name (WWN) becomes the principal switch, primarily for purposes of determining the uniqueness of the ID of the other switches in the fabric. The WWN is a unique identifier burned into the switch at the factory.

If necessary you can change VCS ID.for the switch using the **vcs vcsid** *vcsid* command, where the *vcsid* is a value from 1 to 8192. By default, the VCS ID of every Brocade VDX 8770-4 is 1. Change the VCS ID if you need to create a new, separate VCS fabric.

In order to retain the changes made during configuration, you must copy the running configuration file to the startup configuration file using the **copy running-config startup-config** command. This will ensure that the switch reboots to your preferred configuration.

Establishing a serial connection to the Brocade VDX 8770-4

The serial port is located on the port side of the Brocade VDX 8770-4. The switch uses an RJ-45 connector for the serial port. An RJ-45 to DB9 adapter is also provided with the Brocade VDX 8770-4. The cable supplied with the switch is a rollover cable. The serial port is used to connect to a workstation to configure the Brocade VDX 8770-4 IP address before connecting the switch to a fabric or IP network.

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

To establish a serial connection to the serial (console) port on the Brocade VDX 8770-4, complete the following steps.

1. Verify that the Brocade VDX 8770-4 is powered on and that POST is complete by verifying that all power LED indicators on the management, switch fabric, and line card modules display a steady green light.
2. Remove the shipping cap from the serial port (labeled **IOIOI**) on the active MM.
   By default, the MM installed in slot M1 is the active MM unless an error occurs. The active MM is also indicated by an illuminated blue LED labeled **ACTIVE**.
3. Use the serial cable provided with the Brocade VDX 8770-4 to connect the serial port on the active MM to a computer workstation.

   If the serial port on the workstation or terminal device is DB9 instead of RJ-45, remove the adapter on the end of the serial cable and insert the exposed DB9 connector into the DB9 serial port on the workstation.

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

4. Disable any serial communication programs running on the workstation (such as synchronization programs).
5. Open a terminal emulator application (such as HyperTerminal on a PC, or TERM, TIP, or Kermit in a UNIX environment), and configure the application as follows:
   - In a Windows environment, use the parameters shown in Table 7:

TABLE 7 Windows serial connection parameters

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

   - In a UNIX environment, enter the following string at the prompt:

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

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

     ```
     tip /dev/ttya -9600
     ```

Table 8 lists the serial cable pinouts.

TABLE 8 Serial cable pinouts

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

TABLE 8 Serial cable pinouts

PIN	Signal	Description
5	Not supported	NA
6	RXD	Receive data
7	Not supported	NA
8	Not supported	NA

Logging in to the serial console port

Log in to the Brocade VDX 8770-4 through the serial connection with the *admin* user name. The default password is *password*. While you are not required to change the password at the initial login, Brocade recommends that you change your admin and user passwords. Refer to "Assigning permanent passwords" for more details. Make sure to write down the new passwords and keep this information in a secure location.

```
Network OS (8770HOST)

8770HOST console login: admin
Password:

WARNING: The default password of 'admin' and 'user' accounts have not been
changed.

Welcome to the Brocade Network Operating System Software
admin connected from 127.0.0.1 using console on 8770HOST
8770HOST#
```

Changing the RBridge ID

If you are going to have more than one switch in a fabric, each switch must have a unique RBridge ID. The default RBridge ID for any Brocade VDX 8770-4 is 1. Use the **vcs rbridge-id** [*rbridge-id*] command to change the default RBridge ID. You should be in privileged EXEC mode to run the command. If you have made any other configuration changes you want to persist, be sure to save your running configuration to the startup configuration before running the **vcs rbridge-id** command as this command reboots the switch.

1. Log on to the switch using the admin account (the default password is *password*).
2. Enter the **vcs rbridge-id** [*rbridge-id*] command.

```
switch# vcs rbridge-id 2
This operation will change the configuration to default and reboot the switch.
Do you want to continue? [y/n]:y
```

3. Enter **y**.

   The reply to the command will include a line about the setting of the RBridge ID.

```
Successfully set rbridge-id.
```

Assigning permanent passwords

The factory-configured default accounts on the switch are admin and user. Use the default administrative account as shown in Table 9 to log in to the switch for the first time and to perform the basic configuration tasks. The user account is read-only and used primarily for system monitoring.

TABLE 9 Default administrative account names and passwords

Account type	Login name	Password
Administrative	admin	password
User account (read-only)	user	password

Changing the default account passwords

When you change the default account password after you log in for the first time, only the default password rule is in effect. The rule specifies a minimum password length of eight characters. For advanced user and role management, including setting password rules, refer to the Security chapter of the *Network OS Administrator's Guide*.

NOTE
Passwords can be 8 to 40 characters long. They must begin with an alphabetic character. They can include numeric characters, the period (.), and the underscore (_) only. Passwords are case-sensitive, and they are not displayed when you enter them on the command line. The available roles are **admin** and **user**. For more information on passwords, refer to the *Network OS Administrator's Guide*.

1. Log on to the switch using the admin account (the default password is *password*).
2. Enter **configure terminal** to change to global configuration mode.

```
switch# configure terminal
Entering configuration mode terminal
```

3. Enter the **configure terminal** command to enter global configuration mode.
4. Enter the **username** command followed by the account name and the password parameter.
5. When prompted, enter the new password. and press **Enter**.

Following is an example of using these commands:

```
Switch# configure terminal
Entering configuration mode terminal
switch(config)# username admin password [new-password]
(<WORD>;;User password satisfying password-attributes):********
```

Configuring the IP addresses

You can must configure the Brocade VDX 8770-4 with a static IP address. DHCP is not supported on the Brocade VDX 8770-4. The Brocade VDX 8770-4 supports both IPv4 and IPv6 format addresses.

Setting a static IP address

Complete the following steps to set a static IP address.

1. Log in to the switch using an account that has the admin role.
2. Enter global configuration mode using the **configure terminal** command.
3. Specify the chassis with the **rbridge-id** command.

```
switch(config)# rbridge-id 1
```

4. Use the **chassis virtual-ip** command to set the IP address for the chassis.

```
switch(config-rbridge-id 1)# chassis virtual-ip 10.20.236.132/20
```

5. Return to configuration mode by entering **exit**.
6. Use the **ip address** command to set the Ethernet IP address for the MMs.

   If you are going to use an IPv4 IP address, enter the IP address in dotted decimal notation. You should also enter a gateway address as well.

   When you have assigned the IP and gateway addresses to management interface 1/1, you should also assign IP and gateway addresses to management interface 1/2 if you have installed a second MM.

```
switch(config)# interface Management 1/1
switch(config-Management-1/1)# no ip address dhcp
switch(config-Management-1/1)# ip address 10.24.85.81/20
switch(config-Management-1/1)# ip gateway-address 10.24.80.1
```

ATTENTION

The **ip gateway-address** command will not be available on the Brocade VDX 8770-4 if the Layer 3 or Advanced license is installed. In that case, use the following command sequence:

```
switch(config)# rbridge-id 1
switch(config-rbridge-id 1)# ip route 0.0.0.0/0 <default-gateway>
```

   If you are going to use an IPv6 address, enter the network information in semicolon-separated notation as prompted after the **ipv6 address** operand. You should also disable DHCP.

```
switch(config)# interface Management 1/1
switch(config-Management-1/1)# no ip address dhcp
switch(config-Management-1/1)# ipv6 address \
fd00:60:69bc:832:e61f:13ff:fe67:4b94/64
```

7. Return to privileged EXEC mode by entering **exit**.

```
switch(config)# exit
switch#
```

8. To display the configuration, use the **show running-config interface Management** command.

```
switch# show running-config interface Management 1/1
interface Management 1/1
 no ip address dhcp
 ip address 10.24.85.81/20
 ip gateway-address 10.24.80.1
 ipv6 address fd00:60:69bc:832:e61f:13ff:fe67:4b94/64
 no ipv6 address autoconfig
!
```

Logging off the serial console port and disconnecting the serial cable

You can use the serial port to monitor error messages through the serial connection. If the serial port is no longer required, use the **logout** command to log out of the serial console, remove the serial cable, and replace the protective plug in the serial port.

Establishing an Ethernet connection to the Brocade VDX 8770-4

After using a serial connection to configure the IP addresses for the Brocade VDX 8770-4, you can connect the active MM to the local area network (LAN).

NOTE
Connecting the MMs to a private network is recommended.

By establishing an Ethernet connection, you can complete the Brocade VDX 8770-4 configuration using a serial session, Telnet, or management application, such as Brocade Network Advisor.

NOTE
To protect the Ethernet port from damage, keep the cover on the port when not in use.

Perform the following steps to establish an Ethernet connection to the Brocade VDX 8770-4.

1. Remove the shipping plug from the Ethernet port on the active MM.
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 Brocade VDX 8770-4 can be accessed through a remote connection using the command line by way of Telnet or any of the management tools, such as Brocade Network Advisor.
4. To complete any additional Brocade VDX 8770-4 configuration procedures through a Telnet session, log in to the Brocade VDX 8770-4 by Telnet using the *admin* login. The default password is *password*.

Customizing a host name

This procedure is optional.

While still in Telnet, you can change the host (switch) name of the switch. The host name of the Brocade VDX 8770-4 can be up to 30 characters long using Network OS release 3.0.0 or later; can include letters, numbers, hyphens, and underscore characters; and must begin with a letter. The default host name is “sw0.” The host name is displayed at the system prompt.

1. Log in to the switch using an account that has the admin role.
2. Enter **configure terminal** to change to global configuration mode.

   ```
   switch# configure terminal
   Entering configuration mode terminal
   ```
3. Enter **switch-attributes** followed by the RBridge ID and the **host-name** operand with the new name.

If you have changed the RBridge ID, be sure to use that ID.

```
switch(config)# switch-attributes 1 host-name rack1_8770_4
```

4. Record the new name for reference.
5. Enter **exit** while in global configuration mode to return to privileged EXEC node.

```
switch(config)# exit
switch#
```

6. To verify the new host name, you can run the **show running-config** command in EXEC mode.

```
switch# show running-config
```

Customizing a chassis name

This procedure is optional.

While still in Telnet, you can change the chassis name of the switch. The chassis name of the Brocade VDX 8770-4 can be up to 30 characters long; can include letters, numbers, hyphens, and underscore characters; and must begin with a letter. The default chassis name is “VDX8770-4.”

Brocade recommends that you customize the chassis name for each platform because some of the system logs refer to the platform by its chassis name.

1. Log in to the switch using an account that has the admin role.
2. Enter global configuration mode using the **configure terminal** command.
3. Enter **switch-attributes** followed by the RBridge ID and the **chassis-name** operand with the new chassis name.

   If you have changed the RBridge ID, be sure to use that ID.

```
switch(config)# switch-attributes 1 chassis-name B8770_prime
```

4. Record the new name for reference.
5. Enter **exit** while in global configuration mode to return to privileged EXEC mode.

```
switch(config)# exit
switch#
```

6. To verify the new chassis name, you can run the **show running-config switch-attributes** [*rbridge-id*] command.

```
switch# show running-config switch-attributes 1
```

Setting the date and time

The MM maintains the current date and time inside a battery-backed real-time clock (RTC) circuit. Date and time are used for logging events. Switch operation does not depend on the date and time; a Brocade VDX 8770-4 with an incorrect date and time value functions properly. Because the date and time are used for logging, error detection, and troubleshooting, you should set them correctly.

Time zones

You can set the time zone for a switch by using the **clock timezone** command. The time zone setting has the following characteristics:

- The time zone setting automatically adjusts for Daylight Savings Time.
- Changing the time zone on a switch updates the local time zone setup and is reflected in local time calculations.
- By default, all switches are in the Greenwich Mean Time (GMT) time zone (0,0). If all switches in a fabric are in one time zone, it is possible for you to keep the time zone setup at the default setting.
- System services that have already started will reflect the time zone changes only after the next reboot.
- Time zone settings persist across failover for high availability.
- Time zone settings are not affected by Network Time Protocol (NTP) server synchronization.

The following regions are supported: Africa, America, Arctic, Antarctica, Asia, Atlantic, Australia, Europe, Indian, and Pacific. One of these, along with a city name, establishes the time zone. Refer to "Setting the time zone."

Time synchronization

To keep the time in your network current, it is recommended that each switch has its time synchronized with at least one external NTP server.

All switches in the fabric maintain the current clock server value in nonvolatile memory. By default, this value is the local switch clock.

The **ntp server** command accepts multiple server addresses in either IPv4 or IPv6 format. When multiple NTP server addresses are passed, **ntp server** sets the first obtainable address as the active NTP server. If there are no reachable time servers, then the local switch time is the default time.

Synchronizing local time using NTP

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

1. Log on to the switch using the admin account (the default password is *password*).
2. Enter **configure terminal** to change to global configuration mode.

   ```
   switch# configure terminal
   Entering configuration mode terminal
   ```

3. Enter the **ntp server** "*IPv4 address*" command, where *IPv4 address* is the IP address of the first NTP server in IPv4 format, which the switch must be able to access. The *IPv4 address* variable is optional. By default, this value is LOCL, which uses the local clock as the clock server.

   ```
   switch(config)# ntp server "132.163.135.131"
   ```

   To display the NTP server IP address, use the **show ntp status** [**rbridge-id** *rbridge-id* | **all**] command. If you are in global configuration mode, you must use **do** before the **show** command.

```
switch(config)# do show ntp status rbridge-id 1
```

The request is for the local switch unless an RBridge ID is specified. Specify the **all** parameter to send the request to all switches in the cluster.

If you need to remove an NTP server, use the **no** form of the **ntp server** command.

```
switch(config)# no ntp server "132.163.135.131"
```

Setting the time zone

You must perform this procedure on *all* switches for which the time zone must be set. However, you only need to set the time zone once on each switch, because the value is written to nonvolatile memory. While not necessary for switch operation, setting a time zone is part of ensuring accurate logging and audit tracking. Time zone changes persist through a reboot without having to save the current running configuration.

Use the **clock timezone** command to set the time zone.

1. Log in to the switch using an account that has the admin role.
2. Enter the **clock timezone** *region/city* command while in privileged EXEC mode.

   The following example changes the time zone to US/Pacific Standard Time.

   ```
   switch# clock timezone America/Los_Angeles
   ```

Setting the clock (date and time)

The following procedure sets the local clock date and time. An active NTP server, if configured, automatically updates and overrides the local clock time. Time values are limited to between January 1, 1970 and January 19, 2038.

NOTE
You should set the clock only if there are no NTP servers configured. Time synchronization from NTP servers overrides the local clock.

1. Log in to the switch using an account that has the admin role.
2. Enter the **clock set** *year-month-day*T *hours*:*minutes*:*seconds* command while in privileged EXEC mode.

   The following example sets the clock to March 17, 2012, 15 minutes past noon.

   ```
   switch# clock set 2012-03-17T12:15:00
   ```

If you want to show the clock and time zone settings, use the **show clock [rbridge-id** *rbridge-id* | **all]** command.

```
switch# show clock
rbridge-id 1: 2012-03-17 12:15:00 America/Los_Angeles
```

Determining installed software licenses

Certain licenses are factory installed on the Brocade VDX 8770-4. To determine which licenses are enabled, use the **show license** command while in privileged EXEC mode. The format of the command is **show license** [**rbridge-id** *rbridge-id* | **all**]. You can also use just **show license**.

```
switch# show license
RbridgeId: 1
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
    FCoE Base license
    Feature name:FCOE_BASE
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
    Layer 3 license
    Feature name:LAYER_3
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
    VCS Fabric license
    Feature name:VCS_FABRIC
```

Each license key is represented by a string of x characters in the preceding example. Keep a copy of each license key for reference.

You can display the switch license ID, which is required for installing a new license. Use the command **show license id** [**rbridge-id** *rbridge-id* | **all**]. You can also use just **show license id**.

```
switch# show license id
RbridgeId        LicenseId
========================================
1             10:00:00:05:1E:00:4C:80
```

Configuring operating modes on 27x40 GbE line cards

You can configure Performance or Density mode for the port groups on the 27x40 GbE line card defined in Table 1. When configured in Performance mode, the third port in the group is persistently disabled, allowing the remaining two ports to operate at up to 40 Gbps. When Density mode (default) is configured, all three ports in the group are enabled, but will operate at below the 40 Gbps maximum rate. For more details on 27x40 GbE line card port groups and operating modes, refer to "Brocade VDX 8770-4 line cards" on page 6.

Use the following steps to set Density and Performance modes on port groups on 27x40 GbE line cards. To identify the port group, use the format *rbridge-id/slot-id/port group-id*. For example, 1/3/9 denotes RBridge ID 1, slot 3, and port group 9.

1. Log in to the switch using an account that has the admin role.
2. Power off the line card.

   ```
   switch# power-off linecard 3
   ```

3. Issue the **configure terminal** command to enter global configuration mode.

   ```
   switch# configure terminal
   Entering configuration mode terminal
   ```

4. Enter the **hardware** command to enter hardware configuration mode.

   ```
   switch(config)# hardware
   ```

5. Enter the **port-group** command to enter configuration mode for a specific port group.

   There are nine port groups on the line card. To identify the port group, use the format *rbridge-id/slot-id/port group-id*.

   ```
   switch(config-hardware)# port-group 1/3/9
   ```

6. Perform one of the following steps:

   - Enter the **mode performance** command to configure Performance mode for the port group.

     ```
     switch(config-port-group-1/3/9)# mode performance
     %Warning: port-group mode performance is a disruptive command.
      Please save the running-config to startup-config and a power-cycle for the
     changes to take place.
     ```

     NOTE
     Setting Performance mode shuts down the density-only port in the port group. The configuration is allowed only when the slot is powered off and takes effect when the slot is powered on.

   - Enter the **no mode performance** command to configure Density mode for a port group already configured for Performance mode.

     ```
     switch(config-port-group-1/3/9)# no mode performance
     %Warning: port-group mode performance is a disruptive command.
     Please save the running-config to startup-config and a power-cycle for the
     changes to take place.
     ```

7. Exit port group configuration mode.

   ```
   switch(config-port-group-1/3/9)# exit
   ```

8. Exit hardware configuration mode.

   ```
   switch(config-hardware)# exit
   ```

9. Exit global configuration mode.

   ```
   switch(config)# exit
   switch#
   ```

10. Power on the line card.

    ```
    switch# power-on linecard 3
    ```

Displaying operating modes

To display the current operating mode for a specific port group, use the **show running-config hardware port-group** *rbridge-id/slot-id/port group-id* command. Note the following responses:

- If “mode performance” displays, the port group is enabled in Performance mode.
- If “no mode performance” displays, the port group is enabled in Density mode.

Saving your changes

Complete the following steps to make your changes persistent. This ensures that if you must reboot the switch, the preferences you have set will be in force when the switch comes back up.

1. Log in to the switch using an account that has the admin role.
2. In privileged EXEC mode, enter the **copy running-config startup-config** command.

```
switch# copy running-config startup-config
This operation will modify your startup configuration. Do you want to
continue? [Y/N]: Y
```

3. When the confirmation question appears, answer **Y** for Yes.

   The current running configuration, containing all of your latest changes, is saved to the startup configuration. The next time the switch reboots, all of the changes will remain in force.

Verifying correct operation

Complete the following steps to verify correct operation for the Brocade VDX 8770-4.

1. Check the LEDs to verify that all components are functional.
2. If necessary, log in to the switch by Telnet, using the **admin** account.
3. Enter the **show chassis** command to verify that the Brocade VDX 8770-4 and its components are operating correctly.
4. Enter the **show interface** command to show the status of all of the ports in the line cards.
5. Enter the **show fabric all** command to verify the operation of the Brocade VDX 8770-4 in the fabric.

Backing up the configuration

Complete the following steps to back up the configuration for the Brocade VDX 8770-4. If you back up your configuration to a USB device, be sure to use a Brocade-branded USB device. The Brocade USB device comes pre-configured with four directories, /firmware, /config, /support, and /firmwarekey. Configuration backups are automatically saved in the /config directory.

1. Log in to the switch using an account that has the admin role.
2. You can choose to back up the startup configuration or the running configuration or both. To back up these configurations, use the **copy** command. These examples show backing up the configurations to a Brocade-branded USB device.
   a. Insert the Brocade-branded USB device into the USB port on the active MM.
   b. Enable the USB device by entering the **USB on** command while in privileged EXEC mode.
   c. To back up the startup configuration, enter **copy startup-config usb://mystartupconfig***date*.

      The *date* portion of the target file name should be the current date to indicate when the backup was made. For example: **copy running-config usb://myrunningconfig06142012**.

d. To back up the running configuration, enter **copy running-config usb://myrunningconfig***date*.

Alternatively, you can save the configuration files to a remote host using either FTP or SCP. The destination file argument would be either *ftp://username:password@host_ip_address/path/filename* or *scp://username:password@host_ip_address/path/filename* respectively. Specifying a *path* is optional. As with the USB examples, be sure to append the date to the target file name.

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

NOTE
Brocade recommends that the configuration be backed up on a regular basis to ensure that a complete configuration is available for downloading to a replacement management module or Brocade VDX 8770-4. Be sure to append the date to the end of the target file names to make it clear which are the latest backups.

Connecting network devices

You can connect your chassis to a variety of network devices. Refer to the following topics for some specific requirements for making these connections.

Connecting to Ethernet devices

For copper connections to a 10/100Base-TX or 1000Base-T switch or another Brocade device, a crossover cable is required.

NOTE
The 802.3ab standard (automatic MDI or MDIX detection) calls for automatic negotiation of the connection between two 1000Base-T ports. Therefore, a crossover cable may not be required; a straight-through cable may work as well.

Connecting to workstations, servers, or routers

Straight-through unshielded twisted pair (UTP) cabling is required for direct UTP attachment to workstations, servers, or routers using network interface cards (NICs).

Fiber cabling is required for direct attachment to Gigabit NICs or switches and routers through fiber ports.

Connecting a network device to a fiber port

For direct attachment from the Brocade device to a Gigabit NIC, switch, or router, fiber cabling with an LC connector is required.

Testing connectivity

After you install the network cables, you can test network connectivity to other devices by observing the LEDs related to network connection and performing trace routes.

Installing transceivers and attaching cables

The following sets of steps cover the installation of transceivers and cables for most SFP and QSFP transceivers.

CAUTION

Before plugging a cable to any port, be sure to discharge any static charge stored on the cable by touching the electrical contacts to a grounded surface.

Installing SFP and SFP+ transceivers and cables

Complete the following steps to install optical SFP and SFP+ transceivers.

1. Add the transceivers and cables to the line card ports.

   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.

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

   Cables are keyed so that they can be inserted in only one way. If a cable does not slide in easily, ensure that it is correctly oriented.

3. Repeat step 1 and step 2 for the remaining ports.
4. If you are using direct-attach cables, you can insert them at this time.
5. Organize the cables. Refer to "Managing cables."
6. Verify the Brocade VDX 8770-4 port status using the **show interface** command.
7. Verify fabric connectivity using the **show fabric all** command.

Installing QSFP transceivers and cables

Complete the following steps to install the QSFP transceivers and cables in the 12x40 GbE and 27x40 GbE line cards.

Because each QSFP transceiver consists of four 10 GbE ports, be aware that any problems with one port could affect all four ports in the quad.

1. Position one of the QSFP transceivers so that the key is oriented correctly to the port.
2. Grasping the edges of the transceiver, insert the it into the port until it is firmly seated. You can feel a small click when it completely seats. If your transceiver has a bail, pull the bail up until it latches in the closed position.

   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.

   When the transceiver is correctly seated, the status LED will turn solid amber.
3. Remove the protective plug from the QSFP transceiver and the protective cap from the special QSFP cable and insert it into the transceiver until it is firmly seated.

   The cables are also keyed to fit into the transceivers correctly.

   When the cable is correctly seated, the status LED will change from amber to green.
4. Repeat step 1 through step 3 for the remaining QSFP ports.
5. Organize the cables. Refer to "Managing cables."

Managing cables

Cables can be organized and managed in a variety of ways; for example, using cable channels on the port sides of the rack or patch panels to minimize cable management. With the horizontal orientation of the line cards in the Brocade VDX 8770-4, a pair of vertical cable management finger assemblies have been provided to keep the cables from hanging down in front of other modules.

- Following is a list of recommendations:
- Leave at least 1 m (3.28 ft.) of slack for each port cable. This provides room to remove and replace the Brocade VDX 8770-4, allows for inadvertent movement of the rack, and helps prevent the cables from being bent to less than the minimum bend radius.
- The minimum bend radius should be no smaller than ten times the cable radius. The minimum radius to which a 50 micron cable can be bent under full tensile load is 5.1 cm (2 in.). For a cable under no tensile load, that minimum is 3.0 cm (1.2 in.).
- If ISL trunking is in use, group the cables by trunking group.
- Generally, Velcro®-type cable restraints are recommended to avoid creating sharp bends or kinks in the cables. Do not use tie wraps with optical cables because they are easily overtightened and can damage the optic fibers.
- For easier maintenance, label the fiber-optic cables and record the devices to which they are connected.
- Do not route cables in front of the air intake vents.
- Route the cables to the sides of the Brocade VDX 8770-4 through the vertical cable management fingers.
- Keep LEDs visible by routing port cables and other cables away from the LEDs.

Chapter

4

Monitoring System Components

In this chapter

Monitoring overview

The Brocade VDX 8770-4 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 *Network OS Administrator's Guide* for additional information.

There are two commands that can be especially helpful in monitoring the health of the Brocade VDX 8770-4. These commands are **show chassis** and the various **show environment** commands. For details about these commands, refer to the *Network OS Command Reference*.

Determining the status of a line card

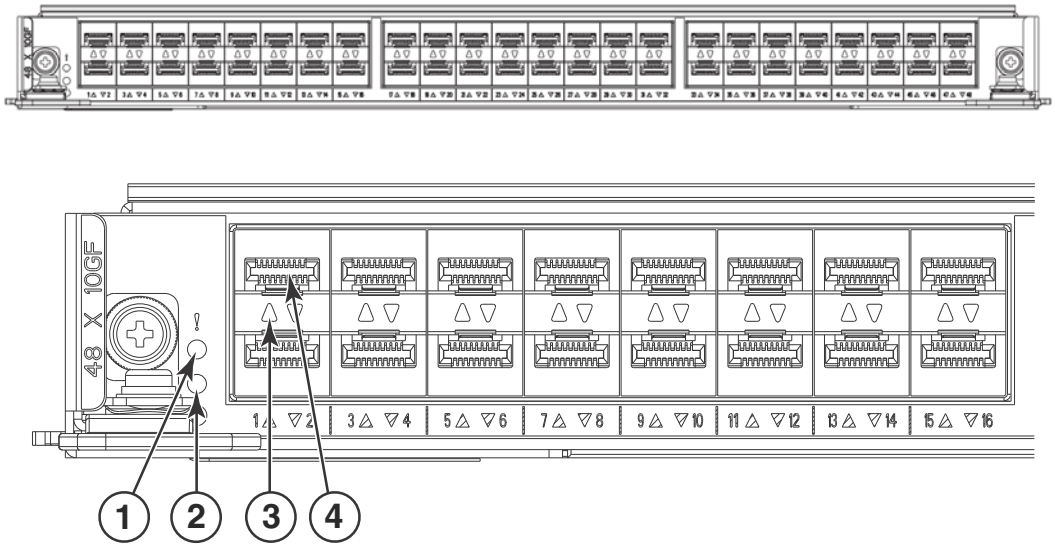
Use the following procedure to determine the status of a line card.

1. Check the LEDs on the line card.
   - Figure 10 illustrates the 48x10 GbE line card. The 48x1G line card looks the same except for the name stamped on the end of the card.
   - Figure 11 illustrates the 12x40 GbE line card.
   - Figure 12 illustrates the 27x40 GbE line card.
   - Figure 13 illustrates the 48x10G-T line card.
   - Figure 14 illustrates the 6x100 GbE line card.

   The LED patterns may temporarily change during POST and other diagnostic tests. For information about how to interpret the LED patterns, refer to Table 10.
2. You can use the **show linecard** or **show slots** command to see if your line cards are enabled. The line cards are labeled L1 through L4 in the output. The **show linecard** command limits the output to the line card slots only.

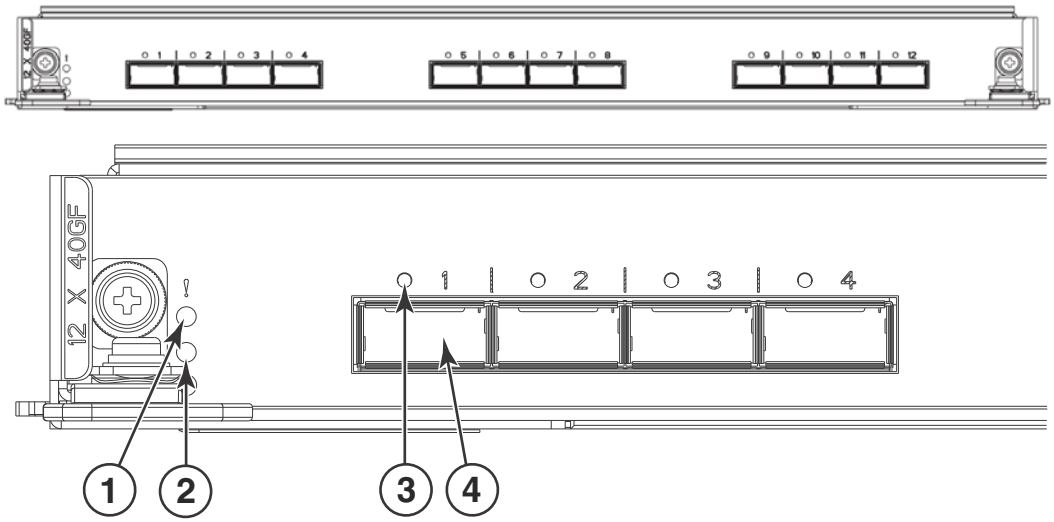
3. To check the status of the interfaces (ports) on the line card, use the **show interface** command.

Line card illustrations



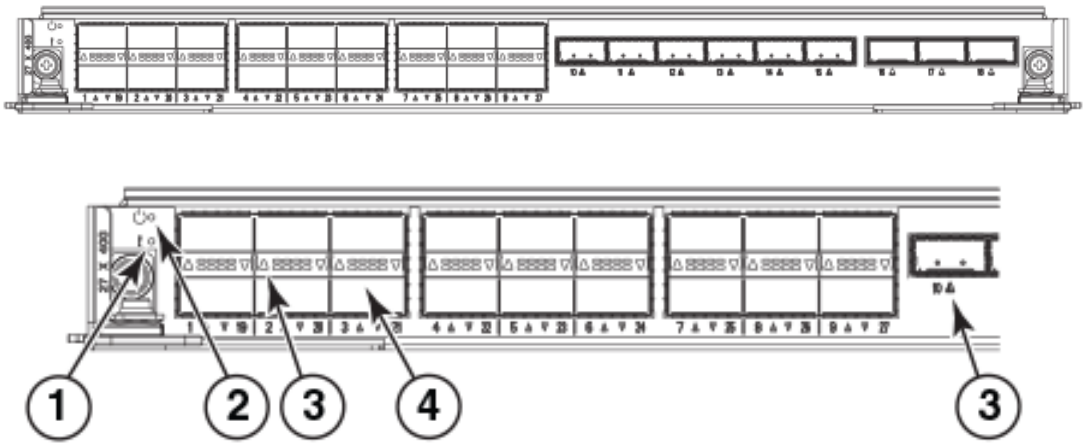
1	Status LED	3	Port Status LED
2	Power LED	4	10 GbE port

FIGURE 10 48x10 GbE line card (full view and close-up)



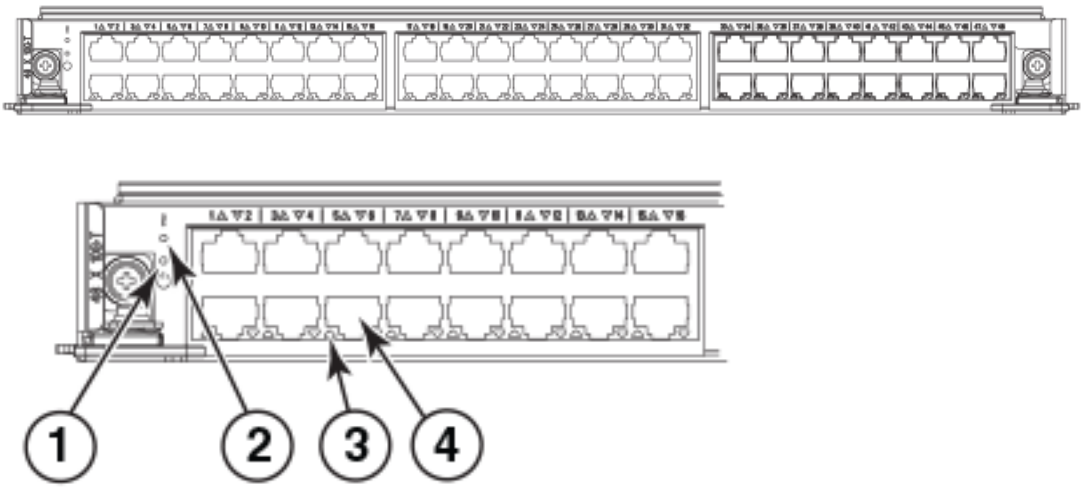
1	Status LED	3	Port Status LED
2	Power LED	4	40 GbE port

FIGURE 11 12x40 GbE line card (full view and close-up)



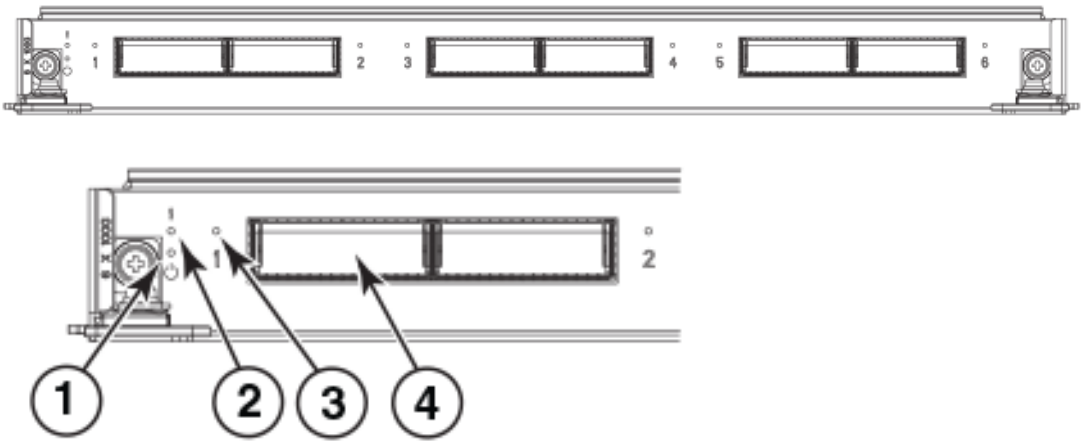
1	Status LED	3	Port Status LED
2	Power LED	4	40 GbE port

FIGURE 12 27x40 GbE line card (full view and close-up)



1	Power LED	3	Port Status LED
2	Status LED	4	10 GbE port

FIGURE 13 48x10G-T line card (full view and close-up)



1	Power LED	3	Port Status LED
2	Status LED	4	100 GbE port

FIGURE 14 6x100 GbE line card (full view and close-up)

Table 10 describes the line card LED indications and the recommended actions for those patterns.

TABLE 10 Line card LED descriptions

LED purpose	Color	Status	Recommended action
Power LED 	No light (LED is off)	Module is not powered on.	Ensure that the module is firmly seated and either the thumbscrew is fully engaged or the slider is pushed up and the ejectors are fully engaged.
	Steady green	Module is powered on.	No action required.
Status LED 	No light (LED is off) Power LED steady green.	Module is operational.	No action required.
	No light (LED is off) Power LED is off.	No power.	No action required.
	Steady amber	Module is faulty or module is booting up.	If module is not booting up, ensure that the module is firmly seated and check the status by entering the **show slot** command. If the LED remains amber, consult the Brocade switch supplier.
	Flashing amber	Module is not seated correctly.	Pull the module out and reseat it. If the LED remains amber, replace the module.

TABLE 10 Line card LED descriptions (Continued)

LED purpose	Color	Status	Recommended action
10 GbE Port Status (48x10 GbE line card) or 1 GbE Port Status (48x1 GbE line card)	No light (LED is off)	The pluggable module (SFP/QSFP/CFP) is not inserted in the port cage or the module is inserted, but no external link is connected.	Verify that the power LED is on, check the transceiver and cable.
	Steady green	The port is online but has no traffic.	No action required.
	Flickering green	The port is online with traffic flowing through the port.	No action required.
	Steady amber	The port is receiving light but it is not online yet.	Reset the port by issuing a **shutdown** and **no shutdown** sequence on the port.
	Slow flashing amber (on 2 seconds, then off 2 seconds)	The port is disabled.	Enable the port by issuing a **no shutdown** command.
	Fast flashing amber (on 1/4 second, then off 1/4 second)	The transceiver or port is faulty.	Change the transceiver or reset the port by issuing a **shutdown** and **no shutdown** sequence.
	Slow flashing green (on 2 seconds, then off 2 seconds)	The port is online but segmented (either a loopback cable or incompatible switch connection).	Consult the Troubleshooting section of the *Network OS Administrator's Guide.*
	Medium flashing green (on 1 seconds, then off 1 seconds)	Beaconing (used to identify specific ports).	No action required.
	Fast flashing green (on 1/2 second, then off 1/2 second)	Internal loopback (diagnostic).	In diagnostic mode. Will return to regular mode when diagnostic is finished.

TABLE 10 Line card LED descriptions (Continued)

LED purpose	Color	Status	Recommended action
40 GbE QSFP Port Status (12x40 GbE or 27x40 GbE line card) in 40 GbE mode	No light (LED is off)	There is no QSFP transceiver installed.	Verify that the power LED is on, ensure the transceiver is fully seated or install the transceiver.
	Steady green	The port is online but has no traffic.	No action required.
	Flickering green	The port is online with traffic flowing through the port.	No action required.
	Steady amber	The port is receiving light but it is not online yet.	Reset the port by issuing a **shutdown** and **no shutdown** sequence on the port.
	Slow flashing amber (on 2 seconds, then off 2 seconds)	The port is disabled.	Enable the port by issuing a **no shutdown** command.
	Fast flashing amber (on 1/4 second, then off 1/4 second)	The transceiver or port is faulty.	Change the transceiver or reset the port by issuing a **shutdown** and **no shutdown** sequence.
	Slow flashing green (on 2 seconds, then off 2 seconds)	The port is online but segmented (either a loopback cable or incompatible switch connection).	Consult the Troubleshooting section of the *Network OS Administrator's Guide.*
	Medium flashing green (on 1 seconds, then off 1 seconds)	Beaconing (used to identify specific ports).	No action required.
	Fast flashing green (on 1/2 second, then off 1/2 second)	Internal loopback (diagnostic).	In diagnostic mode. Will return to regular mode when diagnostic is finished.
10 GbE Port Status (48x10G-T line card)	No light (LED is off)	No power to the Line card.	Verify that the power LED is on, check the transceiver and cable.
	Steady amber	The port is receiving light but it is not online yet.	Reset the port by issuing a **shutdown** and **no shutdown** sequence on the port.
	Slow flashing amber (on 2 seconds, then off 2 seconds)	The port is disabled.	Enable the port by issuing a **no shutdown** command.
	Steady green	The port is online but has no traffic.	No action required.
	Flickering green	The port is online with traffic flowing through the port.	No action required.
	Medium flashing green (on 1 seconds, then off 1 seconds)	Beaconing (used to identify specific ports).	No action required.
100 GbE Port Status (6x100 GbE line card)	No light (LED is off)	There is no transceiver installed' or no external link connected	Verify that the power LED is on, ensure the transceiver is fully seated or install the transceiver.

TABLE 10 Line card LED descriptions (Continued)

LED purpose	Color	Status	Recommended action
	Steady green	The port is online but has no traffic.	No action required.
	Flickering green	The port is online with traffic flowing through the port.	No action required.
	Medium flashing green (on 1 seconds, then off 1 seconds)	Beaconing (used to identify specific ports).	No action required.
	Steady amber	The port is receiving light but it is not online yet.	Reset the port by issuing a **shutdown** and **no shutdown** sequence on the port.
	Slow flashing amber (on 2 seconds, then off 2 seconds)	The port is disabled.	Enable the port by issuing a **no shutdown** command.

NOTE
Then the 40 GbE ports are in breakout mode on the 27x40 GbE and 12x40 GbE line cards, operating status cannot be determined from LED operation.

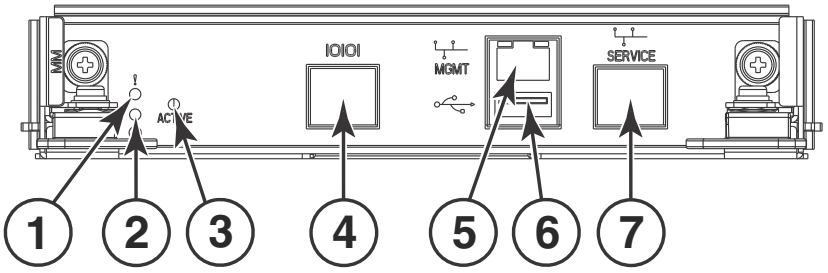
Determining the status of a management module

You must have at least one management module (MM) active for the chassis to be functional. For redundancy, you need two MMs. The active MM is designated by the blue Active LED on the front panel.

Complete the following steps to determine the status of an MM.

1. Check the LED indicators on the module (Figure 15). The LED patterns may temporarily change during POST and other diagnostic tests. For information about how to interpret the LED patterns, refer to Table 11.
2. You can use the **show mm** command to see whether the management modules are enabled. You can also use the **show interface management 1/1** command to see the configuration information.

Figure 15 identifies the management module.



1 Status LED
2 Power LED
3 Active LED
4 Console port (Serial)
5 Ethernet port (Mgmt IP)
6 USB port
7 Ethernet port (Service IP)

FIGURE 15 Management module

Table 11 describes the management module LED patterns and the recommended actions for those patterns.

TABLE 11 Management module LED descriptions

LED purpose	Color	Status	Recommended action
Power	Steady green	MM is powered on.	No action required.
	No light (LED is off)	MM is not powered on.	Ensure that the module is firmly seated and has power.
Status	No light (LED is off)	MM is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	MM requires attention or is still booting up.	If the LED remains amber, the module is faulty. Consult the Brocade VDX 8770-4 supplier.
Active	Steady blue	Module is the active MM.	No action required.
	No light (LED is off)	Module is booting up, negotiating to be the active MM, or is the standby MM.	No action required.
Ethernet management link (upper left)	Steady green	Ethernet link speed is 1000 Mbps (1 Gbps).	No action required.
	No light (LED is off)	There is no link or link speed is 10 or 100 Mbps.	No action required.
Ethernet management link activity (upper right)	Blinking green	Ethernet link is healthy and traffic is flowing through port.	No action required.
	No light (LED is off)	No traffic is flowing.	No action required.

Determining the status of a system fabric module

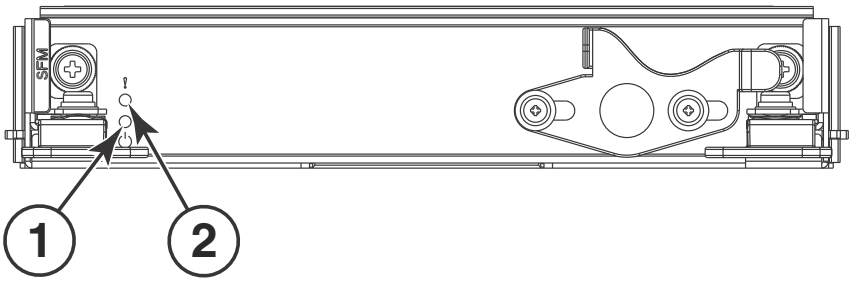
At least one functional switch fabric module (SFM) must be plugged into slots S1 or S2 (the “control plane slots”). If there are no functional SFMs in either slot during bootup, bootup is halted with a message indicating that condition.

In an operational chassis, if all SFMs in the control plane slots become faulty or are removed, then all the line cards will be faulted with a reason code that indicates no availability of an SFM. An external RASlog message will also be displayed.

Complete the following steps to determine the status of an SFM.

1. Check the LED indicators on the SFM (refer to Figure 16). The LED patterns may temporarily change during POST and other diagnostic tests. For information about how to interpret the LED patterns, refer to Table 12.
2. You can use the **show sfm** command or the **show slots** command to see whether the SFM is enabled.

Figure 16 identifies the switch fabric module.



1 Power LED 2 Status LED

FIGURE 16 Switch fabric module

Table 12 describes the switch fabric module LED patterns and the recommended actions for those patterns.

TABLE 12 Switch fabric module LED descriptions

LED purpose	Color	Status	Recommended action
Power 	No light (LED is off)	SFM is not on.	Ensure that the SFM is firmly seated and the power switch is turned on (slider is covering the captive screw).
	Steady green	SFM is on.	No action required.

TABLE 12 Switch fabric module LED descriptions (Continued)

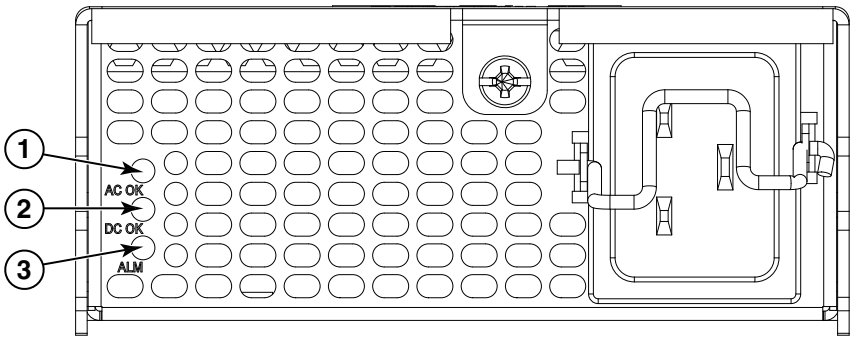
LED purpose	Color	Status	Recommended action
Status LED !	No light (LED is off)	SFM is healthy or is not powered on.	Verify that the power LED is on.
	Steady amber	SFM is faulty.	Ensure that the SFM is firmly seated and check the status by entering the **show slot** command. If the LED remains amber, consult the Brocade switch supplier.
	Slow flashing amber (on 2 seconds, then off 2 seconds)	SFM is not seated correctly of is faulty.	Pull the SFM out and reseat it. If the LED remains amber, replace the module.
	Fast flashing amber (on 1/2 second, then off 1/2 second)	Environmental range exceeded.	Check for the out-of-bounds environmental condition and correct it.

Determining the status of a power supply

Complete the following steps to determine the status of a power supply.

1. Check the alarm LED labeled ALM on the power supply (refer to Figure 17). The LED patterns may temporarily change during POST and other diagnostic tests; for information about how to interpret the LED patterns, refer to Table 14. The Brocade VDX 8770-4 can have up to four power supplies. Be sure to check each module.
2. Check the power supply status by entering **show environment power** {**rbridge-id** *rbridge-id*}. Refer to Table 13 for possible results from this command. You can also use the **show system** command.

Figure 17 shows a power supply.



1 AC power input LED (AC OK)
2 DC power output LED (DC OK)
3 Alarm LED (ALM)

FIGURE 17 Power supply

TABLE 13 Output for **show environment power** command

Output	Explanation
OK	Power supply is functioning correctly.
absent	Power supply is not present. Could also be improperly seated.
unknown	Unknown power supply unit installed.
predicting failure	Power supply is present but predicting failure.
faulty	Power supply is present but faulty (no power cable, power switch turned off, fuse blown, or other internal error). Could also be improperly seated.

For absent or faulty indications, if the power supply is not improperly seated, contact the Brocade VDX 8770-4 supplier to order replacement parts. You may also want to do this if the indication is predicting failure.

Table 14 describes the power supply LED patterns and the recommended actions for those patterns.

TABLE 14 Power supply LED descriptions

LED purpose	Color	Status	Recommended action
AC OK	No light (LED is off)	Power supply does not have incoming AC power.	If using AC power, ensure that the power supply is firmly seated, the AC power source is live, and the power cable is connected.
	Steady green	Power supply has incoming AC power.	No action required.
DC OK	No light (LED is off)	The DC output is not in the acceptable range.	Ensure that the power supply is firmly seated.
	Steady green	The DC output is in the acceptable range.	No action required.
ALM	No light (LED is off)	The power supply has not failed.	No action required.
	Steady amber	The power supply has failed.	Replace the power supply.

Determining the status of a fan

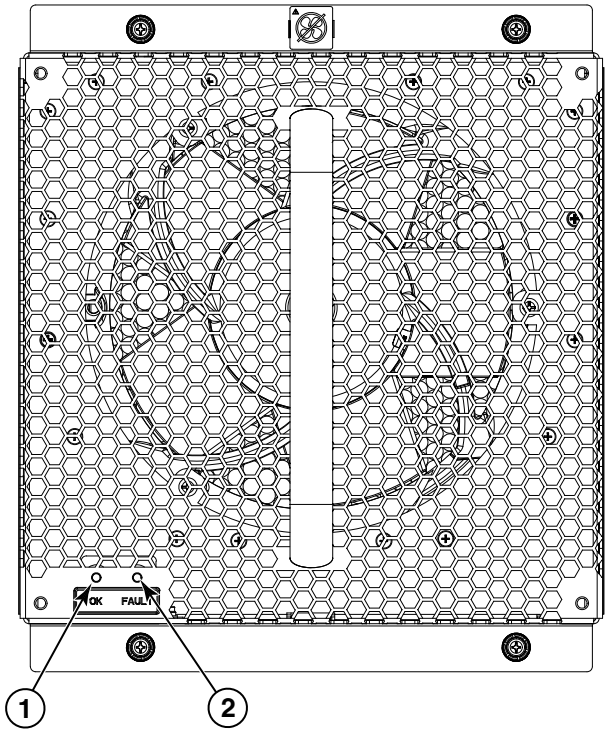
Complete the following steps to determine the status of a fan.

1. Check the LED indicators on the fan (refer to Figure 18). The LED patterns may temporarily change during POST and other diagnostic tests; for information about how to interpret the LED patterns, refer to Table 16. The Brocade VDX 8770-4 has up to two fans. Be sure to check each module.
2. Check the fan status using the **show environment fan** {**rbridge-id** *rbridge-id* | **all**} command.

Refer to Table 13 for possible results from this command. The RPM of each fan is also provided. If a fan displays absent or faulty, contact the Brocade VDX 8770-4 supplier to order replacement parts. Both physically absent or faulty could also be the result of the fan not being properly seated.

NOTE
You can also use the **show system** command.

Figure 18 shows a fan module.



1 Power LED 2 Fault LED

FIGURE 18 Fan module

TABLE 15 Output for **show environment fan** command

Output	Explanation
OK	Fan is functioning correctly at the displayed speed (RPM).
absent	Fan is not present. Could also mean that the fan is improperly seated.
below minimum	Fan is present but rotating too slowly or stopped.
above maximum	Fan is rotating too quickly.

TABLE 15 Output for **show environment fan** command (Continued)

Output	Explanation
unknown	Unknown fan unit installed.
faulty	Fan has exceeded hardware tolerance and has stopped. In this case, the last known fan speed is displayed. Could also mean that the fan is improperly seated.

For absent or faulty indications, contact the Brocade VDX 8770-4 supplier to order replacement parts. You may also want to do this if the indication is below minimum or above maximum.

Table 16 describes the LED patterns for the fan.

TABLE 16 Fan LED descriptions

LED purpose	Color	Status	Recommended action
OK	No light (LED is off)	Fan does not have power.	Ensure that the fan is firmly seated and has power.
	Steady green	Fan has power.	No action required.
Fault	No light (LED is off)	Fan is either healthy or does not have power.	Ensure that the fan has power.
	Steady amber	Fan has a failure (full or partial).	Replace the fan.

Determining the status of a CID card

Each CID card has two serial EEPROMS (seeproms). One is the critical seeprom and the other is the non-critical seeprom. Problems with the critical seeprom cannot be fixed with the CID Recovery Tool. Only issues with the non-critical seeprom can be addressed.

Regular validation tests are run by the system comparing the CID cards to each other. If the information is identical, then the chassis is operating correctly. Once a mismatch is detected, an FFDC message is output to the RASlog. Refer to Table 17 for possible messages.

TABLE 17 Messages that may indicate CID card problems

Error message	Issue
`[EM-1020]...M1, ERROR ... A problem was found on one or both CID cards (x), please run the CIDrecov tool to get more information and recovery options.`	Some kind of error or mismatch has been detected in the CID card audit.
`[EM-1021], ... M1, INFO, ... A CID card has been inserted, a CID verification audit will be run to detect any mismatches or other problems.`	A second CID card is enabled and the CID card audit will be run. If an error is detected during the audit, an EM-1020 message is generated.
`[EM-1022], ... M1, WARNING, ... A CID card access problem has been encountered, please run the CIDrecov tool to get more information and recovery options.`	An error is detected during normal access to the CID cards; typically, one of the cards is corrupted or inaccessible.

Chapter

Removal and Replacement Procedures 5

In this chapter

Introduction

NOTE
Refer to Appendix B, “Caution and Danger Notices” before servicing.

The field-replaceable units (FRUs) in the Brocade VDX 8770-4 can be removed and replaced without special tools. The Brocade VDX 8770-4 can continue operating during many of the FRU replacements if the conditions specified in the procedures are followed.

The following sections contain FRU removal and replacement procedures.

ESD precautions

The Brocade VDX 8770-4 contains ESD-sensitive FRUs. When working with any Brocade VDX 8770-4 FRU, use correct electrostatic discharge (ESD) procedures.

- Wear a wrist grounding strap connected to chassis ground (if the Brocade VDX 8770-4 is plugged in) or a bench ground. Refer to “Port side of the Brocade VDX 8770-4” on page 3 for the location of the ESD jack.
- Store ESD-sensitive components in anti-static packaging.

Cable management finger assembly removal and replacement

The Brocade VDX 8770-4 comes equipped with two vertical cable management finger assemblies. It can continue to operate during the replacement of the cable management fingers. Due to the horizontal orientation of the line cards in the Brocade VDX 8770-4, the cable management finger assemblies are attached to the uprights of the mounting rack. Refer to Figure 19 for this procedure.

Time and items required

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

Removing a cable management finger assembly

Complete the following steps to remove the cable management finger assembly. Refer to Figure 19 for the location of the assembly.

1. Remove the cables from the cable management finger assembly and rearrange the cables around the it.
2. Unscrew and save the three screws holding the cable management finger assembly to the rack upright. Support the assembly to prevent it from falling.
3. Remove the cable management finger assembly.
4. If necessary, repeat step 1 through step 3 for the other cable management finger assembly.

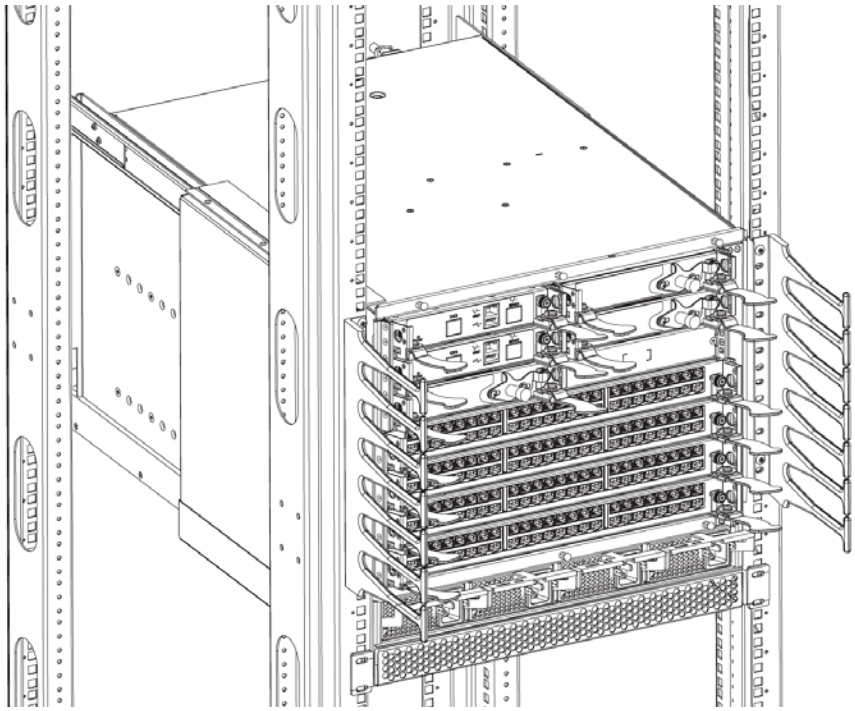


FIGURE 19 Removal and replacement of the vertical cable management finger assemblies

Replacing a cable management finger assembly

Complete the following steps to replace the cable management finger assembly.

1. Position and tighten the three screws to secure the vertical cable management finger assembly to the rack upright.
2. Arrange the cables along the cable management finger assembly.
3. If necessary, repeat step 1 and step 2 for the other cable management finger assembly.

Line card removal and replacement

This section describes the physical procedure for removing and replacing line cards in chassis slots. It does not cover the management modules or the switch fabric modules.

If are replacing a line card with a different type of line card, after removing the original line card, you must enter the Network OS **no linecard** *slot_number* command while in RBridge ID configuration mode to clear the current slot configuration. You must also select the new line card type using the **linecard** *slot_number linecard_type* command before installing the new line card. For more detailed command steps, consult procedures in this section for removing and replacing a line card and in the *Network OS Administrator's Guide*.

Install a new line card only if it is supported by the firmware running in the chassis. Inserting a line card into a chassis running firmware that does not support the line card may result in unexpected behavior.

NOTE
Any slot that is not occupied by a line card should be occupied by a filler panel to ensure correct cooling of the chassis and protection from dust.

Line card slots are numbered from L1 through L4, from top to bottom when facing the port side of the Brocade VDX 8770-4.

Time and items required

The replacement procedure for each line card takes less than 10 minutes. Removing and restoring transceivers and cables may take longer depending on how many must be changed. The following items are required for the line card replacement:

- Electrostatic discharge (ESD) grounding strap
- Workstation computer
- Replacement line card or filler panel
- #2 Phillips screwdriver
- Small form-factor pluggable (SFP or SFP+) or QSFP transceivers (as needed)
- Optical and copper cables (as needed)

NOTE
For information about the transceivers that are qualified for the Brocade chassis, refer to *http://www.brocade.com/downloads/documents/matrices/Brocade_Compatibility_Matrix.pdf*.

Removing a line card

For this procedure, refer to Figure 20.

Complete the following steps to remove a line card.

NOTE
If multiple modules are being replaced, complete the replacement for one module at a time.

NOTE
Follow ESD precautions while removing any line card.

NOTE
Pay particular attention to the orientation of the line cards. The “top” of the line card in a vertical orientation is now on the left side in a horizontal orientation. The components on the card should be facing up.

1. Check for adequate cable slack. Ensure there is plenty of cable slack to remove a line card without cable obstruction.
2. Ensure that the part number on the line card being replaced matches the replacement part number.
3. Power down the existing line card using the **power-off linecard** *slot_number* command.

   NOTE
   Before removing any cables from a line card, note the cable order (identify each cable by its physical port). It is a good practice to keep a table of cable to port mapping. Refer to “Cable routing table” for a blank cable routing table.

4. If you are replacing the line card with a line card of a different type, follow these steps:
   a. Enter the **configure terminal** command to enter global configuration mode
   b. Enter the **rbridge-id** rbridge-id command to enter RBridge ID configuration mode.
   c. Enter the **no linecard** *slot_number* command. This removes the line card configuration and its associated interface configuration from the chassis database so a different type of line card can be used in the slot.
5. Disconnect all cables and transceivers from the line card.
6. Unscrew the two captive screws at the ends of the line card using the Phillips screwdriver.
7. Open the ejectors by rotating them toward the center of the line card face. Pull the line card out of the chassis using the ejectors.
8. If you are replacing the line card with a line card of a different type, follow these steps before replacing the line card.
   a. Enter the **linecard** *slot_number* command followed by a question mark (?) to display the line card types.
   b. Enter the **linecard** *slot_number linecard_type* command using the proper line card type.
   c. Enter the **exit** command twice to return to privileged EXEC mode.

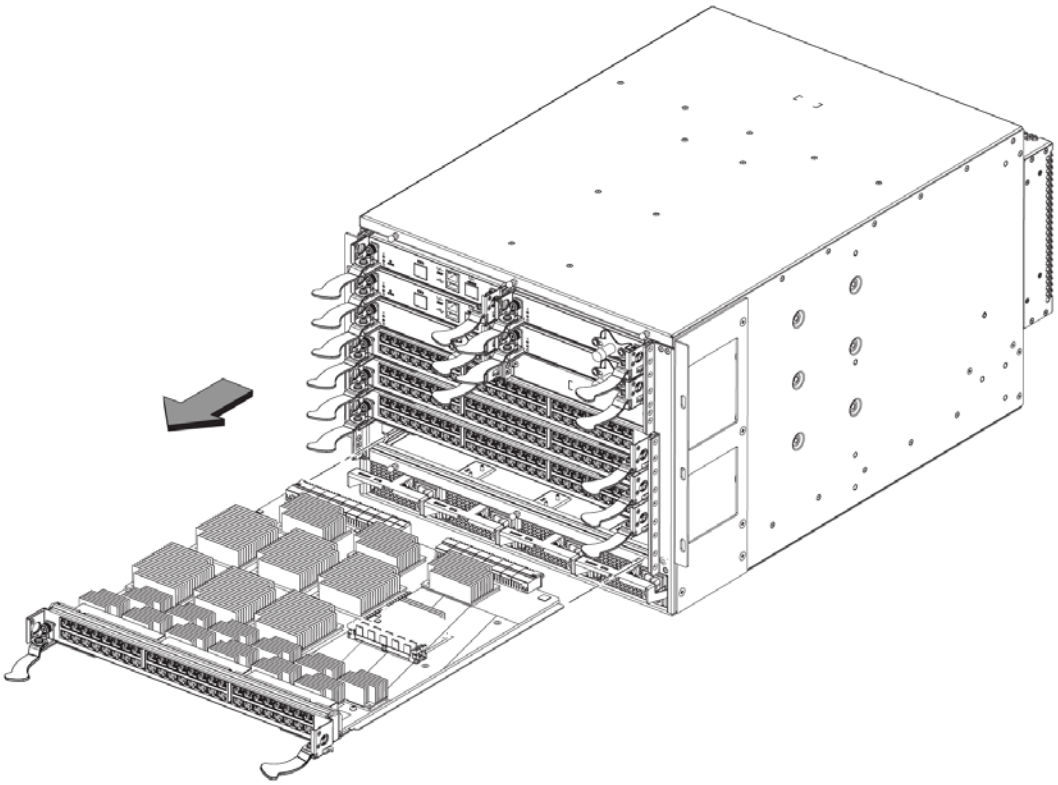


FIGURE 20 Removal and replacement of a line card (48x10 Gbe card shown)

Replacing a line card

For this procedure, refer to "ESD precautions" and Figure 20.

Complete this procedure to insert a new line card.

1. If you are replacing the line card with a line card of a different type, follow these steps:
    a. Make sure that you have cleared the configuration for the original line card from the chassis database using steps under "Removing a line card".
    b. Enter the **linecard** *slot_number* command followed by a question mark (?) to display the current line card types.
    c. Enter the **linecard** *slot_number linecard_type* command using the proper line card type for the new line card.
    d. Enter the **exit** command twice to return to privileged EXEC mode.
2. Unpack the new line card and remove it from the anti-static bag.
3. Inspect the line card for damage.
4. Remove the protective covers from the backplane connectors.
5. Orient the line card so that the ports are at the front of the switch. The component side of the card should face up.

6. Open the ejectors by rotating them toward the center of the line card face and align the flat side of the line card inside the left and right rail guides in the slot. Line cards can be inserted in any of the slots labelled L1 through L4.
7. Slide the line card all the way into the slot.
8. Close the ejectors by rotating them away from the center of the line card. The levering action of the ejectors seats the line card in the slot.
9. Tighten the captive screws using the Phillips screwdriver.
10. Check to see if the line card has powered on. If not, power on the line card using the **power-on linecard** *slot_number* command.

    Verify that the power LED on the line card is displaying a steady green light. If it does not turn on, ensure that the line card is firmly seated.

    The status LED on the line card will show amber until POST completes for the line card. It should then turn off. If it remains amber, the line card may not be properly seated in the backplane or the line card may be faulty.
11. If you have replaced a line card with a line card of a different type, follow these steps:
    a. Save the configuration persistently by issuing the **copy running-config startup-config** command after the interface module reaches the online state.
    b. Verify the configuration by issuing the **show running-config linecard linecard** command.
12. Reinstall the transceivers and cables in the line card or install new transceivers and cables if you have installed a different type of line card.
13. Group and route the cables through the cable management device.

Management module removal and replacement

This section describes how to remove and replace a management module (MM). Each Brocade VDX 8770-4 chassis can have one or two management modules. They reside in slots M1 and M2. There must be at least one MM installed for the chassis to operate.

Time and items required

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

- ESD grounding strap
- Workstation computer
- Serial cable
- IP address of an FTP server for backing up the Brocade VDX 8770-4 configuration
- #2 Phillips screwdriver
- Replacement management module

Faulty management module indicators

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

- The status LED on the management module is lit steady amber, or the power LED is not lit.
- The management module does not respond to Telnet commands, or the serial console is not available.
- The **show mm** command does not show that the management module is enabled.
- Additional information from the **show mm** command indicates a problem.
- The clock is inaccurate, or the management module does not boot up or shut down normally.

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

Recording critical Brocade VDX 8770-4 information

Back up the chassis configuration before you replace a management module. Refer to "Backing up the configuration" on page 37 for backup information.

Removing a management module

For this procedure, refer to "ESD precautions" and Figure 21.

The chassis continues to operate while a management module is being replaced if the redundant management module is active and a failover has already occurred.

Complete the following steps to remove a management module.

1. Remove any cables connected to the module.
2. Unscrew the captive screws from both ejectors using the Phillips screwdriver.
3. Rotate both ejectors simultaneously toward the center of the module.
4. Pull the management module out of the chassis by the ejectors.

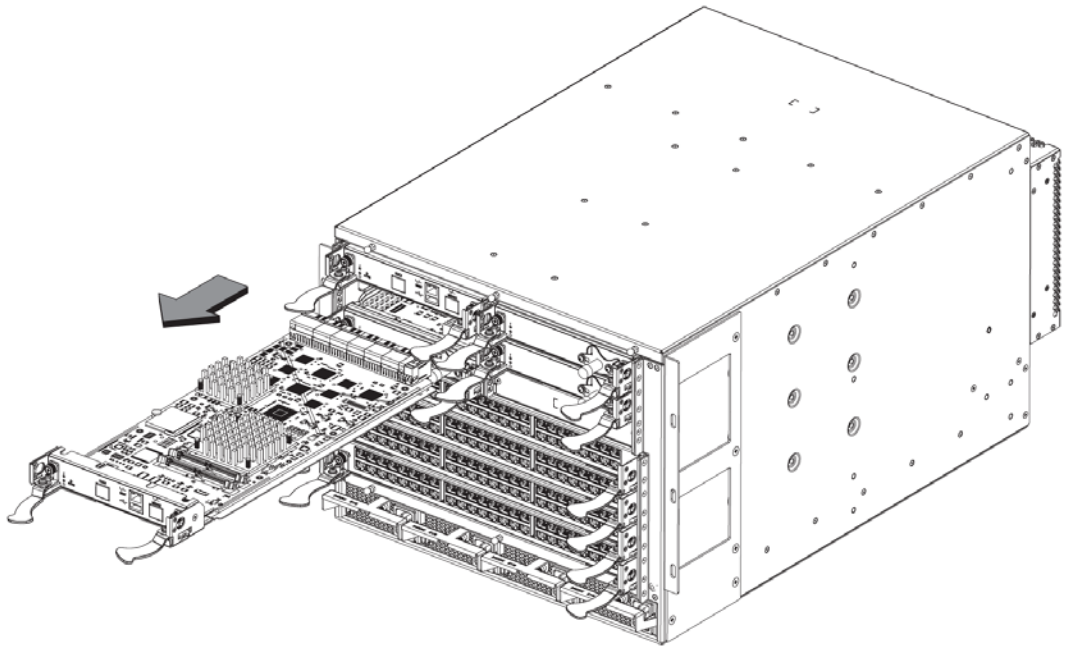


FIGURE 21 Removal and replacement of the management module

Replacing a management module

For this procedure, refer to "ESD precautions" and Figure 21.

Complete the following steps to insert an MM.

1. Unpack the new MM and remove it from the anti-static bag.
2. Inspect the module for damage.
3. Remove the protective caps from the backplane connectors.
4. Rotate the ejectors toward the center of the module.
5. Align the module pan with the guides in the slot. The first MM should be installed in slot M1.
6. Slide the MM into the slot until it is firmly seated.
7. Rotate the ejectors away from the center of the module face until the module is tight in the slot.
8. Tighten the captive screws using the Phillips screwdriver.

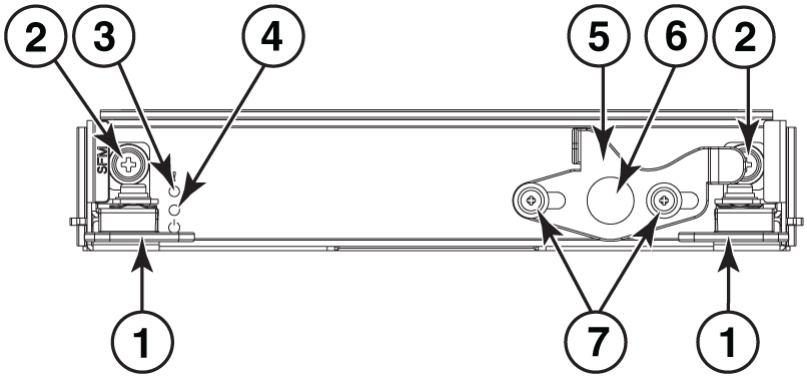
Switch fabric module removal and replacement

This section describes how to remove and replace a switch fabric module (SFM). The Brocade VDX 8770-4 has up to three SFMs. They can be installed only in slots S1 through S3. There must be at least one SFM installed in either slot S1 or slot S2. Refer to Figure 22.

Time and items required

The replacement procedure for the SFM takes approximately 10 minutes. The following items are required for the SFM replacement:

- ESD grounding strap
- #2 Phillips screwdriver
- Replacement SFM



1	Ejectors	5	Slider
2	Captive screws	6	Power enable pin
3	Status LED	7	Slider screws
4	Power LED		

FIGURE 22 switch fabric module front view

Removing a switch fabric module

The Brocade VDX 8770-4 continues to operate while an SFM is being replaced. Refer to Figure 23 for the following procedure.

ATTENTION
Follow ESD precautions.

1. Unscrew the power enable pin.
2. Loosen the two screws on the slider using the Phillips screwdriver if necessary.
3. Pull out the pin and move the slider all the way to the left, exposing the captive screw.
4. Unscrew the two captive screws using the Phillips screwdriver.
5. Open the ejectors by rotating them toward the center of the module face. Pull the SFM out of the chassis using the ejectors.

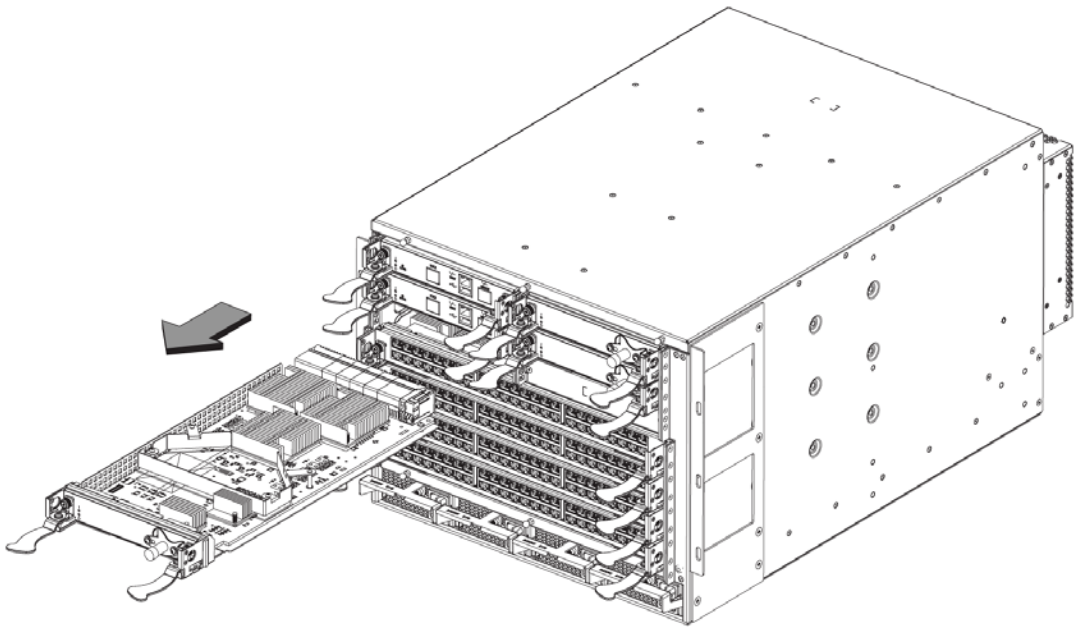


FIGURE 23 Removal and replacement of the switch fabric module

Replacing a switch fabric module

Complete the following steps to insert the SFM.

1. Unpack the new SFM and remove it from the anti-static bag.
2. Inspect the module for damage.
3. Remove the protective caps from the backplane connectors.
4. Unscrew the power enable pin, pull it outward, and move the slider toward the center of the module face.
5. Open the ejectors on the new SFM by rotating them toward the center of the module face. Orient the switch fabric module so that the ejectors are toward you.
6. Align the module pan with the guides in the slot. The first SFM should be installed in slot S1.
7. Push the SFM firmly into the slot.
8. Close the ejectors by rotating them away from the center of the SFM. The levering action of the ejectors seats the module in the slot.
9. Tighten the captive screws using the Phillips screwdriver.
10. Pull out the power enable pin and move the slider all the way to the right.
11. Screw in the power enable pin.
12. Tighten the screws on the slider.

Power supply removal and replacement

Use this procedure to remove and replace a power supply.

NOTE
Depending on the module configuration of the chassis and the number of power supplies installed, the Brocade VDX 8770-4 may be able to continue operating during the replacement. Refer to "Power specifications" on page 17 to determine your power requirements. If insufficient power is present, the chassis will start powering down modules until the power demand can be met.

DANGER

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

Time and items required

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

- New power supply unit or filler panel.
- #1 Phillips screwdriver.
- #2 Phillips screwdriver.

Removing an AC power supply

For the following procedure, refer to Figure 24.

To remove a power supply, complete the following steps.

1. Perform the appropriate following action based on whether the Brocade VDX 8770-4 is operating:
   - If the Brocade VDX 8770-4 is not operating during the replacement procedure, go to step 2.
   - If the Brocade VDX 8770-4 is operating and will continue to operate during the replacement, check the power LEDs to verify that the minimum number of power supplies is functioning. Refer to Table 4 and Table 5 to check your power requirements.
2. Unlatch the power cord retainer clip.
3. Remove the power cord.
4. Loosen the captive screw.
5. Push down on the handle to eject the power supply.
6. Grasp the handle and pull, sliding the power supply from the chassis and supporting the power supply from beneath as you remove it.

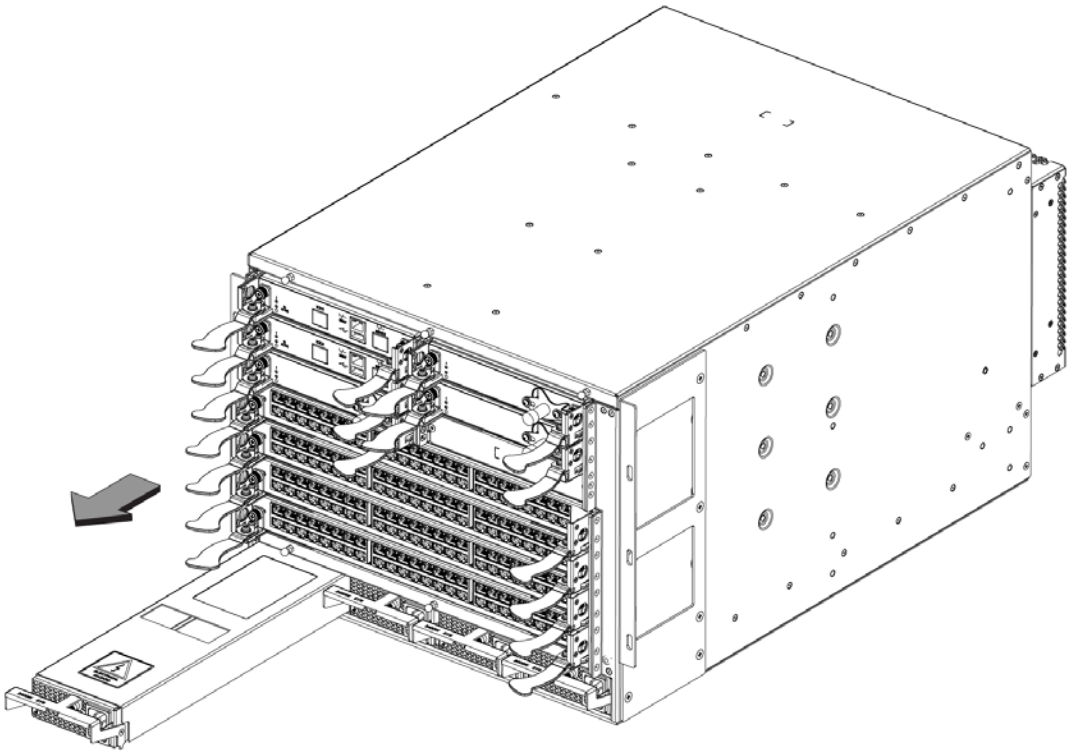


FIGURE 24 Removal and replacement of the power supply

Replacing an AC power supply

If you are not replacing the power supply, insert a filler panel into the slot.

For the following procedure, refer to Figure 24.

To replace a power supply, complete the following steps.

DANGER

High Touch Current. Earth connection essential before connecting supply (Brocade VDX 8770-4).

1. Unpack the new power supply and remove it from the anti-static bag.
2. Inspect the power supply for damage.
3. Ensure that the handle of the replacement power supply is pushed down.
4. Insert the power supply into the slot.
5. Rotate the handle upward to fully seat the power supply.
6. Tighten the captive screw.

Removing a DC power supply

To remove a DC power supply, complete the following steps.

1. If the Brocade VDX 8770-4 is operating and will continue to operate during the replacement, check the power LEDs to verify that the minimum number of power supplies is functioning. Refer to Table 4 and Table 5 to check your power requirements.
2. Disconnect the power supply from the power source.
3. Use a #1 Phillips screwdriver to remove the screw that secures the safety cover over the power lugs. Remove the safety cover.
4. Use a #2 Phillips screwdriver to unscrew the power lugs.
5. Loosen the captive screw underneath the latch handle on the power supply faceplate.
6. Push down on the handle to eject the power supply.
7. Grasp the handle and pull, sliding the power supply from the chassis and supporting the power supply from beneath as you remove it.

Replacing a DC power supply

If you are not replacing the power supply, insert a filler panel into the slot.

To replace a DC power supply, complete the following steps.

1. Unpack the new power supply and remove it from the anti-static bag.
2. Inspect the power supply for damage.
3. Use a #1 Phillips screwdriver to remove the screw that secures the safety cover over the power lugs. Remove the safety cover.
4. Ensure that the handle of the replacement power supply is rotated down.
5. Insert the power supply into the slot.
6. Rotate the handle upward to fully seat the power supply.
7. Tighten the captive screw.

NOTE
This equipment installation must meet NEC/CEC code requirements. Consult local authorities for regulations.

Fan removal and replacement

Use this procedure to remove and replace a fan.

NOTE
The Brocade VDX 8770-4 can continue operating during the fan replacement.

Time and items required

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

- Replacement fan
- #2 Phillips screwdriver

Removing a fan

For the following procedure, refer to Figure 25.

Complete the following steps to remove a fan from the chassis.

1. Before removing a fan, verify that the other fans are functioning properly. The power LEDs should be steady green.

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

2. Use the screwdriver to loosen the four captive screws at the top and bottom of the fan.
3. Grasp the handle and pull, sliding the fan from the chassis and supporting the fan from beneath as you remove it.

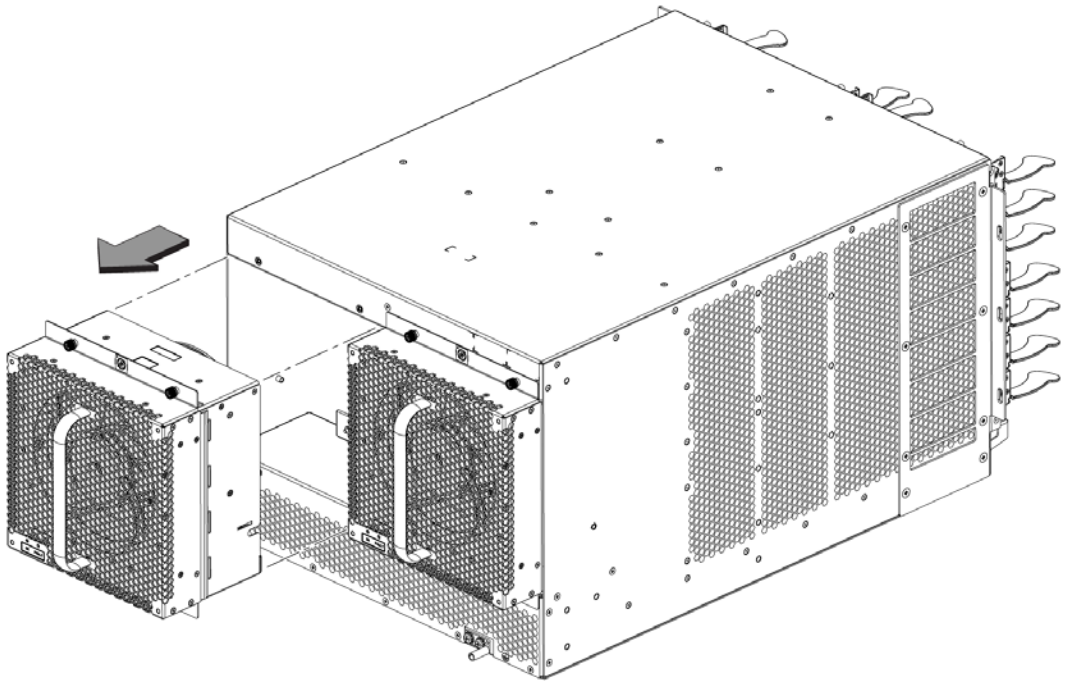


FIGURE 25 Removal and replacement of the fan

Replacing a fan

For the following procedure, refer to Figure 25.

Complete the following steps to replace the fan in a chassis.

1. Orient the fan 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. Use the screwdriver to tighten the four captive screws.

Air filter removal and replacement

You can remove and replace an air filter when it gets too clogged with dirt and dust to operate efficiently. You should perform regular physical inspections to determine how often to replace the air filter. Maintaining clean air filters ensures optimal airflow through the devices.

Based on the traffic and particulate levels of the installation location, the site operator should determine the appropriate replacement intervals for the air filter.

If the air filter were to become sufficiently blocked, the thermal policy of the device would notify the administrator of an environmental issue with the system.

If a site-specific interval cannot be determined by the site operator, the filter should be replaced on an interval of every 3 months.

The filters are single use and non-recyclable. They have a UL fire rating of FLAME RETARDANT, UL 94HF-1 UAF and PPI measurement of 25.

Time and items required

The replacement procedure for the air filter takes less than 5 minutes. Be sure to have the following items available:

- New air filter
- A #2 Phillips screwdriver

Replacing the front air filter

Use this illustration as a reference. The front air filter is used with the Intake Air Duct Rack Kit. The chassis is shown in a flush-mount rack configuration, but the mounting of the air filter is the same for the recessed-mount rack configuration.

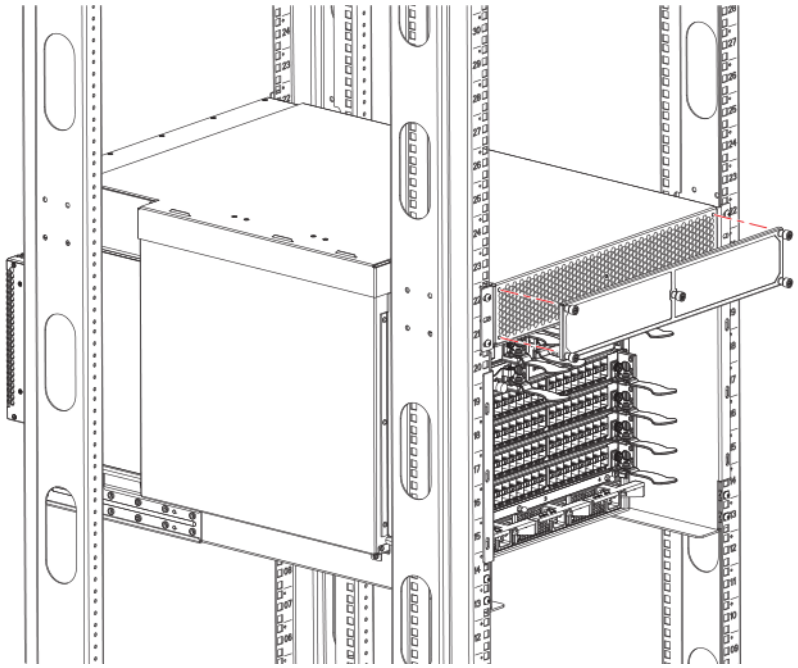


FIGURE 26 Removal and replacement of the front air filter

Removing a front air filter

Complete the following steps to remove a front air filter from the air intake.

1. While holding the air filter in place, unscrew the five captive mounting screws using the #2 Phillips screwdriver.
2. Carefully remove the air filter from the air intake.

To avoid having captured particulates drawn into the chassis, remove the filter in a fashion that maintains the orientation of the filter relative to the system until the filter is 12 inches away from the intake.

Replacing a front air filter

Complete the following steps to mount the new front air filter on the air intake.

1. Orient the new filter over the five mounting holes using the screws as guides.

   The mounting is asymmetric, so the holes match up only one way.

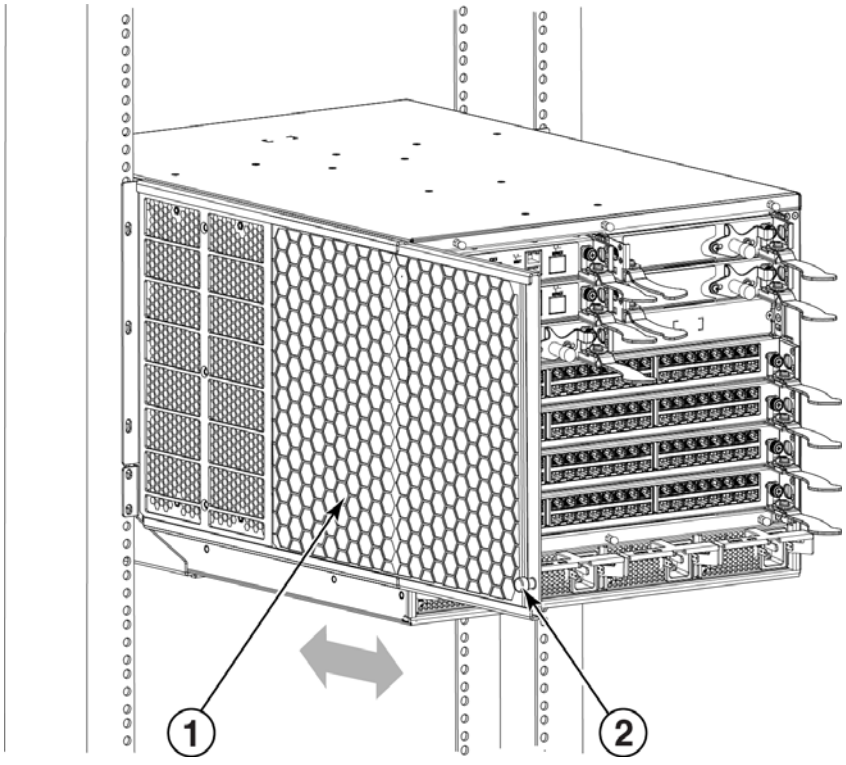
2. Using the #2 Phillips screwdriver, initiate the threads, two turns per screw, until all five are started.

3. Tighten all five screws, one at a time.

   Do not overtighten the screws as this will compromise the frame, admitting unfiltered air.

Replacing the side air filter

The side air filter is used with the two-post mid-mount rack kit. Refer to Figure 27.



1 Filter 2 Captive screw

FIGURE 27 Removal and replacement of the side air filter

Removing a side air filter

Complete the following steps to remove a side air filter from the chassis.

1. While holding the air filter in place, unscrew the captive mounting screw using the #2 Phillips screwdriver.
2. Carefully remove the air filter from the chassis by sliding it out of the upper and lower guides.

   To avoid having captured particulates drawn into the chassis, remove the filter in a fashion that maintains the orientation of the filter relative to the system until the filter is 12 inches away from the intake.

Replacing a side air filter

Complete the following steps to mount the new side air filter on the chassis.

1. Orient the new filter so that the captive screw will be in the lower front corner when installed.
2. Slide the filter into the upper and lower guides carefully.
3. Tighten the captive screw using the #2 Phillips screwdriver.

   Do not overtighten the screw as this will compromise the frame, admitting unfiltered air.

Module filler panel removal and replacement

This section describes how to remove and replace module filler panels. Each removable module in the chassis (except the fans) has a matching filler panel that must be in place if no module is installed in a slot. This includes management modules, switch fabric modules, line cards, and power supplies. There are no filler panels for the fans because all fans must be installed on the chassis.

Removing a filler panel

Complete the following steps to remove a filler panel from the chassis.

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

Filler panels for the MM and SFM are the same. The filler panel for the line card slot is similar, though larger. Both the MM and SFM panels and line card panels have two release pins and sliders. The filler panel for the power supply slot is quite different, having only one release pin and slider.

1. Pull the release pin or pins out and simultaneously move the slider or sliders.

   The entire face of the power supply filler panel is a slider and it moves upward to release the panel.

   The sliders for the MM and SFM and line card filler panels move toward the center of the panel to release it.

2. Pull the filler panel out of the chassis using the release pins.

Replacing a filler panel

Do not leave a slot empty. This will adversely affect cooling of the chassis.

1. Orient the filler panel.

   The MM and SFM and line card filler panels must be aligned with the slot guides.

   The power supply filler panels simply fit into the slots.

2. Slide the filler panel into the slot until it is firmly seated.

   The power supply panel may slide too far into the slot. Insert it only until the facing matches the facing of the other power supplies or filler panels.

3. Move the sliders and release the release pins.

   The release pins should retract completely.

Chassis ID card removal and replacement

Chassis ID (CID) cards cannot be removed or replaced by customers. If you experience a CID card failure, call Brocade Technical Support.

When an error is detected, you can run the CID Recovery Tool to pinpoint the problem and, in some cases, fix it. If the problem is determined to be in the critical seeprom portion of the card, no recovery is possible and you must contact Brocade Technical Support. If however, the problem is in the non-critical seeprom, it is possible that you can use the recovery tool to fix the problem. Refer to Table 18 for the various options for recovery.

To run the CID Recovery Tool, enter the following command in Privileged EXEC mode.

```
sw0# cidrecov
```

If the problem is in the critical seeprom, the output indicates that you should call Brocade Technical Support. If the problem is in the non-critical seeprom, the output describes the issue and the affected data and gives you several possible options for action.

For more detail concerning these options, refer to the “Using the Chassis ID (CID) Recovery Tool” chapter in the *Network OS Administrator’s Guide* and the “cidrecov” topic in the *Network OS Command Reference*.

TABLE 18 Options for the CID Recovery Tool

Condition	Recovery option
One non-critical seeprom is corrupted.	Tool displays the CID to be recovered and prompts to continue or abort.
Both non-critical seeproms are corrupted.	Tool displays both CIDs to be recovered with default data and prompts to continue or abort.

TABLE 18 Options for the CID Recovery Tool (Continued)

Condition	Recovery option
Neither non-critical seeprom is corrupted but there is a data mismatch.	Tool prompts for the CID to be recovered or to abort.
No corruption or mismatch is found.	Tool displays that there is nothing to be done and then exits on acknowledgement.

SFP transceiver removal and replacement

Use the following procedure to remove and replace an SFP or SFP+ transceiver.

DANGER

All fiber-optic interfaces use Class 1 lasers.

DANGER

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

Time and items required

The replacement procedure for one transceiver takes less than 5 minutes. You should have the following items available:

- Replacement SFP or SFP+ transceiver
- Optical transceiver extraction tool

Most Brocade switches and backbones come with an optical transceiver extraction tool (Figure 28) and holster. The extraction tool is designed to remove transceivers from modules where the space is limited.

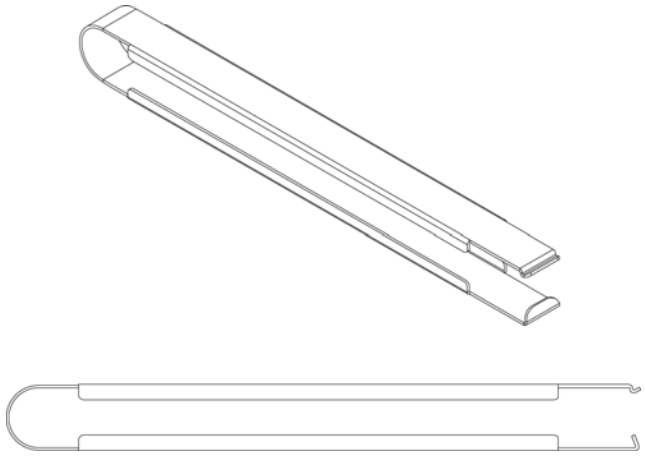


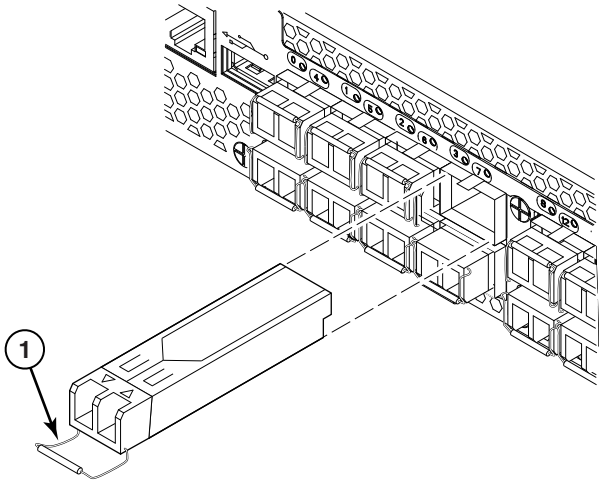
FIGURE 28 Optical transceiver extraction tool

Removing a transceiver

For the following procedure, refer to Figure 29.

Complete the following steps to remove an SFP or SFP+ transceiver.

1. Remove any cables that are inserted into the transceiver. Use the extraction tool to open the cable latching mechanism.
2. Using the hooked end of the tool, pull the bail (wire handle) away from its pivot point and out, sliding the transceiver out of the switch or module.



1 SFP or SFP+ bail

FIGURE 29 Optical transceiver with bail open

Replacing a transceiver

For the following procedure, refer to Figure 29.

Complete the following steps to replace an SFP or SFP+ transceiver.

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

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

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

   Cables are keyed so that they can be inserted in only one way. If a cable does not slide in easily, ensure that it is correctly oriented.

QSFP transceiver removal and replacement

Use this procedure to remove and replace a QSFP transceiver. Because each QSFP transceiver consists of four 10 GbE ports, be aware that any problems with one port could affect all four ports in the quad.

DANGER

All fiber-optic interfaces use Class 1 lasers.

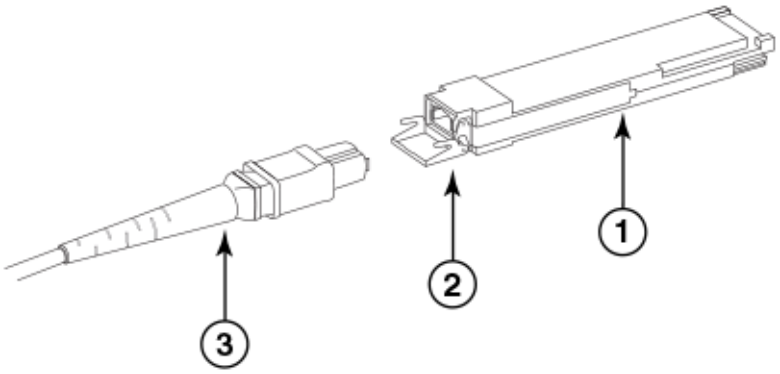
DANGER

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

Removing a QSFP transceiver

Complete the following steps to remove a QSFP transceiver.

1. Remove the fiber optic cable from the transceiver.
2. If your transceiver has an integrated pull tab, gently pull the transceiver from the port using the tab.
3. If your transceiver has a bail release as shown in Figure 30:
   a. Pivot the bail on the transceiver to the horizontal position.
   b. Holding the transceiver by the bail, gently pull the transceiver out of the port.
4. Insert a protective plug into the transceiver and put it aside.



1 Transceiver
2 Fiber optic cable
3 Bail

FIGURE 30 QSFP cable and transceiver with bail open

Replacing a QSFP transceiver

Complete the following steps to replace a QSFP transceiver.

1. Position the new QSFP transceiver so that the key is oriented correctly to the port.
2. Grasping the edges of the transceiver, gently push it into the port until it is firmly seated and the latching mechanism clicks. If your transceiver has a bail release, pull the bail up to lock the transceiver in place.

   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. Remove the protective plug from the transceiver.
4. Position the 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.

Cable routing table

Table 19 is a 48-port template for a cable routing table. Make copies of the table to cover the total number of ports in the Brocade VDX 8770-4.

TABLE 19 Cable routing table for the Brocade VDX 8770-4 (48 ports shown)

Slot/port		Cable labels		Connected device	Slot/port of device
Slot	Port	Switch end	Device end		
	1				
	2				
	3				

TABLE 19 Cable routing table for the Brocade VDX 8770-4 (48 ports shown) (Continued)

Slot/port		Cable labels		Connected device	Slot/port of device
Slot	Port	Switch end	Device end		
	4				
	5				
	6				
	7				
	8				
	9				
	10				
	11				
	12				
	13				
	14				
	15				
	16				
	17				
	18				
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	28				
	29				
	30				
	31				
	32				
	33				
	34				
	35				
	36				
	37				
	38				

TABLE 19 Cable routing table for the Brocade VDX 8770-4 (48 ports shown) (Continued)

Slot/port		Cable labels		Connected device	Slot/port of device
Slot	Port	Switch end	Device end		
	39				
	40				
	41				
	42				
	43				
	44				
	45				
	46				
	47				
	48				

Appendix

Specifications

A

In this appendix

General specifications

The Brocade VDX 8770-4 is compliant with United States and international safety and Electromagnetic Compatibility (EMC) standards. Table 20 lists the general specifications for the Brocade VDX 8770-4.

TABLE 20 General specifications

Specification	Description
System architecture	Nonblocking, shared memory, virtual output queued
System processor	1.5 GHz
Classes of service	8
Port to port latency	3.63 µs

System architecture

Table 21 describes the system architecture of the Brocade VDX 8770-4.

TABLE 21 System architecture

Feature	Description
Ethernet Ports	Up to 192 ports.
Control Processor	Redundant (active/standby) management modules.
Scalability	Full fabric architecture (Refer to the current Network OS Release Notes for the most up-to-date information.)
Brocade ISLs and Brocade Trunking	Interfaces (line card ports) automatically come up as Fabric inter-switch links (Fabric ISLs) in VCS mode. If ISL formation fails, the interfaces come up as edge ports. Trunk groups of up to eight ports are supported on the 48x10 GbE line card and groups of up to 16 ports are supported on the 48x10G-T line card.
Media types	1 GbE optical 1 GbE copper SFP 10 GbE optical 10 G twinax copper 10Base-T copper 40 GbE optical 100 GbE CFP2 (SR10 or LR4) optical

System size and weight

The weight of the Brocade VDX 8770-4 can vary considerably depending on the combination of modules installed. Use Table 22 and Table 23 to determine the weight of the Brocade VDX 8770-4 with your combination of modules.

TABLE 22 System size and weight

System	Size or weight
Width	43.74 cm (17.22 in.)
Height	34.70 cm (13.66 in.)/8U 40.0 cm (15.75 in./10U) with VDX 8770-4 Four-Post Flush and Recessed Mount Intake Air Duct Rack Kit
Depth	60.96 cm (24 in.) 66.04 cm (26 in.) with fans

TABLE 22 System size and weight (Continued)

System	Size or weight
Brocade VDX 8770-4 weight: (fully configured) 192-port configuration with four line cards, including two management modules, three switch fabric modules, two fans, four power supplies, and two cable management finger assemblies	86.18 kg (190 lb)
Empty chassis weight: (includes backplane, cables, bus-bars, power distribution bus, chassis ID card) • No management modules • No switch fabric modules • No line cards • No power supplies • No fans • No cable management devices	31.75 kg (70 lb)

System module and FRU weights

Table 23 lists the weights of the compatible modules and FRUs.

TABLE 23 System component weights

FRU	Weight
Management module	2.25 kg (4.95 lb)
Switch fabric module	2.61 kg (5.75 lb)
48x1 GbE line card	5.85 kg (12.9 lb)
48x10 GbE line card	5.85 kg (12.9 lb)
48 x 10G-T line card	8.66 kg (19.1 lb)
12x 40 GbE line card	5.40 kg (11.9 lb)
27x 40 GbE line card	9.64 kg (21.25 lb)
6x 100 GbE line card	9.62 kg (21.2 lb)
Power supply	2.88 kg (6.35 lb)
Fan assembly	4.76 kg (10.5 lb)
Cable management finger assembly	0.55 kg (0.25 lb)
Line card filler panel	1.72 kg (3.8 lb)
MM or SFM filler panel	.98 kg (2.15 lb)
Power supply filler panel	0.36 kg (0.8 lb)

Ethernet port supported optics

The Ethernet ports in the Brocade VDX 8770-4 support full duplex link speeds at 1, 10, 40, or 100 Gbps inbound and outbound. Table 24 shows the optics supported in the line cards for the Brocade VDX 8770-4.

TABLE 24 Supported optics

Speed	Wavelength	Fiber type	Cable core diameter (microns)	Maximum cable distance
1 GbE	850	MMF	62.5	220 m (721.8 ft)
			62.5	275 m (902.2 ft)
			50	500 m (1640.4 ft)
			50	550 m (1804.5 ft)
	1310	MMF	62.5	550 m (1804.5 ft)
			50	550 m (1804.5 ft)
			50	550 m (1804.5 ft)
		SMF	9	10 km (6.2 mi)
1 GbE Copper SFP	Copper	Cat5	Copper	100 m (328.1 ft)
10 GbE - USR	850	MMF	50	100 m (328.1 ft)
10 GbE - SR	850	MMF	50	300 m (984.3 ft)
10 GbE - LR	1310	SMF	9 or 10	10 km (6.2 mi)
10 GbE twinax	Copper			1 m (3.3 ft)
				3 m (9.8 ft)
				5 m (16.4 ft)
10 GbE Base-T Copper		CAT-6a	Copper	100 m (328.1 ft) at 10 Gbps
		CAT-7	Copper	100 m (328.1 ft) at 10 Gbps
		CAT-6	Copper	55m (180.4 ft) at 10 Gbps
		CAT-5e	Copper	Shorter but indeterminate distance than 55m (180.4 ft) at 10 Gbps 130 m (426.5 ft) at 1 Gbps and 100 Mbps
40 GbE	850	MMF	50	100 m (328.1 ft)

TABLE 24 Supported optics (Continued)

Speed	Wavelength	Fiber type	Cable core diameter (microns)	Maximum cable distance
100 GbE CFP2 SR10	Typical 850 (840 min - 860 max)	OM3, OM4	50	OM3 - 100m (328.1 ft) OM4 - 150m (492.1 ft)
100 GbE CFP2 LR4	WDM 1294.53 - 1296.59 1299.02 - 1301.09 1303.54 - 1305.63 1308.09 - 1310.19	SMF G.652	10	10 km (6.2 mi)

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

Power cords

The types of power cords provided with the Brocade VDX 8770-4 are specific to the country where it is installed. For each of the types of power cords in Table 25, the end that connects to the Brocade VDX 8770-4 has an IEC 60320/C19 cable connector. The AC power receptacles on each power supply are equipped with IEC 60320/C20 power connectors.

In order to connect to a power strip already installed in a rack, the C20, 20A-250V, 12 AWG power cord is required.

To order a power cord, contact your Brocade VDX 8770-4 supplier.

TABLE 25 Power cord types (international)

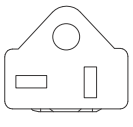
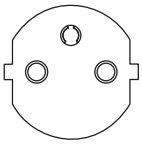
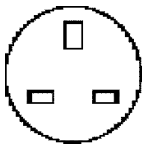
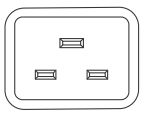
Country	Plug style						
	NEMA 5-20P 125V only USA, Canada, Mexico, other locations	NEMA L6-20 USA, Canada, Mexico, other locations	CEE-7/7 "Schuko" Continental Europe	BS-1363A	AS 3112 Australia/New Zealand	IEC-60309 32A-6h, 230V~	C20 20A-250V 12 AWG connect to in-rack power strip only All locations
							
Argentina						X	X
Australia					X		X
Austria			X				X
Bahrain				X			X
Belgium			X				X
Brazil	X	X					X

TABLE 25 Power cord types (international) (Continued)

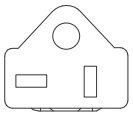
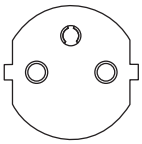
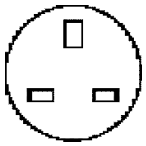
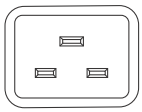
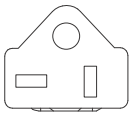
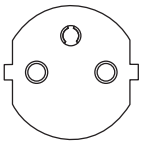
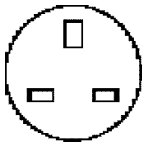
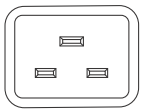
Country	Plug style						
	NEMA 5-20P 125V only USA, Canada, Mexico, other locations	NEMA L6-20 USA, Canada, Mexico, other locations	CEE-7/7 "Schuko" Continental Europe	BS-1363A	AS 3112 Australia/New Zealand	IEC-60309 32A-6h, 230V~	C20 20A-250V 12 AWG connect to in-rack power strip only All locations
							
Chile			X				X
China, People's Rep.					X		X
Czech, Rep. of			X				X
Denmark						X	X
Egypt						X	X
England						X	X
Finland						X	X
France			X				X
Germany			X				X
Greece			X				X
Hong Kong				X			X
Hungary				X			X
India						X	X
Indonesia			X				X
Ireland, North				X			X
Ireland, South				X			X
Israel				X			X
Italy						X	X
Japan	X	X					X
Korea, South			X				X
Malaysia			Alternate			Recommended	X
Mexico	X	X					X
Monaco			X				X
Netherlands			X				X
New Zealand					X		X
Norway						X	X

TABLE 25 Power cord types (international) (Continued)

Country	Plug style						
	NEMA 5-20P 125V only USA, Canada, Mexico, other locations	NEMA L6-20 USA, Canada, Mexico, other locations	CEE-7/7 "Schuko" Continental Europe	BS-1363A	AS 3112 Australia/New Zealand	IEC-60309 32A-6h, 230V~	C20 20A-250V 12 AWG connect to in-rack power strip only All locations
							
Poland			X				X
Portugal			X				X
Puerto Rico	X	X					X
Russia			X				X
Saudi Arabia			X				X
Scotland						X	X
Singapore				X			X
South Africa				X			X
Spain			X				X
Sweden						X	X
Switzerland						X	X
Taiwan	X	X					X
Turkey			X				X
United Arab Emirate			X				X
United Kingdom						X	X
United States	X	X					X
Venezuela	X	X					X
Yugoslavia			X				X

Power cord notice

DANGER

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

Power cord notice (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.

NEBS requirements

Table 26 lists the installation requirements for meeting the NEBS GR-1089 compliance.

TABLE 26 NEBS installation requirements for the Brocade VDX 8770-4

Reference	Warning, requirement, or statement
Intrabuilding or Intra-connection	**WARNING**: The intra-building copper Ethernet ports of the equipment or subassembly are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intra-building ports of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the outside plant (OSP) or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 6) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.
First Level Lightning Criteria AC Power Ports	**WARNING**: The Brocade VDX 8770-4 must be connected to external Special Protection Devices (SPD) when installed and connected to commercial AC power.
Class A2 Voltage Accessibility	The Brocade VDX 8770-4 must be located in a restricted access location were only crafts personnel are allowed access.
Class B Voltage Accessibility	The Brocade VDX 8770-4 must be located in a restricted access location were only crafts personnel are allowed access.
Equipment Grounding Systems	The Brocade VDX 8770-4 must be installed and connected to the CBN, IBN, or Ether.
Communication Equipment Grounding	The Brocade VDX 8770-4 is suitable for connection to the Central Office.
Bonding of Battery Return (BR) Input Terminals	The battery returns of the Brocade VDX 8770-4 must be connected (DC-I).
Connections	The Brocade VDX 8770-4 must be grounded via a copper ground conductor.
Connections	All bare grounding connection points to the Brocade VDX 8770-4 must be cleaned and coated with an antioxidant solution before connections are made.
Connections	All surfaces on the Brocade VDX 8770-4 that are un-plated must be brought to a bright finish and treated with an antioxidant solution before connections are made.
Connections	All non-conductive surfaces on the Brocade VDX 8770-4 must be removed from all threads and connection points to ensure electrical continuity.
Connections	Brocade VDX 8770-4 utilizes a two-hole compression type, agency-approved crimped connector with a copper #2 American Wire Gauge (AWG) that utilizes 20 inch pounds of torque to secure it to the frame and EUT.

TABLE 26 NEBS installation requirements for the Brocade VDX 8770-4 (Continued)

Reference	Warning, requirement, or statement
Input DC Voltage	The Brocade VDX 8770-4 is capable of operating at 200-240 V, 50/60 Hz at a maximum current level 16.0 A max., or -48VDC, 70.0 A max. per power supply.
Thermal policy	Due to recent changes in the NEBS thermal policy testing procedures, Brocade has made changes to the thermal policy for the Brocade VDX 8770-4. These changes include an additional fan speed (raising the number of fan speeds to 5 from 4) and slightly altered trigger temperatures. Additional non-user visible RASlog message generation has also been included with this change to allow for easier debugging and thermal history recording.

Regulatory compliance

This section describes the regulatory compliance requirements for the Brocade VDX 8770-4. It contains the following standards:

FCC warning (US only)

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

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

KCC statement (Republic of Korea)

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

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

VCCI statement (Japan)

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI－A

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.

BSMI statement (Taiwan)

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，
在這種情況下，使用者會被要求採取某些適當的對策。

Warning:

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

CE statement

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

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

- Electromagnetic Compatibility (EMC) Directive 2004/108EEC
- Low Voltage Directive (LVD) 73/23/EEC and the Complementary Directive 93/68/EEC
- EN55022:2006 (European Emissions Requirements)
- EN55024:1998, +A1:2001 and +A2:2003 (European Immunity Requirements)
- EN61000-3-2:2006/JEIDA (European and Japanese Harmonics Spec)
- EN61000-3-3:1995, +A1:2001 and +A2:2005

Canadian requirements

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

German statement

Maschinenlärminformations-Verordnung – 3 GPSGV, der höchste Schalldruckpegel beträgt 79.0 dB(A) gemäss EN ISO 7779.

Machine noise information regulation – 3. GPSGV, the highest sound pressure level value is 79.0 dB(A) in accordance with EN ISO 7779.

Laser compliance

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

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

Safety agency approvals

- CAN/CSA-C22.2 No. 60950-1-07/UL60950-1 - Second Edition, Safety of Information Technology Equipment
- EN 60825-1 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide
- EN 60825-2 Safety of Laser Products - Part 2: Safety of Optical Fibre Communications Systems
- EN 60950-1:2006\IEC 60950-1:2005, Second Edition, Safety of Information Technology Equipment

Regulatory compliance standards

Table 27 lists the regulatory compliance standards for which the Brocade VDX 8770-4 is certified.

TABLE 27 Regulatory compliance standards

Country	Standards		Agency Certifications and Markings	
	Safety	EMC	Safety	EMC
United States	Bi-Nat UL/CSA 60950-1 2nd Ed or latest	ANSI C63.4	cCSAus	FCC Class A and Statement
Canada	Bi-Nat UL/CSA 60950-1 2nd Ed or latest	ICES-003 Class A	cCSAus	ICES A and Statement

TABLE 27 Regulatory compliance standards (Continued)

Country	Standards		Agency Certifications and Markings	
	Safety	EMC	Safety	EMC
Japan		CISPR22 and JEIDA (Harmonics)		VCCI-A and Statement
European Union	EN60950-1 2nd Ed 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 2nd Ed or latest		"S" mark	
Russia	IEC60950-1 2nd Ed or latest	51318.22-99 and 51318.24-99 or latest	GOST mark	GOST mark
Korea		KN22 and KN24		KC 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

Environmental regulation compliance

Refer to the latest revision of the China RoHS document (P/N 53-1000428-xx) that ships with the Brocade VDX 8770-4.

A Environmental regulation compliance

Appendix

Caution and Danger Notices

B

In this appendix

Caution notices

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

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

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

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

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

CAUTION	The Brocade VDX 8770-4 with DC power sources are intended for installation in restricted access areas only. A restricted access area is a location where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.
VORSICHT	Der Brocade VDX 8770-4 mit Gleichspannungsversorgung ist nur zur Installation in Bereichen mit Zugangsbeschränkung bestimmt. Eine Zugangsbeschränkung bedeutet, dass das Servicepersonal nur mit besonderen Hilfsmitteln, schließbaren Verriegelungsvorrichtungen oder anderen Sicherheitseinrichtungen Zugang erlangen kann und der Bereich von der für den Standort verantwortlichen Stelle überwacht wird.
MISE EN GARDE	Les modèles Brocade VDX 8770-4 avec blocs d'alimentation en courant continu (CC) sont destinés à être installés dans des zones à accès réglementé uniquement. Une zone à accès réglementé est un endroit réservé au personnel de maintenance, qui peut accéder uniquement en utilisant un verrou, une clé ou un outil spécial, ou d'autres moyens de sécurité, et qui est contrôlée par les autorités responsables du site.
PRECAUCIÓN	Brocade VDX 8770-4 con fuentes de alimentación de CC está diseñado para instalaciones en zonas de acceso restringido. Una zona de acceso restringido es aquella a la que sólo puede acceder el personal de servicio con una herramienta, llave o candado específicos, u otros medios de seguridad, y que se encuentra supervisada por la autoridad responsable de la ubicación.

CAUTION	For the DC input circuit to the system of a Brocade VDX 8770-4 (3000W supply), make sure there is a 80 amp circuit breaker, minimum -48VDC, double pole, on the input lugs to the power supply. The input wiring for connection to the product should be copper wire, 2 AWG, marked VW-1, and rated minimum 90^{o} C.
VORSICHT	Bei der Gleichstromeingangsschaltung zum System eines Brocade VDX 8770-4 (3000W supply), muss sichergestellt werden, dass an den Eingangskabelschuhen zur Stromversorgung ein zweipoliger Schalter mit UL-Zulassung, 80 Ampere und mindestens -48 V Gleichstrom vorhanden ist. Die Eingangsleitung zum Anschluss an das Produkt sollte als Kupferdraht, 2 AWG, angegeben, als VW-1 gekennzeichnet und für mindestens 90 °C bemessen sein.
MISE EN GARDE	Pour le circuit d'alimentation en courant continu du système Brocade VDX 8770-4 (3000W supply), vérifier la présence d'un disjoncteur bipolaire homologué de 80 A, minimum -48 Vcc, sur l'entrée de l'alimentation. Les câbles d'alimentation du produit doivent être des fils de cuivre homologués de section 33.6 mm² (2 AWG), marqués VW-1 et testés à 90° C.
PRECAUCIÓN	Para el circuito de entrada de CC al sistema de un Brocade VDX 8770-4 (3000W supply), verifique que existe un disyuntor catalogado por UL de 80 amperios, -48VCC como mínimo, bipolar, en las orejetas de entrada a la fuente de alimentación. El cableado de entrada para la conexión al producto deberá ser de cable de cobre catalogado, 2 AWG, marcado con VW-1, y tener una capacidad nominal mínima para 90°C.

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

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

CAUTION:	The Brocade VDX 8770-4 with AC power sources are intended for installation in restricted access areas only. A restricted access area is a location where access can be gained only by service personnel through the use of a special tool, lock and key, or other means of security.
VORSICHT	Der Brocade VDX 8770-4 mit Wechselspannungsversorgung ist nur zur Installation in Bereichen mit Zugangsbeschränkung bestimmt. Eine Zugangsbeschränkung bedeutet, dass das Servicepersonal nur mit besonderen Hilfsmitteln, schließbaren Verriegelungsvorrichtungen oder anderen Sicherheitseinrichtungen Zugang erlangen kann.
MISE EN GARDE	Les modèles Brocade VDX 8770-4 avec blocs d'alimentation à courant alternatif (CA) sont destinés à être installés dans des zones à accès réglementé uniquement. Une zone à accès réglementé est un endroit réservé au personnel de maintenance, qui peut accéder uniquement en utilisant un verrou, une clé ou un outil spécial, ou d'autres moyens de sécurité,.
PRECAUCIÓN	Brocade VDX 8770-4 con fuentes de alimentación de CA está diseñado para instalaciones en zonas de acceso restringido. Una zona de acceso restringido es aquella a la que sólo puede acceder el personal de servicio con una herramienta, llave o candado específicos, u otros medios de seguridad.

CAUTION	For a Brocade VDX 8770-4 AC system, use a ground wire of at least 2 American Wire Gauge (AWG). The ground wire should have an agency-approved crimped connector (provided with the chassis) attached to one end, with the other end attached to building ground. The connector must be crimped with the proper tool, allowing it to be connected to both ground screws on the enclosure.
VORSICHT	Für ein Wechselstromsystem Brocade VDX 8770-4 ist ein Erdleiter von mindestens 2 AWG (amerikanische Norm für Drahtquerschnitte) zu verwenden. An einem Ende des Erdleiters sollte ein geprüfter gecrimpter Anschluss (mit Chassis bereitgestellt) angebracht sein. Das andere Ende sollte an der Gebäudeerdung angeschlossen werden. Der Anschluss muss mit dem richtigen Werkzeug gecrimpt werden, so dass er an beiden Erdungsschrauben am Gehäuse angeschlossen werden kann.
MISE EN GARDE	Pour un système à alimentation secteur Brocade VDX 8770-4, utiliser un câble de mise à la terre de calibre AWG 2 (25 mm^2) minimum. Ce fil de terre doit être équipé d'un côté d'un connecteur à sertir agréé (fourni avec le châssis), et l'autre extrémité doit être reliée à la terre du bâtiment. Ce connecteur doit être serti à l'aide de l'outil approprié afin d'être raccordé aux deux vis de mise à la terre du boîtier.
PRECAUCIÓN	Para un sistema de CA Brocade VDX 8770-4, utilice un conductor de tierra de al menos 2 CAE (Calibre de Alambre Estadounidense, American Wire Gauge o AWG en sus siglas en inglés). El conductor de tierra debe tener un conector rizado homologado (suministrado con el chasis) acoplado a un extremo, y el otro extremo debe estar conectado a la tierra del edificio. El conector debe rizarse con la herramienta apropiada, de manera que se conecte a los dos tornillos de tierra del recinto.

CAUTION	This switch might have more than one power cord. To reduce the risk of electric shock, disconnect all power cords before servicing.
VORSICHT	Dieses System ist möglicherweise mit mehr als einem Netzkabel ausgestattet. Trennen Sie stets die Verbindung aller Netzkabel, bevor Sie Wartungsarbeiten durchführen, um die Gefahr eines Stromschlags auszuschließen.
MISE EN GARDE	Ce commutateur peut comporter plusieurs cordons d'alimentation. Pour réduire les risques de choc électrique, déconnectez tous les cordons d'alimentation avant d'effectuer l'entretien de l'appareil.
PRECAUCIÓN	Este conmutador podría tener más de un cable de alimentación. Para reducir el riesgo de sufrir una descarga eléctrica, desconecte todos los cables de alimentación antes de proceder con la reparación.

CAUTION	An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the terminal block plug. Proper installation must include sleeving over the lug wire crimp area and 1" of wire insulation.
VORSICHT	Abisolierte Stromversorgungskabel für die Gleichstrom-Netzteile können gefährliche Ströme übertragen. Vergewissern Sie sich, dass die abisolierten Stromversorgungskabel für die Gleichstrom-Netzteile nicht aus den Klemmenblocksteckern herausragen. Zur korrekten Installation gehört ein Isolierschlauch, der den Crimpbereich und ca. 2,5 cm Kabelisolierung abdecken muss.
MISE EN GARDE	Un fil dénudé d'un bloc d'alimentation à entrée CC peut conduire à des niveaux dangereux d'électricité. Assurez-vous qu'aucune partie dénudée du fil ne soit reliée au connecteur du bornier. Une gaine isolante sur la zone de sertissage de la cosse et un isolant de fil de 1" garantissent une installation correcte.
PRECAUCIÓN	Los terminales expuestos de una fuente de alimentación de entrada de CC pueden conducir niveles peligrosos de electricidad. Asegúrese de que no quede expuesta ninguna parte del cable de la fuente de alimentación de CC desde la clavija del borne. Una instalación adecuada debe incluir la cobertura de la zona del engarce del cable de la patilla y el aislamiento de 1 pulgada (2,54 cm) de cable.

CAUTION	Before plugging a cable to any port, be sure to discharge the voltage stored on the cable by touching the electrical contacts to ground surface.
VORSICHT	Bevor Sie ein Kabel in einen Anschluss einstecken, entladen Sie jegliche im Kabel vorhandene elektrische Spannung, indem Sie mit den elektrischen Kontakten eine geerdete Oberfläche berühren.
MISE EN GARDE	Avant de brancher un câble à un port, assurez-vous de décharger la tension du câble en reliant les contacts électriques à la terre
PRECAUCIÓN	Antes de conectar un cable en cualquier puerto, asegúrese de descargar la tensión acumulada en el cable tocando la superficie de conexión a tierra con los contactos eléctricos.

CAUTION	For the NEBS-compliant installation of a Brocade Brocade VDX 8770-4 with AC or DC systems, use a ground wire of at least 2 AWG. The ground wire should have an agency-approved crimped connector (provided with the device) attached to one end, with the other end attached to building ground. The connector must be crimped with the proper tool, allowing it to be connected to both ground screws on the enclosure. Before crimping the ground wire into the provided ground lug, ensure that the bare copper wire has been cleaned and antioxidant is applied to the bare wire. In addition, anti-rotation devices or lock washers must be used with all screw connections for the grounding wire.
VORSICHT	Zur NEBS-konformen Installation eines mit Gleich- oder Wechselstrom betriebenen Brocade VDX 8770-8 muss zur Erdung ein Kabel der Stärke von mindestens 2 AWG verwendet werden. Das Erdungskabel muss an einem Ende mit einem zugelassenen Crimp-Anschluss (im Lieferumfang des Geräts) versehen sein und mit dem anderen Ende an die Gebäude-Erde angeschlossen werden. Der Anschluss muss mit einem geeigneten Werkzeug gecrimpt werden, damit er mit den beiden Erdungsschrauben auf dem Gehäuse verbunden werden kann. Bevor das Erdungskabel an die Erdungsöse angeschlossen wird, muss der blanke Kupferdraht gereinigt und mit einem Antioxidationsmittel behandelt werden. Außerdem müssen bei allen Schraubverbindungen des Erdungskabels Drehsicherungen oder Sicherungsscheiben verwendet werden.
MISE EN GARDE	Pour garantir la conformité de l'installation d'un modèle Brocade Brocade VDX 8770-4 avec système alimentation CC ou CA à la norme NEBS, utilisez un câble de mise à la terre d'au moins 2 AWG. Le câble de mise à la terre doit être muni d'une cosse sertie homologuée (fournie avec l'appareil) à une extrémité, l'autre extrémité étant reliée à la terre. La cosse doit être sertie avec l'outil adéquat, ce qui permet de la relier aux deux vis de mise à la terre du boîtier. Avant de sertir le câble de mise à la terre dans la cosse fournie, assurez-vous que le fil de cuivre dénudé a été nettoyé et qu'un antioxydant a été appliqué. De plus, des dispositifs antirotation ou des rondelles de frein doivent être utilisés avec tous les raccords vissés au câble de mise à la terre.
PRECAUCIÓN	Para que la instalación de Brocade Brocade VDX 8770-4 con sistemas de CA o CC sea conforme a la certificación NEBS, utilice un cable de conexión a tierra de calibre AWG 2 como mínimo. El cable de conexión a tierra debe disponer de un conector engarzado homologado (suministrado con el dispositivo) unido a un extremo de modo que el otro extremo se conecte a la toma de tierra. El conector se debe engarzar con la herramienta adecuada de forma que se pueda conectar a los dos tornillos de conexión a tierra del compartimento. Antes de engarzar el cable de conexión a tierra a la patilla de conexión a tierra proporcionada, asegúrese de limpiar y aplicar antioxidante al alambre pelado de cobre. Además, deben emplearse los seguros contra giro o las arandelas de sujeción en todas las uniones atornilladas del cable de toma de tierra.

Danger notices

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

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

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

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

DANGER	Laser Radiation. Do Not View Directly with Optical Instruments. Class 1M Laser Products.
GEFAHR	Laserstrahlung! Schauen Sie nicht direkt mit optischen Instrumenten in den Laserstrahl herein. Klasse 1M Laserprodukte.
DANGER	Rayonnement de laser. Ne regardez pas directement avec les instruments optiques. Produits de laser de la classe 1M.
PELIGRO	Radiacion de Laser. No vea directamente con Instrumentos Opticos. Clase 1M de Productos de Laser.

DANGER	All fiber optic interfaces use Class 1 lasers.
GEFAHR	In allen Glasfaserschnittstellen werden Laserprodukte der Klasse 1 eingesetzt.
DANGER	Toutes les interfaces fibre optique utilisent des lasers de classe 1.
PELIGRO	Todas las interfaces de fibra óptica utilizan láseres de Clase 1.

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

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

DANGER	This switch might have more than one power cord. To reduce the risk of electric shock, disconnect all power cords before servicing.
GEFAHR	Dieses System ist möglicherweise mit mehr als einem Netzkabel ausgestattet. Trennen Sie stets die Verbindung aller Netzkabel, bevor Sie Wartungsarbeiten durchführen, um die Gefahr eines Stromschlags auszuschließen.
DANGER	Ce commutateur peut comporter plusieurs cordons d'alimentation. Pour réduire les risques de choc électrique, déconnectez tous les cordons d’alimentation avant d’effectuer l’entretien de l’appareil.
PELIGRO	Este conmutador podría tener más de un cable de alimentación. Para reducir el riesgo de sufrir una descarga eléctrica, desconecte todos los cables de alimentación antes de proceder con la reparación.

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

DANGER	High Touch Current. Earth connection essential before connecting supply (Brocade VDX 8770-4).
GEFAHR	Hoher Ableitstrom. Vor Anschluss ans Netz Schutzerdung herstellen. (Brocade VDX 8770-4)
DANGER	Courant de fuite élevé. Mise à la terre obligatoire avant la connexion de l'alimentation (Brocade VDX 8770-4).
PELIGRO	Alta tensión al tacto. La conexión a tierra es esencial antes de conectar la alimentación (Brocade VDX 8770-4).

DANGER	Use the supplied power cords. Ensure the facility power receptacle is the correct type, supplies the required voltage, and is properly grounded. (D004)
GEFAHR	Verwenden Sie die mitgelieferten Netzkabel. Achten Sie auf die richtige Bauart, Spannung und Erdung der Anschlusssteckdose. (D004)
DANGER	Utilice los cables de alimentación suministrados. Asegúrese de que el receptáculo para la fuente de alimentación de las instalaciones sea del tipo correcto, suministre el voltaje necesario y se encuentre correctamente conectado a tierra. (D004)
PELIGRO	Utilice los cables de alimentación suministrados. Asegúrese de que el receptáculo de alimentación del edificio sea del tipo correcto, suministre el voltaje necesario y se encuentre correctamente conectado a tierra. (D004)

DANGER	Be careful not to insert your fingers into the fan while removing it from the device. The fan may still be spinning at high speed.
GEFAHR	Seien Sie beim Ausbau von Lüftereinheiten vorsichtig, dass Ihre Finger nicht ins Innere der Einheit gelangen. Der Lüfter kann sich immer noch mit hoher Geschwindigkeit drehen.
DANGER	Veillez à ne pas mettre vos doigts dans le ventilateur lorsque vous le retirez de l'équipement. Il se peut que le ventilateur tourne encore à grande vitesse.
PELIGRO	Tenga cuidado de no introducir los dedos en el ventilador cuando lo extraiga del dispositivo. Puede que el ventilador continúe girando a alta velocidad.

B Danger notices

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