IBM Storage Networking SAN256B-7
MTM Service information: 8961-F74

Installation, Service, and User Guide

IBM

Read Before Using

This product contains software that is licensed under written license agreements. Your use of such software is subject to the license agreements under which they are provided.

Before you use the information in this publication, be sure to read the general information under "Notices" on page 215.

Contents

Figures

Tables

Read this first

Summary of changes

This is the first edition of the IBM® Storage Networking SAN256B-7 Installation, Service, and User Guide.

Getting help

For the latest version of your product documentation, visit the IBM Publications Center at www.ibm.com/shop/publications/order. Search by form number or title.

For more information about IBM Storage Networking products, go to www.ibm.com/systems/storage/san/.

IBM Redbooks® often provide in depth information about product best practices, configurations, and more technical information. For redbooks associated with this product, enter search terms on the following Web site: www.redbook.ibm.com.

For support information for this and other IBM products, see the IBM Support Portal www.ibm.com/supportportal. Search for the product Machine type or product name.

For Fabric OS Release Notes and access to Fabric OS firmware downloads, go to the IBM Support Portal www.ibm.com/supportportal. Search for the product Machine type or product name, and then follow links for **Downloads**. More detailed instructions are available through the **Accessing firmware updates and OS documentation updates** link on the product documentation CD that is shipped with this product.

You can also contact IBM within the United States at 1-800-IBMSERV (1-800-426-7378). For support outside the United States, you can find the service number through the IBM contacts directory website at www.ibm.com/planetwide/.

Visit the IBM contact website www.ibm.com/contact for contact information for your country or region.

For information about storage and networking industry standards, see the Storage Networking Industry Association (SNIA) website at www.snia.org/.

For details regarding FICON and z Systems support, please refer to the qualification letters published on IBM ResourceLink at https://www.ibm.com/servers/resourcelink/svc03100.nsf?OpenDatabase

Note: New users may need to register for a free IBMid and request access.

Accessibility features

Accessibility features help users who have a disability, such as restricted mobility or limited vision, to use information technology products successfully.

Accessibility features

The following list includes the major accessibility features in this product:

- Light emitting diodes (LEDs) that flash at different rates, to represent the same information as the colors of the LEDs
- Industry-standard devices for ports and connectors
- Management of the product through management applications is available through Web and Graphical User Interface (GUI) options

Keyboard navigation

This product does not have an attached or integrated keyboard. Any keyboard navigation is provided through the management software and GUI.

Vendor software

This product includes certain vendor software that is not covered under the IBM license agreement. IBM makes no representation about the accessibility features of these products. Contact the vendor for the accessibility information about its products.

Related accessibility information

You can view the publications for this product in Adobe Portable Document Format (PDF) using the Adobe Acrobat Reader. The PDFs are provided on a product documentation CD-ROM that is packaged with the product. The CD-ROM also includes an accessible HTML version of this document.

IBM and accessibility

See the IBM Human Ability and Accessibility Center website at www.ibm.com/able/ for more information about the commitment that IBM has to accessibility.

Sending comments

Your feedback is important in helping to provide the most accurate and highest quality information.

Procedure

To submit any comments about this publication or any other IBM storage product documentation:

- Send your comments by email to ibmkc@us.ibm.com. Be sure to include the following information:
  - Exact publication title and version
  - Publication form number (for example, GA32-1234-00)
  - Page, table, or illustration numbers that you are commenting on
  - A detailed description of any information that should be changed

Safety and environmental notices

This section contains information about:

- "Safety notices and labels" on page xvii
- "Rack safety" on page xxi
- "Product recycling and disposal" on page xxii

Safety notices and labels

When using this product, observe the danger, caution, and attention notices contained in this guide. The notices are accompanied by symbols that represent the severity of the safety condition. The danger and caution notices are listed in numerical order based on their IDs, which are displayed in parentheses, for example (D004), at the end of each notice. Use this ID to locate the translation of these danger and caution notices in the Safety Notices publication that is shipped with this product.

The following notices and statements are used in IBM documents. They are listed below in order of increasing severity of potential hazards. Follow the links for more detailed descriptions and examples of the danger, caution, and attention notices in the sections that follow.

- **Note:** These notices provide important tips, guidance, or advice.
- **"Attention notices" on page xx:** These notices indicate potential damage to programs, devices, or data.
- **"Cautions" on page xvii:** These statements indicate situations that can be potentially hazardous to you.
- **"Danger notices" on page xviii:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these situations.
- In addition to these notices, "Safety labels" on page xix may be attached to the product to warn of potential hazards.

Cautions

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

General Cautions

⚠ **CAUTION:** If fan assembly LED operation indicates a fault or no power, verify that fan is fully seated in the chassis and that captive screws securing fan in the chassis are fully tightened. If screws are loose, pressure from fans may unseat the fan from chassis connectors.

⚠ **CAUTION:** Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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

⚠ **CAUTION:** Make sure the airflow around the front and back of the device is not restricted.

⚠ **CAUTION:** Ensure that the airflow direction of the power supply unit matches that of the installed fan tray. The power supplies and fan trays are clearly labeled with either a green arrow with an "E" or an orange arrow with an "I."

⚠ **CAUTION:** To protect the serial port from damage, keep the cover on the port when not in use.

⚠ **CAUTION:** Never leave tools inside the chassis.

⚠ **CAUTION:** Use the screws specified in the procedure. Using longer screws can damage the device.

⚠ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.

⚠ **CAUTION:** Do not attempt to lift or support the chassis by the logo bezel attached over the port-side air vents.

⚠ **CAUTION:** Remove the logo bezel protective cover on the port side of chassis before applying power. This cover is attached over the air vents. If not removed, the chassis can overheat and will eventually shut down.

Electrical Cautions

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

⚠ **CAUTION:** For the NEBS-compliant installation of a Brocade device , 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.

⚠ **CAUTION:** Before plugging a cable into any port, be sure to discharge the voltage stored on the cable by touching the electrical contacts to ground surface.

⚠ **CAUTION:** Static electricity can damage the chassis and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

⚠ **CAUTION:** All devices 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 trained service personnel through the use of a special tool, lock and key, or other means of security.

⚠ **CAUTION:** If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

⚠ **CAUTION:** The maximum input voltage for connection to the HVAC/HVDC power supply should not exceed 305 VAC and 400 VDC .

Cautions Related to Equipment Weight

⚠ **CAUTION:** Do not use the port cover tabs to lift the module. They are not designed to support the weight of the module, which can fall and be damaged.

⚠ **CAUTION:** To prevent damage to the chassis and components, never attempt to lift the chassis using the fan or power supply handles. These handles were not designed to support the weight of the chassis.

Danger notices

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.

General Dangers

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

Dangers Related to Equipment Weight

DANGER: Use safe lifting practices when moving the product.

DANGER: Make sure the rack housing the device is adequately secured to prevent it from becoming unstable or falling over.

DANGER: Mount the devices you install in a rack as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.

Electrical Dangers

DANGER: Make sure that the power source circuits are properly grounded, and then use the power cord supplied with the device to connect it to the power source.

DANGER: Before beginning the installation, see the precautions in "Power Precautions."

DANGER: For safety reasons, the ESD wrist strap should contain a series 1 megaohm resistor.

DANGER: If the installation requires a different power cord than the one supplied with the device, make sure that 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.

DANGER: Disconnect the power cord from all power sources to completely remove power from the device.

Laser Dangers

DANGER: All fiber-optic interfaces use Class 1 lasers.

DANGER: Use only optical transceivers that are qualified by Broadcom and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 60825 and EN60825. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

DANGER: Laser Radiation. Do Not View Directly with Optical Instruments. Class 1M Laser Products.

Safety labels

As an added precaution, safety labels are often installed directly on products or product components to warn of potential hazards. These can be either danger or caution notices, depending upon the level of the hazard.

The actual product safety labels may differ from these sample safety labels:

DANGER: Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label. (L001)

DANGER: Rack-mounted devices are not to be used as a shelf or work space. (L002)

DANGER: Multiple power cords. The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords. (L003)

DANGER: Hazardous voltage present. Voltages present constitute a shock hazard, which can cause severe injury or death. (L004)

CAUTION: Hazardous moving parts nearby. (L008)

Attention notices

An attention notice indicates the possibility of damage to a program, device, or system, or to data. An exclamation point symbol may accompany an attention notice, but is not required. A sample attention notice follows:

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

ESD precautions

Attention: Many of the field replaceable units (FRUs) are sensitive to electrostatic discharge (ESD), and can potentially be damaged by improper handling. When working with any FRU, use correct ESD precautions:

- Attach ground to the indicated area on the chassis
- Wear a wrist grounding strap connected to chassis ground (if the switch is plugged in) or a bench ground.

  Note: For safety reasons, the ESD wrist strap should contain a series 1 megaohm resistor.
- Store ESD-sensitive components in antistatic packaging

Rack safety

Rack installation

⚠️ **DANGER:** Observe the following precautions when working on or around your IT rack system:

* Heavy equipment—personal injury or equipment damage might result if mishandled.
* Always lower the leveling pads on the rack cabinet.
* Always install stabilizer brackets on the rack cabinet.
* To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.
* Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.

🚫

* Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
* Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
* An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

(R001 part 1 of 2)

⚠️ **CAUTION:**

* Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
* Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
* Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
* *(For sliding drawers)* Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.
* *(For fixed drawers)* This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack.

(R001 part 2 of 2)

Rack relocation (19" rack)

⚠️ **CAUTION:** Removing components from the upper positions in the rack cabinet improves rack stability during relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building:

- Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must complete these steps:
  - Remove all devices in the 32U position and above.
  - Ensure that the heaviest devices are installed in the bottom of the rack cabinet.
  - Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U level.
  - If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.
  - Inspect the route that you plan to take when moving the rack to eliminate potential hazards.
  - Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that came with your rack cabinet for the weight of a loaded rack cabinet.
  - Verify that all door openings are at least 760 x 2030 mm (30 x 80 in.).
  - Ensure that all devices, shelves, drawers, doors, and cables are secure.
  - Ensure that the four leveling pads are raised to their highest position.
  - Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.
  - Do not use a ramp inclined at more than 10 degrees.
  - Once the rack cabinet is in the new location, do the following:
    - Lower the four leveling pads.
    - Install stabilizer brackets on the rack cabinet.
    - If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.
  - If a long distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also, lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.

  (R002)

Product recycling and disposal

Refer to the *IBM Systems Environmental Notices and User Guide* (Z125-5823) for translated environmental statements and information regarding product recycling and disposal. This document may be provided either in printed version or on the product documentation CD. A more current version may be available through this link ftp://public.dhe.ibm.com/systems/support/warranty/envnotices/environmental_notices_and_user_guide.pdf.

About this document

This document is intended for use by systems administrators and technicians experienced with networking, Fibre Channel, and storage area network (SAN) technologies. It describes how to install, service, and use the IBM Storage Networking SAN256B-7 (machine type-models 8961-F74 Switch). Throughout this document, the product is referred to as the *SAN256B-7*, or simply the *switch*.

This document has been created to include information specific to SAN256B-7 switches running on Fabric OS version 9.0.0 or later. This document does not support all Fabric OS versions. It is specific to Fabric OS 9.0.0 or later. Refer to the Fabric OS Release Notes for more information.

Product documentation

The following documents contain information related to this product:

- *IBM Storage Networking SAN256B-7 Installation, Service, and User Guide* , (this document)
- *IBM Systems Safety Notices*, G229–9054

Brocade documents

IBM b-type switches use software licensed from Brocade Communications Systems, Inc. You can find information related to the software that supports the switch in the following documents on the CD-ROM supplied with this product:

Brocade Fabric OS

- *EZSwitchSetup Administrator's Guide*
- *Fabric OS Administrator's Guide*
- *Fabric OS Command Reference Manual*
- *Fabric OS MIB Reference Manual*
- *Fabric OS Message Reference Manual*
- *Fabric OS Troubleshooting and Diagnostics Guide*

Brocade Fabric OS optional features

- *Fabric Watch Administrator's Guide*
- *Web Tools Administrator's Guide*

IBM and Brocade product matrix

The product matrix provides a cross-reference between the comparable IBM and Brocade product models.

When you use any of the Brocade documents, such as Fabric Operating System (FOS) publications, you will notice that the model numbers reflect the corresponding Brocade products. provides a product matrix to correlate the Brocade products and models to the IBM product names and machine types and model numbers. Products withdrawn from marketing are not listed.

Table 1. Brocade and IBM product and model number matrix		
Brocade product name	**IBM product name**	**IBM machine type and model number**
Brocade 7810	IBM Storage Networking SAN18B-6	8960 Model R18

Table 1. Brocade and IBM product and model number matrix (continued)		
Brocade product name	**IBM product name**	**IBM machine type and model number**
Brocade G630	IBM Storage Networking SAN128B-6	8960 Models F96/F97 and N96/N97
Brocade G620	IBM Storage Networking SAN64B-6	8960 Models F64/F65 and N64/N65
Brocade G610	IBM Storage Networking SAN24B-6	8960 Models F24
Brocade G720	IBM Storage Networking SAN64B-7	8960 Models P64 and R64
Brocade X7-4 Director	IBM Storage Networking SAN256B-7	8961 Model F74
Brocade X7-8 Director	IBM Storage Networking SAN512B-7	8961 Model F78
Brocade X6-4 Director	IBM Storage Networking SAN256B-6	8961 Model F04
Brocade X6-8 Director	IBM Storage Networking SAN512B-6	8961 Model F08
Brocade 6520	IBM System Networking SAN96B-5	2498 Models F96 and N96
Brocade 6505	IBM System Networking SAN24B-5	2498 Model F24, 249824G
Brocade 6510	IBM System Storage SAN48B-5	2498 Model F48
Brocade DCX 8510-4	IBM System Storage SAN384B-2	2499 Model 416
Brocade DCX 8510-8	IBM System Storage SAN768B-2	2499 Model 816
Brocade 7800	IBM System Storage SAN06B-R	2498 Model R06
Brocade 7840	IBM System Storage SAN42B-R	2498 Model R42
Brocade 300	IBM System Storage SAN24B-4	2498 Models B24 and 24E

Chapter 1. Device overview

The IBM SAN256B-7 offers the following features and capabilities

- Redundant and hot-swappable SFP+, SFP28, QSFP+, and Gen 7 QSFP transceivers; port, extension, control processor (CP), and core routing (CR) blades; power supply assemblies, fan assemblies, and WWN cards that enable a high-availability platform and allow nondisruptive software upgrades for mission-critical SAN applications.

- Support for the following features when using the FC32-64 blade:

  - Up to 16 QSFP ports on each FC32-64 port blade that provide 4x32Gb/s, 4x16Gb/s, 4x8Gb/s, 4x4Gb/s, 4x25GbE, or 40GbE operation. Port speeds for 4x32Gb/s transceivers can auto-negotiate between 4x32Gb/s and 4x16Gb/s. Port speeds for 4x16Gb/s transceivers can auto-negotiate between 4x16Gb/s, 4x8Gb/s, and 4x4Gb/s.

  - Flexport technology that allows you to configure each of the 16 QSFP ports on a blade for FC operation or Ethernet operation for FCoE connections. For details on supported transceivers and speeds, see "Supported transceivers and cables" on page 61.

  - Up to four blades and all FC transceivers installed, up to 256 32Gb/s external ports are possible in a single chassis, enabling high-density SAN configurations with a reduced footprint.

  - Trunking technology that allows groups of up to eight ports to create high-performance 256Gb/s ISL trunks between switches using 32Gb/s ports.

- Support for the following features when using the FC64-48 blade:

  - Port blade with 48 front-end 64Gb/s FC SFP+ ports with the edge switch interconnect to the core blades.

  - Supported SFPs include 10Gb/s, 32Gb/s, and 64Gb/s FC.

  - Support for 48 Fibre Channel ports on each FC64-48 port blade that provide 64Gb/s, 32Gb/s, 16Gb/s, 10Gb/s, and 8Gb/s. The 10Gb/s transceivers can be used for any port on the FC64-48 port blades. Note that 10Gb/s transceivers on the FC64-48 and SX6 blade are not interchangeable. For details on supported transceivers and speeds, see "Supported transceivers and cables" on page 61.

  - Trunking technology groups up to eight ports to create high-performance 512Gb/s ISL trunks between switches using 64Gb/s ports.

- Support for the following features when using the FC32-X7-48 blade:

  - Port blade with 48 front-end 32Gb/s FC SFP+ ports with edge switch interconnect to the core blades.

  - Supported SFPs include 32Gb/s, 16Gb/s, and 10Gb/s FC.

  - Support for 48 Fibre Channel ports on each FC32-X7-48 port blade that provide 32Gb/s, 16Gb/s, 10Gb/s, 8Gb/s, and 4Gb/s. The 10Gb/s transceivers can be used for any port on the FC32-X7-48 port blades. Note that 10Gb/s transceivers on the FC32-X7-48 and SX6 blade are not interchangeable. For details on supported transceivers and speeds, see "Supported transceivers and cables" on page 61.

  - Trunking technology groups up to eight ports to create high-performance 256Gb/s ISL trunks between switches using 32Gb/s ports.

- Support for the following features when using the SX6 extension blade:

  - 16 Fibre Channel ports supporting 4, 8, 16, and 32Gb/s.

  - 16GbE ports supporting 1 or 10Gb/s.

  - Two GbE ports supporting 40Gb/s on SX6 extension blades.

  Note: 10Gb/s transceivers on the FC64-48 and the FC32-X7-48 are not interchangeable with the SX6 Blade. For details on supported transceivers and speeds, see "Supported transceivers and cables" on page 61

- Considerations for the SX6 Blade:

  – The SX6 extension blades perform as extension platforms to support Fibre Channel (FC) and FICON data flows and IP-based storage data flows over an IP WAN.

  – Universal ports that self-configure as E_Ports, F_Ports, EX_Ports, M_Ports (mirror ports), and FICON ports. Note that the 10Gb/s ports on the FC64-48 port blade can function as E_Ports only.

  – ClearLink® Diagnostic port (D_Port) functionality on Fibre Channel ports.

  – Data compression capabilities through the port blades when ports are configured as ISLs.

Hardware components

The device has a modular and scalable mechanical construction that allows a wide range of flexibility in installation, fabric design, and maintenance. The device can be mounted with the cables facing either the front or the rear of the equipment rack. It consists of the following hardware components:

- Up to four slots for hot-swappable port blade assemblies, providing up to 192 64Gb/s or 256 32Gb/s Fibre Channel ports for device or ISL connectivity. Flexport technology allows QSFP ports on this blade to be configured for FCoE operation at 4x10GbE, 4x25GbE, and 40GbE speeds when using an FC32-64 port blade. For a list of supported transceivers for these blades, see "Supported transceivers and cables" on page 61.

- Two half-size slots for control processor (CP) blades:

  – A single active CP blade can control all the ports in the device.

  – The standby CP blade assumes control of the device if the active CP blade fails.

- Two slots for core routing (CR) blades:

  – The CR blade interconnects all port blades.

  – The blades support up to 16 Gen 7 QSFP56 (ICL) ports.

  – ICL ports allow interconnection with neighboring director chassis.

  – Both CR blades are active and can be hot-swapped.

  – For a list of supported transceivers for these blades, see .

- Up to four slots for modular, hot-swappable 34-port SX6 extension blades. Blades provide 16 32Gb/s Fibre Channel (FC) ports supporting 4, 8, 16, and 32Gb/s FC ports. Extension blades enable long-distance communication over an existing IP infrastructure. For a list of supported transceivers for these blades, see "Supported transceivers and cables" on page 61.

- Modular, hot-swappable field-replaceable units (FRUs):

  – Two fan assemblies, available with NPI or NPE airflow.

  – Up to two power supplies, available with the NPI or NPE airflow.

    - See the "Power Supply Specifications (per PSU)" in the Appendix A, "Product specifications," on page 191 for maximum output power, input voltage, input line frequency, and other specifications for your power supply model.

    - See the "Power Supply Requirements" section in the Appendix A, "Product specifications," on page 191 for the minimum number of power supplies required for operation and redundancy when different input voltages are used, such as low line and high line AC.

    - See the "Power Consumption" sections in the Appendix A, "Product specifications," on page 191 for power output data and the minimum number of power supplies for supported input voltages.

    - Redundant primary power connections ensure high availability. Each power supply assembly has its own connector, so the number of primary power connections is two for optimum efficiency and redundancy.

  – Two World Wide Name (WWN) cards located on the nonport side of the device behind the WWN card bezel.

- Port blades use small form-factor pluggable (SFP+, QSFP+, and QSFP28) optical transceivers. For details on supported transceivers per blade type, see "Supported transceivers and cables" on page 61.
- Core routing blades use QSFP56 optical transceivers. For a list of supported transceivers for these blades, see "Supported transceivers and cables" on page 61.

- Chassis door. This door must be installed to meet EMI compliance certification.
- Two vertical cable management finger assemblies. These combs install on the equipment rack for cable management.

Note: Device control processors and management modules contain batteries for RTC/NVRAM backup. Do not attempt to replace these batteries. Dispose of hardware components that contain these batteries as required by local ordinances and regulations.

Port-side view of the device

The following figure shows the port-side view of the SAN256B-7 Director with installed blades identified. Note that the SX6 extension blade is not shown in the following figure, but would install in the same slots as the FC32-X7-48 or FC64-48 port blades. A maximum of four SX6 blades is supported.
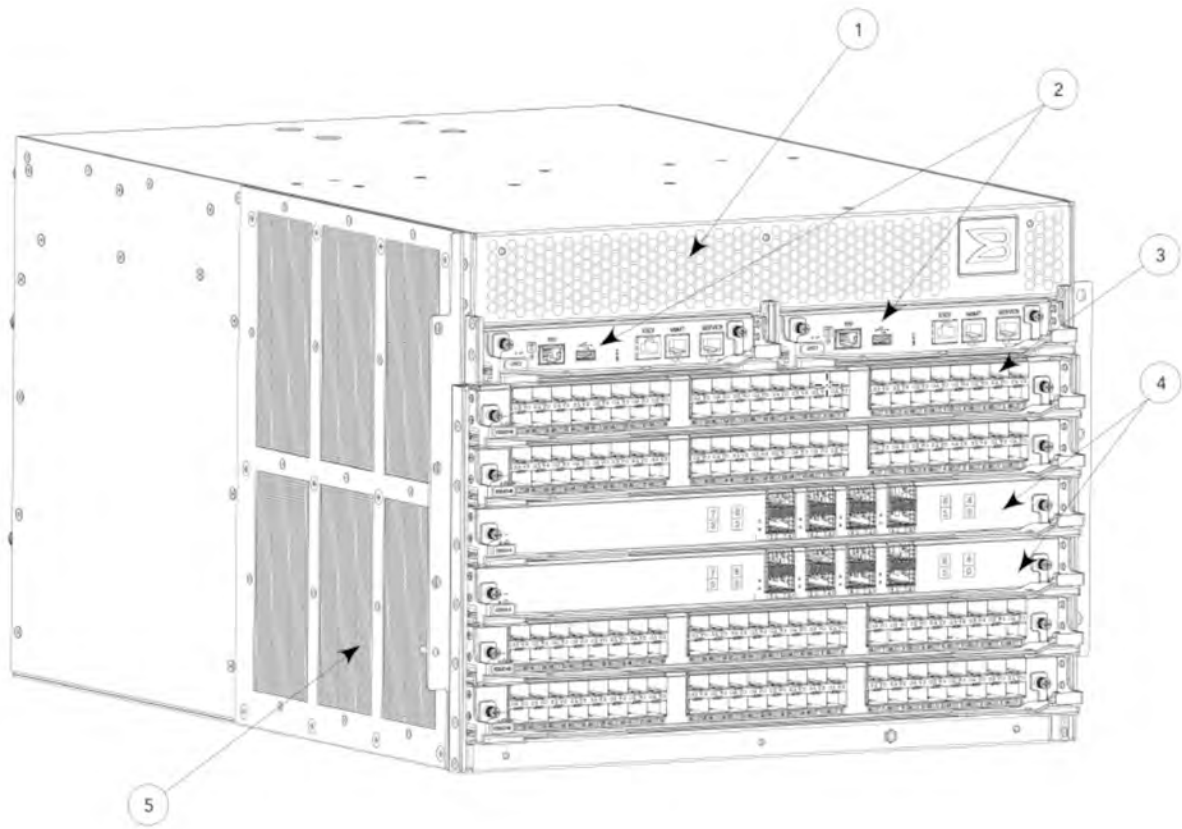
Figure 1. Port Side of the SAN256B-7 Director (Example Configuration)

1. Front Air Vent
2. Control Processor Blades (CPX7) – Slot 1 (left), Slot 2 (right)
3. Port Blades (FC64-48 or FC32-X7-48)
4. Core Routing Blades (CR64-4)
5. Side Air Vent

Note: When nonport-side exhaust (NPE) fan and power supply assemblies are installed, air flows through the side vent and exhausts to the nonport side. When nonport-side intake (NPI) fan and power supply assemblies are installed, air flows from the nonport-side and exhausts through the side vent. When installing the chassis in a four-post rack with the airflow diversion rack mount kit, airflow is redirected to or from the port side of the chassis. Therefore, if NPE fan and power supply assemblies are installed, air flows into port-side air vents and exhausts to the nonport side. If NPI fan and power supply assemblies are installed, air flows into nonport-side air vents and exhausts through to the port-side.

⚠️ **CAUTION:** Do not attempt to lift or support the chassis by the logo bezel attached over the port-side air vents.

Note: Be careful to not push on the mesh screen covering the side air vent or poke it with sharp objects.

Port-side slot numbering

The SAN256B-7 Director contains 6 full-width slots and two half-width slots, for a total of 8 slots. Facing the port side of the device, the half-width slots are on the top, numbered 1 and 2 from left to right. The remaining full-width slots are numbered 3 through 8, counting from top to bottom of the chassis.

Slots contain guide pins and connectors designed for specific blade types. Only install the control processor (CP), core routing (CR), port, and extension blades into slot numbers as follows:

- Slots 1–2 are restricted to CP blades. Note that the blade installed in slot 1 will be designated as CP0, while the blade in slot 2 will be designated as CP1 in CLI command and message output.
- Slots 3–4 and slots 7-8 are restricted to port and extension blades.
- Slots 5–6 are restricted to CR64-4 blades.

Nonport-side view of the device

The following figure shows the nonport-side view of the SAN256B-7 Director with all fan and power supply assemblies installed.

1. WWN Bezel (logo plate - WWN cards Behind)
2. Power Supply Assembly
3. Fan Assembly
4. 2AWG Panduit LCD2-14AF Lug for Building Ground Connection
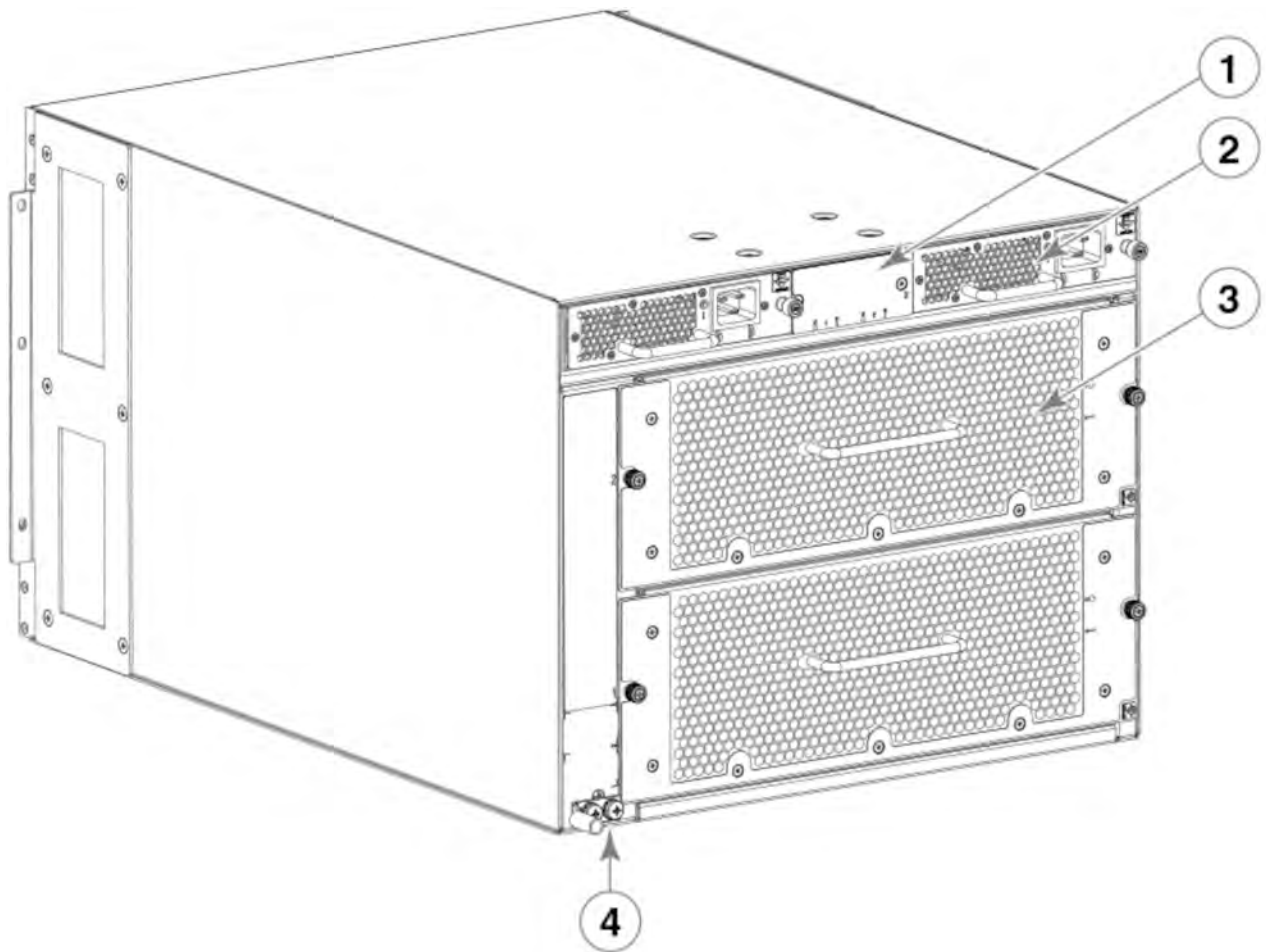
Figure 2. Nonport Side of the SAN256B-7 Director (Example Configuration)

1. WWN Bezel (logo plate - WWN cards behind)
2. Power Supply Assembly
3. Fan Assembly
4. 2AWG Panduit LCD2-14AF Lug for Building Ground Connection

Depending on the fans and the power supplies installed, airflow can be from the port side to the nonport side or from the nonport side to the port side of the chassis through the side air vent. Use the Chassis Airflow Diversion and Port Side Exhaust Kit to divert airflow so that air fully exhausts to the port side of the chassis or is fully drawn from the port side of the chassis while mounted in a four-post rack.

Although not illustrated, the chassis label that contains the serial number, SKU, and WWN is located on the upper portion of the chassis to the left of the fan assemblies.

Chapter 2. Preparing for installation

Use the following precautions and requirements for successful installation and operation of the switch.

Safety precautions

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

General Precautions

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

⚠️ **DANGER:** Before beginning the installation, see the precautions in "Power Precautions."

⚠️ **CAUTION:** Changes or modifications made to this device that are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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

⚠️ **CAUTION:** Make sure the airflow around the front and back of the device is not restricted.

⚠️ **CAUTION:** To protect the serial port from damage, keep the cover on the port when not in use.

⚠️ **CAUTION:** Never leave tools inside the chassis.

⚠️ **CAUTION:** Use the screws specified in the procedure. Using longer screws can damage the device.

ESD Precautions

⚠️ **DANGER:** For safety reasons, the ESD wrist strap should contain a series 1 megaohm resistor.

Power Precautions

⚠️ **DANGER:** If the installation requires a different power cord than the one supplied with the device, make sure that 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.

⚠️ **DANGER:** Make sure that the power source circuits are properly grounded, and then use the power cord supplied with the device to connect it to the power source.

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

⚠️ **DANGER:** High Touch Current. Earth connection essential before connecting supply.

⚠️ **CAUTION:** All devices 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 trained service personnel through the use of a special tool, lock and key, or other means of security.

⚠️ **CAUTION:** The maximum input voltage for connection to the HVAC/HVDC power supply should not exceed 305 VAC and 400 VDC.

⚠ **CAUTION:** The maximum input voltage for connection to the HVAC/HVDC power supply should not exceed 305 VAC and 400 VDC .

⚠ **CAUTION:** For removal of the metal cable restraint cover under the high voltage power supply inlet, remove the 2 Torx screws.

Lifting Precautions

⚠ **DANGER:** Use safe lifting practices when moving the product.

⚠ **CAUTION:** Do not attempt to lift or support the chassis by the logo bezel attached over the port-side air vents.

Laser Precautions

⚠ **DANGER:** Use only optical transceivers that are qualified by Broadcom and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 60825 and EN60825. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

Facility requirements

Before installing the device, be sure that the following facility requirements are met.

Table 2. Facility Requirements	
Type	**Requirements**
Device specifications	Ensure that the facility can accommodate the system, power, and environmental specifications for this device as outlined in the Appendix A, "Product specifications," on page 191.
Electrical	Ensure that there are dedicated electrical branch circuits with the following characteristics available: • Two cables for DC operation. • Circuit breaker protection in accordance with local electrical codes. • Supply circuit, line fusing, and wire size adequate to the electrical rating on the chassis nameplate. • An easily accessible location close to the chassis. • Grounded outlets installed by a licensed electrician and compatible with the power cords. Ensure that all equipment in the rack is grounded through a reliable branch circuit connection. Make sure that power distribution units (PDUs) can handle the maximum input amperage of the power supplies. Use cables with an adequate amperage rating from the PDUs to the power source.
Thermal	Ensure that the air intake and exhaust vents have a minimum of 5.1 cm (2 in.) of air space. Ensure that the air intake temperature is less than 40°C (104°F) during operation.

Table 2. Facility Requirements (continued)	
Type	**Requirements**
Rack (when rack-mounted)	Ensure that the following airflow requirements are met: • Plan to install the device with the air-intake side facing the cool-air aisle. The device can be installed facing either direction if serviceability and cooling requirements are met. • Ensure that the airflow available at the air vents meets the minimum requirements for the device. • Install the device with the airflow aligned with other devices in the rack. Some devices have airflow running from the port side to the nonport side, and others have the opposite arrangement. Make sure that the airflow for all devices moves in the same direction to maximize cooling. Ensure that the following amount of space is available in the rack: • 61.29 cm (24.09 in.) deep. • 43.74 cm (17.22 in.) wide. Ensure that the rack meets the following additional requirements: • The additional weight of the chassis does not exceed the rack's weight limits. • The rack is secured to ensure stability in case of unexpected movement.

Time and items required

You can set up and install the device in the following ways:

• As a stand-alone unit on a flat surface.
• In a 19-in. Electronic Industries Association (EIA) rack or in a telecommunications (Telco) rack using a Brocade rack mount kit. See Chapter 3, "Mounting the switch," on page 15 for applicable rack mount kits.

The following table describes the main installation and setup tasks, the estimated time required for each, and the items required to complete the task for a device that is fully populated with port blades. Configurations with fewer blades or ports require less time. These time estimates assume a prepared installation site and appropriate power and network connectivity.

Table 3. Installation Tasks, Time, and Items Required

Installation Task	Time Estimate	Items Required
Preparing the site and unpacking the device.	30 minutes	1/2-in. socket wrench (optional). No. 1 and No. 2 Phillips screwdrivers. Pallet jack. Hydraulic lift or assisted lift, able to raise to a minimum of 140 cm (55 in.), with a minimum capacity of 115 kg (254 lb). To find the weight of your device fully populated with the required port blades, refer the Appendix A, "Product specifications," on page 191.
Installing the rack mount kit.	30 minutes	See the procedures for your rack-mount kit located in this guide.
Mounting and securing the device in the rack.	30 minutes	
Installing power cables and powering on the device.	20 minutes	Power cables. These are ordered and shipped separately based on the country where the device is installed.
Establishing a serial connection, logging on to the device, and configuring IP addresses.	20 minutes	Serial cable (provided in the accessory kit). Workstation computer with a serial port or terminal server port and a terminal emulator application (such as HyperTerminal). Ethernet IP addresses for the device and for both control processor blades; total of three addresses.
Installing an Ethernet cable, opening a telnet session, and configuring the device domain ID, date and time, and additional system parameters. Verifying and backing up the configuration.	20 minutes	Ethernet cable (optional) for telnet access. Refer to the *Fabric OS Administration Guide*
Installing transceivers as needed.	20–30 minutes	SFP+, QSFP28, or QSFP56 optical transceivers as needed.
Attaching fiber-optic cables, cable ties, and cable guides.	2–3 hours	

Table 3. Installation Tasks, Time, and Items Required (continued)		
Installation Task	**Time Estimate**	**Items Required**
Obtain a USB drive pretested by Broadcom	20 minutes	It is recommended that a USB drive that has been test-validated (verified) is used: • SanDisk 32 CZ48 USB 3.0 Flash Drive (SDCZ48-032G-UAM46) • SanDisk 16 CZ48 USB 3.0 Flash Drive (SDCZ48-016G-UAM46) • Kingston 32GB DataTraveler 100 G3 USB 3.0 Flash Drive (DT100G3/32GB) • Kingston 32GB DataTraveler G4 USB 3.0 Flash Drive (DTIG4/32GB) • PNY Attache 3.0 4 USB 32GB Flash Drive • PNY Attache 3.0 4 USB 16GB Flash Drive These drives are not orderable from IBM but are generically-branded and can be purchased from other suppliers.

Shipped items

When unpacking the device, follow procedures under "Unpacking and transporting the device" on page 16. Verify that you have the following items. Save shipping cartons and packaging in the event you need to return the device.

The following items are packaged in device shipping carton:

- SAN256B-7 Director with a shipping tray
- Packing foam
- Antistatic plastic
- Inner foam

The following items are packaged in a device shipping carton or separate carton:

- Door (for EMI compliance)
- ESD wrist strap
- Cable management finger assembly
- China-RoHS Hazardous/Toxic Substance statement
- Brocade documentation web pointer card
- Rack mount kit for your device
- Ground lug kit
- Airflow Diversion Kit Documentation
- Shipping Bracket Installation Documentation
- Ball Stud Hardware Assembly for Door Mounting

Quick installation checklists

The following checklists provide a high-level overview of the basic installation process from the planning stage to the point when the device comes online and is ready to be deployed. Completing all the tasks in the suggested order ensures a successful installation. Print these checklists and take them to the installation site.

Preinstallation Tasks

Review all installation requirements ahead of time as part of your site preparation. Careful planning and site preparation ensure seamless installation, especially when installing multiple devices.

Table 4. Installation Prerequisites

Task	Task Details or Additional Information	Completed
Unpack the device.	Take an inventory of the hardware components included in your shipment. See "Shipped items" on page 11.	
Gather necessary components and required tools.	Review the time and items required information at the beginning of the following sections in this guide to ensure that you have gathered all necessary components: • Chapter 3, "Mounting the switch," on page 15 • Chapter 4, "Initial setup and verification," on page 43 • Chapter 7, "Port and extension blades," on page 109 (if required to install) • Chapter 11, "Power supply assemblies," on page 155 (if required to install)	
Review the safety precautions.	See "Safety precautions" on page 7.	
Plan the installation.	Obtain the appropriate rack mount kit. See Chapter 3, "Mounting the switch," on page 15.	
Review and verify installation requirements.	Verify that the following requirements are met. See "Facility requirements" on page 8. • Electrical • Environmental • Rack • Thermal	
Gather network configuration parameters.	• IP address • Subnet mask • Default gateway • Domain ID • Time zone	

Installation and Initial Configuration

The initial setup includes mounting the device on a flat surface or in a rack and completing the configuration tasks necessary to bring the device online and verify the operation.

Table 5. Installation and Basic System Configuration		
Task	**Task Details or Additional Information**	**Complet ed**
Install blades or power supply assemblies.	Install any blades or power supply assemblies that have shipped separately from the chassis. Be sure to use a No.1 Phillips screwdriver for captive screws to lock these FRUs into place.	
Mount the device.	Choose one of the following mounting options: • Mount the device in a four-post rack. See the instructions in this guide for mounting your device in a four-post rack. • Mount the device in a two-post rack. See the instructions in this guide for mounting your device in a two-post rack.	
Check the airflow of the power supply and fan assembly.	The airflow direction of the power supply and fan should match. The power supplies and fan trays are clearly labeled with either a green arrow with an "E" or an orange arrow with an "I". For more details, see "Fan and power supply airflow" on page 157.	
Gather all components required for the initial setup.	See "Items required" on page 44.	
Provide power to the device.	See "Connecting the power cord to AC power supplies" on page 45.	
Attach a management station, establish a serial connection, and change the default passwords (optional).	See "Establishing a serial connection to the device" on page 49. After completing this task, log on to the serial port to configure the device.	
Set the IP address, the subnet mask, and the default gateway IP address.	Use the `ipaddrset` command to configure a static device IP address, subnet mask, and gateway IP address, or you can use a DHCP server to obtain the information dynamically. See "Configuring the IP addresses" on page 50.	
Set the date and time.	• Use the `date` command to display and set the date and time. • Use the `tstimezone` command to display and set the time zone. • Use the `tsclockserver` command to synchronize the time with an external NTP server. See "Setting the date and time" on page 53 for more information.	
Customize the switch name and chassis name.	• Use the `switchname` command to change the default switch name. • Use the `chassisname` command to change the default chassis name. See "Customizing the chassis and switch name" on page 56 for more information.	
Establish an Ethernet connection.	By establishing an Ethernet connection, you can complete the device configuration using a serial session, Telnet, or management application, such as SANnav. See "Establishing an ethernet connection to the device" on page 52.	
Optional: Configure the DNS service.	Use the `dnsconfig` command to create DNS server entries. Refer to the *Fabric OS Administration Guide*.	

Table 5. Installation and Basic System Configuration (continued)		
Task	**Task Details or Additional Information**	**Completed**
Optional: Customize the domain ID.	Use the `configure` command to change the domain ID (the default ID is 1). See "Setting the domain ID" on page 52 for more information.	

Verify that the device operates correctly.	• Check the LEDs to verify the operation of functional parts. See Chapter 3, "Mounting the switch," on page 15.
	
	• The following commands can be useful to establish an operational baseline for the device. Refer to the *Brocade Fabric OS Command Reference Manual* for more information on these commands.
	
	  – `errdump`
	  – `fanshow`
	  – `historyshow`
	  – `psshow`
	  – `tempshow`	

Back up the configuration.	Use the interactive `configupload` command to back up the configuration. See "Backing up the configuration" on page 57 for more information.	
Optional: Power off the devices.	Enter the `shutdown` command and wait for the device to power down, and then unplug the power cords. See "Powering down the chassis" on page 58 for more information.	

Chapter 3. Mounting the switch

You can install the device in several ways:

- As a stand-alone unit on a flat surface, such as a tabletop.
- In a four-post 19 in. (48.3 cm) EIA rack:
  - Use the 27-31 inch four-post rail rack mount kit (XBR-DCX4S-0120), which contains 27-31 in. (68.58 to 78.74 cm) expandable rails.
  - See "Installing the 8U chassis 27-31-inch rail rack lit for four-post racks" on page 36 for instructions.
- In a four-post 19 in. (48.3 cm) EIA rack using an airflow diversion rack mount kit:
  - Use the 8U Chassis Airflow Diversion and Port Side Exhaust rack mount kit to divert airflow so that it fully exhausts to the port side of the device or is fully drawn from the port side of the device while mounted in a four-post rack. The XBR-DCX4S-0121 rack kit is designed for rack rail-to-rail depth of 27 to 31 in. (68.58 to 78.74 cm) depths and the XBR-DCX4S-0130 kit is designed for 18 to 24 in. (45.72 to 60.96 cm) depths.
  - See "Installing the 8U chassis airflow diversion or port-side exhaust kit for four-post racks" on page 16 for instructions.
- In a two-post Telco rack:
  - Use the mid-mount rack kit for the SAN256B-7 Director for two-post racks (XBR-X64-0126).
  - See "Installing the 8U chassis mid-mount rack kit for two-post racks" on page 31 for instructions.

Note: Review the following mounting precautions before mounting the device, and ensure that all "Facility requirements" on page 8 are met.

Note: The preceding rack mount kits are supported for these devices on the publication date of this guide. For current support information, contact IBM Support.

Mounting precautions

The following precautions specifically apply to mounting the device.

⚠ **CAUTION:** Do not use the port cover tabs to lift the module. They are not designed to support the weight of the module, which can fall and be damaged.

⚠ **CAUTION:** Make sure the airflow around the front and back of the device is not restricted.

⚠ **DANGER:** Mount the devices you install in a rack as low as possible. Place the heaviest device at the bottom and progressively place lighter devices above.

⚠ **DANGER:** Use safe lifting practices when moving the product.

⚠ **CAUTION:** To prevent damage to the chassis and components, never attempt to lift the chassis using the fan or power supply handles. These handles were not designed to support the weight of the chassis.

⚠ **CAUTION:** Do not attempt to lift or support the chassis by the logo bezel attached over the port-side air vents.

Note: You can connect the device to the building ground by connecting an appropriate 2 AWG wire from a grounded connection to the 2 AWG Panduit LCD2-14AF lug on the nonport-side of the device.

Unpacking and transporting the device

About this task

Procedure

1. Unpack the device:
   a) Cut the bands that encircle the packaging.
   b) Open the top of the shipping box and remove the accessory kit, the rack mount kits, and the foam from the top of the device.
   c) Lift the cardboard shipping container and the inner cardboard sleeve off the device.
   d) Remove the antistatic plastic off the device.
   e) Leave the device on top of the foam shipping tray and wood pallet if the device must be transported to the installation location.
   f) Verify the contents of the shipping carton by referring to "Shipped items" on page 11.
   g) Save the foam packing material and wooden pallet for reuse.
2. Use a pallet jack or other assisted lift to transport the device to the installation area. Ensure that the doorways are wider than 36 in. (91 cm) to accommodate the device.
3. Remove the chassis door if installed.
4. Use a lift to raise the device to the correct level. Use two people, one to operate the lift and the other to secure the device on the lift.

   ⚠️ **CAUTION:** Do not attempt to lift or support the chassis by the logo bezel attached over the port-side air vents.

   Note: Orient the device on the lift so that you can slide it into the correct side of the rack to provide cool air intake. Fans and power supply FRUs in this device have a green "E" or "I" symbol on the FRU faceplate. An "E" indicates that the FRU pulls air from the port side of the device and exhausts out the nonport side. An "I" indicates that the FRU pulls air from the nonport side of the device and exhausts out the nonport side. Fans and power supplies must have the same airflow indicator. Be sure that you are pulling cool air into the air intake side of the device. For more details, see "Fan and power supply airflow" on page 157.
5. If applicable, lock the wheels of the lift.
6. Install the applicable rack mount kit in your equipment rack and mount the device using the rack mount kit's installation instructions.

   Note: When installing the device into the rack, use one person on each side of the device to gently slide it onto the final installation surface and ensure that it remains supported during the transfer.
7. Reinstall the chassis door. The door must be installed to meet EMI compliance.

Installing the 8U chassis airflow diversion or port-side exhaust kit for four-post racks

Use the following instructions to install a modular device in a 19 in. (48.26 cm) Electronic Industries Association (EIA) rack using the following Brocade rack mount kits:

- XBR-DCX4S-0121 - Kit for rack rail-to-rail depth of 27 to 31 in. (68.58 to 78.74 cm).
- XBR-DCX4S-0130 - Kit for rack rail-to-rail depth of 18 to 24 in. (45.72 to 60.96 cm).

These kits have a different function, depending on the device being installed in the rack and the airflow direction provided by fans and power supplies installed in the device. For details, refer to the rack kit procedures in the Hardware Installation Guide for your device.

These kits have a different function, depending on the device being installed in the rack and the airflow direction provided by fans and power supplies installed in the device.

Observe the following when mounting this device:

- Installing this rack mount kit with an 8U chassis requires 9U of rack space.
- Before mounting your device, review any specific installation and facility requirements in the Hardware Installation Guide for the device.
- Before mounting your device, review any specific installation and facility requirements in this Hardware Installation Guide.
- Hardware devices illustrated in these procedures are only for reference and may not depict the device you are installing into the rack.

Time and items required

Allow approximately one hour to unpack and install the device in a rack.

The following tools are required when installing the 8U Airflow Diversion and Port Side Exhaust Kit for Four-Post Racks:

- Torque wrench with No. 2 Phillips screwdriver tip
- Flathead screwdriver
- Hydraulic or assisted lift with a minimum raise of 140 cm (55 in.) and a minimum capacity of 113 kg (250 lbs).

Installing the device in an 18–24-inch rack

Use the following instructions to install the device in a rack with a rail-to-rail depth of 45.72 to 60.96 cm (18 to 24 in.). Be sure to use the 18–24 in. 8U Chassis Airflow Diversion and Port Side Exhaust Kit for Four-Post Racks for this installation.

Parts List

The following parts list refers to items illustrated in the following figure.

Note: Not all parts may be used with certain installations depending on the device type.

Table 6. Hardware for Airflow Diversion and Port-Side Exhaust Kit for 18-24 in. (45.72 to 60.96 cm) Racks	
Description	**Quantity**
Top rail	1
Top rail mounting brackets for 18-20 in., (45.72–50.8 cm) 20–22-in. (50.8–55.88 cm), and 22-24.in (55.88-60.96 cm) racks	3
Duct	1
Shelf	1
Shelf saddle	1
10-32 x .5 in. (1.27 cm) Phillips screw (blue Loctite on threads)	12
10-32 x .63 in.(1.60 cm) Phillips screw with square-cone washer	12
10-32 clip nut for racks that have rails with round holes	8
10-32 retainer nut for racks that have rails with square holes	8
Alignment washer for racks that have rails with square holes	12
6-32 x .25 in. (.635 cm) Phillips screw	2

Figure 3. Airflow Diversion and Port-Side Exhaust Kit Assembly for 18-24 in. (45.72 to 60.96 cm) Racks

1. Top Rail
2. Duct
3. Shelf
4. 10-32 x .5 in. (1.27 cm) Phillips Screw with blue Loctite on threads
5. 10-32 x .63 in.(1.60 cm) Phillips Screw with square cone washer for racks that have tails with round holes
6. 10-32 Clip nut for racks that have rails with round holes
7. 10-32 retainer nut for racks that have rails with square Holes
8. Alignment washer for racks that have rails with square holes
9. 6 32 x .25 in. (.635 cm) Phillips Screw
10. Top rail mounting brackets for 18–20 in., (45.72–50.8 cm) 20–22-in. (50.8–55.88 cm), and 22–24.in (55.88-60.96 cm) racks
11. Shelf Saddle

Torque Requirements

Use the following torque settings when tightening screws that secure the rack mount kit and device to the rack.

Screw Size	Torque
Table 7. Torque Requirements for Mounting Screws	
Screw Size	**Torque**
6-32 x .25 in. (.635 cm) Phillips screw	10 cm-kg (8.75 in.-lb)
10-32 x .63 in. (1.60 cm) Phillips screw	36.86 cm-kg (32 in.-lb)

Assembling the rack hardware

Procedure

1. Determine how the device can be oriented in the rack so that the nonport side has access to intake air (cool).

2. Install clip or retainer nuts in the rack rail locations shown in the following figure. These nuts will secure the 10-32 screws that mount the rack kit's shelf and the device to the rack. For rails with round holes, use clip nuts. For rails with square holes, use retainer nuts. Note that the following figure shows relative positions for these nuts in the rack rails to mount the shelf and device. You may mount the shelf and device in 9U of rack space higher or lower in the rack than shown.
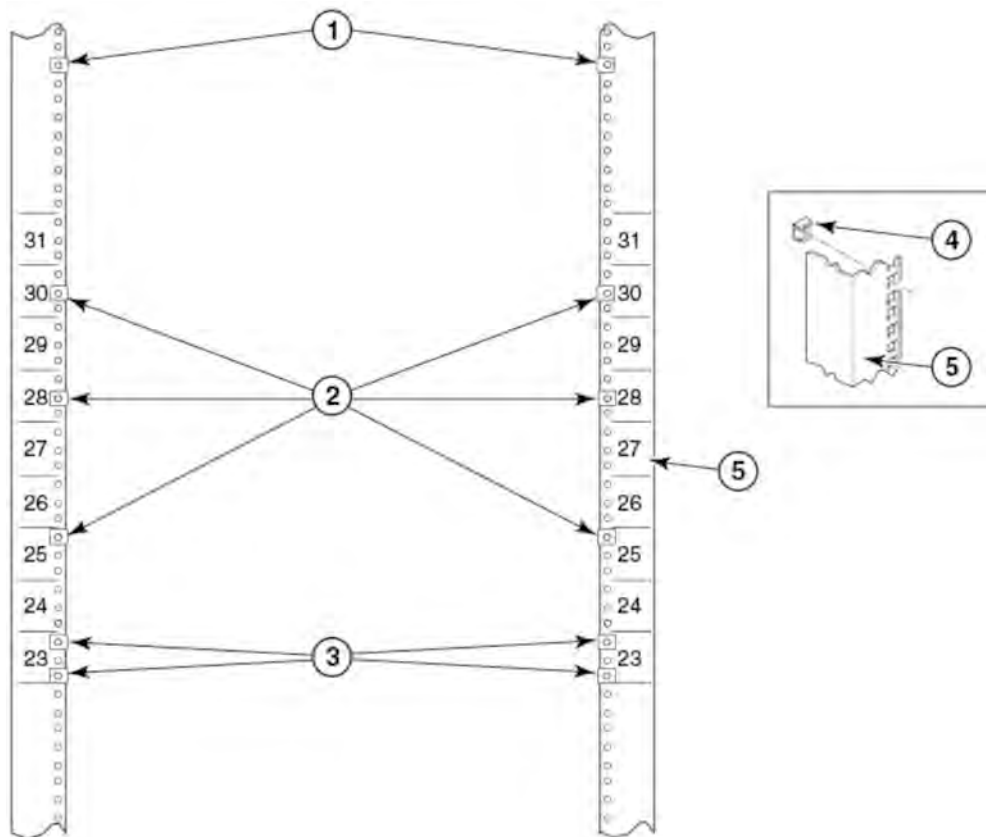
Figure 4. Clip and Retainer Nut Locations on Rack Rails

3. Install the shelf saddle to the nonport side of the rack shown in the following figure. Install the saddle in the same vertical location as where the shelf installs on the port side of the rack. In using the previous figure as an example, if the shelf is installed in location 23 on the port side, install the saddle in location 23 on the nonport side. Ensure that the words "THIS SIDE UP" on the saddle face towards the port side of the rack (see the following figure).

Secure the saddle to the rack using four 10-32 screws with washers, two screws on each side of the saddle. Tighten the screws according to specifications under "Torque Requirements" on page 19.
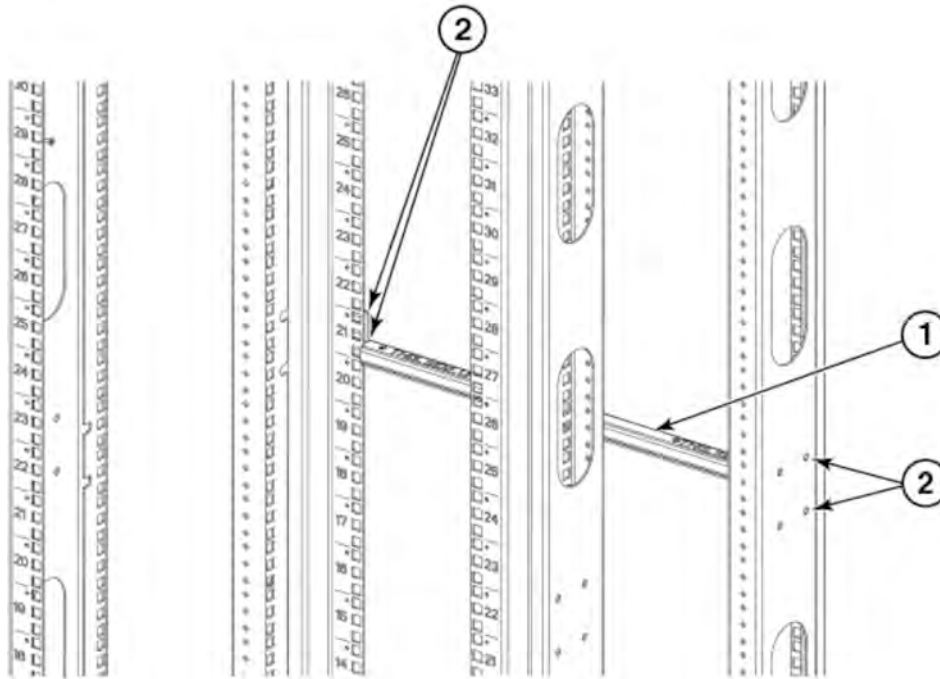
a. Shelf Saddle

b. 10-32 x .5 in. (1.27 cm) Phillips screw with blue Loctite on threads or 10-32 x .63 in. (1.60 cm) Phillips screw with square cone washer for racks that have rails with round holes.

Figure 5. Installing Saddle to Equipment Rack

Note: For rails with round holes, use the clip nuts on the rails for securing 10-32 screws. For rails with square holes, use the retainer nuts.

4. Place the shelf (see the following figure) on the saddle then secure it to the rack rails using four 10-32 screws with washers shown in the following figure. Tighten the screws according to specifications under "Torque Requirements" on page 19.
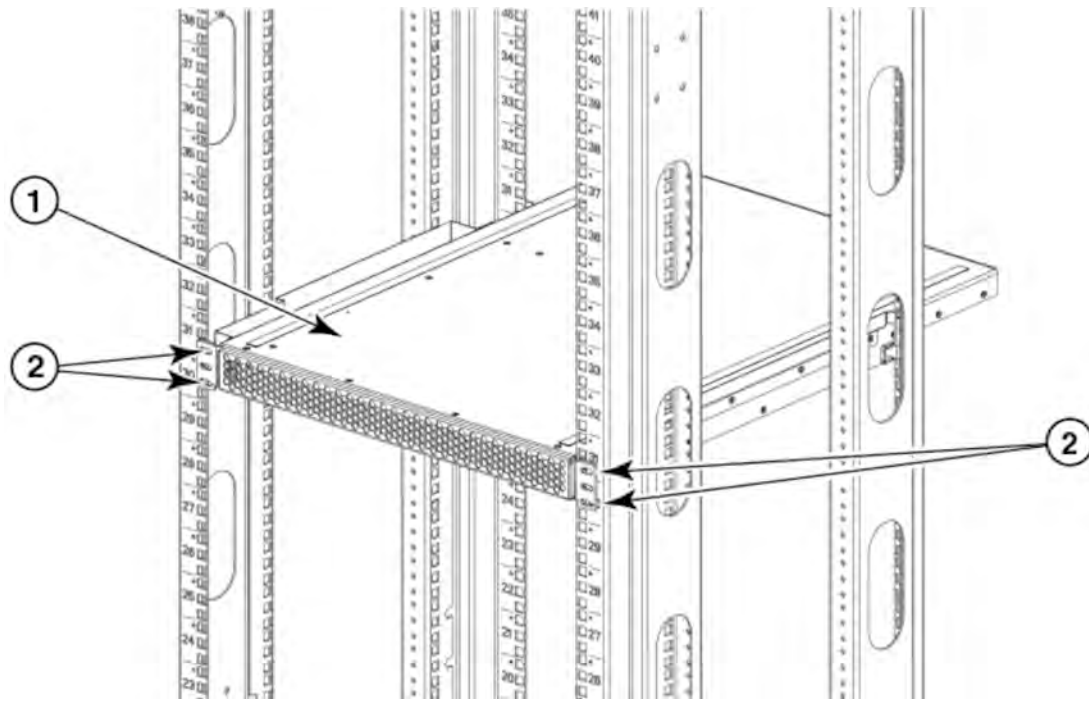
a. Shelf

b. 10-32 x .63 in.(1.60 cm) Phillips Screw with Washers

Figure 6. Shelf Installed in Rack

Note: For rails with round holes, use the clip nuts on the front rails for securing 10-32 screws. For rails with square holes, use the retainer nuts.

5. Install the air duct assembly (see the following figure) by inserting it down into the side-slot on the shelf. Ensure that the tabs of the duct align and engage with the slots in the shelf.
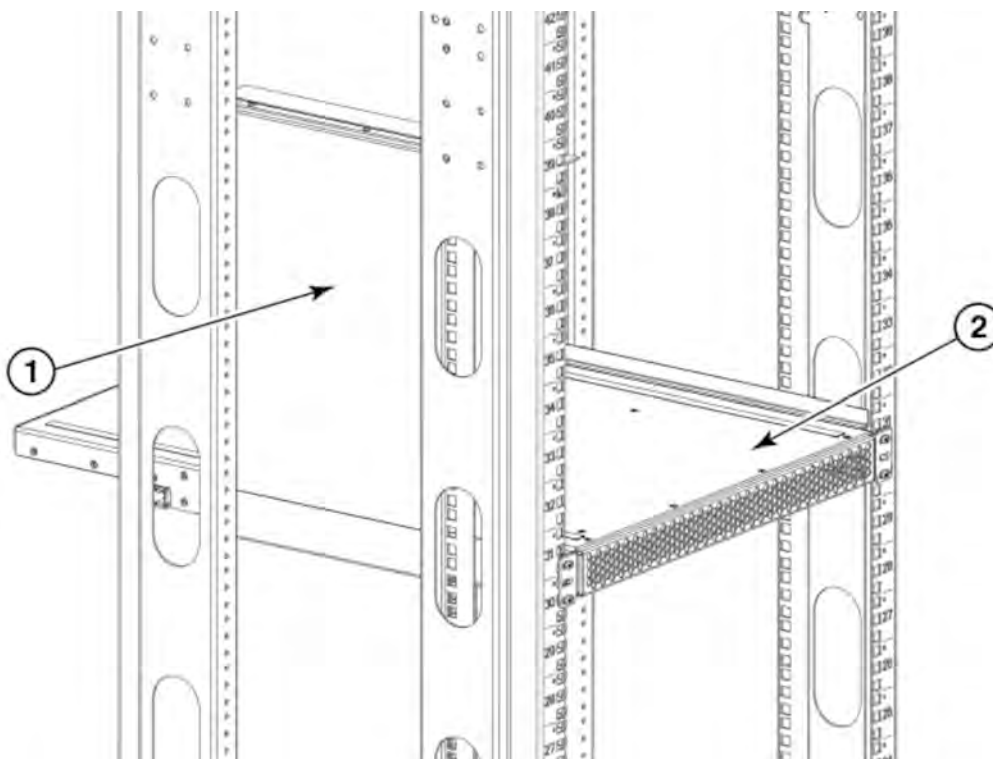
a. Duct

b. Shelf

Figure 7. Installing Air Duct into Side Slot on Shelf

6. Install the top rail inner bracket to the top rail assembly.

   a) Determine the size of the top rail inner bracket that you will need to install on the top rail so that the top rail will fit on the inside of the rack rails. Remove the appropriate bracket from the accessory kit. Note that the accessory kit contains three sizes, depending on the depth of your equipment rack.

   b) Secure the top rail inner bracket to the top rail assembly with two 6-32 screws. Tighten the screws according to specifications under "Torque Requirements" on page 19.

7. Install the top rail assembly.

   a) Insert the top rail assembly (with the top rail inner bracket attached) down into the air duct assembly, and then secure the top rail assembly to the air duct assembly with two 6-32 screws, one screw on each side of the air duct assembly (see the following figure).

   b) Secure the top rail assembly to the rack.

      For rails with round holes, use two 10-32 screws with washers on each end of the top rail assembly. Tighten the screws according to specifications under "Torque Requirements" on page 19.

      For rails with square holes, use the two standard 10-32 screws with blue Loctite on the threads and alignment washers on each end of the top rail assembly. Tighten the screws according to specifications under "Torque Requirements" on page 19.
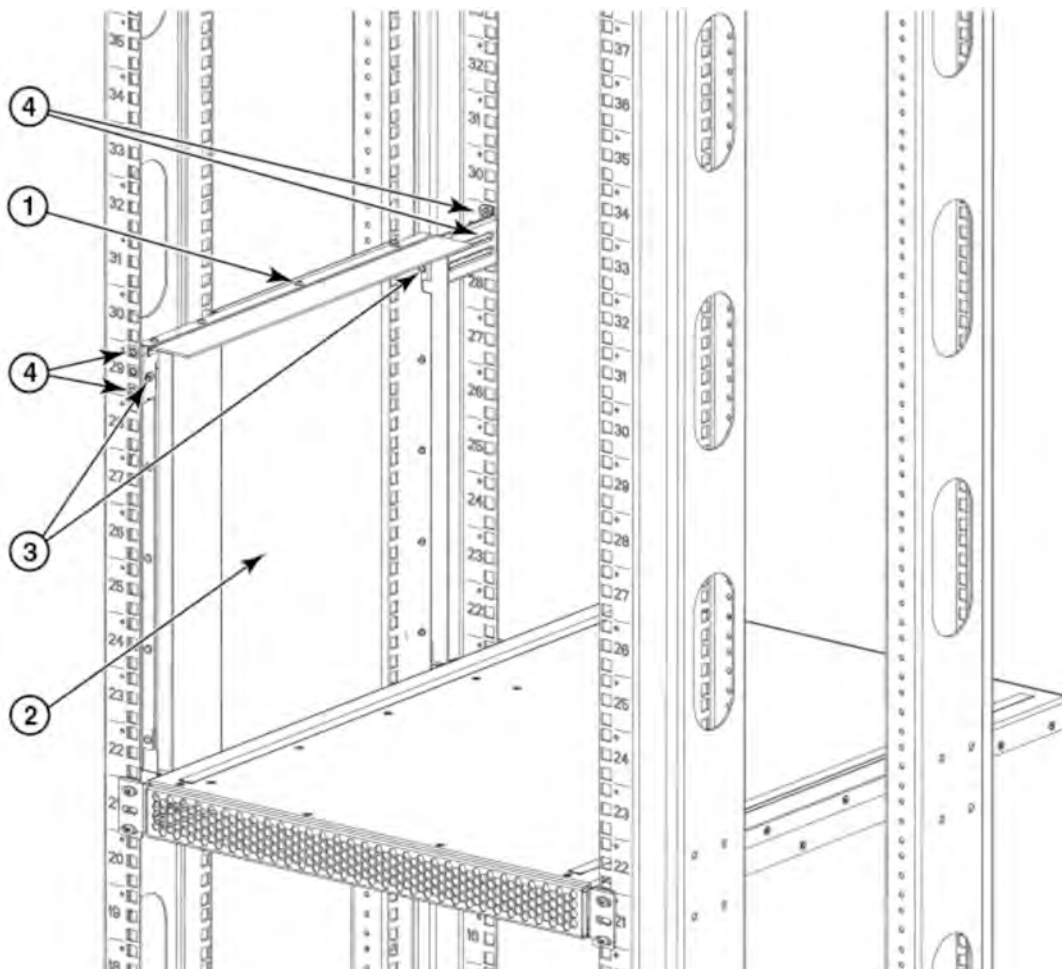
1) Top Rail

2) Duct

3) 6-32 x .25 in. (.635 cm) Phillips Screws

4) 10-32 x .5 in. (1.27 cm) Phillips screws with blue Loctite on threads and alignment washers or 10-32 x .63 in.(1.60 cm) Phillips screw with square cone washer

Figure 8. Securing Top Rail in Rack

Installing the device in the rack

Procedure

1. If a door is installed on your chassis, ensure that it is removed. See the procedures for removing and replacing the device door in this guide.

2. Use a hydraulic lift to raise the device to the correct level.

⚠️ **DANGER:** Use safe lifting practices when moving the product.

3. If applicable, lock the wheels of the lift.

4. Carefully lift the device and slide it into the rack.

5. Secure the device to the rack with six 10-32 screws with washers, three screws on each side (see the following figure). Tighten the screws according to specifications under "Torque Requirements" on page 19.

Note: Screws, clip nuts, and retainer nuts for securing the device to the equipment rack are included in the device hardware accessory kit.

Figure 9. SAN Device with 18-24 in. (45.72 to 60.96 cm) Kit Installed in Rack

Note: For rails with round holes, use the clip nuts on the front rails for securing 10-32 screws. For rails with square holes, use the retainer nuts.

6. Reinstall the device door if removed. See the procedures for removing and replacing the device door in this guide.

Installing the device in a 27-31-inch rack

Use the following instructions to install the device in a rack with rail-to-rail depth of 68.58 to 78.74 cm (27 to 31 in.). Be sure to use the 27-31 in. 8U Chassis Airflow Diversion and Port Side Exhaust Kit for Four-Post Rack for this installation.

Parts list

Use he following parts for the Airflow Diversion and Port Side Exhaust Kit.

Note: Not all parts may be used with certain installations depending on the device type.

Table 8. Hardware for Airflow Diversion and Port-Side Exhaust Kit for 68.58 to 78.74 cm (27-31 in.) Racks	
Description	**Quantity**
Top rail	1
Duct	1
Shelf	1
10-32 x .5 in. (1.27 cm) Phillips Screw (blue Loctite on threads)	12

Description	Quantity
10-32 x .63 in.(1.60 cm) Phillips Screw with square cone washer	12
10-32 clip nut for racks that have rails with round holes	8
10-32 retainer nut for racks that have rails with square holes	8
Alignment washer for racks that have rails with square holes	12
6-32 x .25 in. (.635 cm) Phillips Screw	2

Figure 10. Airflow Diversion and Port-Side Exhaust Kit Assembly for 68.58 to 78.74 cm (27-31 in.) Racks

1. Top Rail
2. Duct
3. Shelf
4. 10-32 x .5 in. (1.27 cm) Phillips Screw with Blue Loctite on Threads

5. 10-32 x .63 in.(1.60 cm) Phillips Screw with Square Cone Washer (for racks that have rails with round holes)
6. 10-32 Clip Nut (for racks that have rails with round holes)
7. 10-32 Retainer Nut (for racks that have rails with square holes)
8. Alignment Washer (for racks that have rails with square holes)
9. 6-32 x .25 in. (.635 cm) Phillips Screw

Torque requirements

Use the following torque settings when tightening screws that secure the rack mount kit and device to the equipment rack.

Table 9. Torque Requirements for Mounting Screws

Screw Size	Torque
6-32 x .25 in. (.635 cm) Phillips screw	10 cm-kg (8.75 in.-lb)
10-32 x .63 in. (1.60 cm) Phillips screw	36.86 cm-kg (32 in.-lb)

Assembling the rack hardware

Procedure

1. Determine how the device can be oriented in the rack so that the nonport side has access to intake air (cool).
2. Install clip nuts or retainer nuts (as shown in the previous figure) in rack rail locations shown in the following figure. These nuts will secure the 10-32 screws that mount the Port Side Exhaust Kit shelf and device to the rack. For rails with round holes, use clip nuts. For rails with square holes, use retainer nuts. Note that the following figure shows relative positions for these nuts in the rack rails to mount the shelf and device. You may mount the shelf and device in 9U of rack space higher or lower in the rack than shown.
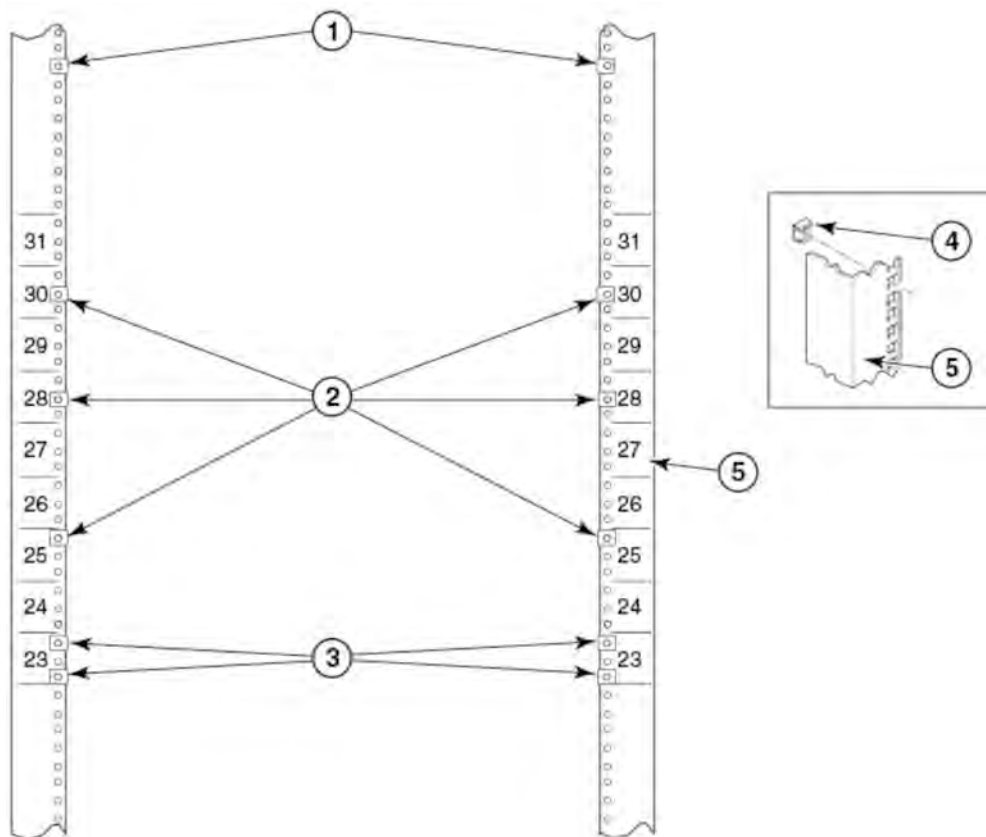
Figure 11. Clip and Retainer Nut Locations on Rack Rails

3. Install the shelf as shown in the following figure.

   a) The shelf can be adjusted to a length of between 68.58 and 78.74 cm (27 and 31 in.) to accommodate your rack size. To lengthen or shorten the shelf, loosen the four 6-32 screws in the four slots on the shelf and adjust the shelf to the desired length. Once adjusted, tighten the four 6-32 screws.

   b) Secure the shelf to the rack with eight 10-32 screws with washers, two screws in each corner of the shelf (see the following figure). Tighten the screws according to specifications under Torque requirements.
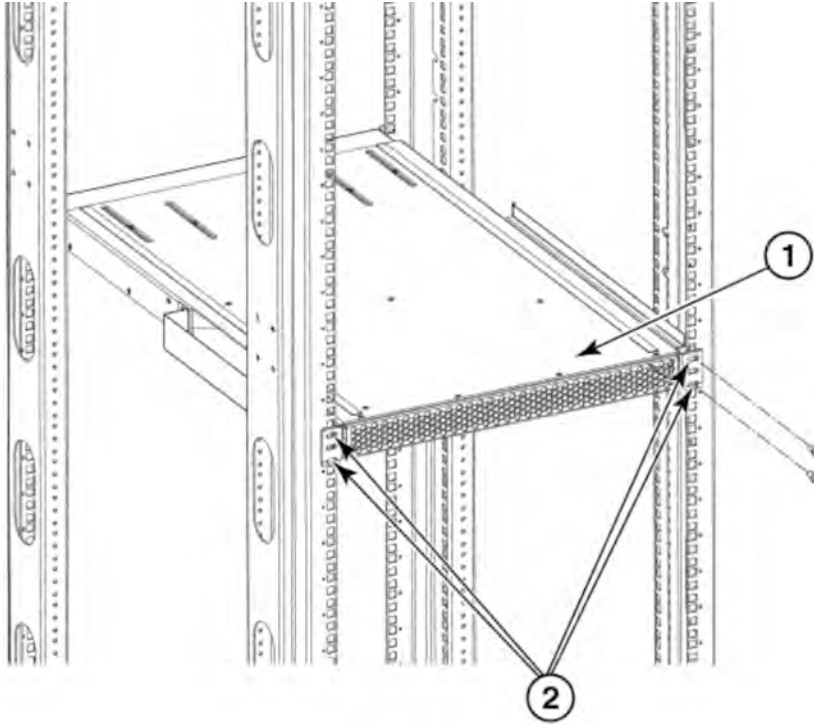
Figure 12. Shelf Installed in Rack

4. Install the air duct assembly by inserting it down into the side slot on the shelf. Ensure that the tabs of the duct align and engage with the slots in the shelf.
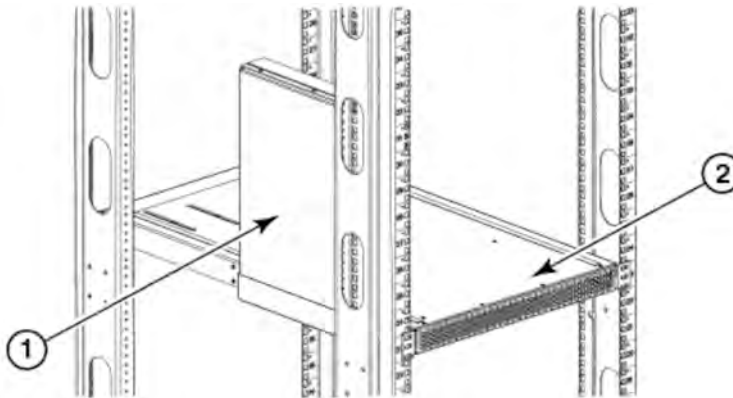
Figure 13. Installing Air Duct into Side Slot on Shelf

5. Install the top rail assembly to the air duct assembly as shown in the following figure.

   a) The top rail assembly can be adjusted to a length of between 68.58 to 78.74 cm (27 and 31 in.) to fit on the inside of the rack rails. To lengthen or shorten the top rail assembly, loosen the two 6-32 screws and adjust the top rail assembly to the desired length. The length will be approximately the length of the adjustable shelf. Once adjusted, tighten the two 6-32 screws.

   b) Insert the top rail assembly down into the air duct assembly and then secure the top rail assembly to the air duct assembly with two 6-32 screws, one screw on each side of the air duct assembly. Tighten the screws according to specifications under "Torque requirements" on page 26.
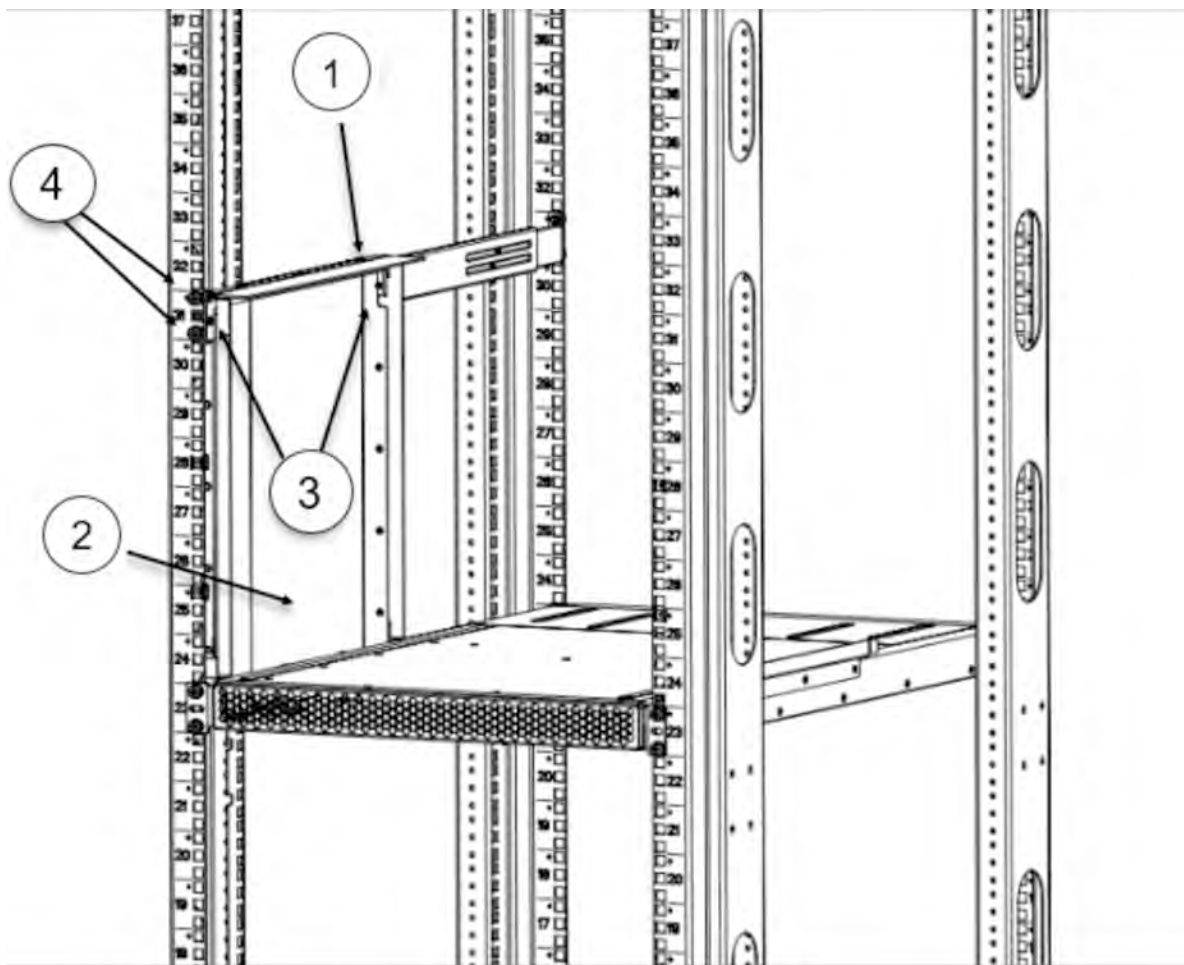
Figure 14. Securing Top Rail in Rack

6. Secure the top rail assembly to the rack with four 10-32 screws, two screws on each end of the top rail assembly.

   - For rails with round holes, use two 10-32 screws with washers on each end of the top rail assembly. Tighten the screws according to specifications under "Torque requirements" on page 26.

Installing shipping brackets (optional)

Shipping brackets are required when devices are installed with the intent to ship pre-installed in a rack. Use these brackets as an alternate method from what is explained in "Installing the device in the rack" on page 23 to secure the device to the rack for shipping.

Parts in the following table are provided with your rack mount kit for installing these shipping brackets on the device and the device into a rack.

Note: Not all parts may be used with certain installations depending on the device type.

Table 10. Hardware for Optional Chassis Shipping Brackets	
Description	**Quantity**
Mounting plates	2 (marked A and B)
L-brackets	2 (marked R and L)
6-32 x 3/8 in. panhead Phillips screw with square cone washer	10
10-32 x .63 in.(1.60 cm) panhead Phillips screw with square cone washer	23
10-32 clip nut for racks that have rails with round holes	6

Table 10. Hardware for Optional Chassis Shipping Brackets (continued)	
Description	Quantity
10-32 retainer nut for racks that have rails with square holes	6

For steps to install these shipping brackets, see the *Installing Chassis Shipping Brackets* instructions packaged with the bracket parts.

Installing the device in the rack

About this task

⚠️ **DANGER:** Use safe lifting practices when moving the product.

Procedure

1. If a door is installed on your chassis, ensure that it is removed. See the procedures for removing and replacing the device door in this guide.
2. Use a lift to raise the device to the correct level.
3. If applicable, lock the wheels of the lift.
4. Carefully lift the device and slide it into the rack.
5. Secure the device to the rack with six 10-32 screws with washers. Tighten the screws according to specifications under "Torque requirements" on page 26.

   Note: Screws, clip nuts, and retainer nuts to secure the device to the rack are provided in the device hardware accessory kit.
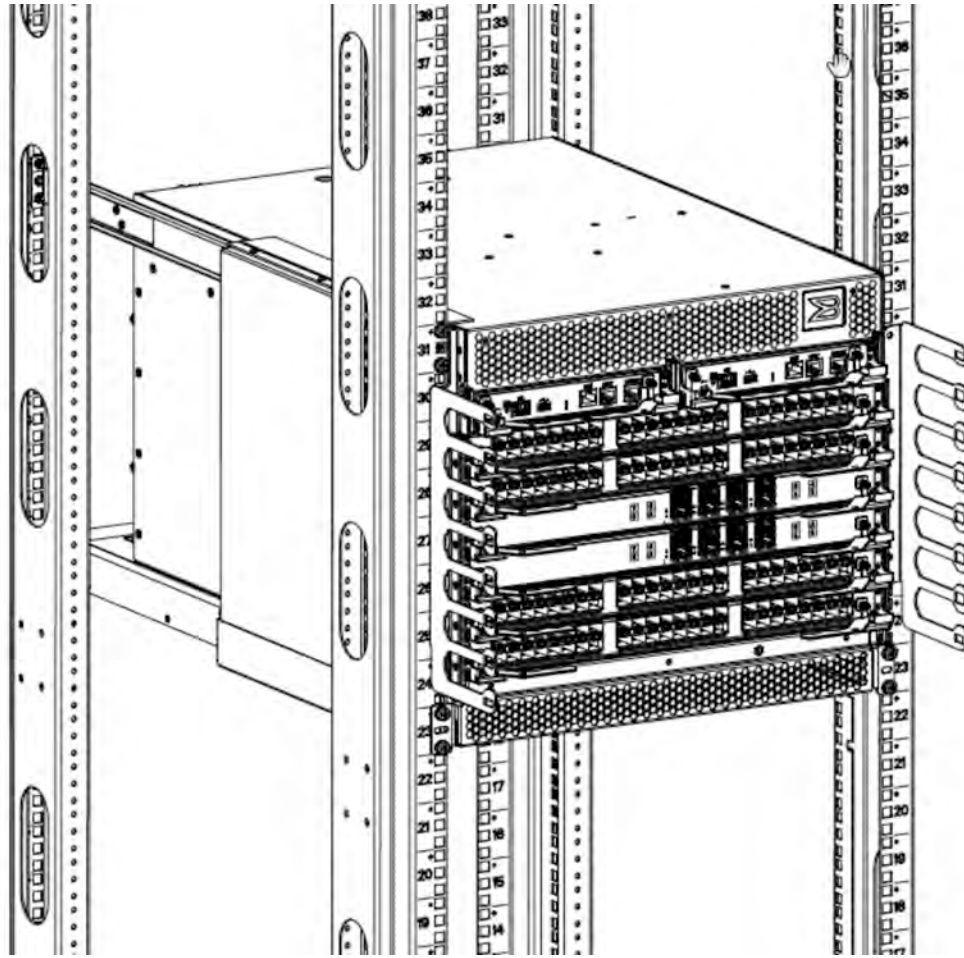
Figure 15. Device and 27–31 in. (68.58 to 78.74 cm) Kit Installed in Rack

> **Note:** For rails with round holes, use the clip nuts on the rails for securing the 10-32 screws. For rails with square holes, use the retainer nuts.

6. Reinstall the device door. See the procedures for removing and replacing the device door in this guide.

Installing the 8U chassis mid-mount rack kit for two-post racks

Use the following instructions to install the device in a rack using the 8U Chassis Mid-Mount Rack Kit for Two-Post Racks (XBR-DCX4S-0126 and XBR-X64-0126).

Observe the following when mounting this device:

- Before mounting your device, review any specific installation and facility requirements in the Hardware Installation Guide for the device.
- Before mounting your device, review any specific installation and facility requirements in this Hardware Installation Guide.
- Hardware devices illustrated in these procedures are only for reference and may not depict the device you are installing into the rack.

Time and items required

Allow approximately one hour to unpack and install the chassis in a rack.

The following tools are required when installing the 8U Chassis Mid-Mount Rack Kit for Two-Post Racks:

- Torque wrench with No. 2 Phillips screwdriver tip
- Flathead screwdriver

- Hydraulic or assisted lift with a minimum raise of 140 cm (55 in.) and a minimum capacity of 113 kg (250 lbs)

Parts list

The following parts are provided with the 8U Chassis Mid-Mount Rack Kit for Two-Post Racks.

Note: Not all parts may be used with certain installations depending on the device being installed.

Use parts in the following XBR-DCX4S-0126 rack mount kit to install the Brocade DCX-4S Director in a two-post rack.

Use parts in the following XBR-X64-0126 rack mount kit to install the Brocade Director in a two-post rack.
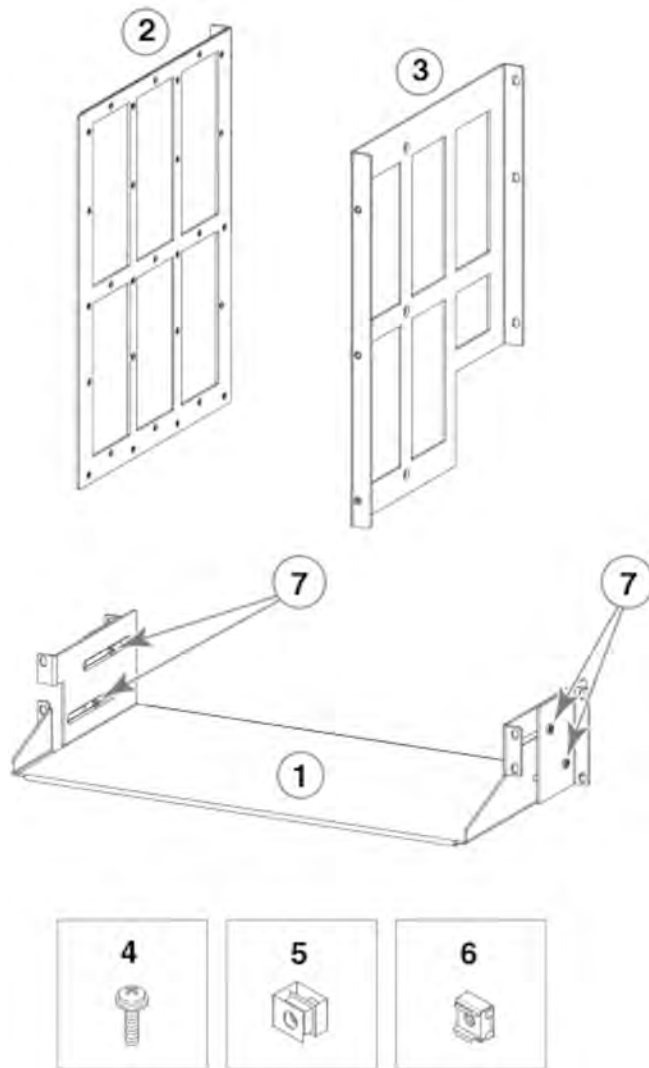
Figure 16. Rack Kit Parts (XBR-X64-0126)

1. Saddle
2. Telco Mid-Mount Mounting Bracket (left)
3. Telco Mid-mount Mounting Bracket (right)
4. 10-32 x .63 in.(1.60 cm) Phillips Screws with Square Cone Washer (for racks that have rails with round holes)
5. 10-32 Clip Nuts (for racks that have rails with round holes)
6. 10-32 Retainer Nuts (for racks that have rails with square holes)

7. Bracket Adjusting Screws

Assembling the rack hardware

Procedure

1. Loosen the two 10-32 adjusting screws securing each mid-mount bracket to the saddle (see the previous figure) and slide the brackets as far backward as possible.
2. Install the saddle to the equipment rack rails using the following steps while referring to the following figure.
   a) Install the saddle to the port side of the rack rails using four 10-32 screws with square-cone washers, two screws on each side of the saddle. Tighten the screws to 36.86 cm-kg (32 in.-lb).
   b) Move the mid-mount brackets into position so they align with the rack mounting holes on the nonport side of the rack. Secure the mid-mount brackets to the rack with four 10-32 screws with square-cone washers, two on each side. Tighten the screws to 36.86 cm-kg (32 in.-lb).
   c) Tighten the two 10-32 adjusting screws on each mid-mount bracket.

   Note: The following figure shows the saddle for XBR-DCX4S-0126. The saddle for XBR-X64-0126 has a somewhat different design but installs the same way.
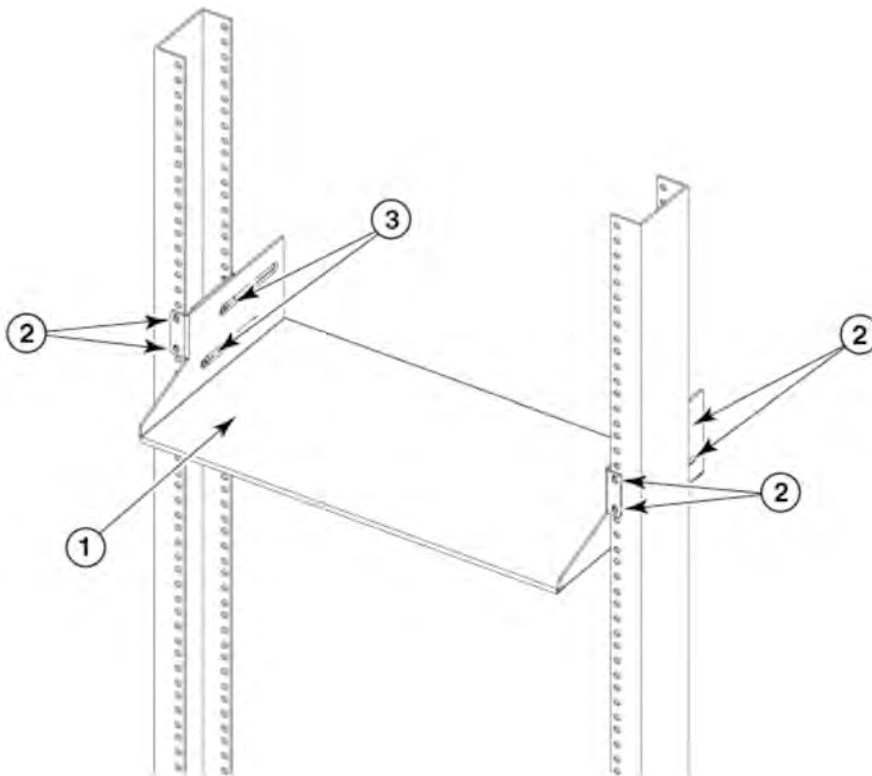
Figure 17. Saddle Installed in a Rack

Note: For rails with round holes, use the clip nuts on the rack rails for securing 10-32 screws. For rails with square holes, use the retainer nuts.
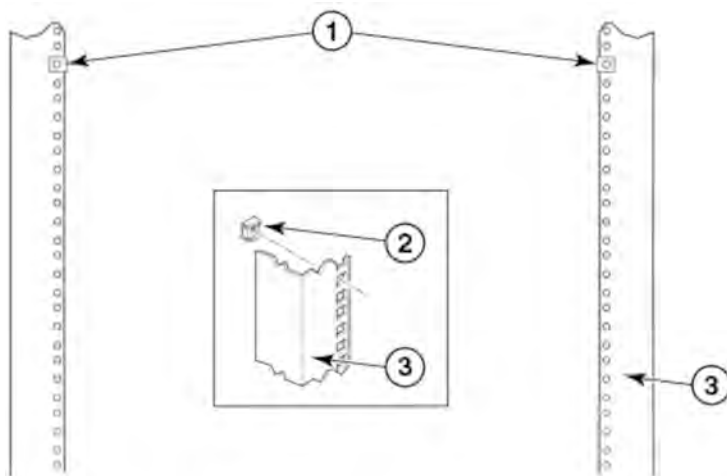
Figure 18. Using Clip Nuts and Retainer Nuts to Secure Screws to Rack Rails

3. Remove any existing rack-mount brackets from the device, and install the new Telco mid-mount brackets from the accessory kit. Refer to the following figure.

   Note: The following figure shows mounting brackets from XBR-DCX4S-0126. Mounting brackets from the XBR-X64-0126 kit install the same way.
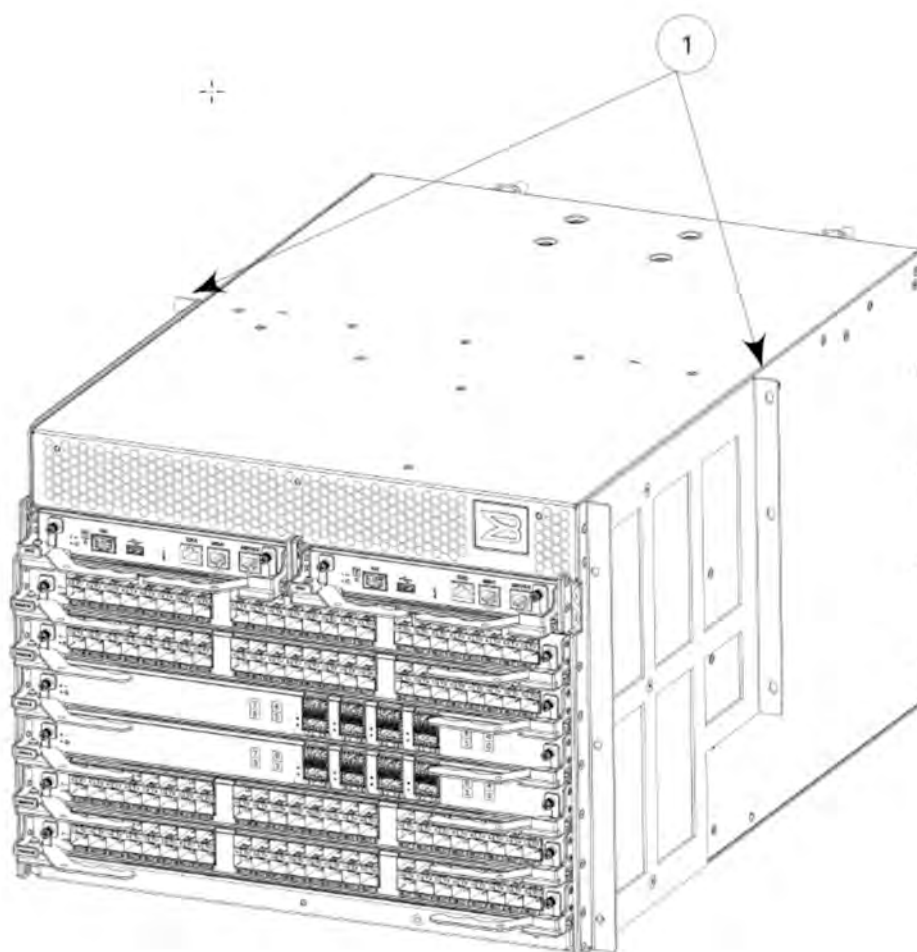
Figure 19. Telco Mid-Mount Brackets Installation

Installing the device in the rack

About this task

⚠️ **DANGER:** Use safe lifting practices when moving the product.

Procedure

1. Ensure that the door is removed from the port side of the device if installed. Refer to procedures for removing and replacing the device door in this guide.
2. Ensure the device can be oriented so that the nonport side has access to intake air (cool).
3. Use a lift to raise the device to the correct level.
4. If applicable, lock the wheels of the lift.
5. Gently slide the device onto the saddle, ensuring that it remains supported during the transfer.

   Note: The following figure shows mounting brackets from XBR-DCX4S-0126. Mounting brackets from the XBR-X64-0126 kit install the same way.
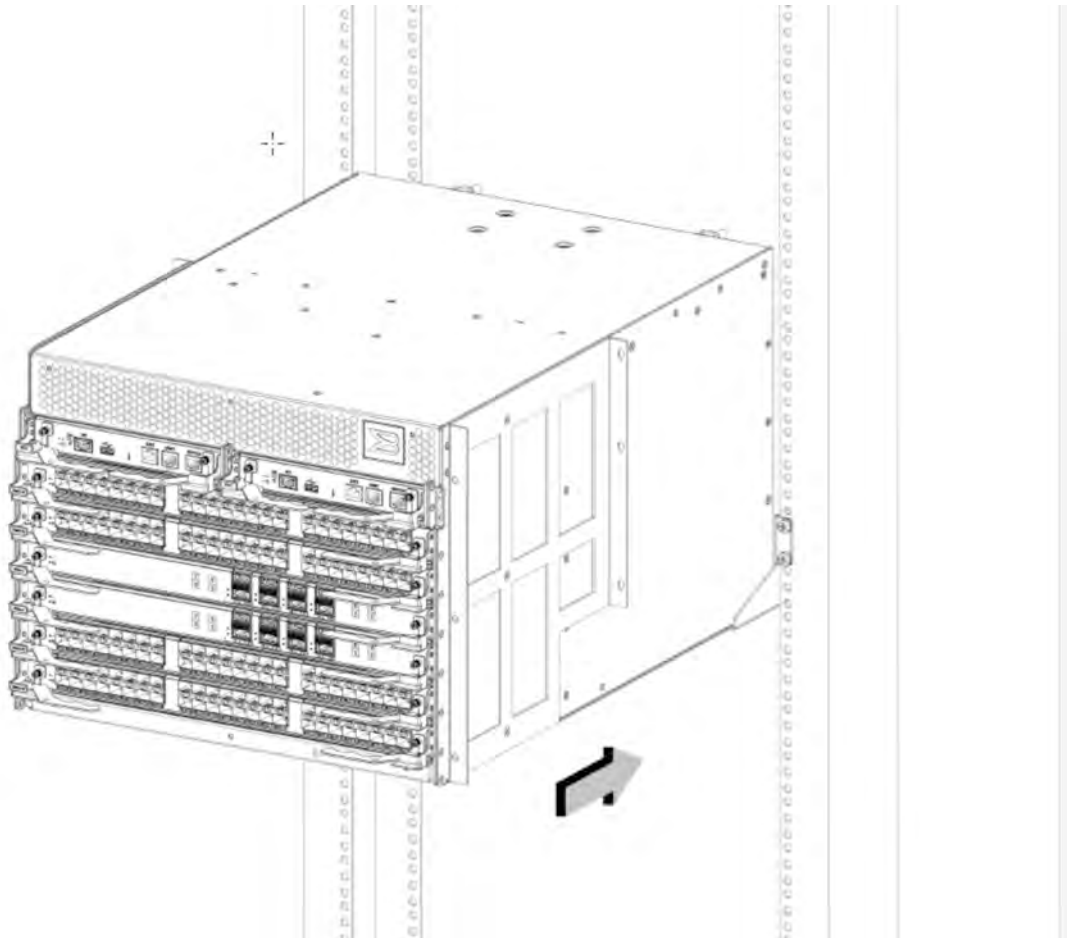
Figure 20. Sliding the Device into the Mid-Mount Saddle

6. Secure the device to the rack using six 10-32 screws with square-cone washers, three screws for each mounting bracket attached to the device. Refer to the following figure. Tighten the screws to 36.86 cm-kg (32 in.-lb).

   Note: Screws, clip nuts, and retainer nuts for mounting the device to the equipment rack are located in the device hardware accessory kit.
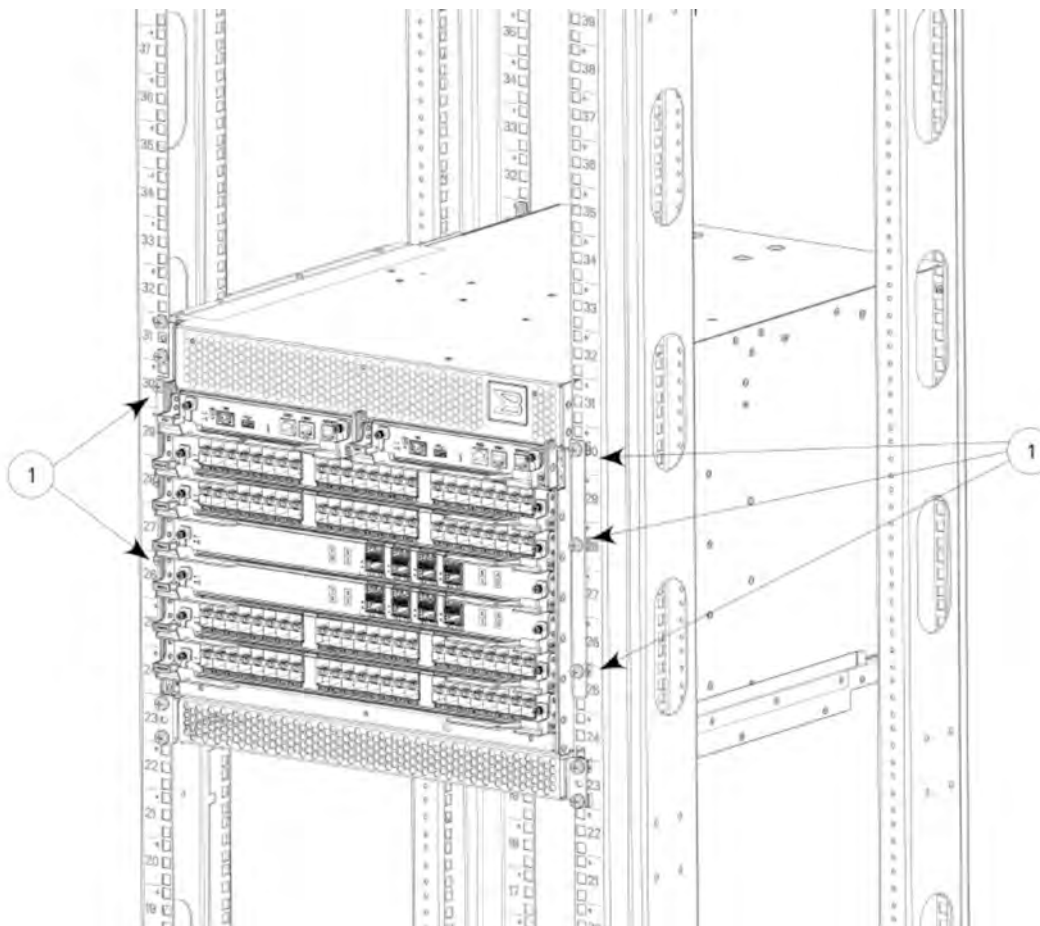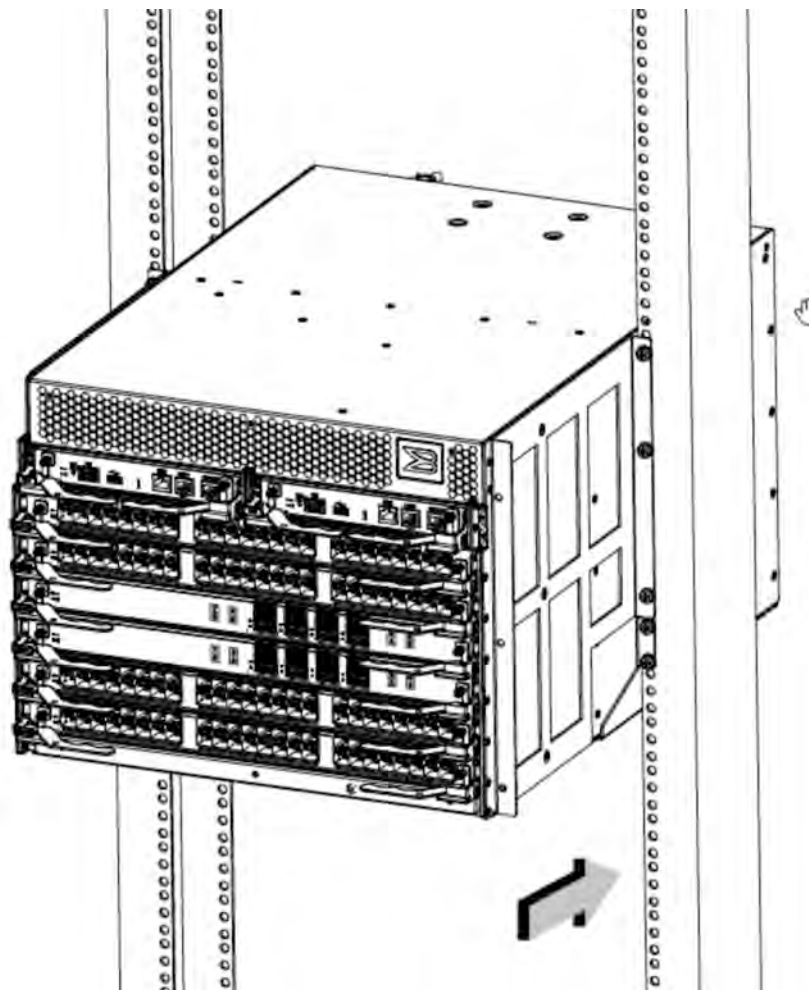
Figure 21. Device Installed in Mid-Mount Saddle

> **Note:** For rails with round holes, use the clip nuts on the rack rails for securing 10-32 screws. For rails with square holes, use the retainer nuts.

7. Reinstall the door. See the procedures for removing and replacing the device door in this guide.

Installing the 8U chassis 27-31-inch rail rack lit for four-post racks

Use the following instructions to install the device in a rack using the 8U Chassis 27-31 Inch Rail Rack Kit for Four-Post Racks.

Observe the following when mounting this device:

- Use Electronic Industries Association (EIA) standard racks to install a modular device in a 19 in. Provide a space that is 8 rack units (8U) high, with a rail-to-rail depth of 27-31 in.(68.58 to 78.74 cm). 1U is equal to 4.45 cm (1.75 in.).
- Before mounting your device, review any specific installation and facility requirements in the Hardware Installation Guide for the device.
- Before mounting your device, review any specific installation and facility requirements in this Hardware Installation Guide.
- Hardware devices illustrated in these procedures are only for reference and may not depict the device you are installing into the rack.

Time and Items Required

Allow approximately one hour to unpack and install a device in a rack.

The following tools are required to install the 8U Chassis 27-31 Inch Rail Rack Kit for Four-Post Racks.

- Torque wrench with No. 2 Phillips screwdriver tip
- Flathead screwdriver
- Hydraulic or assisted lift with a minimum raise of 140 cm (55 in.) and a minimum capacity of 113 kg (250 lbs).

Parts List

The following parts are provided with the 8U Chassis 27–31 Inch Rail Rack Kit for Four-Post Racks.

Note: Not all parts may be used with certain installations depending on the device type.
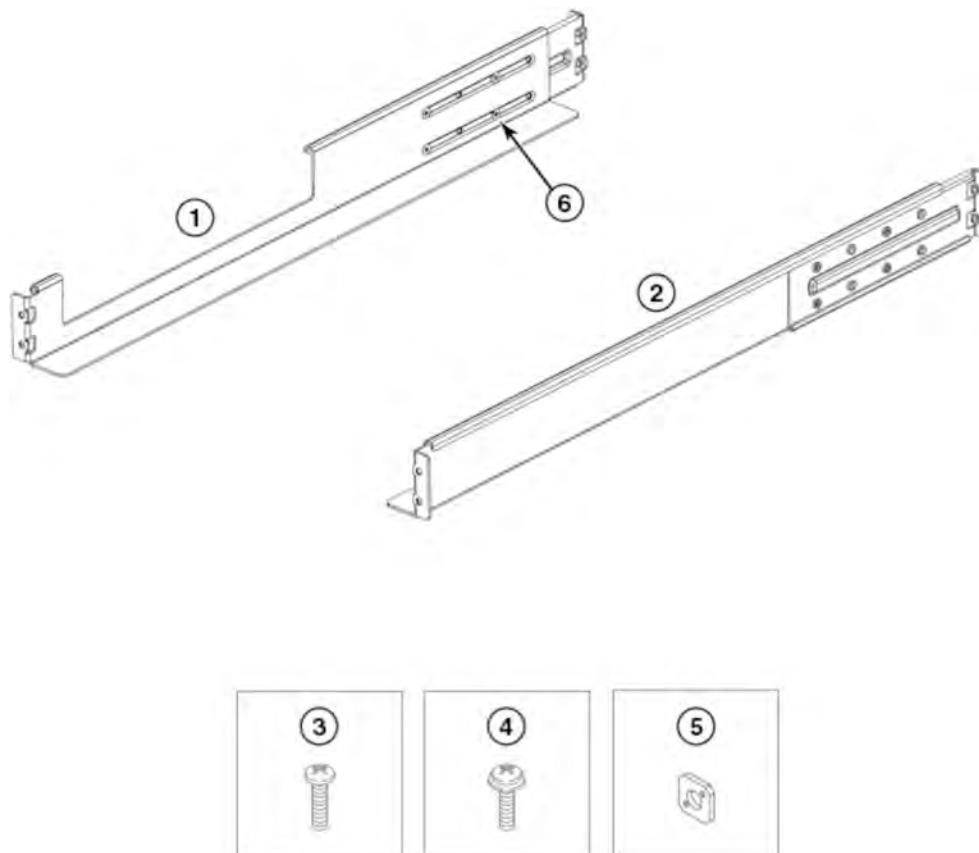
Figure 22. Rack Kit Parts

1. Left Rail
2. Right Rail
3. 10-32 x .5 in. (1.27 cm) Phillips Screw
4. 10-32 x .63 in.(1.60 cm) Phillips Screw with Square Cone Washer (for racks that have rails with round holes)
5. Alignment Washer (for racks that have rails with square holes)
6. Adjusting Screw Locations

Assembling the Rack Hardware

About this task

Use the following instructions to install the rack mount kit illustrated in the previous figure into the equipment rack for mounting the device.

Procedure

1. On each rail (1 and 2 in the previous figure), loosen the four 10-32 screws on the adjustable brackets and adjust the rails to the depth of your equipment rack. Tighten screws after adjustment.

2. Noting that the rails are designated "Left" and "Right," install each rail in the rack using four 10-32 x .63 in. or four 10-32 x .5 in. screws, two screws on each end of each rail. See the following figure.

   - Position the rails so that the adjustable ends are mounted on the intake aisle side of the rack.

   - For rails with round holes - use two 10-32 x .63 screws with square-cone washers on each end of the rail assembly. Tighten the screws to a torque of 33.6 to 42 cm-kg (29.2 to 36.5 in.-lb).

   - For rails with square holes - use the two standard 10-32 x .5 in. screws with blue Loctite on the threads and alignment washers on each end of the rail assembly. Tighten the screws to a torque of 33.6 to 42 cm-kg (29.2 to 36.5 in.-lb).
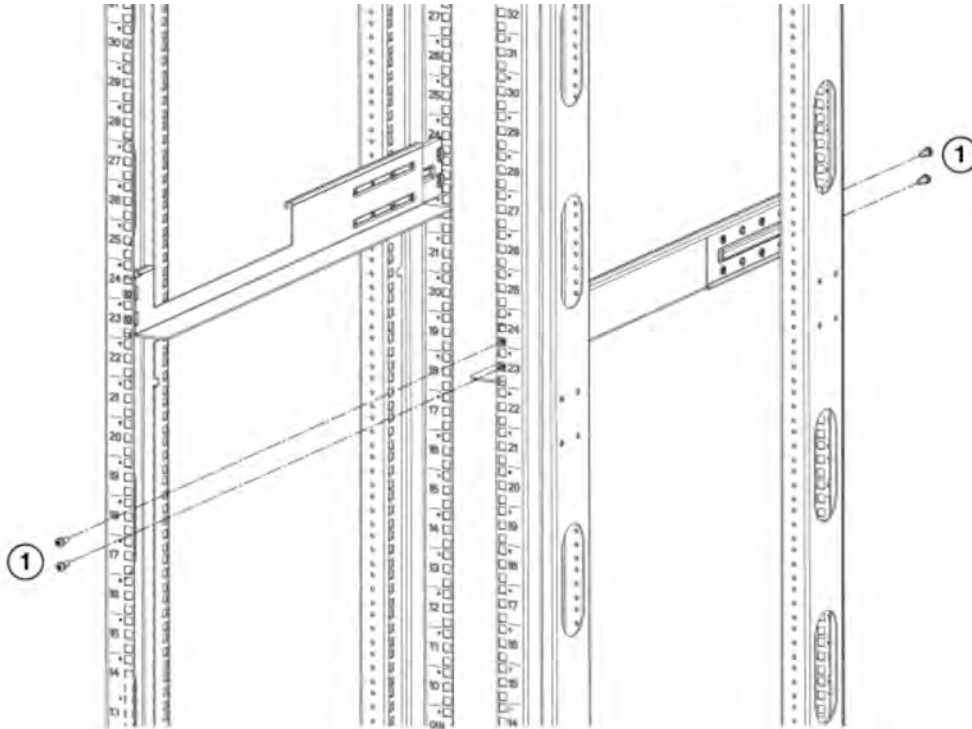
Figure 23. Device Rails Installed in Equipment Rack

3. Install either clip nuts or retainer nuts depending on whether your rack has round holes or square holes.

   These will allow you to secure the device to the rack uprights.

   Note: For rails with round holes, use the clip nuts on the rack rails for securing 10-32 x .63 in. screws. For rails with square holes, use the retainer nuts. See the following figure.
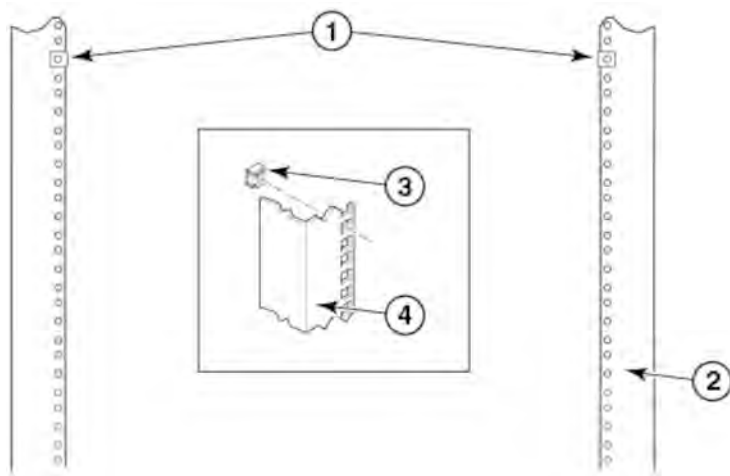
Figure 24. Using Clip Nuts and Retainer Nuts to Secure Screws to Rack Rails

Installing the Device in the Rack

Procedure

1. Ensure that the door is removed from the port side of the device if it is installed. See the procedures for removing and replacing the device door in this guide.
2. Ensure the chassis can be oriented so that the nonport side has access to intake air (cool).
3. If applicable, lock the wheels of the lift.
4. Use a lift to raise the chassis to the correct level.
5. Gently slide the chassis onto the rack, ensuring that it remains supported during the transfer. See the following figure.
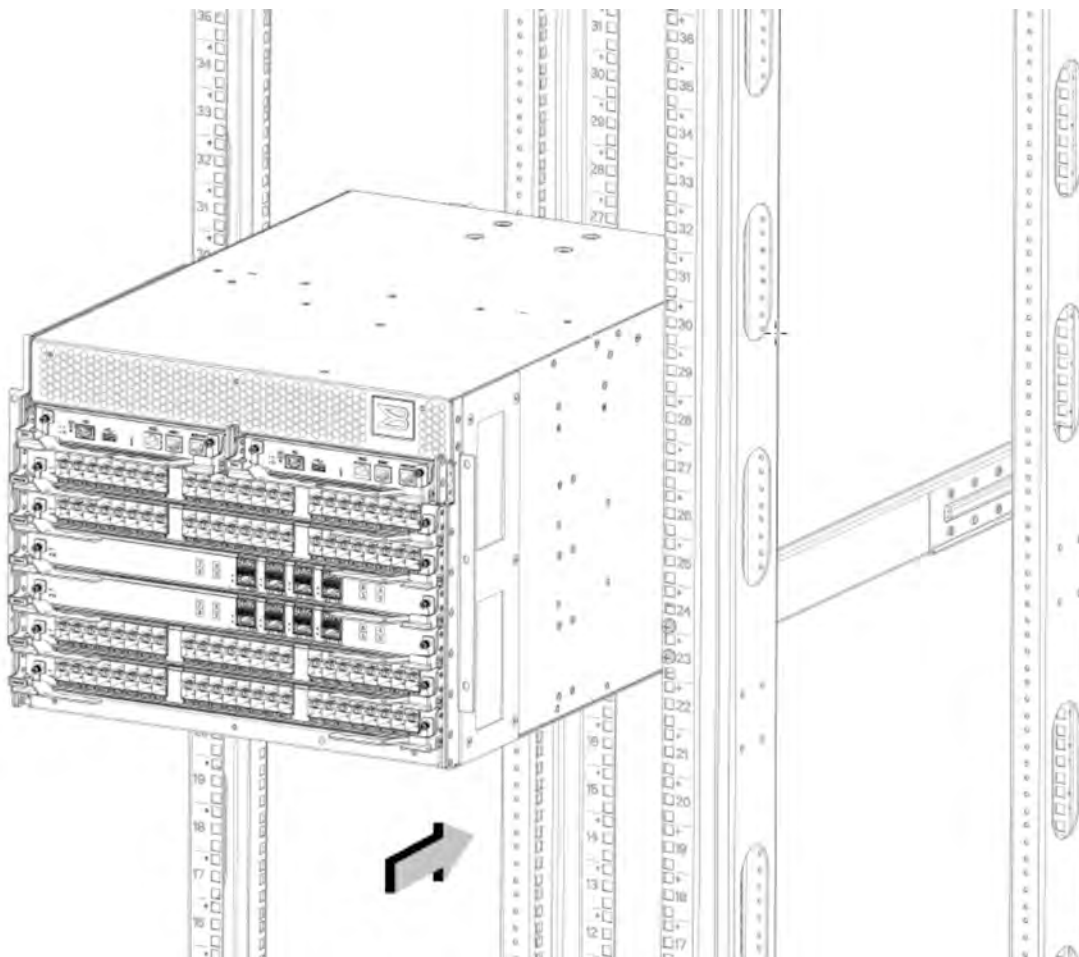
Figure 25. Installing a Chassis into the Equipment Rack

6. Secure the device to the equipment rack racks with six 10-32 x .63 screws with square-cone washers, three screws on each side. Tighten the screws to a torque of 92 cm-kg (80 in-lb). See the following figure.
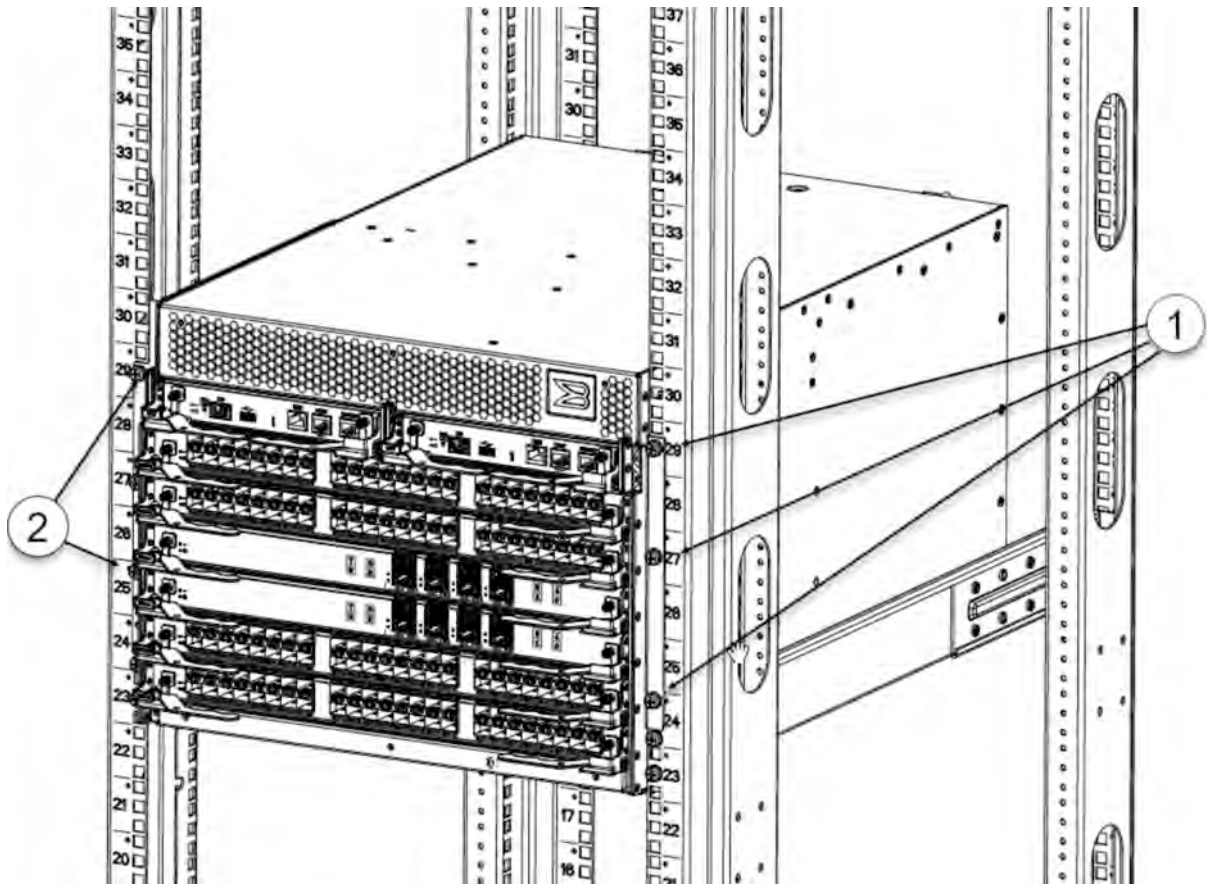
Figure 26. Chassis Installed in Equipment Rack

7. Reinstall the device door. For instructions, see procedures for removing and replacing the device door in this guide.

Chapter 4. Initial setup and verification

Once you have set up the device in a rack or as a standalone switch, it is time to attach power and set up a basic configuration

Configuration and verification task guide

Before connecting the device to the fabric, perform the following tasks to initially configure and set up the device, verify correct operation, and back up the configuration.

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

Note: The device WWN is set by the factory to match the license ID (which is based on the chassis serial number).

Table 11. Configuration and Verification Tasks

Task	Task Details or Additional Information
Establish a serial connection to the director.	Connect a serial cable to the port labeled "Console" on the active CP blade and use a terminal emulator program (such as HyperTerminal on a PC, or TERM, TIP, or Kermit in a UNIX environment) to log on to the console port and device. The blue "Active" LED illuminates on the active CP blade.
Configure IP addresses for the device.	Configure an IP address and subnet mask for a chassis management connection. Configure IP addresses, host names, subnet masks, and gateway addresses for both control processor (CP) blades.
Establish an Ethernet connection to the device.	Connect Ethernet cable to active CP blade Ethernet port labeled "Management" and establish a connection.
Set a unique domain ID for the device.	Disable the device using the `switchDisable` command, and then use the `configure` command to step through prompts to configure a domain ID. Use `switchEnable` to re-enable the device.
Set the date and time for the device.	Use the `date`, `tsTimeZone`, and `tsClockServer` commands to set date, time zone, and synchronize local time of device with the NTP server.
Customize the switch and chassis name for the device.	Use the `switchName`command, followed by new name in quote marks (`switchName`"bigswitch".) Use the `chassisname` command followed by the new name in quote marks ("chassis_002").

Table 11. Configuration and Verification Tasks (continued)	
Task	**Task Details or Additional Information**
Verify installed licenses and the license key	Enter the `license --show` command to determine display enabled licenses and the license key. The `license --show` command displays a 'License Id," which is similar to the switchWwn displayed in the output of the `switchshow` command. You use the `license --show` command to determine enabled licenses and license keys. chassis ID is the License Id/switchWwn. Record the license key and chassis ID for future reference.
Verify correct operation of director.	Check LEDs on blades and FRUs, and use the following commands to verify operation: • `errdump` • `fabricShow` • `fanShow` • `historyShow` • `psShow` • `slotShow` • `switchShow` • `tempShow`
Back up the configuration.	Use the `configUpload` command.

Items required

The following items are required for initial setup and verification of the device:

• The device is mounted and installed with the required blades, FRUs, transceivers, and cables and is connected to a power source.
• A workstation computer with an installed terminal emulator application, such as HyperTerminal for Windows.
• An unused IP address with corresponding subnet mask and gateway address.
• A serial cable with an RJ-45 connector. (The serial cable is not provided with the chassis.)
• An RJ-45 to DB-9 adapter.
• Three Ethernet cables (including one spare).
• Access to an FTP server or USB device for backing up (uploading) or downloading the device configuration or collecting `supportsave` output data (optional).
• A Brocade test-validated off-the-shelf USB drive.

Providing power to the device

Perform the steps to provide power that are applicable to your power supply model. Observe the following precautions for all power connections:

• Before connecting power, refer to the following sources of information:
  – Electrical caution and danger statements in "Safety precautions" on page 7 and "Facility requirements" on page 8

- Power supply specifications section in the Appendix A, "Product specifications," on page 191 for power supply requirements of your device.
- Connect each power supply to a different power source or circuit to provide full redundancy.
- Route the power cords so they will be out of the way when connected to the power source. Ensure that the power cords have a minimum service loop of 15.2 cm (6 in.) and are routed to avoid stress.
- Remember that power is supplied to the device as soon as the first power supply is connected to a power source.

Connecting the power cord to AC power supplies

About this task

Complete the following steps to connect the power cord from the facility AC power source to the device's AC power supply. Before connecting to power, be sure to observe all "Power Precautions" in "Safety precautions" on page 7. In addition, see the power supply specifications and requirements in Appendix A, "Product specifications," on page 191.

Procedure

1. Install all power supplies provided for your device if they are not already installed. See "Installing a power supply" on page 161 for procedures.
2. When installing the device in a rack, route power cables from power distribution units (PDUs) so they do not cover air vents in chassis.
3. Connect the provided AC power cords to a power source with a voltage of 200–240 VAC, 50/60 Hz or optionally to a power source with a voltage of 100–120 VAC, 50/60 Hz.

   ⚠️ **DANGER:** High Touch Current. Earth connection essential before connecting supply.

   Note: The use of the high-voltage line (200–240 VAC) is highly recommended because of better power-conversion efficiency. With 120 VAC primary input, the power distribution unit (PDU) supplies roughly half the available wattage, which can limit blade and port configurations. For a "fully-loaded" chassis with maximum supported blades and optics, two power supplies connected to 200–240 VAC are required for full N+N redundancy. For details on power supplies required for operation and high availability, see the "Power Supply Requirements" and "Power Consumption" tables in the Appendix A, "Product specifications," on page 191.
4. Route the cords so they will be out of the way when connected to the power source. Ensure that the power cords have a minimum service loop of 15.2 cm (6 in.) available and are routed to avoid stress.
5. Plug the power cords into power supplies. The power supply LED will light green when power is applied. Note that after one power supply is plugged into AC power, LEDs on the remaining installed power supplies will flash green until they also have power applied.

   The director performs a power-on self-test (POST) each time it is powered on. POST takes approximately 10 minutes, during which time status LEDs on installed blades and other FRUs may display amber. Power LEDs on all FRUs display green when power-on self-test (POST) is complete and all FRUs are functional. You can bypass POST by using the `fastBoot` command. You can also disable POST for successive reboots using the `diagDisablePost` command.

   Note:

   Do not connect the device to the network until the IP addresses are configured.
6. After POST is complete, verify that the power LEDs on blades and other FRUs are green.

   For information about LED patterns, see *Monitoring the Device*.
7. Ground the chassis by attaching a ground wire from building the ground to an appropriate crimp connector and attaching the connector to the 2AWG Panduit LCD2-14AF lug located to the left of the bottom fan assembly near the bottom of the chassis.

Connecting to HVAC/HVDC power supplies

About this task

Perform steps in this section to apply power to the dual-function high-voltage AC and DC (HVAC/HVDC) power supply. This power supply converts high-voltage DC or AC input to appropriate DC power for the device.

Make sure that you observe the electrical caution and danger statements in "Safety precautions" on page 7 when connecting this power supply.

Note: The equipment installation must meet NEC/CEC code requirements. Consult local authorities for regulations.

Note: Power is supplied to the device as soon as the first power supply is connected to a power source.

⚠️ **CAUTION:** The maximum input voltage for connection to the HVAC/HVDC power supply should not exceed 305 VAC and 400 VDC .

Procedure

1. If connecting to AC power, attach an AC power plug to the unterminated wires on the HVAC/HVDC power cord that meets your facility and local code requirements. If connecting to DC power, verify how you will attach these unterminated wires to your site's DC power terminal blocks. For more information on the HVAC/HVDC power cord available for these power supplies, see "Using HVAC/ HVDC power cords" on page 48.
2. Install all power supplies provided for your device if not already installed. See "Installing a power supply" on page 161 for procedures.
3. When installing the device in a rack, route power cables from power distribution units (PDUs) so they do not cover air vents in chassis.
4. Before connecting the power cord to a power supply, first remove the cable restraint cover, if it is installed under the power cord connector. Remove the cover by unscrewing the two torx head screws.

   Save the retainer cover and screws for reinstallation after plugging in the power cord.

   Note: When removing the metal cable restraint cover under the high voltage power supply inlet, remove the 2 Torx head screws only.
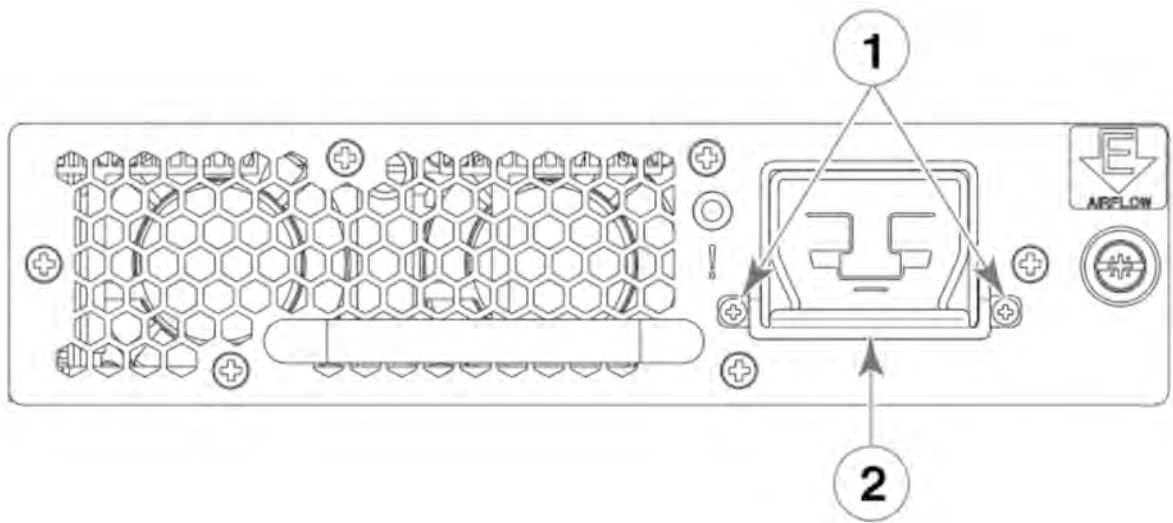
5. Connect power cords to installed power supplies.

   The connector on the power cord is keyed so that it only fits one way into the power supply connector. Note that the connector's latch should be positioned under the connector and will latch when the power cord connector is fully inserted into the power supply.
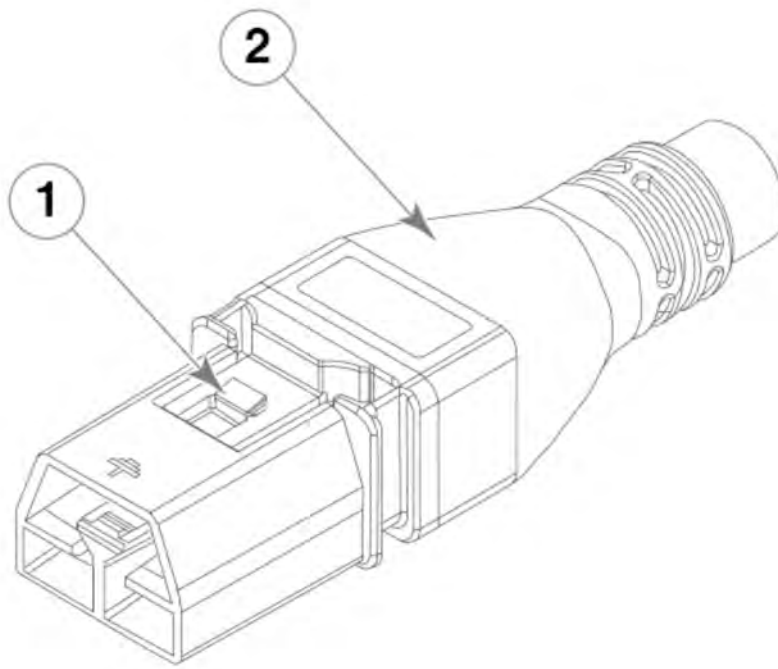
6. Attach the cable restraint cover under the power cord connector using its two torx head screws (see Step "4" on page 46).

   Note: This retainer cover protects the power cord from being accidentally unlatched and disconnected from the power supply.

7. If connecting to an AC power source, use the following steps. (If connecting to a DC power source, go on to Step "8" on page 47.)

   a) Make sure that you observe the electrical caution and danger statements in "Safety precautions" on page 7 when connecting this power supply.

   b) Make sure that the AC power plug is attached to the power-source end of the HVAC/HVDC power cord that meets your facility and local code requirements.

      For more information on the HVAC/HVDC power cord available for these power supplies, see "Using HVAC/HVDC power cords" on page 48.

      ⚠️ **DANGER:** Make sure that the power source circuits are properly grounded, and then use the power cord supplied with the device to connect it to the power source.

   c) If connecting to an AC power source, connect to a power source with voltage of 200–277 VAC, 50/60 Hz (recommended).

      Note: Use of a high-voltage line (200–277 VAC) is highly recommended because of better power-conversion efficiency. For a "fully-loaded" chassis with maximum supported blades and optics, two power supplies connected to 200–277 VAC are required for full N+N redundancy. For details on power supplies required for operation and high availability, see "Power Supply Requirements" and "Power Consumption" tables in the Appendix A, "Product specifications," on page 191.

      ⚠️ **DANGER:** High Touch Current. Earth connection essential before connecting supply.

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

8. If connecting to an DC power source, use the following steps. (If connecting to a AC power source, go to Step 7.)

   a) Make sure that you observe applicable electrical caution and danger statements in "Safety precautions" on page 7 when connecting this power supply.

b) Terminate the negative (-) and positive (+) unterminated wires on the HVAC/HVDC power cord to the DC power source. Connect the ground wire to building ground.

For more information on the HVAC/HVDC power cord available for these power supplies, see "Using HVAC/HVDC power cords" on page 48.

Note: Make sure that there is an adequate circuit breaker in the DC input circuit to the system based on input wiring to the product and input voltage.

9. Route the cords so they will be out of the way when connected to the power source. Ensure that the power cords have a minimum service loop of 15.2 cm (6 in.) available and are routed to avoid stress.

10. After power is applied, the power supply LED will light green.

The director performs a power-on self-test (POST) each time it is powered on. POST takes approximately 10 minutes, during which time status LEDs on installed blades and other FRUs may display amber. Power LEDs on all FRUs display green when power-on self-test (POST) is complete and all FRUs are functional. You can bypass POST by using the `fastBoot` command. You can also disable POST for successive reboots on the device using the `diagDisablePost` command.

Note:

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

11. After POST is complete, verify that the power LEDs on blades and other FRUs are green.

For information about LED patterns, see the "Monitoring the Device" chapter.

12. Ground the chassis by attaching a ground wire from facilites ground to an appropriate crimp connector and attaching the connector to the 2AWG Panduit LCD2-14AF lug located to the left of the bottom fan assembly near the bottom of the chassis.

Using HVAC/HVDC power cords

HVAC/HVDC power supply power cords, available from Brocade, are shipped with an Anderson Saf-D-Grid 400 connector on the power supply end and three unterminated 14 AWG UL 600V 90C wires with ring lugs on the power source end. Power cord length is 6 m (19 ft. 8 in.). For connecting to a power source, attach either an AC power plug to these wires that meets your facility and local code requirements, or connect these wires to appropriate DC power terminal blocks.

The following table defines the function of the 14 AWG wires in the power cable:

Table 12. HVAC/HVDC Power Cable		
Wire Label	**Color**	**Function**
L+	Brown	Return positive (+)
–	Blue	Negative (-)
PE	Green with yellow stripe	Earth ground (PE)

The Anderson Saf-D-Grid connector on the power supply end of the cord is keyed so that it only fits one way into the power supply. Note that the connector's latch should be positioned under the connector and will latch when the power cord connector is fully inserted into the power supply.
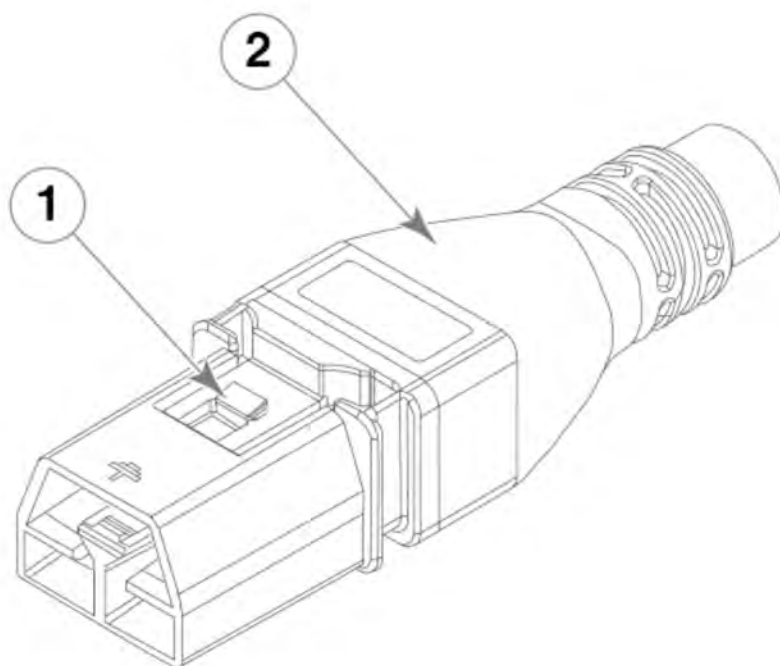
Establishing a serial connection to the device

About this task

To establish a serial connection to the console port on the device, complete the following steps.

Procedure

1. Verify that the device is powered on and that POST is complete by verifying that all power LED indicators on the power supplies, fans, and blades display a steady green light.
2. Remove the shipping cap from the console (IOIO) port on the active CP blade. The active CP is indicated by an illuminated blue LED on the CP blade front panel.

   Note: The console or serial port is intended primarily for the initial setting of the IP address and for service purposes.
3. Use a serial cable (not provided with the chassis) to connect the console (serial) port on the active CP to a computer workstation.

   Note: The active CP is indicated by an illuminated blue LED, labeled "Active," on the CP blade front panel.

   If the serial port on the workstation is RJ-45 instead of RS-232, remove the adapter on the end of the serial cable and insert the exposed RJ-45 connector into the RJ-45 serial port on the workstation.
4. Access the device using a terminal emulator application (such as HyperTerminal in a Windows environment or tip in a UNIX environment).
5. Disable any serial communication programs running on the workstation (such as synchronization programs).
6. 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:

Parameter	Value
Bits per second	9600

Parameter	Value
Data bits	8
Parity	None
Stop bits	1
Flow control	None

Note: Flow control is not supported on the serial consoles when the serial consoles are attached to remote terminal servers and must be disabled on the customer-side remote terminal server and the host-side clients.

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

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

If ttyb is already in use, use ttya -9600 instead.

When the terminal emulator application stops reporting information, press Enter. The following logon prompt displays:

```
    CP0 Console Login:
```

Note: CP0 in the preceding prompt is an example. "CP1" will display if it is the active CP.

7. Log on to the console using admin as the default logon name and password as the default password.

As logon to the device occurs, you are prompted to change the device passwords.

```
Please change passwords for switch default accounts now.
Use Control-C to exit or press 'Enter' key to proceed.
```

8. Press Enter to step through a procedure to change the passwords as shown in the following example. To skip modifying the password, press Ctrl+C.

```
-----------------------------------------------------
for user - admin
Changing password for admin
Enter old password:
Enter new password:
Re-type new password:
passwd: all authentication tokens updated successfully
```

Passwords can be 8 to 40 characters long. They must begin with an alphabetic character. They can include numeric characters, periods (.), and underscores (_) only. Passwords are case-sensitive, and they are not displayed when you enter them on the command line. For more information on passwords, refer to the *Fabric OS Administration Guide*.

Configuring the IP addresses

About this task

The device requires three IP addresses, which are configured using the ipaddrset command. IP addresses are required for both CP blades (CP0 and CP1) and for chassis management (shown as SWITCH under the ipaddrshow command) in the device.

Following are the default IP addresses and host names for the device:

- 10.77.77.75 / CP0 (the CP blade in slot 1 at the time of configuration)
- 10.77.77.74 / CP1 (the CP blade in slot 2 at the time of configuration)

Use one of the following formats for IPv4 or IPv6 addressing when entering the IP address using the `ipaddrset` command:

- If using an IPv4 IP address, enter the IP address in dotted-decimal notation as prompted.

```
Ethernet IP Address: [192.168.74.102]
```

- If using an IPv6 address, enter the network information in colon-separated notation as prompted.

```
device:admin> ipaddrset -ipv6 --add 1080::8:800:200C:417A/64
```

Note:

Resetting an IP address while the device has active IP traffic or has management and monitoring tools running, such as DCFM, Fabric Watch, and SNMP can cause traffic to be interrupted or stopped.

Complete the following steps to set the IP addresses for the device.

Procedure

1. Log on to the device through a serial console connection to the active CP blade.

   The active CP is indicated by an illuminated blue LED on the blade front panel. If you are already logged on through a console port, you can determine whether you are logged in to the active or standby CP by entering `hashow` at the prompt. The following example shows the local login at CP1, which is the active blade.

```
Core-X7-8_130239:FID128:admin> hashow
Local CP (Slot 2, CP1): Active, Cold Recovered
Remote CP (Slot 1, CP0): Standby, Healthy
HA enabled, Heartbeat Up, HA State synchronized
```

2. Configure the chassis management IP address by entering the `ipaddrset -chassis` command:

```
swDir:admin> ipAddrSet -chassis
```

   Enter the required information at the prompts. Specify the `-chassis` IP address. The `-sw 0` IP address is not valid on this device.

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

   Following is an example configuration for setting the chassis IP address.

```
swDir:admin> ipaddrset -chassis
DHCP [Off]:
Ethernet IP Address [10.0.0.0]:192.168.1.1
Ethernet Subnetmask [255.0.0.0]:255.255.240.0
IP address is being changed...
```

3. Set up the CP0 IP address by entering the `ipaddrset -cp 0` command:

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

   Enter the required information at the prompts. Following is an example configuration for setting the CP0 IP address.

```
swDir:admin> ipaddrset -cp 0
DHCP [Off]:
Host Name [cp0]:
Ethernet IP Address [10.0.0.0]:192.168.1.2
Ethernet Subnetmask [255.0.0.0]:255.255.260.0
Gateway IP Address [10.0.0.0]:10.38.160.1
IP address is being changed...
Done.
```

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

```
swDir:admin> ipAddrSet -cp 1
```

Enter the required information at the prompts. The following is an example configuration for setting the CP1 IP address.

Following is sample configuration for setting the CP1 IP address:

```
swDir:admin> ipaddrset -cp 1
DHCP [Off]:
Host Name [cp0]:
Ethernet IP Address [10.0.0.0]:192.168.3
Ethernet Subnetmask [255.0.0.0]:255.255.230.0
Gateway IP Address [10.0.0.0]:10.38.160.1
IP address is being changed...
Done.
```

Establishing an ethernet connection to the device

About this task

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

Note: Connecting the CP blades to a private network or VLAN is recommended.

After establishing an Ethernet connection, you can complete the device configuration using a serial console connection, telnet connection, or management applications, such as Web Tools or Brocade Network Advisor.

Perform the following steps to establish an Ethernet connection to the device.

Procedure

1. Remove the shipping plug from the Ethernet port on the active CP blade.

   The active CP is indicated by an illuminated blue LED on the blade front panel.

2. Insert one end of an Ethernet cable into the Management (MGMT) Ethernet port.

3. Connect the other end to an Ethernet 10/100/1000 BASE-T LAN.

4. Complete any additional device configuration procedures for the device using one of the following steps:

   • Log on to the device using a serial console connection and `admin` logon.

   • Log on to the device through a telnet session using the chassis management IP address and `admin` logon.

Setting the domain ID

About this task

Each device in the fabric must have a unique domain ID. The default domain ID is 1. If the device is not powered on until after it is connected to the fabric and the default domain ID is already in use, the domain ID for the new device is automatically reset to a unique value. If the device is connected to the fabric after it has been powered on and the default domain ID is already in use, the fabric segments.

You can use the `fabricshow` command on another device in the fabric to view domain IDs already assigned. Manually configure a unique domain ID using the `configure` command as in the following steps:

Procedure

1. Log on to the device using one of the following methods:

    - A serial console connection to the active CP blade. The active CP is indicated by an illuminated blue LED on the blade front panel.
    - A telnet session using the chassis management IP address.

2. Log on to the device using `admin` as your password. If you have not changed the default password, use `password`.

3. Perform the following steps to modify the Domain ID.

    a) Disable the device by entering the `switchdisable` command.

    b) Enter the `configure` command. The command prompts display sequentially. Enter a new value or press `Enter` to accept each default value.

    c) Enter `y` after the `Fabric param` prompt.

    ```
    Fabric param (yes, y, no, n): [no] y
    ```

    d) Enter a unique domain ID (such as the domain ID used by the previous device, if still available).

    ```
    Domain: (1..239) [1] 3
    ```

    e) Complete the remaining prompts or press Ctrl+D to accept the remaining settings without completing all the prompts.

    f) Re-enable the device by entering the `switchenable` command.

Setting the date and time

About this task

The date and time settings are used for event logging, error detection, and troubleshooting; and hence, you should set them correctly. However, device operation does not depend on the date and time; a device with an incorrect date or time values still functions properly.

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

Perform the following steps to set the date and time.

Procedure

1. Log on to the device using one of the following methods:

    - A serial console connection to the active CP blade. The active CP is indicated by an illuminated blue LED on the blade front panel.
    - A telnet session using the chassis management IP address.

2. Log on to the device using `admin`. If you have not changed the default password, use `password`.

3. Enter the `date` command, using the following syntax:

    ```
    date "mmddHHMMyy"
    ```

    The values are:

    - mm is the month; valid values are 01 through 12.
    - dd is the date; valid values are 01 through 31.
    - HH is the hour; valid values are 00 through 23.
    - MM is minutes; valid values are 00 through 59.

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

```
switch:admin> date
Fri Sep 28 17:01:48 UTC 2016
switch:admin> date "0927123016"
Thu Sep 27 12:30:00 UTC 2016
switch:admin>
```

Setting the time zone

About this task

The default time zone is Coordinated Universal Time (UTC). The time zone needs to be set only once because the value is stored in nonvolatile memory. Use the following procedure to set the time zone. The time zone change will take affect after the next system reboot.

Procedure

1. Log on to the device using one of the following methods:
   - A serial console connection to the active CP blade. The active CP is indicated by an illuminated blue LED on the blade front panel.
   - A telnet session using the chassis management IP address.
2. Log on to the device using admin. If you have not changed the default password, use password.
3. Use one of the following steps for the tsTimeZone command.
   - Enter the tsTimeZone --interactive command, enter the appropriate number as shown in the following example, and then follow prompts.

```
sw0:admin> tstimezone --interactive
Please identify a location so that time zone rules can be set correctly.
Please select a continent or ocean.
1) Africa
2) Americas
3) Antarctica
4) Arctic Ocean
5) Asia
6) Atlantic Ocean
7) Australia
8) Europe
9) Indian Ocean
10) Pacific Ocean
11) none - I want to specify the time zone using the POSIX TZ format.
Enter number or control-D to quit ?
```

   - Enter tsTimeZone [-*houroffset*[,*minuteoffset*]] command as follows:
     - For Pacific Standard Time, enter tsTimeZone -8,0.
     - For Central Standard Time, enter tsTimeZone -6,0.
     - For Eastern Standard Time, enter tsTimeZone -5,0.

Table 13. Example: tsTimeZone Command Parameter Selection for the U.S. Time Zones	
Local Time	**tsTimeZone Parameter (Difference from UTC)**
Atlantic Standard	−4,0
Atlantic Daylight	−3,0
Eastern Standard	−5,0

Table 13. Example: tsTimeZone Command Parameter Selection for the U.S. Time Zones (continued)	
Local Time	**tsTimeZone Parameter (Difference from UTC)**
Eastern Daylight	−4,0
Central Standard	−6,0
Central Daylight	−5,0
Mountain Standard	−7,0
Mountain Daylight	−6,0
Pacific Standard	−8,0
Pacific Daylight	−7,0
Alaskan Standard	−9,0
Alaskan Daylight	−8,0
Hawaiian Standard	−10,0

- Enter the `tsTimeZone` command followed by the time zone, such as US/Pacific, US/Central, or US/Eastern as in the following example.

```
switch_99:Admin> tstimezone US/Pacific
System Time Zone change will take effect at next reboot
```

Synchronizing the local time with an external source

About this task

Perform the following steps to synchronize the local time of the principal or primary FCS device with the time of an external NTP server.

Procedure

1. Log on to the device using one of the following methods:
    - A serial console connection to the active CP blade. The active CP is indicated by an illuminated blue LED on the blade front panel.
    - A telnet session using the chassis management IP address.
2. Log on to the device using `admin`. If you have not changed the default password, use `password`.
3. Enter the `tsClockServer` *ipaddr* command.

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

```
switch:admin> tsclockserver 192.168.126.60
Updating Clock Server configuration...done.
Updated with the NTP servers
```

Customizing the chassis and switch name

About this task

Refer to the considerations and rules for creating switch, fabric, and chassis names listed in the *Fabric OS Administration Guide*.

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

Procedure

1. Log onto the device using one of the following methods:

   - A serial console connection to the active CP blade. The active CP is indicated by an illuminated blue LED on the blade front panel.
   - A Telnet session using the chassis management IP address.

2. Log onto the device using `admin` as your password. If you have not changed the default password, use `password`.

3. Enter `chassisName` followed by the new name.

   ```
   switch:admin> chassisname Chassis_01
   ```

   A message displays explaining that the chassis name change is applied and the new name will display at next login. You can enter `chassisName` to verify the new name after login.

4. To change the switch name, enter `switchName` followed by the new name.

   ```
   swDir:admin> switchName Switch_01
   Committing configuration...
   Done.
   Switch name has been changed.Please re-login into the switch for the
   change to be applied.
   ```

   A message displays that the name change is applied and the new name will display at the next login. You can enter `switchName` to verify the new name after login.

5. Record the new names for future references.

Verifying installed licenses and the license key

About this task

All licenses come preinstalled on the director. Use the following steps to list installed licenses and to record your license key and chassis ID for future reference.

Procedure

1. Log on to the device using one of the following methods:

   - A serial console connection to the active CP blade. The active CP is indicated by an illuminated blue LED on the blade front panel.
   - A telnet session using the chassis management IP address.

2. Log on to the device using `admin` as your password. If you have not changed the default password, use `password`.

3. Enter the `license  --show` command to determine which licenses are enabled.

   This will list installed licenses and display a license key, such as aNYtMJg7tcMZrTZ9JTXBC4SXWLJMY3QfBKYHG.

4. Enter the `license  --show` command on the active CP blade to obtain the license ID (the switchWwn, formerly chassis ID).

The chassis ID is required to obtain and activate licenses for the device.

5. Store and record the license key file for future reference.

What to do next

Refer to the *Fabric OS Administration Guide* for more information.

Verifying correct operation

About this task

Perform the following steps to verify correct operation of the device.

Procedure

1. Check the LEDs of all power supplies, fans, and blades to verify that all are functional.
2. Log on to the device using one of the following methods:

   * A serial console connection to the active CP blade. The active CP is indicated by an illuminated blue LED on the blade front panel.
   * A Telnet session using the chassis management IP address.
3. Log on to the device using `admin` as your password. If you have not changed the default password, use `password`.
4. Verify the correct operation of the device by entering the following commands. Copy the output to a file to save the information.

Command	Description
`errDump`	Displays any errors.
`fabricShow`	Displays information about the device operation in the fabric and general information about the fabric.
`fanShow`	Displays fans status and information.
`historyShow`	Displays the device history.
`psShow`	Displays power supply status and information.
`slotShow`	Displays the current status of each slot in the device.
`slotshow -m`	Displays blades (with model numbers) detected in each slot.
`slotshow -p`	Displays power consumption data and enabled status for installed blades.
`switchShow`	Displays switch status and information.
`tempShow`	Displays temperature status and information.

Backing up the configuration

About this task

Back up the configuration on a regular basis to ensure that a complete configuration is available for downloading to a replacement switch.

Observe the following notes about configuration data:

* Passwords are not saved in the configuration file, and are not uploaded during a configuration upload.
* It is recommended that the configuration be backed up on a regular basis to ensure that a complete configuration is available for downloading to a replacement chassis.

- Besides saving configuration files to an FTP server or local file system, you can save to a test validated USB device with the `usbstorage` command.

Note: Use a USB drive that has been test validated (verified) by Broadcom (Brocade):

- SanDisk 32 CZ48 USB 3.0 Flash Drive (SDCZ48-032G-UAM46)
- SanDisk 16 CZ48 USB 3.0 Flash Drive (SDCZ48-016G-UAM46)
- Kingston 32GB DataTraveler 100 G3 USB 3.0 Flash Drive (DT100G3/32GB)
- Kingston 32GB DataTraveler G4 USB 3.0 Flash Drive (DTIG4/32GB)
- PNY Attache 3.0 4 USB 32GB Flash Drive
- PNY Attache 3.0 4 USB 16GB Flash Drive

These drives are not orderable from Broadcom but are generically-branded and can be purchased from other suppliers.

Procedure

1. Log on to the device using one of the following methods:

    - A serial console connection to the active CP blade. The active CP is indicated by an illuminated blue LED on the blade front panel.
    - A telnet session using the chassis management IP address.

2. Log on to the device using `admin` as your password. If you have not changed the default password, use `password`.

3. Back up the device configuration using the `configUpload` command.

    Follow the prompts to upload the configuration to an external host using the file transfer protocol (FTP), secure copy protocol (SCP), or secure FTP (SFTP), or save the configuration to the local file system on device or attached USB device.

    ```
    Core-X7-8_130239:FID128:admin> configupload
    Protocol (scp, ftp, sftp, local) [ftp]:
    Server Name or IP Address [host]: 10.154.5.40
    User Name [user]: anonymous
    Path/Filename [(home dir)/config.txt]: dumps/supportsaves/andy/fos9k/folder/d239    -all
    Section (all|chassis|FID# [all]):

    configUpload complete: All selected config parameters are uploaded
    ```

4. Back up the virtual fabric configuration using the `configUpload -vf` command.

    For more information on using the `configUpload` and `configUpload -vf` commands, refer to the *Fabric OS Command Reference Manual*.

5. Enter the following commands for additional configuration information that you can save to files:

    - `configShow`
    - `ipaddrShow`
    - `licenseShow`
    - `switchShow`

Powering down the chassis

About this task

Perform the following steps to power down the chassis.

Procedure

1. Shut down the chassis using the `sysShutdown`command.

```
switch::admin> sysshutdown
This command will shutdown the operating systems on your switch.
You are required to power-cycle the switch in order to restore operation.
Are you sure you want to shutdown the switch [y/n]?y
HA is disabled
Stopping blade 1
Shutting down the blade....
Stopping blade 2
Shutting down the blade....
Stopping blade 8
Shutting down the blade....
Broadcast message from root (pts/1) Tue Aug 23 14:23:06 2010...
The system is going down for system halt NOW !!
```

Note: If you do **not** use the `sysshutdown` command and you sequence power off on power distribution units (PDU) with a few seconds between power-offs, be aware that a low-power condition will be detected and logged along with possible blade power-offs before shutdown. This is an expected error condition due to delays in powering down PDUs without halting the control processors first using `sysShutdown`.

2. Power off the chassis by disconnecting all power cords or switching off rack power source.

   Note that power supply LEDs will continue to flash green briefly after disconnecting power until power supply is completely off.

3. To disconnect power cables from HVAC/HVDC power supplies only, perform the following steps.

   a) Remove the cable restraint cover, if installed under the power cord connector, by unscrewing the two torx head screws.
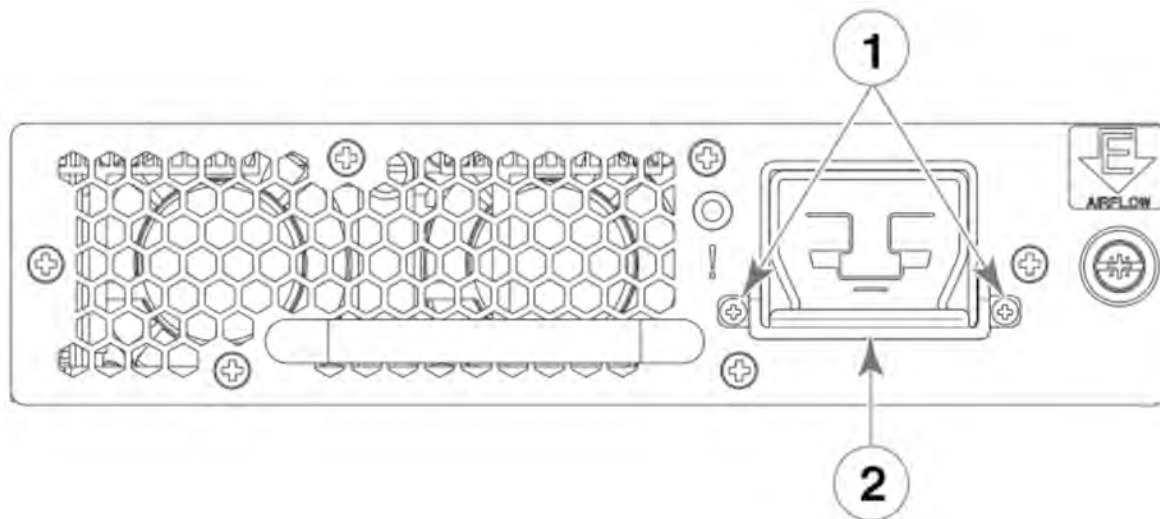
       ⚠ **CAUTION:** When removing the metal cable restraint cover under the high voltage power supply inlet, remove the two Torx head screws only.

   b) Disconnect the power cable from the power supply.

   Note: The latch for the power cable connector is positioned under the connector. Press on the latch using a small screwdriver or other tool to unlatch from the power supply.
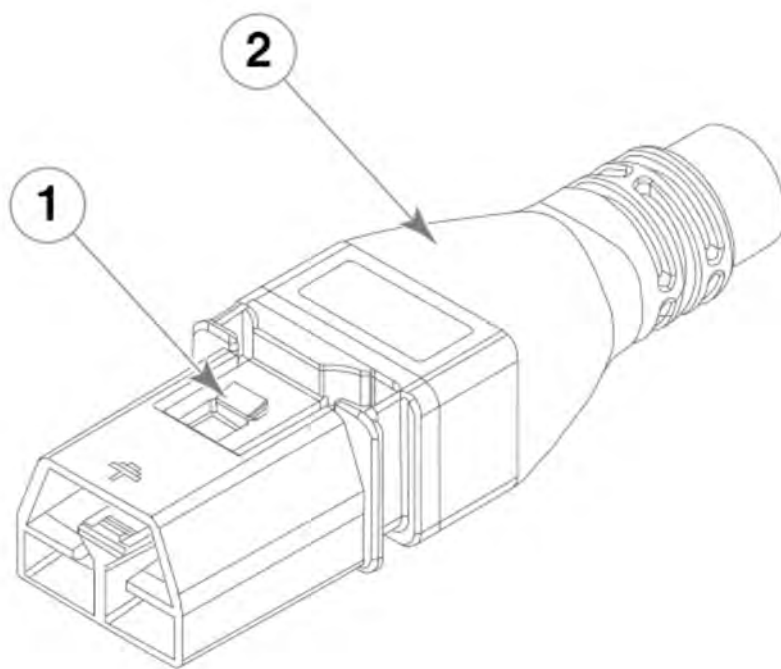
Chapter 5. Installing transceivers and cables

Complete the steps in the following topics to install the transceivers and then connect the cables.

Supported transceivers and cables

The following table is a general reference of the types of transceivers supported on device blades.

Table 14. Supported Transceivers and Cables

Blade	Transceiver Type	AutoNegotiate/Fixed	Speeds Supported
FC32-48 port blade	32Gb/s, SWL, LWL, ELWL	Autonegotiate	8, 16, and 32Gb/s
	16Gb/s SFP+, SWL, LWL, ELWL	Autonegotiate	4, 8, and 16Gb/s
	10Gb/s SFP+, SWL, LWL	Fixed	10Gb/s
FC32-64 port blade	4x32Gb/s QSFP+, SWL	Autonegotiate (each 32Gb/s channel)	4x32Gb/s and 4x16Gb/s
	4x16Gb/s QSFP+, SWL	Autonegotiate (each 16Gb/s channel)	4x16, 4x8, and 4x4Gb/s
	128Gb/s CWDM4 2 km QSFP+ for ISL links	Fixed	4x32Gb/s
	40GbE QSFP+ with breakout for 40GBASE SR4 and 10GBASE SR connectivity over MTP 1x8 or 1x12 cabling	Fixed	4x10GbE (breakout mode) or 40 GbE
	40GbE QSFP+ for bidirectional SR connectivity with LC connectors	Fixed	40GbE
	100GbE QSFP28 for SR4 connectivity over MTP 1x12 cabling This QSFP+ provides 4x25GbE connectivity only.	Fixed	4x25GbE (breakout mode)
FC32-X7-48 port blade	32Gb/s, SWL, LWL, ELWL	Autonegotiate	8, 16, and 32Gb/s
	16Gb/s SFP+, SWL, LWL, ELWL	Autonegotiate	4, 8, and 16Gb/s
	10Gb/s SFP+, SWL, LWL	Fixed	10Gb/s
FC64-48 port blade	32Gb/s, SWL, LWL, ELWL	Autonegotiate	8, 16, and 32Gb/s
	10Gb/s SFP+, SWL, LWL	Fixed	10Gb/s

Table 14. Supported Transceivers and Cables (continued)

Blade	Transceiver Type	AutoNegotiate/Fixed	Speeds Supported
SX6 extension blade	32Gb/s SFP28, SWL, LWL	Autonegotiate	8, 16, and 32Gb/s
	16Gb/s SFP+, SWL, LWL, ELWL	Autonegotiate	4, 8, and 16Gb/s
	10Gb/s, SFP+, SWL, LWL	Fixed	10Gb/s
	10GbE SFP+, SR, LR, USR	Fixed	10GbE
	10GBase-ZRD tunable SFP+	Fixed	10GbE
	1GbE SFP, Copper	Fixed	1GbE
	1GbE SX SFP, LX SFP, and CWDM SFP+	Fixed	1GbE
	40GbE QSFP, SR4, LR4, ER4	Fixed	40GbE
CR64-4 core routing blade	4xGen 7 ICL QSFP56 SWL	Fixed	Gen 7 ICL speed
	4x32Gb/s QSFP28, SWL	Manual port speed configuration, 32Gb/s default	32Gb/s or 16Gb/s
	4x32Gb/s QSFP28, LWL (2 km)	Fixed	32Gb/s
CR64-8 core routing blade	4xGen 7 ICL QSFP56 SW	Fixed	Gen 7 ICL speed
	4x32Gb/s QSFP28, SWL	Manual port speed configuration, 32Gb/s default	32Gb/s or 16Gb/s
	4x32Gb/s QSFP28, LWL (2 km)	Fixed	32Gb/s

Gen 7 ports require the use of Gen 7 or 32Gb/s optics that are labeled with an SEC designation in the optic description. Gen 6 32Gb/s optics that do not have SEC in the product description are not supported. The image provides an example of an optic label with SEC in the description (32G LW-SEC 10km).

The following note applies to QSFP transceivers on core routing blades.

- To connect an ICL between a QSFP on a SAN256B-7 or SAN512B-7 Director core routing blade and a QSFP on a SAN384B-2 or SAN768B-2 Director core routing blade, use the 4x32Gb/s QSFP28 SWL transceiver that supports 4x32Gb/s and 4x16Gb/s operation. Use the appropriate ICL kit to meet SAN256B-7 or SAN512B-7 QSFP requirements. Contact your SAN256B-7 or SAN512B-7 representative for ordering information.

The following figures show examples of QSFP to QSFP and QSFP breakout cables.
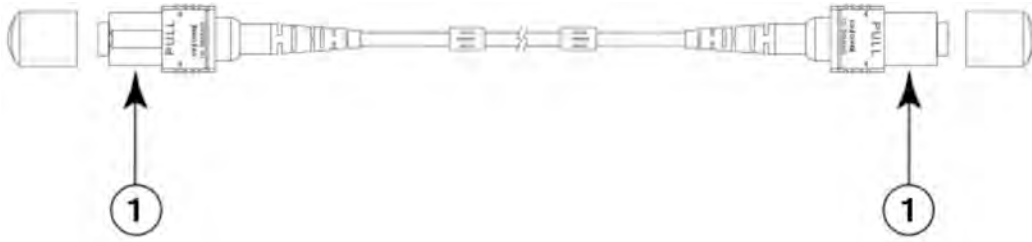
1. QSFP Quad Connector

Figure 27. QSFP to QSFP Standard Cables

This is only useful for ICLs if connecting to a patch panel.
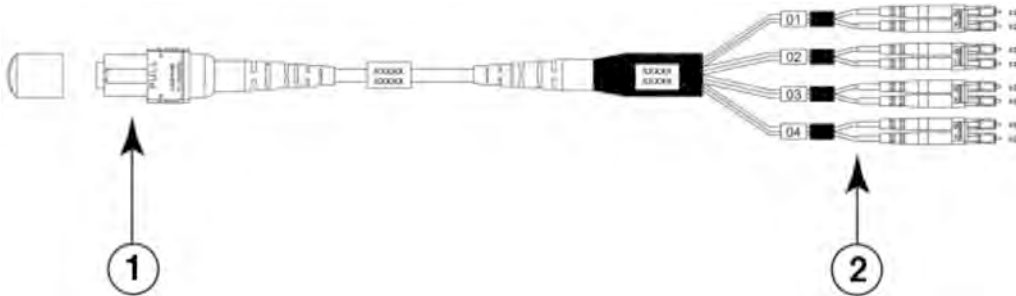
1. QSFP MPO Connector

2. SFP Connectors

Figure 28. QSFP to SFP Breakout/Cables

> ⚠️ **DANGER:** Use only optical transceivers that are qualified by Broadcom and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 60825 and EN60825. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

For Class 1M transceiver specifications, see Appendix A, "Product specifications," on page 191.

For current information on qualified transceivers supported by this device, refer to the *Fibre Channel Transceiver Platform Support Matrix* and *Transceiver Module Resources* . These resources include transceiver data sheets.

Port and extension blade transceivers

FC SFP+ transceivers installed in port blades and extension blade ports provide connections to devices on FC fabrics. The following figure illustrates a FC SFP+ transceiver. A separate fiber optic cable plugs into the transceiver.
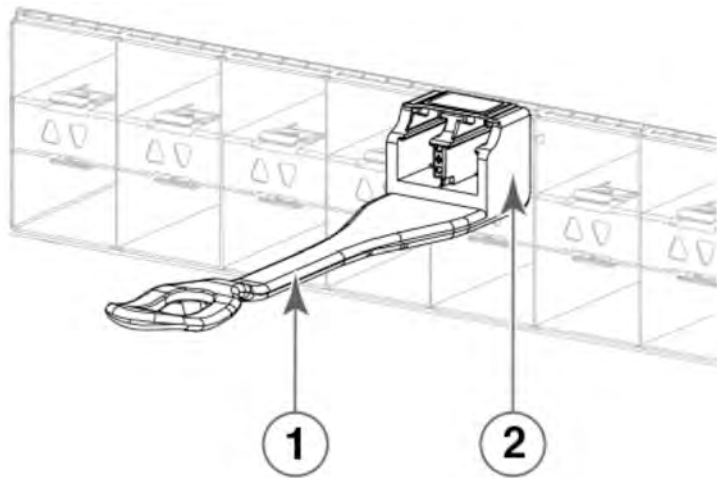
Figure 29. FC SFP+ Transceiver

 1. Pull Tab

 2. Transceiver

GbE SFP+ and QSFP ports on extension blades allow connection of blades to IP WANs and allow Fibre Channel and IP I/O traffic to pass through the IP WAN through extension tunnels. The following illustration shows a typical SFP+ transceiver that uses a bail latching mechanism to release the transceiver from the blade port cage. A separate fiber optic cable plugs into the transceiver.
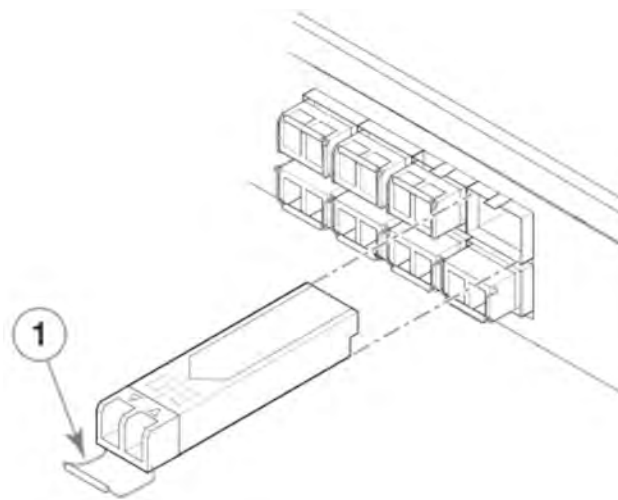
Figure 30. Optical Transceiver with Bail Open

 1. SFP+ Bail

The following illustration shows a 40GbE QSFP transceiver that uses a bail latching mechanism to release the transceiver from the blade port cage. A separate fiber optic cable connects to the transceiver. Some QSFP transceivers have an integrated pull tab that releases the transceiver from the port.
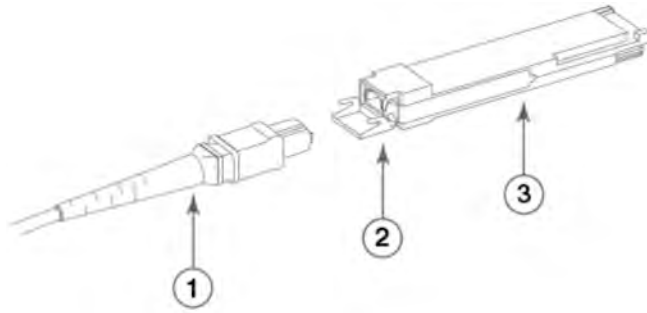
Figure 31. QSFP Cable and Transceiver with Bail Open

 1. Fiber-Optic Cable

 2. Bail

 3. Transceiver

Core routing blades

QSFPs installed in core routing blades are used for connecting inter-switch links (ICLs) between SAN256B-7 and SAN512B-7 Directors or between SAN256B-7/SAN512B-7 and SAN256B-6/SAN512B-6 or SAN384B-2 and SAN768B-2 Directors. Interconnecting these devices increases the number of useable ports for device connections.

The following list and illustration show the types of QSFPs installed in core routing blades:

• Separate MTP cable and transceiver. The transceiver is inserted into the blade port and the cable plugs into a QSFP on the other end of the ICL.
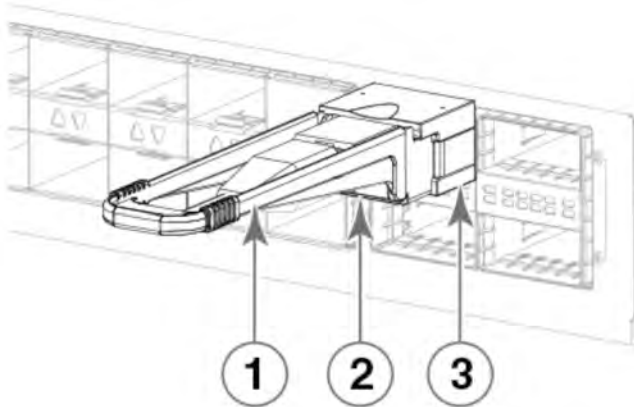
Figure 32. QSFP Transceiver with Separate Cable

 1. Pull Tab

 2. QSFP Cable

 3. QSFP Transceiver

Note: If the fiber optic cables are not connected to the transceivers, make sure that the rubber sealing gaskets are plugged into the transceivers.

• 2 km 4x32Gb/s QSFP transceiver with LC connectors. The transceiver is inserted into the blade port connector and single-mode optical fiber (SMF) LC cable connects the transceiver to the other end of the ICL or a patch panel.

Note: Because 16Gb/s speeds are not supported with this optic, connectivity to a DCX 8510 over distances beyond 100m is not possible.

Follow these guidelines for using QSFPs when connecting ICLs. See to install cables and QSFP transceivers.

- The QSFP ports on the core switch blades can be used only with an inter-chassis link (ICL) license. After the addition or removal of a license, the license enforcement is performed on the ports only when the `portdisable` and `portenable`commands are issued on the ports. An ICL license must be installed on all SAN256B-7 and SAN512B-7 Directors forming the ICL connection. Up to nine neighboring Directors can be connected with the MTP cables.
- The 32Gb/s QSFP28 SWL transceivers on SAN256B-7 and SAN512B-7 Director core routing blades operate at 4x32Gb/s and 4x16Gb/s speeds so can be used for an ICL connection between a 32Gb/s QSFP on a SAN256B-7 and SAN512B-7 Director core routing blade and a 16Gb/s QSFP transceiver on a SAN384B-2 or SAN768B-2 Director core routing blade. The 32Gb/s QSFP can also be used to connect an SAN256B-7 or SAN512B-7 Director to an SAN256B-6 or SAN512B-6 Director. Use the appropriate ICL kit for this application.
- An off-the-shelf MTP cable up to 100m can be used as an ICL cable when using the standard SWL optics.
- Brocade supports fully populating a switch with ICL connections using a mixture of 100m SWL and 4x32Gb/s 2 km optics.
- For complete requirements and considerations for using QSFPs to support 2 km on ICL ports, refer to "Using the QSFPs that support 2 km on ICL ports" in the *Fabric OS Administration Guide*.

On the core routing blade faceplates, QSFP ports belonging to the same trunking groups are indicated with the same color border under the ports. These colors are also applied to the port map labels on each blade faceplate to indicate ports belonging to the same trunking groups.

For details on the following subjects, refer to the "Inter-Chassis Links' section of the *Fabric OS Administration Guide*:

- ICL topologies
- ICL trunking
- Configuring ICLs between SAN256B-7 and SAN512B-7 Directors
- Configuring ICLs between SAN256B-7 and SAN512B-7 and SAN384B-2 or SAN768B-2 Directors
- Configuring ICLs between X7 and X6 Chassis

4x32Gb/s 2-Km LWL QSFPs

The 2-km 4x32Gb/s LWL QSFP28 is a hot-swappable, low-voltage (3.3V) digital diagnostic optical transceiver that supports high-speed serial links over parallel single-mode optical fibers at signaling rates up to 4×28.05Gb/s. This is a multi-rated CWDM4 QSFP28 transceiver with a duplex LC connector, as in the following illustration. It supports up to 2-km link length using duplex single-mode fiber. a
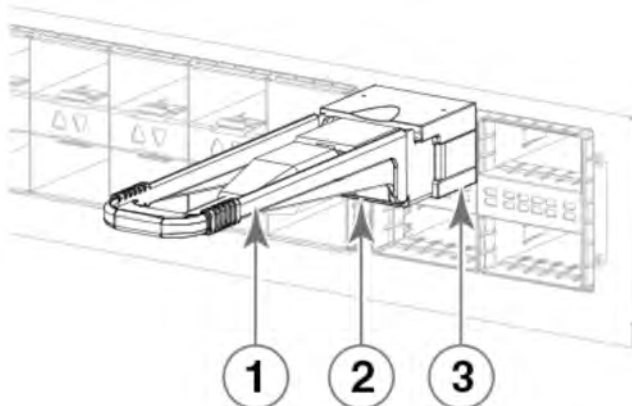
Figure 33. QSFP28 Transceiver

1. Pull Tab
2. QSFP Cable
3. QSFP Transceiver

All 16 ICL ports can be used for 2 km distances when 20 buffer credits are configured per virtual channel.

Time and items required

The installation or replacement procedure for one transceiver takes less than 5 minutes. Ensure that the following items are available:

- Required number of compatible power cables
- Required number of supported Brocade-branded transceivers
- Required number of compatible fiber-optic cables

Precautions specific to transceivers and cables

⚠️ **DANGER:** Use only optical transceivers that are qualified by Broadcom and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 60825 and EN60825. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

⚠️ **CAUTION:** Do not use the port cover tabs to lift the module. They are not designed to support the weight of the module, which can fall and be damaged.

⚠️ **CAUTION:** Before plugging a cable into any port, be sure to discharge the voltage stored on the cable by touching the electrical contacts to ground surface.

Cleaning the fiber-optic connectors

About this task

To avoid problems with the connection between the fiber-optic transceiver (SFP+ or QSFP) and the fiber cable connectors, clean both connectors *each time you disconnect and reconnect them*. Dust can accumulate on the connectors and cause problems such as reducing the optic launch power.

To clean the fiber cable connectors, use a fiber-optic reel-type cleaner. When not using an SFP+ or QSFP connector, make sure to keep the protective covering in place.

Cable management

The minimum radius that a 50-micron cable can be bent under full tensile load is 5.1 cm (2 in.). For a cable under no tensile load, that minimum is 3.0 cm (1.2 in.). Cables can be organized and managed in a variety of ways, for example, using cable channels on the sides of the rack or patch panels to minimize cable management. Following is a list of additional recommendations:

- Plan for the required rack space for cable management before installing the switch.
- Leave at least 1m (3.28 ft) of slack for each port cable. This slack provides room to remove and replace the switch, allows for inadvertent movement of the rack, and helps prevent the cables from being bent to less than the minimum bend radius.
- If you are using ICL Trunking, consider grouping cables by trunking groups. The cables used in trunking groups must meet specific requirements, as described in the *Fabric OS Administrator's Guide.*
- For easier maintenance, label the fiber-optic cables and record the devices to which they are connected.
- Keep LEDs visible by routing port cables and other cables away from the LEDs.
- Do not route the cables in front of air vents.
- Use Velcro-type straps to secure and organize fiber-optic cables.
- Route the cables away from LEDs to keep them visible.

⚠️ **CAUTION:** Before plugging a cable into any port, be sure to discharge the voltage stored on the cable by touching the electrical contacts to ground surface.

Note: Do not use tie wraps with optical cables because they are easily overtightened and can damage the optic fibers.

Installing an SFP+ transceiver

About this task

Note: For current information on qualified transceivers supported by this device, refer to the Brocade Fibre Channel Transceiver Support Matrix and Brocade Transceiver Modules on www.broadcom.com.

The device supports only Brocade-qualified transceivers. If you use an unqualified transceiver, the `switchshow` command output shows the port in a Mod_Inv state. Fabric OS also logs the issue in the system error log. To insert an SFP+ transceiver, complete the following steps:

Note: Always use the pull tab to insert or remove 16Gb/s and 32Gb/s transceivers since they might be hot.

Procedure

1. Perform one of the following steps, depending on your transceiver type.

   - If the transceiver has a pull tab (16Gb/s and 32Gb/s SFP+ transceivers), use the pull tab to help push the transceiver into the port until it is firmly seated and the latching mechanism clicks.
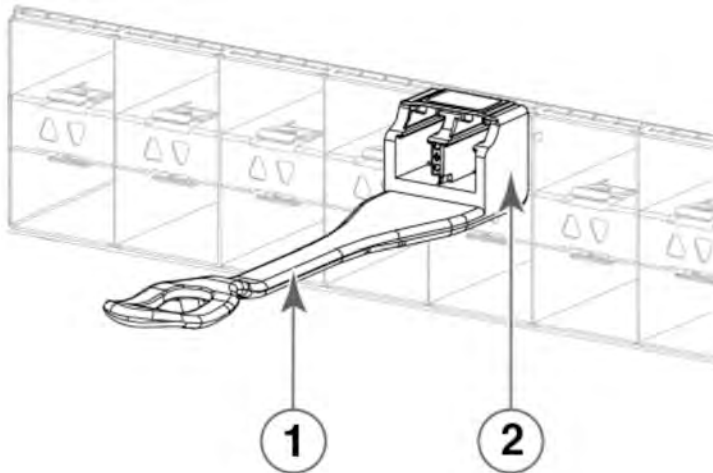
   Figure 34. Installing an SFP+ Transceiver with a Pull Tab into a Blade Port

   - If the transceiver has a bail latch mechanism (10GbE transceivers), ensure that the bail (wire handle) is in the unlocked position, grasp the transceiver, and push it into the port until firmly seated. Close the bail to latch the transceiver in the slot.
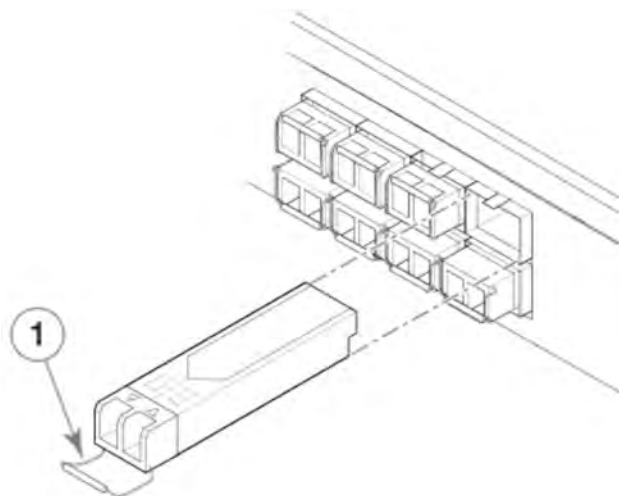
Figure 35. Installing an SFP+ Transceiver with a Bail Latch into a Blade Port

Transceivers are keyed so that they can be inserted only 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.

   Note: Cables are keyed so that they can be inserted in only one way. If a cable does not slide in easily, ensure that it is correctly oriented. Do not insert any unsupported cable intended for another type of transceiver into a regular SFP+ transceiver. You may damage the cable as well as the transceiver.

Replacing an SFP+ transceiver

About this task

Complete the following steps to remove and then install a new SFP+ transceiver.

Note: The 16Gb/s and 32Gb/s SFP+ transceivers do not have bails but pull tabs. Always use the pull tab to insert or remove the SFP+ transceivers, since the transceiver might be hot.

Procedure

1. Remove any cables that are inserted into the transceiver.
2. To remove the transceiver, perform one of the following steps, depending on your transceiver type.

   - If the transceiver has a pull tab (16Gb/s and 32Gb/s SFP+ transceivers), grasp the pull tab and pull the transceiver straight out from the port.

     Note: Grasp the pull tab near the body of the transceiver to reduce the chances of bending the pull tab. Since the transceiver may be hot, avoid touching it.
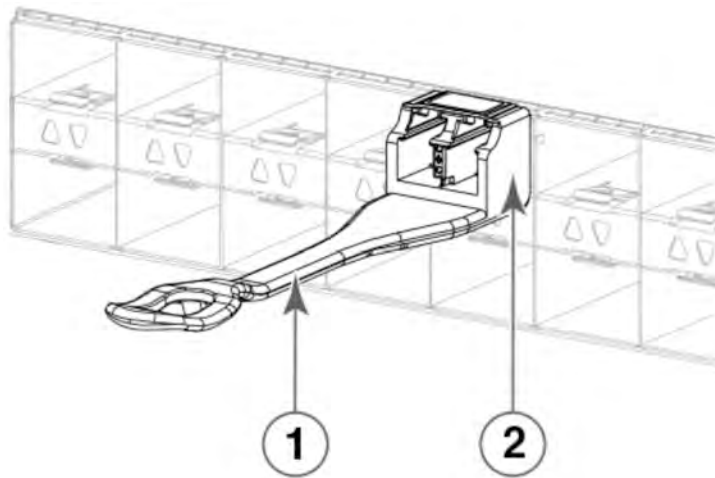
Figure 36. Replacing an SFP+ Optical Transceiver with a Pull Tab into a Blade Port

- If the transceiver has a bail latch mechanism (10GbE transceivers), unlatch from the port by pulling the bail (wire handle) away from its pivot point using your fingers or the hooked end of the transceiver extraction tool. Pull the transceiver out from the port slightly using the bail, and then gasp the transceiver with your fingers and slide it straight out of the port.
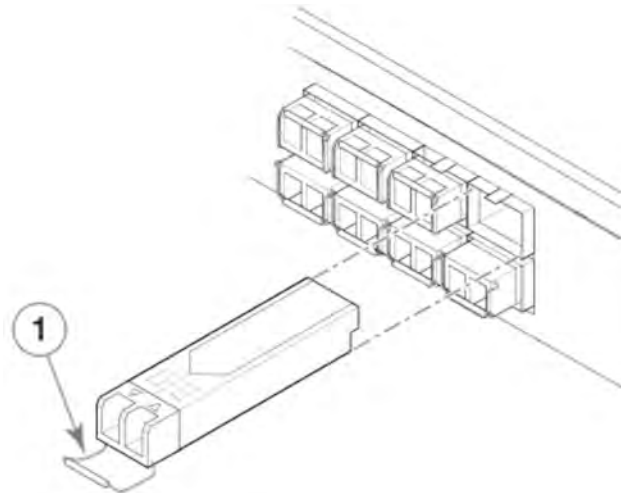
Figure 37. Installing an SFP+ Transceiver with a Bail Latch into a Blade Port

3. To install the transceiver, perform one of the following steps depending on your transceiver type:

   - If the transceiver has a pull tab (16Gb/s and 32Gb/s SFP+ transceivers), use the pull tab to help push the transceiver into the port until it is firmly seated and the latching mechanism clicks.
   - If the transceiver has a bail latch mechanism (10GbE transceivers), ensure that the bail (wire handle) is in the unlocked position, grasp the transceiver, and push it into the port until firmly seated. Close the bail to latch the transceiver in the slot.

   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.

4. 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.

Installing a QSFP transceiver

About this task

The device supports only transceivers qualified for Brocade devices. If you use an unqualified transceiver, the `switchshow` command output shows the port in a Mod_Inv state. The operating system also logs the issue in the system error log. Also, note the following:

- Each QSFP contains four individual 16Gb/s or 32Gb/s ports. Be aware that any problems with one port could affect all four ports in the quad if the QSFP must be replaced.
- Although installation and removal procedures are the same for QSFP transceivers installed in port blades and extension blades, these transceivers are not interchangeable between the two blade types.

To insert a QSFP transceiver and cable, complete the following steps.

Procedure

1. Push the transceiver into the port using the pull tab. Transceivers are keyed so that they can be inserted only with the correct orientation. If a transceiver does not slide in easily, ensure that it is correctly oriented. Push the correctly oriented transceiver into the port until it is firmly seated and the latching mechanism clicks.

   Note: Always use the transceiver pull tab to insert or remove the QSFP transceivers, as the transceiver might be hot.
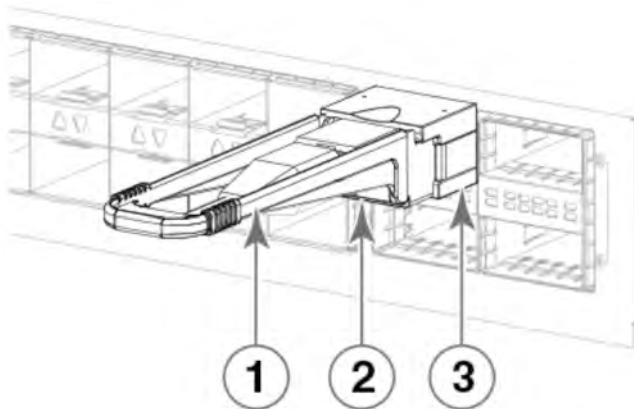
   Figure 38. Installing a QSFP Transceiver into a Blade Port

   The port LED initially blinks amber after installation, and then displays steady amber.

2. 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.

   Note: If your transceiver has an integrated cable, you will not need to install a cable.

   The port LED displays steady amber until both ends of the cable are inserted and the link is established. When the link is fully established, the LED displays a steady green.

   Note: Cables are keyed so that they can be inserted in only one way. If a cable does not slide in easily, ensure that it is correctly oriented. Do not insert any unsupported cable intended for another type of transceiver into a regular QSFP transceiver. You may damage the cable as well as the transceiver.

3. Organize the cables to avoid covering LEDs and air vents. See "Cable management" on page 67.

Replacing a QSFP transceiver

About this task

The device supports only transceivers qualified for SAN devices. If you use an unqualified transceiver, the output from the `switchshow` command shows the port in a Mod_Inv state. Fabric OS also logs the issue in the system error log. Also, note the following:

- Each QSFP contains four individual Gen 7 ICL or 32Gb/s ports. Be aware that any problems with one port could affect all four ports in the quad if the QSFP must be replaced.
- Although installation and removal procedures are the same for QSFP transceivers installed in port blades and extension blades, these transceivers are not interchangeable between the two blade types.

Complete the following steps to remove and then install a new QSFP transceiver.

Procedure

1. Remove any cables that are inserted into the transceiver.

2. Grasp the transceiver pull tab and gently pull the transceiver straight out from the port.

   Note: Grasp the pull tab near the body of the transceiver to reduce the chances of bending the pull tab. Since the transceiver may be hot, always use the pull tab and avoid touching the transceiver body.

3. To insert the replacement transceiver, use the pull tab to carefully push the transceiver into the port. Transceivers are keyed so that they can be inserted only with the correct orientation. If a transceiver does not slide in easily, ensure that it is correctly oriented. Gently push the correctly oriented QSFP transceiver until the latching mechanism clicks.
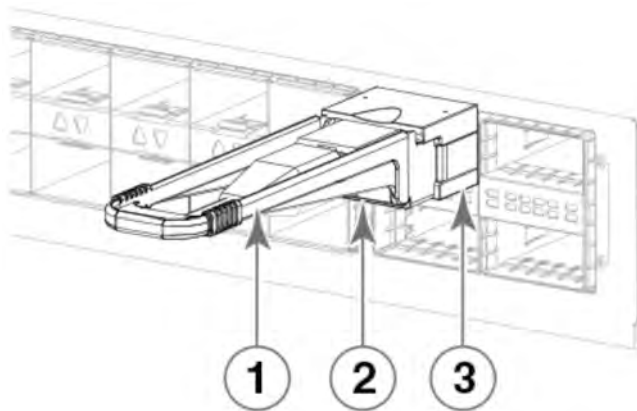
Figure 39. Installing a QSFP Optical Transceiver into a Blade Port

   The port's status LED initially blinks amber after installation, and then displays steady amber.

4. 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.

   Note: If your transceiver has an integrated cable attached, you will not install a cable.

   The port's status LED displays steady amber until both ends of the cable are inserted and the link is established. When the link is fully established, the LED displays a steady green.

   Note: 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.

5. Organize cables to avoid covering LEDs and air vents. See "Cable management" on page 67.

Verifying the operation of new transceivers

About this task

You can use the following commands to verify if the transceivers are working correctly:

- errDump
- fabricShow
- sfpShow
- switchShow
- switchshow -qsfp
- switchshow -slot, where *slot* is the slot number

For output examples and additional information on Fabric OS commands, see "Using monitoring commands" on page 97 and the *Fabric OS Command Reference*.

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

Chapter 6. Monitoring the switch

System activity and status can be determined through the activity of the LEDs on the switch. There are three possible LED states: no light, a steady light, and a flashing light. Flashing lights may be slow, fast, or flickering. The lights are green or amber. Sometimes, the LEDs may flash either of the colors during boot, POST,or other diagnostic tests. This is normal; it does not indicate a problem unless the LEDs do not indicate a healthy state after all boot processes and diagnostic tests are complete.

Introduction

This device is engineered for high reliability, high availability, and enhanced serviceability (RAS) 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 *Fabric OS Web Tools Administration Guide* and the *Fabric OS Administration Guide* for additional information.

Interpreting FC32-X7-48 port blade LEDs

See the following figure and table to interpret the LED patterns for the FC32-X7-48 blade. The LED patterns temporarily change during the POST and other diagnostic tests.
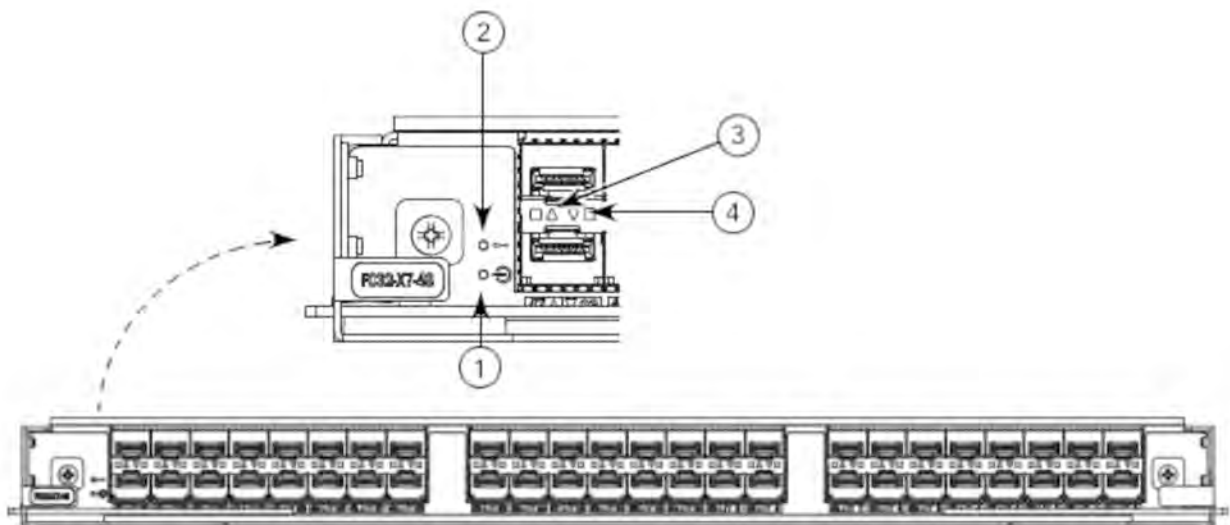
Figure 40. FC32-X7-48 Port Blade LEDs

1. Blade Power LED
2. Blade Status LED
3. Status LED for Upper FC port
4. Status LED for Lower FC port

The following table describes the port blade LED patterns and the recommended actions for those patterns.

Table 15. Port Blade LED Descriptions			
LED Purpose	**Color**	**Status**	**Recommended Action**
Power	Steady green	The blade is operational.	No action is required.
	No light (LED is off)	The blade is not powered on.	Ensure that the blade is firmly seated, with ejectors pushed in fully to the center of the blade and ensure that the captive screw for each ejector is fully tightened.
Status	No light (LED is off)	The blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	The blade is faulty.	Ensure that the blade is firmly seated and check the status by entering the `slotShow` command. If LED remains amber, consult the device supplier.
	Slow-flashing amber (on 2 seconds, then off 2 seconds)	The blade is not seated correctly or is faulty.	Pull the blade out and reseat it. If LED continues to flash, replace the blade.
	Fast-flashing amber (on 1/2 second, then off 1/2 second)	Environmental range has been exceeded.	Check for out-of-bounds environmental conditions and correct them.

Table 15. Port Blade LED Descriptions (continued)

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

Interpreting FC64-48 port blade LEDs

See the following figure and table to interpret the LED patterns for the FC64-48 blade. The LED patterns temporarily change during POST and other diagnostic tests.
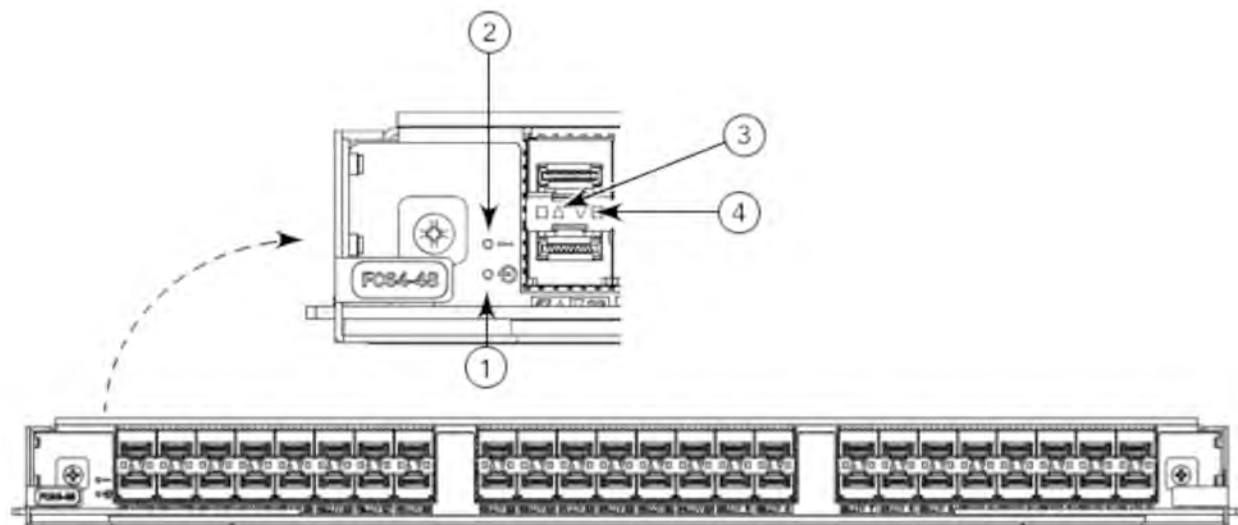
Figure 41. FC64-48 Port Blade LEDs

1. Blade Power LED
2. Blade Status LED
3. Status LED for Upper FC port
4. Status LED for Lower FC port

The following table describes the port blade LED patterns and the recommended actions for those patterns.

Table 16. Port Blade LED Descriptions

LED Purpose	Color	Status	Recommended Action
Power	Steady green	The blade is operational.	No action is required.
	No light (LED is off)	The blade is not powered on.	Ensure that the blade is firmly seated, with ejectors pushed in fully to the center of blade and ensure that the captive screw for each ejector is fully tightened.

Table 16. Port Blade LED Descriptions (continued)			
LED Purpose	**Color**	**Status**	**Recommended Action**
Status ⚠	No light (LED is off)	The blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	The blade is faulty.	Ensure that the blade is firmly seated and check the status by entering the `slotShow` command. If the LED remains amber, consult the device supplier.
	Slow-flashing amber (on 2 seconds, then off 2 seconds)	The blade is not seated correctly or is faulty.	Pull the blade out and reseat it. If LED continues to flash, replace the blade.
	Fast-flashing amber (on 1/2 second, then off 1/2 second)	Environmental range has been exceeded.	Check for out-of-bounds environmental condition and correct it.

Table 16. Port Blade LED Descriptions (continued)

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

Interpreting FC32-64 port blade LEDs

See the following figure and table to interpret the LED patterns for the FC32-64 blade. The LED patterns temporarily change during POST and other diagnostic tests.

1. Blade Power LED
2. Blade Status LED
3. Status LEDs for QSFP+ Ports
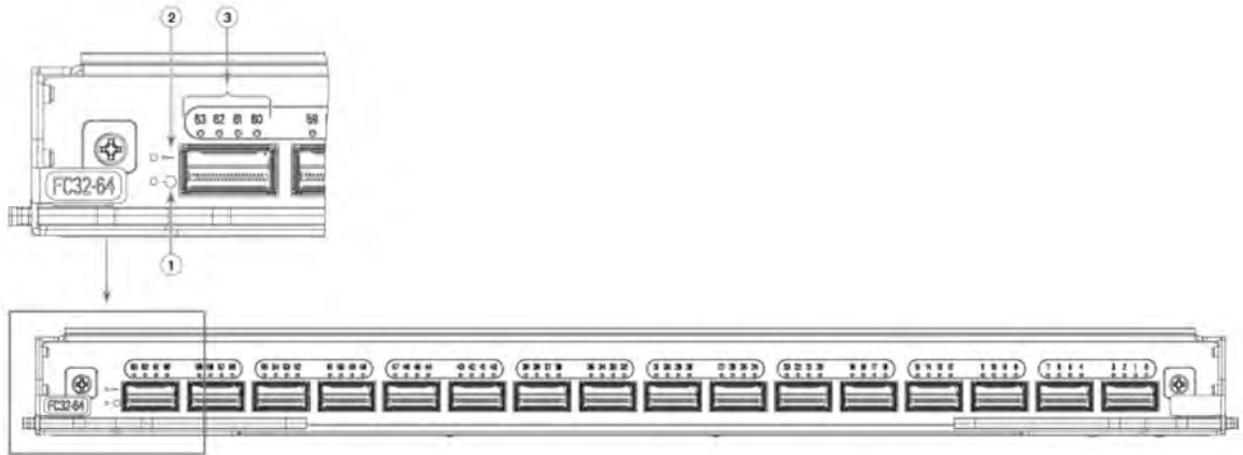
Figure 42. FC32-64 Port Blade LEDs

1. Blade Power LED
2. Blade Status LED
3. Status LEDs for QSFP+ Ports

The following table describes the blade LED patterns and the recommended actions for those patterns.

Note: When the QSFP is operating in breakout mode, each of the four LEDs above the QSFP+ port indicates the status of an individual breakout port. When the QSFP is operating in nonbreakout mode (Ethernet QSFPs only), the primary port LED (leftmost LED) indicates the status of the single, unified QSFP port. For example, for a 40GbE QSFP in breakout mode, each of the four LEDs indicates the status of a 10GbE port. In nonbreakout mode, the primary LED (leftmost LED) indicates the status of the unified 40GbE port.

The following table describes the blade LED patterns and the recommended actions for those patterns.

Table 17. Port Blade LED Descriptions			
LED Purpose	**Color**	**Status**	**Recommended Action**
Power	Steady green	The blade is operational.	No action is required.
	No light (LED is off)	The blade is not powered on.	Ensure that the blade is firmly seated, with ejectors pushed in fully to the center of the blade and ensure that the captive screw for each ejector is fully tightened.

Table 17. Port Blade LED Descriptions (continued)			
LED Purpose	**Color**	**Status**	**Recommended Action**
Status ⚠	No light (LED is off)	The blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	The blade is faulty.	Ensure that the blade is firmly seated and check the status by entering the `slotShow` command. If LED remains amber, consult the device supplier.
	Slow-flashing amber (on 1.28 seconds, then off 1.28 seconds)	The blade is not seated correctly or is faulty.	Pull the blade out and reseat it. If LED continues to flash, replace the blade.
	Fast-flashing amber (on 320 ms second, then off 320 ms)	Environmental range has been exceeded.	Check for out-of-bounds environmental conditions and correct them.

Table 17. Port Blade LED Descriptions (continued)

LED Purpose	Color	Status	Recommended Action
QSFP port Status	No light (LED is off)	Port has no incoming power, or there is no light or signal carrier detected.	Verify that the blade power LED is on, check the transceiver and cable.
		Polling is in progress.	Allow 60 seconds for polling to complete.
		The connected device is configured in an offline state.	Verify the status of the connected device.
	Steady green	Port is online (connected to an external device) but has no traffic.	No action is required.
	Slow-flashing green (on 1.28 second, then off 1.28 second)	Port is online but segmented, indicating a loopback plug or cable or an incompatible switch.	Verify that the correct device is attached to the chassis.
	Fast-flashing green (on 320 ms, then off 320 ms)	Port is in internal loopback (diagnostic).	No action is required.
	Flickering green	Port is online, with traffic flowing through the port.	No action is required.
	Steady amber	Port is receiving light or signal carrier, but it is not online yet.	Reset the port from the workstation using the `portEnable` or `portCfgPersistentEnable` command.
	Slow-flashing amber (on 1.28 seconds, then off 1.28 seconds)	Port is disabled due to diagnostic tests or the `portDisable` or `portCfgPersistentEnable` commands.	Reset the port from the workstation using the `portDisable` or `portCfgPersistentEnable` command.
	Fast-flashing amber (on 320 ms second, then of 320 ms)	Transceiver or port is faulty.	Change the transceiver or reset the switch from the workstation.
	Alternating green/amber	Port is beaconing.	No action is required.

Interpreting extension blade LEDs

See the following figure and table to interpret the LED patterns on the SX6 extension blade. The LED patterns temporarily change during POST and other diagnostic tests.

1. Blade Power LED

2. Blade Status LED

3. Right 40GbE QSFP (Port 0) Status LED

4. Left 40GbE QSFP (Port 1) Status LED

5. Right 1 or 10GbE Port Status LED

6. Left 1 or 10GbE Port Status LED

7. Right FC Port Status LED

8. Left FC Port Status LED

1. Blade Power LED

2. Blade Status LED

3. Right 40GbE QSFP (Port 0) Status LED

4. Left 40GbE QSFP (Port 1) Status LED

5. Right 1 or 10GbE Port Status LED

6. Left 1 or 10GbE Port Status LED

7. Right FC Port Status LED

8. Left FC Port Status LED
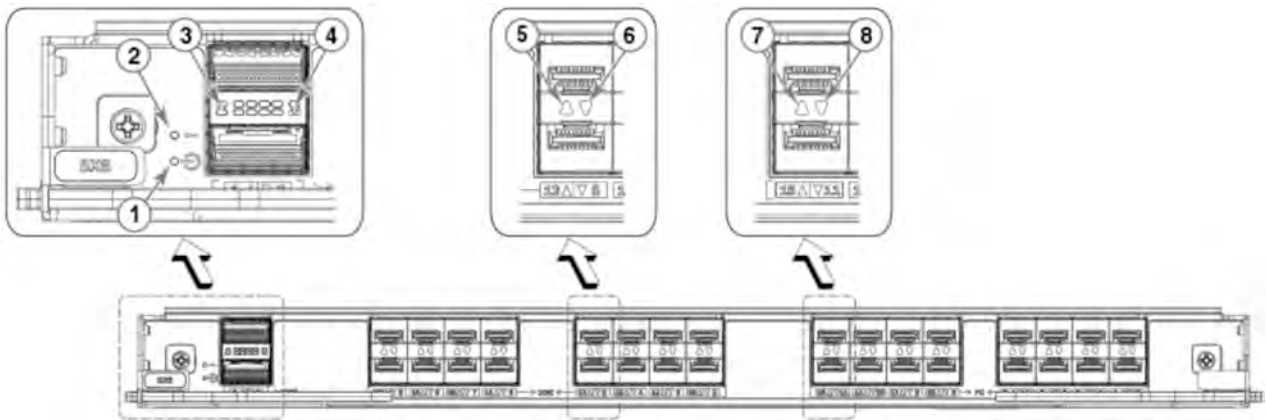
Figure 43. SX6 Extension Blade LEDs

1. Blade Power LED

2. Blade Status LED

3. Upper 40GbE QSFP (Port 0) Status LED

4. Lower 40GbE QSFP (Port 1) status LED

5. Upper 1 or 10GbE Port Status LED

6. Lower 1 or 10GbE Port Status LED

7. Upper FC Port Status LED

8. Lower FC Port Status LED

1. Blade Power LED

2. Blade Status LED

3. Upper 40GbE QSFP (Port 0) Status LED

4. Lower 40GbE QSFP (Port 1) status LED

5. Upper 1 or 10GbE Port Status LED

6. Lower 1 or 10GbE Port Status LED

7. Upper FC Port Status LED

8. Lower FC Port Status LED

The following table describes the extension blade LED patterns and the recommended actions for those patterns.

Table 18. Extension Blade LED Descriptions

LED Purpose	Color	Status	Recommended Action
Power	Steady green	The blade is operational.	No action is required.
	No light (LED is off)	The blade is not powered on.	Ensure that the blade is firmly seated, with ejectors pushed in fully to the center of the blade and ensure that the captive screw for each ejector is fully tightened.
Status	No light (LED is off)	The blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	The blade is faulty or initializing.	Ensure that the blade is firmly seated and check the status by entering the `slotShow` command. If LED remains amber, consult the device supplier.
	Blinking amber and green.	Attention. The blade is not seated correctly or is faulty.	Pull the blade out and reseat it. If LED continues to flash, replace the blade.
	Green	The blade is operational.	No action required.
GbE port status	No light (LED is off)	The port has no incoming power or is offline.	Verify that the power LED is on, check the transceiver and cable.
	Steady green	Port is online but has no traffic.	No action is required.
	linking green	Port is online, with traffic lowing through the port.	No action is required.
	Blinking amber	A transceiver or port has an error or is faulty.	Change the transceiver or reset the switch from the workstation.

Table 18. Extension Blade LED Descriptions (continued)

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

Interpreting control processor blade LEDs

See the following figure and table to interpret the LED patterns on the CPX7 blade. The LED patterns temporarily change during POST and other diagnostic tests.
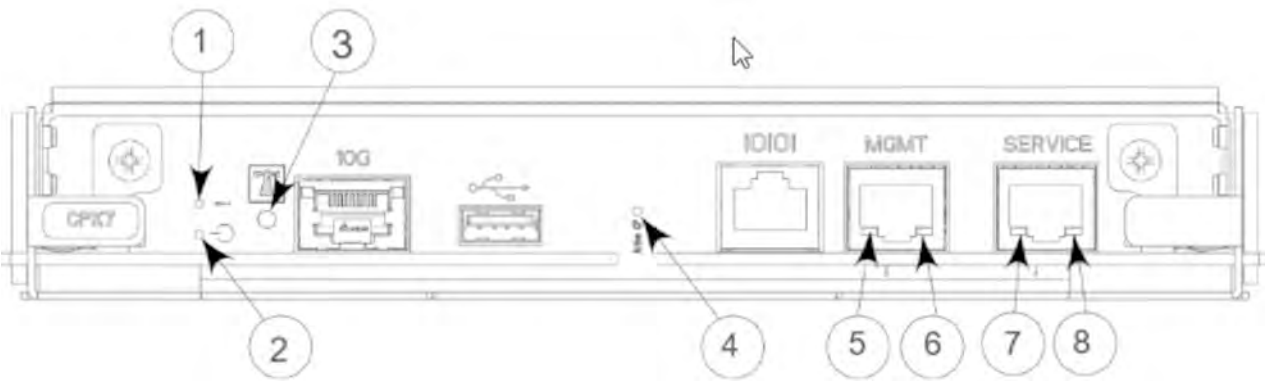

Figure 44. Control Processor Blade (CPX7)

1. Blade Status LED
2. Blade Power LED
3. Chassis Beacon LED
4. Active (Blue) CP LED
5. 10/100/1000Mb/s Ethernet Port (MGMT) Link Status LED
6. 10/100/1000Mb/s Ethernet Port (MGMT) Link Activity LED
7. 10/100/1000Mb/s Ethernet Port (SERVICE) Link Status LED
8. 10/100/1000Mb/s Ethernet Port (SERVICE) Link Activity LED

The following table describes the CP blade LED patterns and the recommended actions for those patterns.

Table 19. CP Blade LED Descriptions

LED Purpose	Color	Status	Recommended Action
Power ⏻	Steady green	The CP blade is on.	No action is required.
	No light (LED is off)	The CP blade is not on.	Ensure that the blade is firmly seated and has power.

Table 19. CP Blade LED Descriptions (continued)			
LED Purpose	**Color**	**Status**	**Recommended Action**
Attention ⚠	No light (LED is off)	The CP blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	If the LED is on for more than 5 seconds, the CP blade is faulty.	Ensure that the blade is firmly seated and the switch has completed booting. If LED remains amber, consult the device supplier.
	Slow-flashing amber (on 2 seconds, then off 2 seconds)	The CP blade is not seated correctly or is faulty.	Pull the blade out and reseat it. If the LED continues to flash, replace the blade.
	Fast-flashing amber (on 1/2 second, then off 1/2 second)	Environmental range has been exceeded.	Check for out-of-bounds environmental conditions and correct them.
Beacon	Steady white	The LED illuminates white on both CP blades when `chassisbeacon 1` is issued from management interface to locate chassis in equipment racks. To turn off beaconing, issue the `chassisbeacon 0`.	No action is required.
Active CP	Steady blue	The CP blade is active.	No action is required.
	No light (LED is off)	GThe CP blade is either booting, negotiating to be active, or is the standby CP blade.	No action is required.

The following tables describes how link activity and 10/100/1000Mb/s link speed are indicated by status and activity LED operation on the MGMT and SERVICE Ethernet ports on the CP blade.

Note: To force a persistent Ethernet link speed, enter the `ifModeSet` command.

Table 20. LED Descriptions for 10/100/1000Mb/s Ethernet Ports: CPX7				
LED	**Inactive link**	**10Mb/s**	**100Mb/s**	**1000Mb/s**
Ethernet link status (10/100/1000Mb/s port)	No light (LED is off)	No light (LED is off)	On (LED is on)	On (LED is on)
Ethernet link activity (10/100/1000Mb/s port)	No light (LED is off)	Blinking green	Blinking green	Blinking green

When an X6-4 Director has been upgraded in the field to a Gen 7 Director, the chassis will have CPX6 control processor blades that were installed for use with that chassis. Occasionally, the LED patterns for

the CPX6 blade differ from those found on the CPX7 blade. See the following figure and table to interpret the LED patterns on the CPX7 blade.

Table 21. LED Descriptions for 10/100/1000Mb/s Ethernet Ports: CPX6+ (Upgraded Chassis)				
LED	**Inactive link**	**10Mb/s**	**100Mb/s**	**1000Mb/s**
Ethernet link status (10/100/1000Mb/s port)	No light (LED is off)	Blinking green	Blinking green	No light (LED is off)
Ethernet link activity (10/100/1000Mb/s port)	No light (LED is off)	No light (LED is off)	Blinking green	Blinking green

Note: If an link is inactive, ensure that the blade has power, the Ethernet cable is firmly seated, and the connected device is functioning.

Interpreting core routing blade LEDs

See the following figure and table to interpret the LED patterns on the CR64-4 blade. The LED patterns temporarily change during POST and other diagnostic tests.
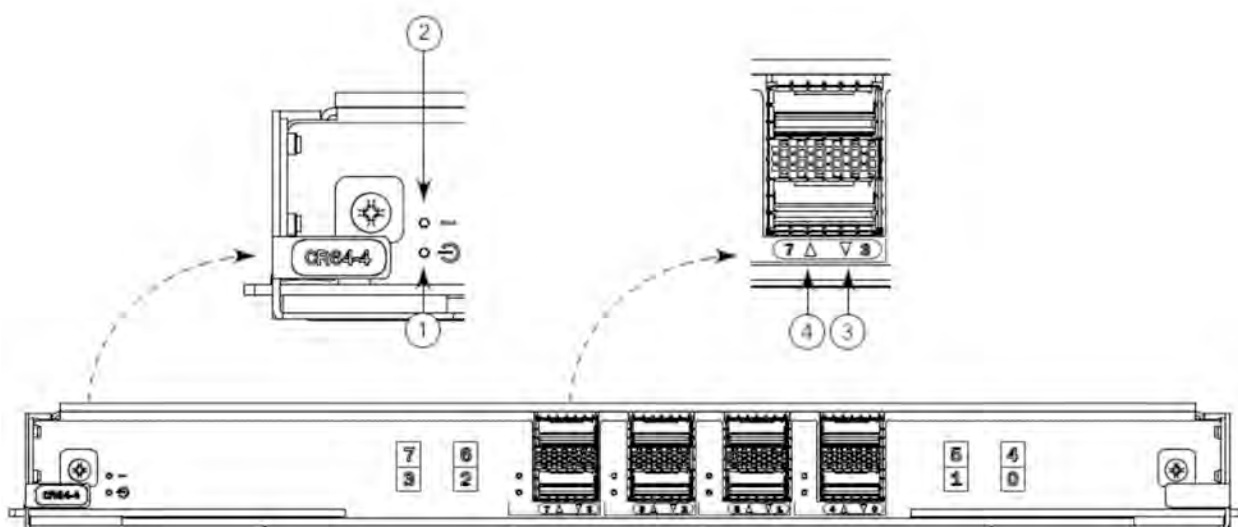
Figure 45. CR64-4 Core Routing Blade LEDs

1. Blade Power LED
2. Blade Status LED
3. QSFP Status LED for Right QSFP Port
4. QSFP Status LED for Left QSFP Port

Table 22. Core Routing Blade LED Descriptions			
LED Purpose	**Color**	**Status**	**Recommended Action**
Power	Steady green	The blade is on.	No action is required.
	No light (LED is off)	The blade is not on.	Ensure that the blade is firmly seated and has power.

LED Purpose	Color	Status	Recommended Action
Status ⚠	No light (LED is off)	The blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	The blade is faulty or the switch is still booting.	Ensure that the blade is firmly seated and the switch has completed booting. If the LED remains amber, consult the supplier for your Brocade device.
	Slow-flashing amber (on 2 seconds, then off 2 seconds)	The blade is not seated correctly or is faulty.	Pull the blade out and reseat it. If the LED continues to flash, replace the blade.
	Fast-flashing amber (on 1/2 second, then off 1/2 second)	Environmental range has been exceeded.	Check for out-of-bounds environmental conditions and correct them.
QSFP port status LED	No light (LED is off)	No QSFP module is seated; all four QSFP ports are disabled.	No action is needed if the QSFP is not installed; otherwise, verify that the QSFP is fully inserted.
	Steady amber	The QSFP module is in; all four ports have no signal/no sync.	Ensure that the cable is properly connected. If the LED remains amber, consult the supplier for your Brocade device.
	Blinking amber	The port is disabled or faulted, FC link activity, segmented, loopback mode, also during the transition between cable plugin and all four ports online.	Check for console messages or wait for all four ports to come online.
	Steady green	The QSFP module is in and all ports are online.	No action is needed.

Table 22. Core Routing Blade LED Descriptions (continued)

Interpreting WWN card LEDs

See the following figure and table to interpret the LED patterns of installed WWN cards. LEDs for WWN card 1 and WWN card 2 are located on the WWN card (logo) bezel between the power supplies on the nonport side of the device. The LED patterns may temporarily change during POST and other diagnostic tests.
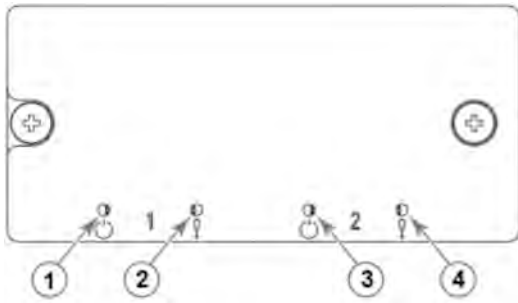
Figure 46. WWN Card LEDs on Bezel

1. Power LED for WWN Card 1

2. Status LED for WWN Card 1

3. Power LED for WWN Card 2

4. Status LED for WWN Card 2

Table 23. WWN Card LED Descriptions			
LED Purpose	**Color**	**Status**	**Recommended Action**
Power ⏻	No light (LED is off)	The card is not receiving power.	Ensure that device power supplies are firmly seated, power cables are connected, and cables are connected to a power source.
	Steady green	The card is receiving power.	No action required.
Status ⚠	No light (LED is off)	The card is either healthy or does not have power.	No action required.
	Steady amber	The card is faulty.	Replace card.

Interpreting power supply LEDs

See the following information to interpret the LED patterns on the power supply. The LED patterns may temporarily change during POST and other diagnostic tests. The SAN256B-7 Director has two power supplies.
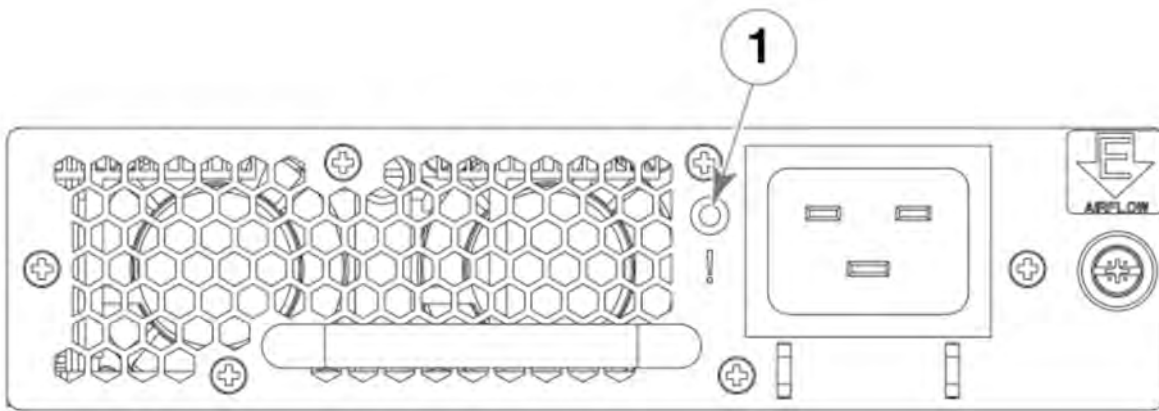
Figure 47. AC Power Supply LED
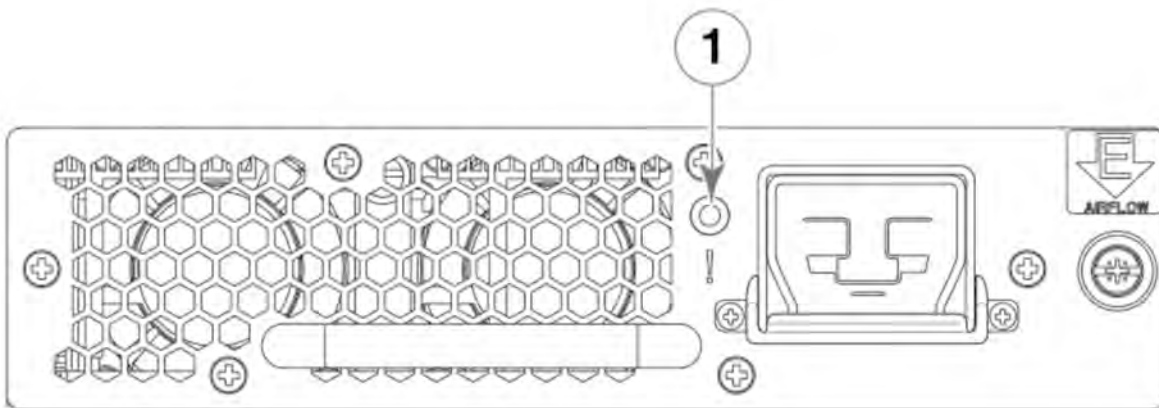
 1. Power Status LED

Figure 48. HVAC/HVDC Power Supply LED

 1. Power Status LED

The following tables describe the power supply LED patterns and the recommended actions for those patterns. In the unlikely event of a faulty power supply, the status LED will flash in a coded pattern to provide additional fault information. Record the sequence of flashes and status as defined in the table to provide to your support representative along with `supportsave` output data.

Table 24. AC Power Supply LED Descriptions

LED Purpose	Color	Status	Recommended Action
Power status	No light (LED is off)	The power supply does not have incoming power and is not providing power to the device. **Note:** When incoming power is first removed, LED flashes, and then turns off.	Ensure that the power supply is firmly seated, the power cable is connected, and the power cable is connected to the power source. Disconnect the power cable from the power supply, remove and reinsert the power supply, and then reconnect the power cable to restart. If the status persists, replace the power supply assembly
	Steady green	The power supply has incoming power and is providing power to the device.	No action is required.
	Flashing on one-half second and then off a one-half second.	AC power is disconnected from the power supply assembly, but an additional power supply installed in the device is powered on.	Check the power connection at the power supply, cable, and AC power source. If these check out, disconnect the power cable from the power supply, remove and reinsert the power supply, and then reconnect the power cable to restart. If the status persists, replace the power supply assembly.
	Flashing on two times, and then off 5 seconds.	48V is out of range.	Disconnect the power cable from the power supply, remove and reinsert the power supply, and then reconnect the power cable to restart. If the status persists, replace the power supply assembly.
	Flashing on three times, and then off 5 seconds.	12V is out of range.	Disconnect the power cable from the power supply, remove and reinsert the power supply, and then reconnect the power cable to restart. If the status persists, replace the power supply assembly.
	Flashing on four times, and then off 5 seconds.	AC input is under voltage.	Verify voltage in the power distribution unit (PDU) or system providing power to the power supply assembly. Check the cabling and voltage between the PDU and the switch. Correct the voltage as necessary. If the correct voltage is verified, replace the power supply assembly.
	Flashing on five times, and then off 5 seconds.	The power supply assembly fan is faulty.	Replace the power supply.

Table 25. HVAC/HVDC Power Supply LED Descriptions			
LED Purpose	**Color**	**Status**	**Recommended Action**
Power status ⚠️	No light (LED is off)	The power supply does not have incoming power and is not providing power to the device. **Note:** When incoming power is first removed, LED flashes, and then turns off.	Ensure that the power supply is firmly seated, the power cable is connected, and the power cable is connected to a power source. Disconnect the power cable from the power supply, remove and reinsert the power supply, and then reconnect the power cable to restart. If the status persists, replace the power supply assembly.
	Steady green	The power supply has incoming power and is providing power to the device.	No action is required.
	Flashing on one-half second and then off a one-half second.	Source power is disconnected from the power supply assembly, but the additional power supply installed in the device is powered on.	Check power connection at power supply, cable, and power source. If these check out, disconnect the power cable from the power supply, remove and reinsert the power supply, and then reconnect the power cable to restart. If status persists, replace the power supply assembly.

Note: If the airflow direction for a power supply assembly does not match the chassis airflow direction as stored on WWN cards, the power supply will have a "fault" status. However, the LED operation for the power supply will not indicate a fault.

Interpreting fan assembly LEDs

See the following figure and table to interpret the LED patterns on fan assemblies. The LED patterns may temporarily change during POST and other diagnostic tests. The SAN256B-7 Director has two fan assemblies.
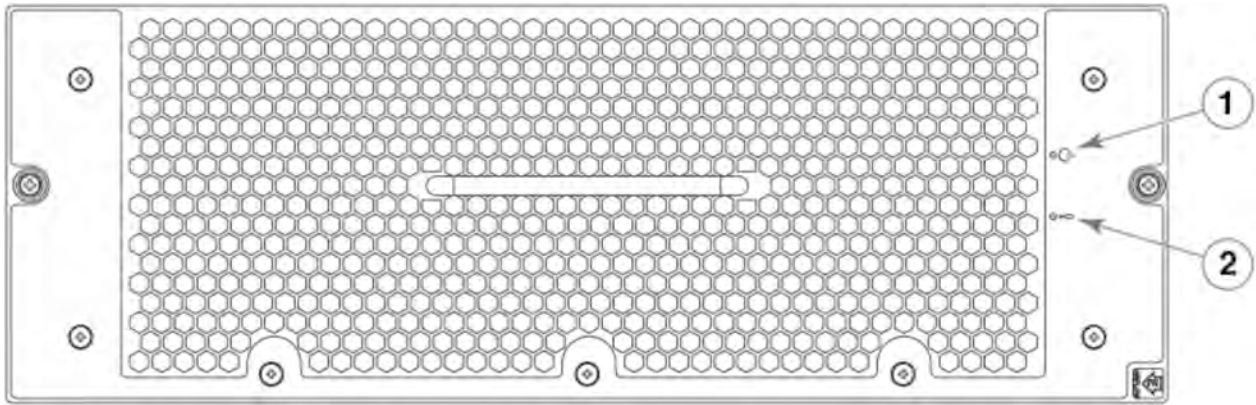
Figure 49. Fan Assembly LEDs

 1. Power LED

 2. Status LED

Table 26. Fan Assembly LED Descriptions			
LED Purpose	**Color**	**Status**	**Recommended Action**
Power ⏻	No light (LED is off)	The fan assembly does not have power.	Ensure that the fan assembly is firmly seated and has power.
	Steady green	The fan assembly has power.	No action is required.
Status ⚠	No light (LED is off)	The fan assembly is either healthy or does not have power.	Ensure that the fan assembly has power.
	Steady amber	The fan assembly is being initialized or has a failure (full or partial).	Wait to see if the fan fully initializes. If the LED remains amber, replace the fan assembly.
	Slow-flashing amber (on 2 seconds, then off 2 seconds)	The fan assembly is not seated correctly or is faulty.	Pull the unit out and reseat it. If the LED continues to flash, replace the unit.
	Flashing amber (on ½ second, then off 3.5 seconds)	The fan is disabled.	Run the `fanEnable` command to enable the fan.
	Fast-flashing amber (on ½ second, then off ½ second)	Environmental range has been exceeded.	Check for out-of-bounds environmental condition, resolve any problems, and reseat the unit. If the LED continues to flash, replace the unit.

> ⚠ **CAUTION:** If fan assembly LED operation indicates a fault or no power, verify that fan is fully seated in the chassis and that captive screws securing fan in the chassis are fully tightened. If screws are loose, pressure from fans may unseat the fan from chassis connectors.

Interpreting POST and boot results

The device performs a power-on self-test (POST) by default each time the device is powered on, rebooted, or reset. The device can be rebooted using the `reboot` command to reboot each CP individually) or the `fastBoot` command. The `fastBoot` command reboots the switches without running POST. If the active CP blade is rebooted, it fails over to the standby CP blade.

POST

About this task

The device automatically performs POST each time it is powered on or reset.

To verify that POST has completed without error, do the following tasks:

- Verify that all LEDs return to a normal state after POST completes.

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

- Verify that the switch prompt displays when POST completes.

  If it does not display, POST was not successfully completed. Contact the device supplier for support.

- Review the system error log using the `errShow` or `errDump` commands.

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

POST includes the following steps:

Procedure

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

Boot

About this task

Gen 7 platforms implement Secure Boot. This feature enforces validation of the digital signature of the signed Boot Code image in Boot Flash. It uses a pre-programmed public key HASH inside the CPU-internal-fuses to ensure authenticity and integrity of the code prior to proceeding with the boot sequence.

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

Procedure

1. The digital signature of the signed image in Boot Flash flash code is validated against a pre-programmed public key in the CPU to ensure integrity of the code prior to proceeding with the boot sequence.
2. Universal port configuration is performed.

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

Optical transceiver requirements

Optics are authenticated as genuine during system boot or installation into a port. The user of specific optics for Gen 7 switches and blades is required to ensure optimal performance and reliability.

Using monitoring commands

This section provides example output and an explanation for commands referenced in this guide for monitoring and verifying operation of the director and various components, such as blades, power supply assemblies, and fan assemblies.

Output for the following commands is provided:

- `chassisShow`
- `errDump`
- `fanShow`
- `haShow`
- `HistoryShow`
- `psShow`
- `sensorShow`
- `sfpShow`
- `SupportSave`
- `switchShow`
- `tempShow`

For more detail on using these commands, refer to the *Fabric OS Command Reference Manual*. For more information on error messages, refer to the *Fabric OS Messages Reference Manual*.

chassisShow

The `chassisShow` command can be especially helpful in monitoring the health of the device. This command provides information on installed blade, fan assembly, and power supply assembly FRUs. In addition, customer-supplied information can also be viewed, if included, for each FRU type. Four measurements to note are:

- Power Consume Factor—Maximum power allocated for a given FRU. Except for power supply assemblies, all power is shown as a negative number.
- Power Usage—If shown, this reflects real-time power usage for the FRU.
- Time Awake—Time that the system as been powered on since the last reboot.
- Time Alive—Reflects the total power-on time for the FRU (when available).

The following examples show output from this command.

Note: The output has been truncated to reduce duplicate information.

```
chassisX6-4:admin> chassisshow
Chassis Family:         X7-4
Chassis Backplane Revision: 0

SW BLADE   Slot: 3
Header Version:         2
```

```
Power Consume Factor:    -245W
Power Usage:             -152W
Factory Part Num:        60-1003325-01
Factory Serial Num:      DYJ0339L029
Manufacture:             Day:  6  Month: 11  Year: 2015
Update:                  Day: 15  Month:  2  Year: 2016
Time Alive:              26 days
Time Awake:              0 days
ID:

SW BLADE   Slot: 4
Header Version:          2
Power Consume Factor:    -245W
Power Usage:             -157W
Factory Part Num:        60-1003325-01
Factory Serial Num:      DYJ0339L014
Manufacture:             Day:  3  Month: 10  Year: 2015
Update:                  Day: 15  Month:  3  Year: 2016
Time Alive:              80 days
Time Awake:              0 days
ID:

CP BLADE   Slot: 1
Header Version:          2
Power Consume Factor:    -50W
Power Usage:             -47W
Factory Part Num:        60-1003201-09
Factory Serial Num:      DYK0338L008
Manufacture:             Day:  7  Month: 10  Year: 2015
Update:                  Day: 23  Month:  3  Year: 2016
Time Alive:              84 days
Time Awake:              0 days
ID:

CP BLADE   Slot: 2
Header Version:          2
Power Consume Factor:    -50W
Power Usage:             -41W
Factory Part Num:        60-1003201-09
Factory Serial Num:      DYK0338L00E
Manufacture:             Day:  7  Month: 10  Year: 2015
Update:                  Day: 23  Month:  3  Year: 2016
Time Alive:              87 days
Time Awake:              0 days
ID:

CORE BLADE   Slot: 5
Header Version:          2
Power Consume Factor:    -450W
Power Usage:             -264W
Factory Part Num:        60-1003199-08
Factory Serial Num:      DYH0344L005
Manufacture:             Day: 17  Month: 11  Year: 2015
Update:                  Day:  0  Month:  0  Year: 0
Time Alive:              0 days
Time Awake:              0 days
ID:

CORE BLADE   Slot: 6
Header Version:          2
Power Consume Factor:    -450W
Power Usage:             -289W
Factory Part Num:        60-1003199-08
Factory Serial Num:      DYH0344L003
Manufacture:             Day:  7  Month: 11  Year: 2015
Update:                  Day:  0  Month:  0  Year: 0
Time Alive:              0 days
Time Awake:              0 days
ID:

SW BLADE   Slot: 7
Header Version:          2
Power Consume Factor:    -420W
Power Usage:             -264W
Factory Part Num:        60-1003373-01
Factory Serial Num:      EAL0339L009
Manufacture:             Day: 24  Month: 10  Year: 2015
Update:                  Day: 12  Month:  3  Year: 2016
Time Alive:              66 days
Time Awake:              0 days
ID:
```

```
SW BLADE   Slot: 8
Header Version:          2
Power Consume Factor:    -420W
Power Usage:             -264W
Factory Part Num:        60-1003373-01
Factory Serial Num:      EAL0339L009
Manufacture:             Day: 24  Month: 10  Year: 2015
Update:                  Day: 12  Month:  3  Year: 2016
Time Alive:              66 days
Time Awake:              0 days
ID:

POWER SUPPLY  Unit: 1
Power Source:            AC
Fan Direction:           Non-portside Intake
Header Version:          2
Power Consume Factor:    2870w
Factory Part Num:        23-0000161-01
Factory Serial Num:      DUC2M32L06L
Manufacture:             Day: 10  Month:  8  Year: 2015
Update:                  Day: 16  Month:  2  Year: 2016
Time Alive:              88 days
Time Awake:              3 days
ID:

FAN  Unit: 1
Fan Direction:           Non-portside Intake
Header Version:          2
Power Consume Factor:    -300w
Factory Part Num:        60-1003203-03
Factory Serial Num:      DYL0329L05J
Manufacture:             Day:  3  Month: 10  Year: 15
Update:                  Day: 16  Month:  2  Year: 2016
Time Alive:              88 days
Time Awake:              3 days
ID:

FAN  Unit: 2
Fan Direction:           Non-portside Intake
Header Version:          2
Power Consume Factor:    -300w
Factory Part Num:        60-1003203-03
Factory Serial Num:      DYL0329L05M
Manufacture:             Day:  3  Month: 10  Year: 15
Update:                  Day: 16  Month:  2  Year: 2016
Time Alive:              88 days
Time Awake:              3 days
ID:

WWN  Unit: 1
System AirFlow:          Non-portside Intake
Header Version:          2
Power Consume Factor:    -1W
Factory Part Num:        60-1003194-02
Factory Serial Num:      DZH0331L039
Manufacture:             Day:  3  Month: 10  Year: 15
Update:                  Day:  0  Month:  0  Year: 0
Time Alive:              24 days
Time Awake:              0 days
ID:                      ***(@*%)(*
Part Num:                ***(@*%)(*@#%(@*%)@*
Serial Num:              ***(@*%)(*@#%(@*%)@*
Revision Num:            ***(

WWN  Unit: 2
System AirFlow:          Non-portside Intake
Header Version:          2
Power Consume Factor:    -1W
Factory Part Num:        60-1003194-02
Factory Serial Num:      DZH0331L032
Manufacture:             Day:  3  Month: 10  Year: 15
Update:                  Day:  0  Month:  0  Year: 0
Time Alive:              24 days
Time Awake:              0 days
ID:                      ***(@*%)(*
Part Num:                ***(@*%)(*@#%(@*%)@*
Serial Num:              ***(@*%)(*@#%(@*%)@*
Revision Num:            ***(

Chassis Factory Serial Num: DZB1339A006
```

errDump and errShow

Use the errShowcommand to display device error log messages one at a time. Use the errDump command to display error log messages without any page breaks. The output of these commands are unique for each Control Processor (CP), so must be executed on each CP blade to obtain a complete record.

The following partial example shows the output of the errDump command.

```
chassisX7:admin> errdump

2016/03/28-08:44:28,[FV-1001], 90, SLOT 1 CHASSIS,INFO,My_Switch,Flow Vision daemon initialized.

2016/03/28-08:44:51,[FSSM-1002],91,SLOT 1 CHASSIS,INFO,My_Chassis,HA State is in sync.

2016/03/28-08:44:51,[SULB-1003],92,SLOT 1 CHASSIS,INFO,My_Chassis,Firmwarecommit has started.

2016/03/28-08:48:27,[SULB-1004],93,SLOT 1 CHASSIS,INFO,My_Chassis,Firmwarecommit has completed.

2016/03/28-08:48:27,[SULB-1036],94,SLOT 1 CHASSIS,INFO,My_Chassis,The new Version: Fabric OS
v8.0.1_bld52.

2016/03/28-08:48:27,[SULB-1002],95,SLOT 1 CHASSIS,INFO,My_Chassis,Firmwaredownload command has
completed successfully.

2016/03/28-08:50:51,[IPAD-1003],96,SLOT 1 CHASSIS,INFO,My_Chassis,DNS parameters saved
successfully.

--------------------------------------------------------------------------------------------
------------
```

Note the following about this output:

- The output can contain several thousand lines. Use the errClear command to reset the output when needed. This command clears all error log messages for all director instances on the CP where the command is issued.
- *My_Switch* corresponds to what is entered for switchname and is a switch or logical switch event.
- *My_Chassis* corresponds to what is entered for chassisname and is a chassis event.

fanShow

Use the fanShow command to display the current status and speed of each installed fan. The following example displays output from this command.

```
chassisX7-4:admin> fanshow
Fan 1 is Ok, speed is 6993 RPM
Fan 2 is Ok, speed is 6993 RPM
```

haShow

Use the haShow command to display the control processor (CP) status. The display includes the following information:

- Local CP state (slot number and CP ID), warm or cold, recovering or recovered.
- Remote CP state (slot number and CP ID).
- High Availability (enabled or disabled).
- Heartbeat (up or down).
- Health of standby CP.
- HA synchronization status.

The following is an example of haShow output:

```
chassisX7:admin> hashow
Local CP (Slot 1, CP0): Active, Warm Recovered
```

```
   Remote CP (Slot 2, CP1): Standby, Healthy
   HA enabled, Heartbeat Up, HA State synchronized
```

Note the following about this output:

- A warm recovery typically does not disrupt traffic flow.
- A cold recovery is usually a result of a reboot of the active CP, which disrupts traffic.
- A lack of HA synchronization can be related to a firmware download in progress or that the device is recovering from a reboot or power-cycle.

historyShow

Use the `historyShow` command to display the entire history log, which includes insertion and removal events for field-replaceable units (FRUs), such as blades, power supplies, fans, and world wide name (WWN) cards.

The following is an example of `historyShow` output:

```
chassisX7-4:admin> historyshow

CORE BLADE  Slot 5      Inserted at Fri Jun 17 12:05:02 2016
Factory Part Number:    60-1003324-01
Factory Serial Number:  DZD0331L004

POWER SUPPLY  Unit 1    Inserted at Fri Jun 17 12:05:26 2016
Factory Part Number:    23-0000162-01
Factory Serial Number:  DUD2M36L04N

POWER SUPPLY  Unit 2    Inserted at Fri Jun 17 12:05:26 2016
Factory Part Number:    23-0000162-01
Factory Serial Number:  DUD2M08M08G

CORE BLADE  Slot 6      Inserted at Fri Jun 17 12:05:26 2016
Factory Part Number:    60-1003324-01
Factory Serial Number:  DZD0331L016

FAN  Unit 1             Inserted at Fri Jun 17 12:05:27 2016
Factory Part Number:    60-1003203-03
Factory Serial Number:  DYL0329L05R

FAN  Unit 2             Inserted at Fri Jun 17 12:05:27 2016
Factory Part Number:    60-1003203-03
Factory Serial Number:  DYL0329L01Z

SW BLADE  Slot 3        Inserted at Fri Jun 17 12:05:27 2016
Factory Part Number:    60-1003200-07
Factory Serial Number:  DYJ0332L00H

WWN  Unit 1             Inserted at Fri Jun 17 12:05:27 2016
Factory Part Number:    60-1003194-02
Factory Serial Number:  DZH0331L00E

WWN  Unit 2             Inserted at Fri Jun 17 12:05:28 2016
Factory Part Number:    60-1003194-02
Factory Serial Number:  DZH0331L01C

SW BLADE  Slot 4        Inserted at Fri Jun 17 12:05:28 2016
Factory Part Number:    60-1003336-01
Factory Serial Number:  EAL0338L00R

SW BLADE  Slot 7        Inserted at Fri Jun 17 12:05:29 2016
Factory Part Number:    60-1003200-07
Factory Serial Number:  DYJ0332L02G

SW BLADE  Slot 8        Inserted at Fri Jun 17 12:05:29 2016
Factory Part Number:    60-1003200-07
Factory Serial Number:  DYJ0332L03G

CP BLADE  Slot 1        Inserted at Fri Jun 17 12:05:30 2016
Factory Part Number:    60-1003201-09
Factory Serial Number:  DYK0331L007

CP BLADE  Slot 2        Inserted at Fri Jun 17 12:05:31 2016
Factory Part Number:    60-1003201-09
```

```
Factory Serial Number:  DYK0331L00N
```

psShow

Use the psShow command to display the current status of installed power supplies. The following is an example of psShow output:

```
        Gen7-4:FID128:root> psshow

Power Supply #1 is OK Temperature is 29.00 C
V10L32, DUC2M32L06C ,23-0000161-01,30,DELTA,ECD16020042 ,S4,DUC2M32L
Power Supply #2 is OK Temperature is 29.00 C
V10N46, DUC2M46N9Y5 ,23-0000161-03, A,DELTA,ECD16020042 ,02,DUC2M46N
```

sensorShow

Use the sensorShow command to display the current temperature, fan, and power supply status, and readings from sensors located on the device. The sensorShow command output is similar to tempShow except that fan and power supply sensor information is also included. Temperatures are in Celsius only.

The following is an example of sensorShow output.

```
chassisX7-4:admin> sensorshow
sensor  1: (Temperature) is Ok, value is 29 C
sensor  2: (Temperature) is Ok, value is 47 C
sensor  3: (Temperature) is Ok, value is 43 C
sensor  4: (Temperature) is Ok, value is 34 C
sensor  5: (Temperature) is Ok, value is 53 C
sensor  6: (Temperature) is Ok, value is 36 C
sensor  7: (Temperature) is Ok, value is 39 C
sensor  8: (Temperature) is Ok, value is 33 C
sensor  9: (Temperature) is Ok, value is 41 C
sensor 10: (Temperature) is Ok, value is 43 C
sensor 11: (Temperature) is Ok, value is 44 C
sensor 12: (Temperature) is Ok, value is 41 C
sensor 13: (Temperature) is Ok, value is 45 C
sensor 14: (Temperature) is Ok, value is 31 C
sensor 15: (Temperature) is Ok, value is 45 C
sensor 16: (Temperature) is Ok, value is 48 C
sensor 17: (Temperature) is Ok, value is 31 C
sensor 18: (Temperature) is Ok, value is 45 C
sensor 19: (Temperature) is Ok, value is 45 C
sensor 20: (Temperature) is Ok, value is 29 C
sensor 21: (Temperature) is Ok, value is 44 C
sensor 22: (Temperature) is Ok, value is 43 C
sensor 23: (Temperature) is Ok, value is 30 C
sensor 24: (Temperature) is Ok, value is 45 C
sensor 25: (Temperature) is Ok, value is 42 C
sensor 26: (Fan        ) is Ok,speed is 6984 RPM
sensor 27: (Fan        ) is Ok,speed is 6984 RPM
sensor 28: (Power Supply) is Ok
sensor 29: (Power Supply) is Ok
```

sfpShow

Use the sfpShow command without operands to display a summary of all installed SFPs. For each port, the command displays the SFP type and, for a serial ID SFP, the vendor name and SFP, serial number, and speed capability (in Gb/s). Use this command with a port number to display detailed information about the serial ID SFP in the specified port.

The following is example of sfpShow output:

```
chassisX7-4:admin> sfpshow
Slot  3/Port  0: id (sw) Vendor: BROCADE   Serial No: JAF3154200000VJ  Speed: 8,16,32_Gbps
Slot  3/Port  1: --
Slot  3/Port  2: --
Slot  3/Port  3: --
Slot  3/Port  4: --
Slot  3/Port  5: --
```

```
Slot  3/Port   6: --
Slot  3/Port   7: --
Slot  3/Port   8: --
Slot  3/Port   9: --
Slot  3/Port  10: --
Slot  3/Port  11: --
Slot  3/Port  12: --
Slot  3/Port  13: --
Slot  3/Port  14: --
Slot  3/Port  15: --
Slot  3/Port  16: --
Slot  3/Port  17: --
Slot  3/Port  18: --
Slot  3/Port  19: --
Slot  3/Port  20: --
Slot  3/Port  21: --
Slot  3/Port  22: --
Slot  3/Port  23: --
Slot  3/Port  24: --
Slot  3/Port  25: --
Slot  3/Port  26: --
Slot  3/Port  27: --
Slot  3/Port  28: --
Slot  3/Port  29: --
Slot  3/Port  30: --
Slot  3/Port  31: --
Slot  3/Port  32: --
Slot  3/Port  33: --
Slot  3/Port  34: --
Slot  3/Port  35: --
Slot  3/Port  36: --
Slot  3/Port  37: --
Slot  3/Port  38: --
Slot  3/Port  39: --
Slot  3/Port  40: --
Slot  3/Port  41: --
Slot  3/Port  42: --
Slot  3/Port  43: --
Slot  3/Port  44: --
Slot  3/Port  45: --
Slot  3/Port  46: --
Slot  3/Port  47: --
Slot  4/Port   0: --
Slot  4/Port   1: --
Slot  4/Port   2: --
Slot  4/Port   3: --
Slot  4/Port   4: --
Slot  4/Port   5: --
Slot  4/Port   6: --
Slot  4/Port   7: --
Slot  4/Port   8: --
Slot  4/Port   9: --
Slot  4/Port  10: --
Slot  4/Port  11: --
Slot  4/Port  12: --
Slot  4/Port  13: --
Slot  4/Port  14: --
Slot  4/Port  15: --
Slot  7/Port   0: --
Slot  7/Port   1: --
Slot  7/Port   2: --
Slot  7/Port   3: --
Slot  7/Port   4: --
Slot  7/Port   5: --
Slot  7/Port   6: --
Slot  7/Port   7: --
Slot  7/Port   8: --
Slot  7/Port   9: --
Slot  7/Port  10: --
Slot  7/Port  11: --
Slot  7/Port  12: --
Slot  7/Port  13: --
Slot  7/Port  14: --
Slot  7/Port  15: --
Slot  7/Port  16: --
Slot  7/Port  17: --
Slot  7/Port  18: --
Slot  7/Port  19: --
Slot  7/Port  20: --
Slot  7/Port  21: --
Slot  7/Port  22: --
Slot  7/Port  23: --
```

```
Slot  7/Port 24: --
Slot  7/Port 25: --
Slot  7/Port 26: --
Slot  7/Port 27: --
Slot  7/Port 28: --
Slot  7/Port 29: --
Slot  7/Port 30: --
Slot  7/Port 31: id (sw) Vendor: BROCADE   Serial No: JAF3154200000K8  Speed: 8,16,32_Gbps
Slot  7/Port 32: --
Slot  7/Port 33: --
Slot  7/Port 34: id (sw) Vendor: BROCADE   Serial No: JAF3154200000K3  Speed: 8,16,32_Gbps
Slot  7/Port 35: id (sw) Vendor: BROCADE   Serial No: JAF315410000NN4  Speed: 8,16,32_Gbps
Slot  7/Port 36: --
Slot  7/Port 37: id (sw) Vendor: BROCADE   Serial No: HAF314410000596  Speed: 4,8,16_Gbps
Slot  7/Port 38: --
Slot  7/Port 39: --
Slot  7/Port 40: --
Slot  7/Port 41: --
Slot  7/Port 42: --
Slot  7/Port 43: --
Slot  7/Port 44: --
Slot  7/Port 45: --
Slot  7/Port 46: --
Slot  7/Port 47: --
Slot  8/Port  0: --
Slot  8/Port  1: --
Slot  8/Port  2: --
Slot  8/Port  3: --
Slot  8/Port  4: --
Slot  8/Port  5: --
Slot  8/Port  6: --
Slot  8/Port  7: --
Slot  8/Port  8: --
Slot  8/Port  9: --
Slot  8/Port 10: --
Slot  8/Port 11: --
Slot  8/Port 12: --
Slot  8/Port 13: --
Slot  8/Port 14: --
Slot  8/Port 15: id (sw) Vendor: BROCADE   Serial No: JAF315420000188  Speed: 8,16,32_Gbps
Slot  8/Port 16: --
Slot  8/Port 17: --
Slot  8/Port 18: --
Slot  8/Port 19: --
Slot  8/Port 20: --
Slot  8/Port 21: --
Slot  8/Port 22: --

GE: Slot  4/Port 17: --
```

slotShow

Use the slotShow command to display the current status of each blade in the system. Depending on the option used, the command retrieves information on blade type, blade ID, status, Brocade model name, and power usage for each slot in the switch or chassis. Use the -m operand to display the blade model name and status.

Following is an example of slotShow output.

Note: The most common status is shown. A status of Faulty (51) would display for a POST failure during power-on or a blade hot-plug.

```
Core-X7-8:admin> slotshow -m

Slot Blade Type ID Model Name Status
------------------------------------------------
1 CP BLADE 220 CPX7 ENABLED
2 CP BLADE 220 CPX7 ENABLED
3 AP BLADE 186 SX6 ENABLED
4 AP BLADE 186 SX6 ENABLED
5 SW BLADE 218 FC32-G7-48 ENABLED
6 SW BLADE 216 FC64-48 ENABLED
7 CORE BLADE 215 CR64-8 ENABLED
8 CORE BLADE 215 CR64-8 ENABLED
9 AP BLADE 186 SX6 ENABLED
10 SW BLADE 204 FC32-64 ENABLED
```

```
11 SW BLADE 204 FC32-64 ENABLED
12 AP BLADE 186 SX6 ENABLED

Upgraded-X6-8:admin> slotshow -m

Slot Blade Type ID Model Name Status
-------------------------------------------------
1 CP BLADE 175 CPX6 ENABLED
2 CP BLADE 175 CPX6 ENABLED
3 SW BLADE 178 FC32-48 ENABLED
4 SW BLADE 216 FC64-48 ENABLED
5 SW BLADE 178 FC32-48 ENABLED
6 SW BLADE 178 FC32-48 ENABLED
7 CORE BLADE 215 CR64-8 ENABLED
8 CORE BLADE 215 CR64-8 ENABLED
9 SW BLADE 204 FC32-64 ENABLED
10 SW BLADE 204 FC32-64 ENABLED
11 SW BLADE 216 FC64-48 ENABLED
12 SW BLADE 216 FC64-48 ENABLED
```

switchShow

The `switchShow` command can be especially helpful in monitoring the health of the device. This command displays status, identification, and configuration information on the chassis and installed blades and ports. The following example shows output from this command.

Note: The following `switchShow` output has been truncated to reduce duplicate information.

supportSave

Use the `supportSave` command to collect RASLOG, TRACE, supportShow, core file, FFDC data, and other support information to a remote FTP location. On platforms that support a USB, the information can also be stored on an attached USB device. SupportShow information is available on active and standby CPs.

The following is an example of `supportSave` output. This output assumes that the `supportFtp` command was used to set up FTP parameters (always recommended). In the following examples, the `-c` operand allows use of the FTP, SCP, or SFTP parameters set by `supportFtp`. The `-n` operand turns off confirmation prompting.

```
chassisX7-4:admin> supportsave -n -c

Saving support information for switch:ras010, module:RAS...
.....................................................................
Saving support information for switch:ras010, module:FTRACE_START...
....
Saving support information for switch:ras010, module:SSHOW_SYS...
...............................................

Saving support information for switch:ras010, module:SSHOW_ISWITCH...
....................................
Saving support information for switch:ras010, module:FABRIC...
...............
Saving support information for switch:ras010, module:DIAG...
..............
Saving support information for switch:ras010, module:RTE...
Saving support information for switch:ras010, module:IF_TREE...
Saving support information for switch:ras010, module:ISCSID_DBG...
Saving support information for switch:ras010, module:AGDUMP...
Saving support information for switch:ras010, module:AGWWNS...
Saving support information for switch:ras010, module:AGWWN_CFG...
Saving support information for switch:ras010, module:VPWWN_CFG...
.....

Saving support information for switch:ras010, module:SSHOW_PLOG...
..
```

```
Saving support information for switch:ras010, module:SSHOW_OS...
...........................................
Saving support information for switch:ras010, module:SSHOW_EX...
..
Saving support information for switch:ras010, module:SSHOW_FABRIC...
...........................................
Saving support information for switch:ras010, module:SSHOW_SERVICE...
...........
Saving support information for switch:ras010, module:SSHOW_SEC...
..................
Saving support information for switch:ras010, module:SSHOW_NET...
.....................
Saving support information for switch:ras010, module:SSHOW_FICON...
..............
Saving support information for switch:ras010, module:SSHOW_ASICDB...
....................................................................
Saving support information for switch:ras010, module:SSHOW_AG...

Saving support information for switch:ras010, module:SSHOW_CRYP...


Saving support information for switch:ras010, module:SSHOW_FCIP...
....................................................................
slot 4-dp1 support file transfer done.
.................
slot 4-dp0 support file transfer done.
....................................................................
Saving support information for switch:ras010, module:SSHOW_PORT...
.
.
.
Saving support information for switch:ras010, module:SSHOW_DCEHSL...


Saving support information for switch:ras010, module:SSHOW_FLOW...
...
Saving support information for switch:ras010, module:CEEDEBUG...
Saving support information for switch:ras010, module:CEETECHSUPPORT...
Saving support information for switch:ras010, module:FCOESUPPORT...
Saving support information for switch:ras010, module:C2REGDUMP...
Saving support information for switch:ras010, module:C1REGDUMP...
Saving support information for switch:ras010, module:PBREGDUMP...
Saving support information for switch:ras010, module:BLSREGDUMP...
Saving support information for switch:ras010, module:AVREGDUMP...
Saving support information for switch:ras010, module:C3REGDUMP...
Saving support information for switch:ras010, module:C4REGDUMP...
Saving support information for switch:ras010, module:BCM_STATS...
Saving support information for switch:ras010, module:CRYP...


Saving support information for switch:ras010, module:FCIP...


Saving support information for switch:ras010, module:FCIP_DPLOGS...
................
Saving support information for switch:ras010, module:VFABRIC...
.....
Saving support information for switch:ras010, module:MAPS...
Saving support information for switch:ras010, module:ENC_LOGGER...
Saving support information for switch:ras010, module:AN_DEBUG...
..................
Saving support information for switch:ras010, module:AMS_MAPS_LOG...
Saving support information for switch:ras010, module:FLOW_VISION_LOG...
Saving support information for switch:ras010, module:MP_LOG...
Saving support information for switch:ras010, module:DM_FTR_FFDC...
........................
Saving support information for switch:ras010, module:CORE_FFDC...
```

```
No core or FFDC data files found!
Saving support information for switch:ras010, module:RAS_POST...
..............

SupportSave completed.
```

tempShow

Use the `tempShow` command to display temperature readings of blade temperature sensors. The command displays the following information:

- Sensor ID (an index number)
- Slot number
- Sensor index (when command issued with the `--detail` option)
- Sensor state (OK or absent)
- Temperature in both Centigrade and Fahrenheit

The following is an example of `tempShow` output:

```
chassisX7-4:admin> tempshow

Sensor  Slot    Sensor  State           Centigrade    Fahrenheit
  ID            Index
=================================================================
  1       3       0      Ok               29             84
  2       3       1      Ok               47            116
  3       3       2      Ok               43            109
  4       4       0      Ok               34             93
  5       4       1      Ok               53            127
  6       1       0      Ok               36             96
  7       1       1      Ok               39            102
  8       1       2      Ok               33             91
  9       1       3      Ok               41            105
 10       2       0      Ok               43            109
 11       2       1      Ok               44            111
 12       2       2      Ok               41            105
 13       2       3      Ok               45            113
 14       5       0      Ok               31             87
 15       5       1      Ok               45            113
 16       5       2      Ok               48            118
 17       6       0      Ok               31             87
 18       6       1      Ok               45            113
 19       6       2      Ok               45            113
 20       7       0      Ok               29             84
 21       7       1      Ok               44            111
 22       7       2      Ok               43            109
 23       8       0      Ok               30             86
 24       8       1      Ok               45            113
 25       8       2      Ok               43            109
```

Note the following facts about this output:

- The absent state simply reflects that the blade slot is empty.
- The sensor index is mainly for support use.
- Multiple sensors are commonly averaged to determine thresholds used for managing fan speeds or for determining a high temperature condition that may require that the blade be shut off.

Running diagnostic tests

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

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

Note: Error messages do not necessarily indicate that the device requires maintenance.

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

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

For more information about diagnostic tests and how to run them, refer to the *Fabric OS Administration Guide* and the *Fabric OS Command Reference Manual*. For information about system error messages (errShow or errDump), refer to the *Fabric OS Troubleshooting and Diagnostics Guide*.

Chapter 7. Port and extension blades

FC32-X7-48 port blade overview

The FC32-X7-48 port blade has 48 front end 32Gb/s FC SFP+ ports with an edge switch interconnect to the core blades. All FC blade features are supported. Supported SFPs include 32Gb/s, 16Gb/s, and 10Gb/s FC.

Each FC32-X7-48 blade supports up to 48 Fibre Channel ports that provide 32Gb/s, 16Gb/s, 8Gb/s, and 4Gb/s.

Each port blade provides 48 backplane port connections to core routing blades. The port blade supports port-based in-flight encryption/decryption and compression/decompression.

Port and extension blades can be mixed in device slots 3, 4, 7, and 8, but CR64-4 blades must be installed in slots 5 and 6. Up to four hot-swappable port blades can be installed in a single chassis to provide up to 192 32Gb/s FC ports.

Optics such as the following can be installed in the blade's FC ports. For a complete list of transceivers, see Supported Transceivers and Cables.

- 32Gb/s SFP+ transceivers supporting speeds 32Gb/s, 16Gb/s, and 8Gb/s.
- 16Gb/s SFP+ transceivers supporting speeds 16Gb/s, 8Gb/s, and 4Gb/s.
- 10Gb/s SFP+ transceivers supporting 10Gb/s.

Port blades contain the following LED indicators:

- Green blade power LED
- Amber blade status LED
- Bicolor green/amber FC port status LEDs

For details on interpreting LED operation, see Interpreting FC32-X7-48 Port Blades.

FC32-X7-48 port blade numbering and trunking

The following figure shows how ports are numbered on the blade:
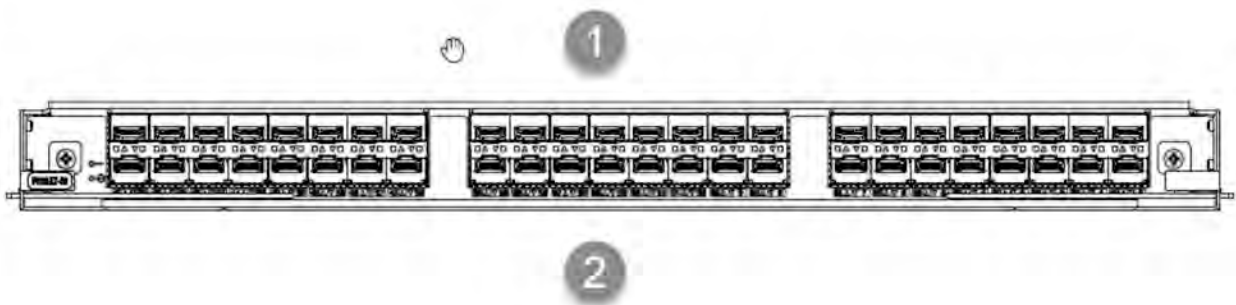
Figure 50. FC32-X7-48 Blade Port Numbering

1. FC ports 0-23 (numbered right to left)
2. FC ports 24-47 (numbered right to left)

See Supported Transceivers and Cables for a list of qualified transceivers for blade ports.

The following table defines the eight-port Fibre Channel port groups for configuring trunk groups or "trunks." On the blade, ports belonging to the same port group are indicated with the same color border beneath the port on the blade label. Ports belonging to the same ASIC are indicated by a border with a similar color tone.

Table 27. Port Groups for Configuring Trunks	
Port Number	**Port Group**
0–7	0
8–15	1
16–23	2
24–31	3
32–39	4
40–47	5

The following list shows the requirements for forming trunk groups:

- All ports in a trunk group must belong to the same port group. For example, to form an 8-port trunk select all eight ports from port group 0 or port group 1. You cannot use ports from each port group for the trunk.
- You can use from 1 to 8 ports in a port group to form a trunk.
- All ports in a trunk must be running at the same speed.
- All ports in a trunk must be configured for the same distance.
- All ports in a trunk must have the same encryption, compression, QoS, and FEC settings.
- Trunk groups must be created between Brocade switches (or Brocade adapters in the case of F_Port trunking). Brocade trunking is proprietary and is not supported on M-EOS or third-party switches.
- There must be a direct connection between participating switches.

FC64-48 port blade overview

The FC64-48 port blade provides 48 front end 64Gb/s FC SFP+ ports with the edge switch interconnected to the core blades. Supported SFPs include 64, 32, and 10Gb/s FC.

Each port blade provides 48 backplane ports connections to core routing blades. The port blade supports port-based in-flight encryption/decryption and compression/decompression.

Port and extension blades can be mixed in device slots 3, 4, 7, and 8, but CR64-4 blades must be installed in slots 5 and 6. Up to four hot-swappable port blades can be installed in a single chassis to provide up to 192 32Gb/s FC ports.

Optics, such as the following, can be installed in the blade's FC ports. For a complete list of transceivers, see Supported Transceivers and Cables.

- 64Gb/s SFP+ transceivers supporting speeds 64Gb/s, 32Gb/s, and 16Gb/s.
- 32Gb/s SFP+ transceivers supporting speeds of 32Gb/s, 16Gb/s, and 8Gb/s.
- 10Gb/s SFP+ transceivers supporting 10Gb/s.

Port blades contain the following LED indicators:

- Green blade power LED
- Amber blade status LED
- Bicolor green/amber FC port status LEDs

For details on interpreting LED operation, see "Interpreting FC64-48 port blade LEDs" on page 78.

FC64-48 port blade numbering and trunking

The following figure shows how ports are numbered on the blade.
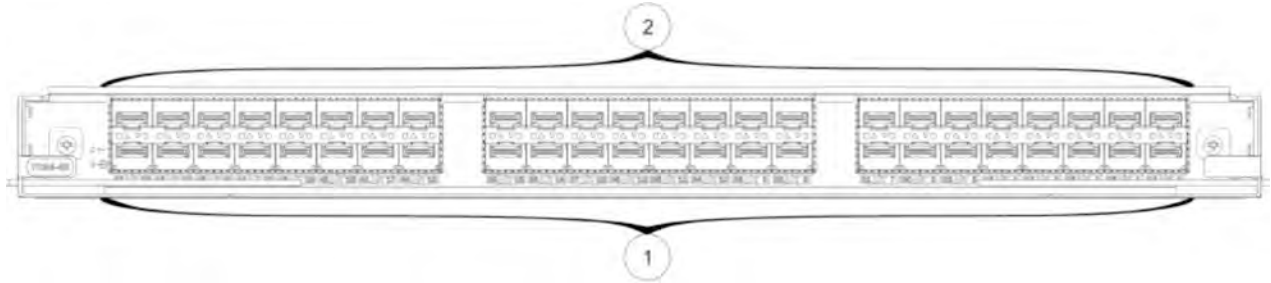
Figure 51. FC64-48 Blade Port Numbering

1. FC ports 0-23 (numbered right to left)
2. FC ports 24-47 (numbered right to left)

See Supported Transceivers and Cables for a list of qualified transceivers for blade ports.

The following table defines the eight-port Fibre Channel port groups for configuring trunk groups or "trunks." On the blade, ports belonging to the same port group are indicated with the same color border beneath the port on the blade label. Ports belonging to the same ASIC are indicated by a border with a similar color tone.

Table 28. Port Groups for Configuring Trunks

Port Number	Port Group
0–7	0
8–15	1
16–23	2
24–31	3
32–39	4
40–47	5

Following are the requirements for forming trunk groups:

- All ports in a trunk group must belong to the same port group. For example, to form an 8-port trunk select all eight ports from port group 0 or port group 1. You cannot use ports from each port group for the trunk.
- You can use from 1 to 8 ports in a port group to form a trunk.
- All ports in a trunk must be running at the same speed.
- All ports in a trunk must be configured for the same distance.
- All ports in a trunk must have the same encryption, compression, QoS, and FEC settings.
- Trunk groups must be created between Brocade switches (or Brocade adapters in the case of F_Port trunking). Brocade trunking is proprietary and is not supported on M-EOS or third-party switches.
- There must be a direct connection between participating switches.

FC32-64 port blade overview

The FC32-64 port blade contains 16 QSFP28 ports. Each QSFP optics supports four ports for connecting FC devices. With a breakout cable connected to the QSFP transceiver, connections are provided for up to four devices.

Breakout capability allows four SFP+ front ports on qualified Fibre Channel and Ethernet QSFP transceivers to operate at multiple speeds. For example, SFP+ front ports on an FC 4x32Gb/s SWL QSFP+ transceiver each operate at 32Gb/s or four SFP+ front ports on a 40GbE QSFP+ transceiver can each operate at 10GbE. By default Ethernet ports operate in non-breakout mode, so you must enable breakout mode for ports containing Ethernet transceivers using the `portcfgbreakout --enable` command.

Connection speeds depend on the QSFP transceiver installed. For example, a 4x32Gb/s QSFP+ transceiver would provide four 32/16Gb/s connections and a 4x16Gb/s QSFP+ transceiver provides four 16/8/4Gb/s connections.

The following list shows considerations for using these blades:

- Port and extension blades can be mixed in device slots 3, 4, 7, and 8, but CR64-4 blades must be installed in slots 5 and 6. Up to four hot-swappable port blades can be installed in a single chassis to provide up to 192 32Gb/s FC ports.
- It is recommended that two fan assemblies be installed on the SAN256B-7 chassis if blades are being used.

Port blades contain the following LED indicators. For details on interpreting LED operation, see Supported Transceivers and Cables.

- Green blade power LED
- Amber blade status LED
- Bicolor green/amber port status LEDs

Flexport allows you to configure individual ports on the FC32-64 blade for Fibre Channel (FC) or Fibre Channel over Ethernet (FCoE) connections when qualified FC or Ethernet transceivers are installed in the ports. Configure FC (default) or Ethernet operation for a port using the `portcfgflexport` command.

- FC operation allows the connection of blades to fabric storage, servers, and switches. An FC transceiver must be installed in a port to configure FC operation for that port. Supported FC transceivers include 4x32Gb/s QSFP28 and 4x16Gb/s QSFP+ transceivers.
- FCoE operation allows the connection of blades to FCoE devices as part of a unified fabric. The FCoE devices can be servers or connections through an FCoE Initialization Protocol snooping bridge (FSB). An Ethernet transceiver must be installed in a port to configure FCoE operation for that port. Supported Ethernet transceivers include 40GbE, 4x10GbE, and 4x25GbE QSFP+ transceivers.

Reference the following resources for more information:

- For a complete list of qualified transceivers for this blade, see "Supported transceivers and cables" on page 61.
- For more details on FCoE, Flexport, and breakout mode features and commands, refer to the *Fabric OS Administration Guide* and *Fabric OS Command Reference Manual*.

FC32-64 port blade numbering and trunking

The following illustration shows how ports are numbered on the blade.
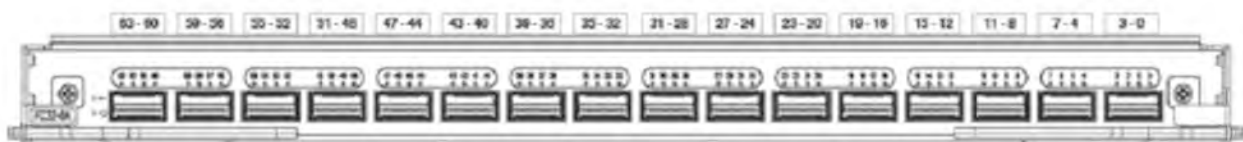
Figure 52. FC32-64 Blade Port Numbering

Note: Numbering (0-63) on this figure accounts for the quad ports available for 16 installed QSFP+ transceivers. The physical QSFP+ ports are numbered 0-15 from right to left.

See "Supported transceivers and cables" on page 61 for a list of qualified transceivers for blade ports.

The following table defines the eight-port Fibre Channel port groups for configuring trunk groups or "trunks." Color coding on the physical blade identifies the port groups. On the blade, ports belonging to the same port group are indicated with the same color border beneath the port on the blade label. Ports belonging to the same ASIC are indicated by a border with a similar color tone.

Table 29. Port Groups for Configuring Trunks	
Port Number	**Port Group**
0–7	0
8–15	1
16–23	2
24–31	3
32–39	4
40–47	5
48-55	6
56-63	7

Following are the requirements for forming trunk groups:

- All ports in a trunk group must belong to the same port group. For example, to form an 8-port trunk select all eight ports from port group 0 or port group 1. You cannot use ports from each port group for the trunk.
- You can use from 1 to 8 ports in a port group to form a trunk.
- All ports in a trunk must be running at the same speed.
- All ports in a trunk must be configured for the same distance.
- All ports in a trunk must have the same QoS and FEC settings.
- Trunk groups must be created between Brocade switches (or Brocade adapters in the case of F_Port trunking). Brocade trunking is proprietary and is not supported on M-EOS or third-party switches.
- There must be a direct connection between participating switches.

Extension blade overview

The Brocade SX6 Extension blade is intended as an extension platform to support Fibre Channel (FC), FICON, and IP based storage data flows. Brocade Extension enables you to use the existing IP wide area network (WAN) infrastructure to connect Fibre Channel and IP fabrics. Brocade Extension supports applications such as remote data replication (RDR), centralized backup, and data migration over very long distances that are impractical or very costly using native Fibre Channel or IP connections. Extension tunnels, built on a physical connection between two extension switches or blades, allow Fibre Channel and IP I/O to pass through the IP WAN. The SX6 Extension blade can connect with an SX6 blade in another SAN512B-7 or SAN256B-7 Director or with a SAN42B-R.

You can mix port and extension blades in device slots 3, 4, 7, and 8, but CR32-4 blades must be installed in slots 5 and 6. You can install a maximum of four SX6 blades in the device.

The SX6 blade has the following external ports:

- 16 Fibre Channel (FC) SFP+ ports that support Fibre Channel Routing Services and connection to FC devices for the Brocade Extension feature. These ports support 32Gb/s transceivers operating at 8, 16, or 32Gb/s, 16Gb/s transceivers operating at 4, 8, or 16Gb/s, and 10Gb/s transceivers operating at fixed 10Gb/s. FC ports can auto-negotiate speeds with connecting ports.
- 10 or 1GbE SFP+ and two 40GbE QSFP ports. These ports allow the connection of blades to IP WANs and allow Fibre Channel and IP I/O to pass through the IP WAN using extension tunnels. The 10GbE or

1GbE ports operate at 10Gb/s or 1Gb/s fixed speeds with appropriate 10Gb/s or 1Gb/s transceivers installed. The 40GbE QSFP ports operate at 40Gb/s fixed speed.

Extension blades have the following LED indicators:

- Green blade power LED
- Amber blade status LED
- Bicolor green/amber 40GbE and 10GbE or 1GbE port status LEDs
- Bicolor green/amber FC port status LEDs

For details on interpreting LED operation, see "Interpreting extension blade LEDs" on page 83.

All features are supported on this blade with no license requirements.

Extension features

The SX6 Extension blade supports the following extension features:

Note: For full details on extension blade features and configuration, refer to the *Fabric OS Extension*.

- Connectivity with another SX6 extension blade or the SAN42B-R.
- Multiple logical extension tunnels with maximum tunnel bandwidth up to 40Gb/s (FCIP mode) allow for scalable connections between sites.
- The Extension Trunking feature allows multiple IP source and destination address pairs (defined as circuits) through multiple 10GbE or 40GbE interfaces to provide a high bandwidth extension tunnel and lossless failover resiliency. In addition, each extension circuit supports four QoS classes (class-F, high, medium, and low priority), each as a TCP connection.
- The ARL feature meets the minimum bandwidth guarantee for each tunnel while fully utilizing the available network bandwidth without adverse throughput performance impact at a high traffic load.
- Hardware-based compression delivers the ability to maximize throughput over lower bandwidth links in the wide-area network, optimizing the cost efficiencies of FCIP. The SX6 blade compresses FC frames before they are encapsulated into FCIP packets.
- Key protocol features are enabled in the FCIP implementation to optimize the performance of extension over IP networks, including WAN Optimized TCP (WO-TCP), 9K jumbo frame and end-to-end Path MTU auto-discovery.
- Hardware-based IPsec supports a mix of secure and non-secure tunnels on the same Ethernet port, jumbo frames, and VLAN tagged connections. The IPsec function is capable of supporting both IPv4 and IPv6.
- FastWrite, Open Systems Tape Pipelining and Advanced Accelerator for FICON mitigate the latency effect of a long-distance FCIP distance connection over IP WAN.
- Extension HCL (Hot Code Load) provides in-service firmware upgrade for supporting 24/7 non-stop business operations
- Built-in WAN link tester generates traffic over an IP connection to test for maximum throughput, congestion, loss percentage, out of order delivery, latency, and other network conditions. It helps to determine the health of a WAN link before deploying it for use.
- Fabric Vision advanced monitoring provides the following functions:
  - Policy-based monitoring monitors extension connectivity and WAN anomalies using multi-layer metrics.
  - Flow monitoring reports IOPS and data rate of individual I/O flows of inter-DC replication and tape backup operations.
  - Flow generator generates FC frames for a defined flow with default or custom size and pattern and sent across extension tunnel to help validate end to end network setup and configuration.
- Extended distance Fibre Channel supports long-distance native FC connectivity.
- Extension tunnels and circuits:

– A maximum of 8 circuits can be configured per tunnel.

– A maximum of 20 tunnels (VE_Ports) can be configured for all GbE ports.

– The maximum committed rate of a single circuit is 10Gb/s, whether configured on a 10GbE or 40GbE port.

- FCIP and hybrid mode (FC + IP) modes.

SX6 blade port numbering and trunking

The following figure shows how ports are numbered on the blade. Ports are labeled as 10GE, 40GbE, and FC on the blade.
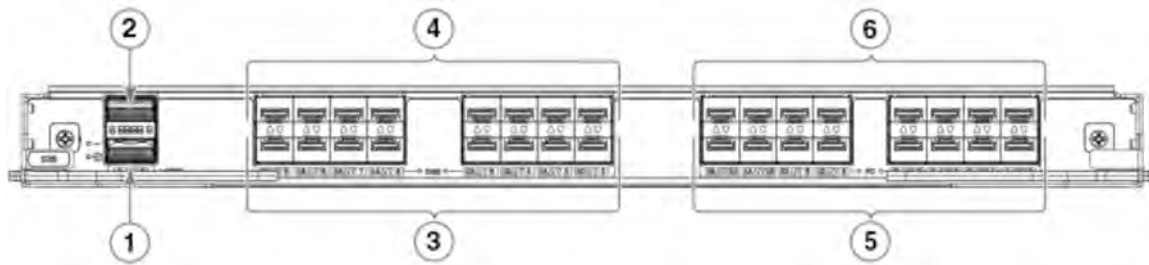
Figure 53. SX6 Extension Blade Port Numbering

1. 40GbE Port 0
2. 40GbE Port 1
3. 10/1GbE Ports 2–9 (right to left)
4. 10/1GbE Ports 10–17 (right to left)
5. FC Ports 0, 1, 2, 3, 8, 9, 10, 11 (right to left)
6. FC Ports 4, 5, 6, 7, 12, 13, 14, 15 (right to left)

Following are the eight-port Fibre Channel port groups for configuring trunk groups or "trunks":

- Port group 0: ports 0–7
- Port group 1: ports 8–15

Following are the requirements for forming trunk groups:

- All ports in a trunk group must belong to the same port group. For example, to form an 8-port trunk select all eight ports from port group 0 or port group 1. You cannot use ports from each port group for the trunk.
- You can use from 1 to 8 ports in a port group to form a trunk.
- Ports must be running at the same speed.
- Ports must be configured for the same distance.
- Ports must have the same encryption, compression, QoS, and FEC settings.
- Trunk groups must be created between Brocade switches (or Brocade adapters in the case of F_Port trunking). Brocade trunking is proprietary and is not supported on M-EOS or third-party switches.
- There must be a direct connection between participating switches.

For full details on trunking requirements and configuration, refer to the *Fabric OS Administration Guide*.

Blade-specific precautions

This document describes how to remove and replace a port or extension blade.

Observe the following precautions when replacing these blades:

- Wear an appropriately grounded ESD wrist strap when handling and installing device blades and cards. Follow electrostatic discharge (ESD) precautions. Wear a wrist grounding strap connected to chassis ground (if the chassis is plugged in) or a bench ground.
- Install port and extension blades only in slots 3–4 and 7–8. Slots 5 and 6 are reserved for CR64-4 blades. These blades cannot be installed in other slots as guide pins and connectors in each slot allow only specific blade types.

> ⚠️ **DANGER:** For safety reasons, the ESD wrist strap should contain a series 1 megaohm resistor.

> ⚠️ **CAUTION:** If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

> ⚠️ **CAUTION:** Static electricity can damage the chassis and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

> ⚠️ **CAUTION:** Before plugging a cable into any port, be sure to discharge the voltage stored on the cable by touching the electrical contacts to ground surface.

> ⚠️ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.

Faulty blade indicators

Confirm that you need to replace the blade before continuing. The following events may indicate that a blade is faulty:

- The status LED on the blade is lit steady amber, or the power LED is not illuminated.
- The slotShow command does not show that the blade is enabled.
- The errShow command displays error log messages one at a time.
- Any of the following messages display in the error log or "show" command output:
  - "Slot unknown" message relating to the blade slot
  - FRU: FRU_FAULTY messages for the blade
  - FAULTY (xx) with an associated (xx) code used by support

For output examples and additional information on Fabric OS commands, see "Using monitoring commands" on page 97 and the *Fabric OS Command Reference Manual*.

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

Time and items required for removal and installation

The removal or installation procedure for each blade 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 blade and filler panel replacement:

- Electrostatic discharge (ESD) grounding strap
- Workstation computer
- Replacement blade or filler panel
- No. 1 Phillips screwdriver
- SFP, SFP+, or SFP28 transceivers (as needed)
- Optical and copper cables (as needed)

Note: For information about the transceivers that are qualified for this Brocade device, see Supported Transceivers and Cables.

Removing a blade

Before you begin

Before removing the blade, consider the following:

• Before removing any cables from a blade, note the cable order (identify each cable by its physical port).

• It is a good practice to create a table of cable-to-port mapping for reference.

• If multiple blades are being replaced, replace one blade at a time.

About this task

Perform the following steps to remove a port or extension blade from the unit while the system power is on. This procedure is applicable for all the port and extension blades supported on the device.

Procedure

1. Remove the chassis door.

2. Check the blade power and status LEDs and port status LEDs on the front of each blade to identify any possible problems.

3. Before replacing a blade, establish a Telnet or console connection to determine failure and verify operation after replacement. Use the `switchShow` and `slotShow` commands to view the status of the blades.

4. Check for adequate cable slack. Ensure there is plenty of cable slack to remove a blade without cable obstruction.

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

6. Ensure that traffic is not flowing through the blade (port status LED should be off) prior to disconnecting cables.

7. Disconnect all cables and remove transceivers from the blade.

8. If removing an extension blade, perform the following steps:

   a) Delete all fciptunnel configurations using the `portcfg fciptunnel slot/vePort delete` command.

   b) Delete all IP routes defined on the blade to be removed using the `portcfg iproute delete` command.

   c) Delete all IP interfaces (IPIFs) defined on the blade using the `portcfg ipif slot/geX delete` command.

   d) If logical switches are used on the switch, move all blade ports back to the default logical switch. Refer to the `lscfg` command in the for details.

   Note: If you are removing the extension blade to install in a different slot, you must remove configuration using the preceding steps, then reconfigure the blade in the new slot. If you move the blade without performing these steps and the blade faults, you must move the blade to the original slot and remove configuration.

9. Loosen the captive screws for both ejector handles on the blade using a #1 Phillips screwdriver.

   Loosening the screws initiates a hot-swap request and disconnects power from the blade. The spring-loaded captive screws will pop out from the slot .63 cm (.25 in.) when fully disengaged. Do not eject the blade using blade handles until the screws disengage from the slot and the power LED is off.

10. Grasp both ejector handles and simultaneously pull them away from the center of the blade using equal pressure to approximately 45 degrees (fully open).

    As you move the handles, you will hear connectors disengaging from the backplane connector and possibly a slight popping noise. This is normal and is due to the dense backplane. The blade will move out approximately 1.27 cm (.5 in.) from the slot when fully disengaged.

11. Pull the blade out from the slot slightly using the ejector handles until you can grasp the blade edges with your hands. Before touching the blade, ensure that it has cooled sufficiently.

> ⚠️ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.

12. Continue pulling the blade from the slot by the blade edges. As you slide out the blade, place one hand under it for support. Do not support the blade by the injector handles after removal.
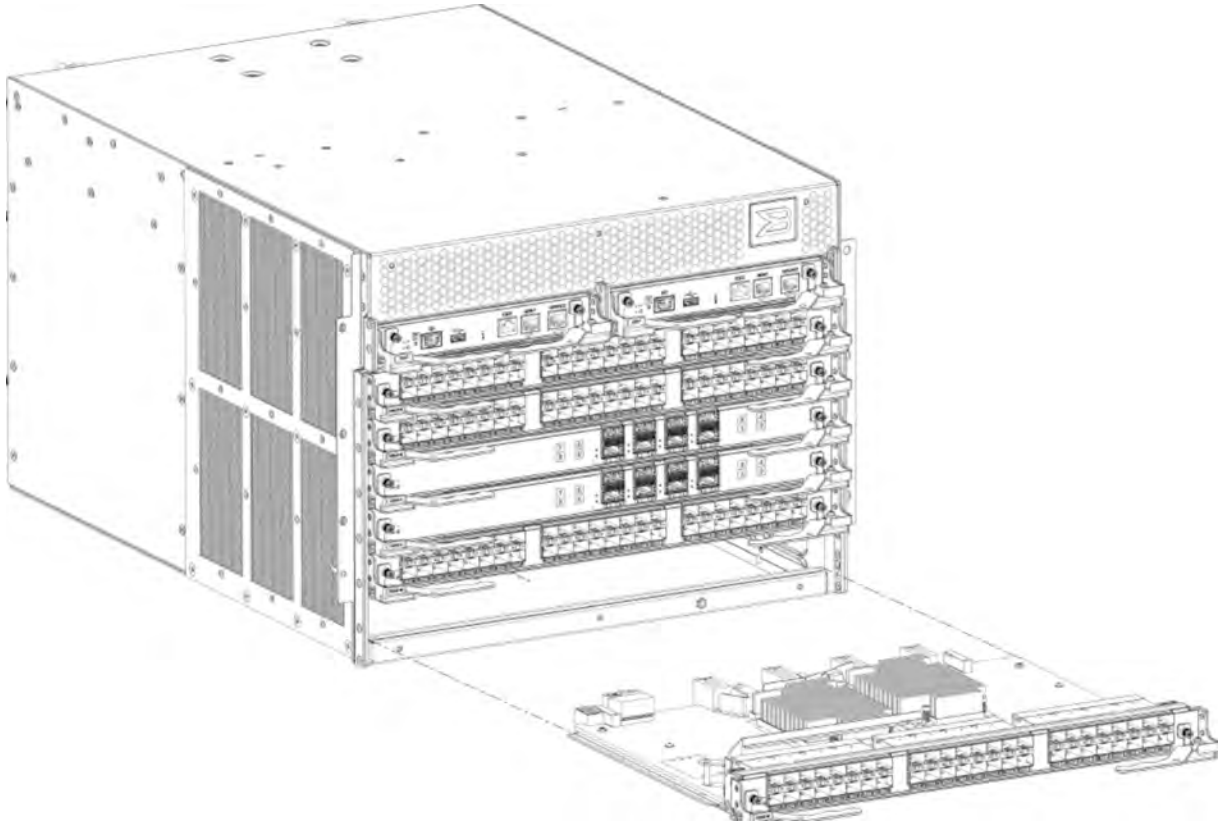
Figure 54. Removing and Replacing a Port or Extension Blade

13. If the blade is not being replaced by another blade, install a filler panel and reinstall the chassis door. The filler panel is required for proper chassis cooling. The door is required to meet EMI compliance.

Installing a blade

About this task

Complete this procedure to install a port or extension blade. These steps apply to all port and extension blades installed in the device.

Procedure

1. If a protective sleeve is covering the blade connectors, remove the sleeve.
2. Follow these steps to insert the blade into the slot.

   a) Carefully push the blade into the slot using your thumbs or fingers on the blade faceplate.

   > ⚠️ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.

   When the blade face is about 2.54 cm (1 in.) from the chassis, you should feel resistance as the blade connectors meet the backplane connectors.

b) Continue pushing the blade into the slot using your thumbs or fingers until the ejectors move in toward the blade slightly, indicating that the connectors are engaged.

c) Simultaneously push both ejector handles in toward the blade center with even pressure until the blade completely seats in the slot.

Note: As you move the handles, you will hear connectors engaging the backplane connector and possibly a slight popping noise. This is normal and is due to the dense backplane.

3. Tighten the captive screw for each ejector using a No. 1 Phillips screwdriver.

As the blade seats completely, the amber blade status and green blade power LEDs illuminate.

Note: Be sure that captive screws are tightened. If they are not tightened, high pressure from fan operation may unseat the blade from chassis connectors.

4. Observe the blade power and status LEDs and verify the following:

a) Verify that the status LED on the blade shows amber until POST completes for the blade. The status LED should then display green to indicate that the blade has power. If the status LED remains amber, the board might not be properly seated in the backplane or the board may be faulty.

b) Verify that the power LED on the port blade is displaying a steady green light to indicate that the blade has power. If it does not turn on, ensure that the blade is firmly seated and ejector captive screws are tightened.

5. Install the transceivers and cables in the blade.

6. Replace the chassis door. The door is required to meet EMI compliance.

Verifying blade operation

About this task
Perform the following tasks to verify the operation of a blade:

Procedure

1. Check the LED indicators on the blade's front panel. For information on interpreting LED patterns, see one of the following sections of this guide:

   - "Interpreting FC32-X7-48 port blade LEDs" on page 75
   - "Interpreting FC32-64 port blade LEDs" on page 80
   - "Interpreting FC64-48 port blade LEDs" on page 78
   - "Interpreting extension blade LEDs" on page 83

2. Enter the following commands and note any error conditions:

   - `slotshow -p` – Displays the current data on each slot in the system, including blade type, blade ID, status, and Brocade model name.
   - `tempShow` – Displays temperature reading of blades.
   - `chassisShow` – Displays information about each component in the system.
   - `sensorShow` – Displays temperature reading of blades with fan and power supply status.
   - `errDump` – Displays the entire system error log.
   - `errShow` – Displays error log messages one at a time.

Example

For output examples and additional information on Fabric OS commands, see Using Monitoring Commands and the *Fabric OS Command Reference Manual*.

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

Chapter 8. Core routing blades

Two CR64-4 core routing blades are installed in device slots 5 and 6. Core routing blades contain ASICs that allow switching between up to four-port blades. Core routing blades connect to port blades through Fibre Channel backplane ports. Each core routing blade provides 96 backplane Gen 7 FC ports for the port blade connection. Each core routing blade also has 32 front-end ports that are mapped to 8 QSFP transceivers on the blade's front panel. These transceivers can create inter-chassis link (ICL) connections for up to 9 separate directors in a full-mesh topology and 12 directors in a core-to-edge topology. This core routing blade is compatible only with the SAN256B-7.

Core routing blades contain the following LED indicators:

- Green blade power LED
- Amber blade status LED
- Bicolor green/amber QSFP port status LEDs

For details on interpreting LED operation, see Interpreting Core Routing Blade LEDs.

CR64-4 port numbering

The following figure shows how ports are numbered and port trunking groups are arranged on the blade.
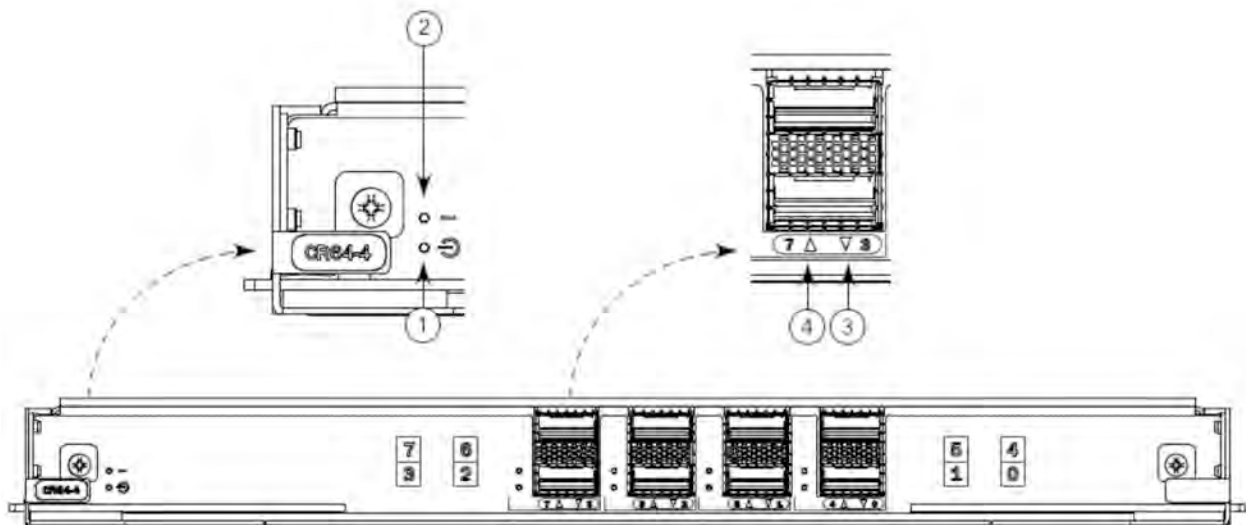
Figure 55. CR64-4 Core Routing Blade Port Numbering

1. QSFP Ports 4-7 (right to left)
2. QSFP Ports 0-3 (right to left)
3. Map of Ports 2, 3, 6, and 7
4. Map of Ports 0, 1, 4, and 5

QSFP ports are numbered from 0 through 3 along the top row from right to left and 4 through 7 along the bottom row from right to left. For information on supported QSFP transceivers, see "Supported transceivers and cables" on page 61.

Each numbered QSFP port on the blade provides four Gen 7 ICL FC ports. The following table shows the mappings from the numbered QSFP ports on the face of the core blade to the individual FC port numbers as shown by the slotShow command.

Table 30. External Port to slotShow Command Port Mapping for Core Blades	
External Port Number	**slotShow FC Port Numbers**
0	0-3
1	4-7
2	8-11
3	12-15
4	16-19
5	20-23
6	24-27
7	28-31

ICL trunking groups

Multiple directors can be connected through inter-chassis links (ICLs) between the Gen 7 ICL or 4x32Gb/s QSFPs installed on core routing blades. Each QSFP connection between two devices provides 128Gb/s bandwidth. Trunking optimizes the use of ICL bandwidth by allowing a group of links to merge into a single logical link, called a trunk. Traffic is distributed dynamically and in order over this trunk, achieving greater performance with fewer links. Within the trunk, multiple physical ports appear as a single port, thus simplifying management. Trunking also improves system reliability by avoiding I/O retries if one link within the trunk fails.

Since each port within a QSFP terminates on a different ASIC within each core blade, an ICL trunk cannot be formed using the individual FC ports within the same QSFP. A trunk must be formed from individual FC ports in different QSFP ports, which must reside in the same trunk group. To form an ICL trunk between two devices, a minimum of two QSFPs within a port trunk group on a core blade installed in one device must be connected to a pair of QSFPs within a trunk group on a core blade in another device.

Each CR64-4 blade on the SAN256B-7 Director has two ICL trunking groups consisting of the following QSFP ports:

- 0, 1, 5, and 4
- 2, 3, 6, and 7

Ports belonging to the same trunking groups are indicated with the same color border under the ports on the blade faceplate. These colors are also applied to the port map labels on each blade faceplate to indicate ports belonging to the same trunking groups.

For more information on ICLs and configuring ICL trunking between core routing blades on different directors, refer to "Inter-Chassis Links" in the *Fabric OS Administration Guide*.

Note: You cannot configure ISLs using ports on port blades and QSFP-based ICLs using ports on core routing blades concurrently on the same chassis. ISLs and ICLs can co-exist between a pair of chassis if the ISLs and ICLs are in different logical switches.

ICL cabling configurations

The following figures show acceptable cabling configurations for the ICL feature between QSFP ports in core routing blades. The recommended topology is the "parallel" type where at least four QSFP cables connect between both core routing blades on any two directors. This provides ICL trunking between

directors, ensuring redundancy. Although the following illustrations show SAN256B-6 and SAN512B-6 Directors, the discussion applies to SAN256B-7 or SAN512B-7 Directors as well.

Following are the maximum numbers of directors that you can connect using 4x Gen 7 QSFP ICLs:

- Up to nine SAN256B-7 or SAN512B-7 directors can be connected in a full-mesh topology.
- Up to six directors in a full-mesh topology if connecting a mixture of directors.
- Up to 12 directors can be connected in a core-to-edge topology.

To connect multiple SAN256B-7 or SAN512B-7 Directors via ICLs, a minimum of four ICL ports (two on each core routing blade) must be connected between each chassis. The dual connections on each core blade must reside within the same trunk group. If more than four ICL connections are required between a pair of directors, additional ICL connections should be added in pairs (one on each core blade). ISLs and ICLs can co-exist between the same pair of directors if the ISLs and ICLs are on different logical switches.

The following illustration shows the minimum connectivity between a pair of SAN512B-7 chassis:
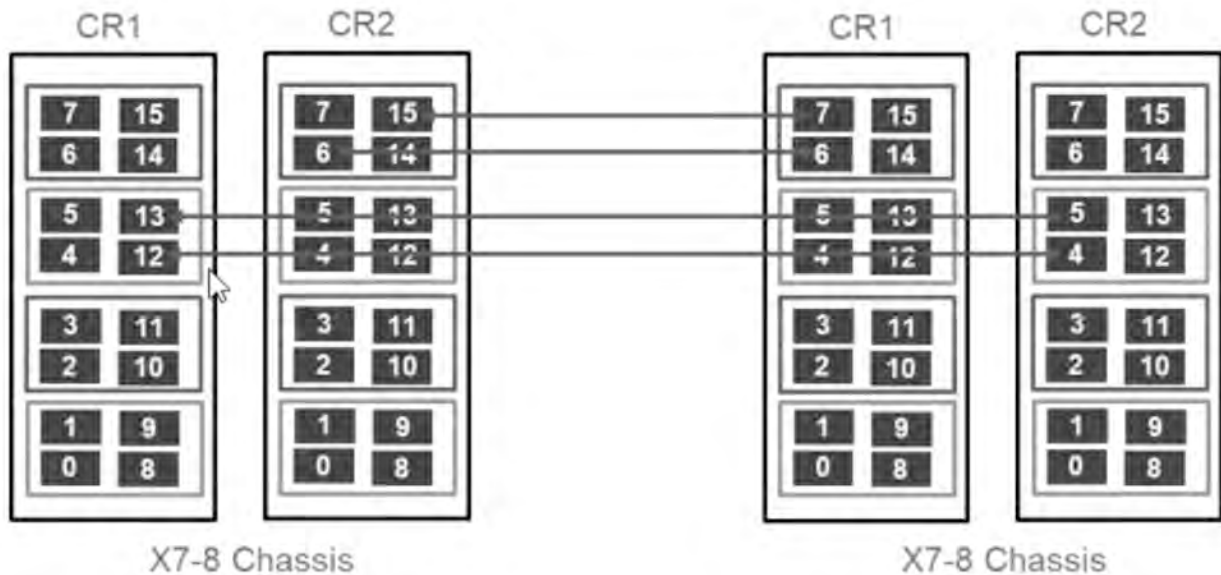
Figure 56. ICL Cable Connections between Two SAN512B-7 Directors

The following illustration shows the minimum connectivity between an SAN512B-7 and SAN256B-7 chassis:
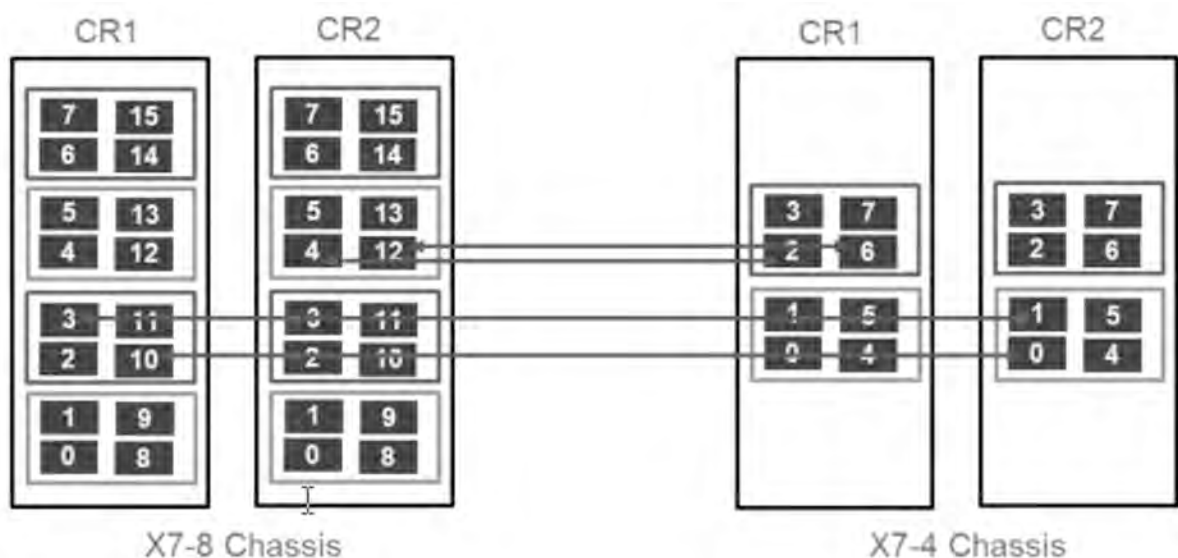
Figure 57. ICL Cable Connections for the SAN Director (Sample Configuration)

The following illustration shows the minimum connectivity between an SAN512B-7 Director and a SAN768B-2 chassis:
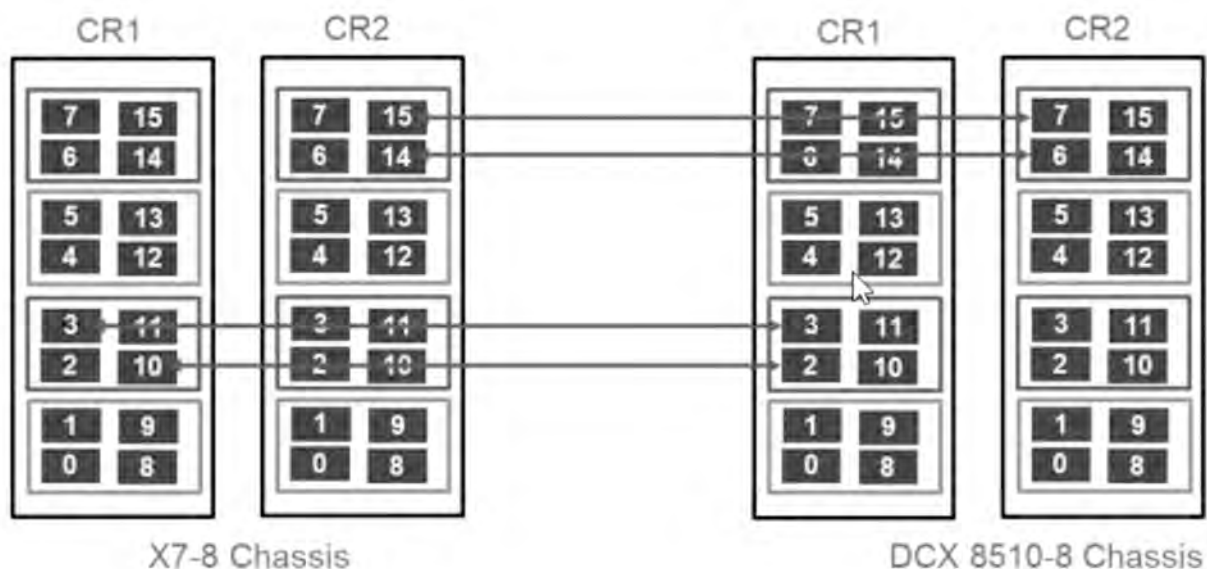
Figure 58. ICL Cable Connections for the X6 Director (Sample Configuration)

The following requirements apply for ICLs:

- A minimum of four ICL ports (two on each core blade) must be connected between each chassis pair.
- The dual connections on each core blade must reside within the same ICL trunk boundary on the core blades.
- If more than four ICL connections are required between a pair of chassis, additional ICL connections should be added in pairs, with each additional pair residing within the same trunk boundary.
- QSFP-based ICLs and traditional ISLs are not concurrently supported between any pair of chassis.
- Gen 6 QSFPs (4x32G QSFPs) must be used on Gen 7 ICL ports to connect to a Gen 6 or Gen 5 chassis through an ICL port for connections up to 100m.

- Gen 6 QSFPs (4x32G 2-km QSFPs) must be used on Gen 7 ICL ports to connect to a Gen 6 chassis through an ICL port for connections up to 2 km. 16G 2-km QSFPs are not supported on Gen 7 ICL ports.

The SAN256B-7 or SAN512B-7 Director can be connected in a core-edge configuration. The following figure shows two core devices and four edge devices. Although SAN256B-6 and SAN512B-6 Directors are shown in the figure, the same principles apply to SAN256B-7 and SAN512B-7 Directors. The cabling scheme should follow the parallel example shown in the previous figure. Each line in the example actually represents four cables running between the devices.
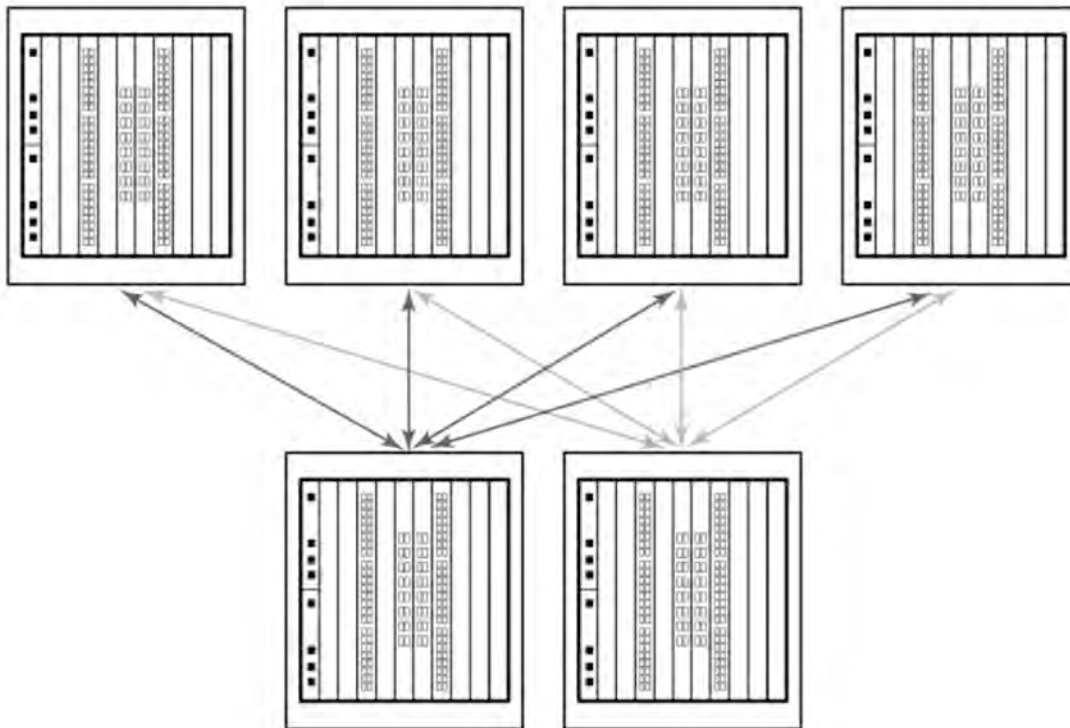
Figure 59. SAN Director Core-Edge ICL Topology

For details on the following subjects, refer to the "Inter-Chassis Links" section of the *Fabric OS Administration Guide*:

- ICL topologies
- ICL trunking
- Configuring ICLs between SAN512B-6 and SAN256B-6 Directors
- Configuring ICLs between SAN512B-6 and SAN256B-6 Directors and SAN768B-2 and SAN384B-2 Director models

Blade-specific precautions

This document describes how to remove and replace a core routing blade.

Observe the following precautions when replacing these blades:

- The CR64-4 core routing blade is compatible only with the SAN256B-7 Director.
- Wear an appropriately grounded ESD wrist strap when handling and installing blades and cards. Follow electrostatic discharge (ESD) precautions. Wear a wrist grounding strap connected to a chassis ground (if the chassis is plugged in) or a bench ground.
- Install core routing blades only in slots 5–6. These blades cannot be installed in other slots because guide pins and connectors in each slot allow only specific blade types.

⚠️ **DANGER:** For safety reasons, the ESD wrist strap should contain a series 1 megaohm resistor.

> ⚠ **CAUTION:** If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

> ⚠ **CAUTION:** Static electricity can damage the chassis and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

> ⚠ **CAUTION:** Before plugging a cable into any port, be sure to discharge the voltage stored on the cable by touching the electrical contacts to ground surface.

> ⚠ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.

Faulty core routing blade indicators

Confirm that you need to replace the blade before continuing. The following events may indicate that a core routing blade is faulty:

- The status LED on the core switch blade is lit steady amber, or the power LED is not illuminated.
- The `slotShow` command does not show that the core switch blade is enabled.
- Any of the following messages display in `errShow` output or `errShowAll` output for root-capable administrators:
  - "Slot unknown" message relating to a core switch slot
  - Core switch blade errors or I2C timeouts
  - FRU: FRU_FAULTY messages for a core switch blade
  - FAULTY (xx) with an associated code used by support
  - Configuration loader messages or "Sys PCI config" messages
  - Generic system driver messages ("FABSYS")
  - Platform system driver messages ("Platform")
  - EM messages that indicate a problem with a core switch blade
  - Function fail messages for the core switch master

See Using Monitoring Commands and the *Fabric OS Command Reference Manual* for output examples and additional information on Fabric OS commands.

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

Time and items required

The replacement procedure for the core switch blade takes approximately 30 minutes. The following items are required to replace the core switch blade.

- Electrostatic discharge (ESD) grounding strap
- Workstation computer
- Replacement blade or filler panel
- No. 1 Phillips screwdriver
- QSFP transceivers (as needed)
- Optical cables (as needed)

Note: For information about the transceivers that are qualified for this Brocade device, see the Supported Transceivers and Cables discussion in this guide.

Replacing a core routing blade

Use the following procedures in this section to replace routing blades:

- Preparing for replacement. Use these procedures to ensure that traffic is not disrupted through existing ICL connections when you are replacing a core routing blade. If ICLs are not connected to the blade or traffic through ICL ports has ceased, you can skip these procedures, and then go to "Removing a core routing blade" on page 128.
- "Removing a core routing blade" on page 128. Use these procedures to remove a blade from the chassis.
- "Installing a core routing blade" on page 129. Use these procedures to install a blade into an empty chassis slot.

Note: Perform these procedures to remove and install one core routing blade at a time while chassis power is on. You must replace a blade and ensure its operation before replacing the other core routing blade. Removing both blades will shut down the chassis. To replace both blades at the same time, power off the chassis and follow steps under "Removing a core routing blade" on page 128 and "Installing a core routing blade" on page 129.

Preparing for replacement

Before you begin
For nondisruptive replacement of a core blade, ensure that the core blade in the system that you are not replacing is active and is allowing traffic through ICL ports to the same fabrics as ICL ports on the blade is replaced.

About this task
Use the following procedures to ensure that traffic will offload from the blade that you are replacing to the other core blade in the system during replacement. This ensures a nondisruptive impact on existing traffic flowing through the blade's ICLs. If ICLs are not connected to the blade or traffic over blade ICLs has been halted, skip these procedures, and then go on to "Removing a core routing blade" on page 128.

Procedure

1. Ensure that Lossless Dynamic Load Sharing is enabled on each logical switch that resides on each physical switch that has ICL connections through the core blades. Log on to each logical switch using an account with admin permissions, and then enter `dlsShow`.

   `DLS is set with Lossless enabled` should display if Lossless is enabled.

2. To enable Lossless Dynamic Load Sharing, use the following options.

   You can enable this feature on individual logical switches or on each logical switch configured for the chassis.

   - Log on to each logical switch and enter the `dlsset --enable -lossless` command.
   - Enable Lossless on all logical switches configured in the chassis using the `fosexec --fid all -cmd dlsset` command.

3. Disable each ICL port on the core blade that you are replacing using the `portdecom[`*slot/*`]`*port* command.

   This command persistently disables the port without frame loss and moves all traffic flows from the port to redundant paths between fabrics and ICL ports on the other core routing blade.

4. Confirm that all of the ICL ports are persistently disabled (decommissioned) on the blade by logging into the physical switch and entering the `portcfgpersistentdisable` command.

   This command displays the status of ports in each chassis slot.

5. Remove and replace the core blade following procedures in "Removing a core routing blade" on page 128 and "Installing a core routing blade" on page 129.

   Note: After installing the new blade, allow sufficient time for it to initialize and for all decommissioned ports to transition back online.

Removing a core routing blade

About this task

Perform the following procedures to remove one core routing blade at a time with chassis power on. You must replace the blade and ensure its operation before removing the other core routing blade. Removing both blades will power down the chassis. To replace both blades at the same time, power down the chassis and perform the following steps.

Procedure

1. Remove the chassis door.
2. Check the blade power and status LEDs and port status LEDs on the front of each blade to identify any possible problems.
3. Before replacing a blade, establish a telnet or console connection to determine failure and verify operation after replacement. Use the switchShow and slotShow commands to view the status of the blades.
4. Ensure that existing traffic through blade ICL ports will not be disrupted when the blade is removed by performing steps under "Preparing for replacement" on page 127.
5. Check for adequate cable slack. Ensure that there is plenty of cable slack to remove a blade without cable obstruction.
6. Ensure that the part number on the unit being replaced matches the replacement part number. The chassisShow command displays information about the blades, including part numbers (xx-xxxxxxx-xx), serial numbers, and additional status.
7. Disconnect all cables and remove transceivers from the blade.
8. Label and then disconnect cables from the faulty core routing blade.
9. Loosen the captive screws for both ejector handles on the blade using a No. 1 Phillips screwdriver.

   Loosening the screws initiates a hot-swap request and disconnects power from the blade. The spring-loaded captive screws will pop out from the slot .63 cm (.25 in.) when fully disengaged. Do not eject the blade using blade handles until screws disengage from the slot and the power LED is off.
10. Grasp both ejector handles and simultaneously pull them away from the center of the blade using equal pressure to approximately 45 degrees (fully open).

    As you move the handles, you will hear connectors disengaging from the backplane connector and possibly a slight popping noise. This is normal and is due to the dense backplane. The blade will move out approximately 1.27 cm (.5 in.) from the slot when fully disengaged.
11. Pull the blade out from the slot slightly using the ejector handles until you can grasp the blade edges with your hands. Make sure that the blade has cooled sufficiently to touch.

    ⚠️ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.
12. Continue pulling the blade from the slot by the blade edges. As you slide out the blade, place one hand under it for support. Do not support the blade by the injector handles after removal.

Figure 60. Removing and Installing a Core Routing Blade on an SAN256B-7 Director

13. If the blade is not being replaced by another blade, install a filler panel and reinstall the chassis door. The filler panel is required for proper chassis cooling. The door is required to meet EMI compliance.

Installing a core routing blade

About this task

Complete the following steps to install a core routing blade into an empty slot.

Note: The device continues to operate while a core routing blade is installed.

Procedure

1. If a protective sleeve is covering the blade connectors, remove the sleeve.
2. Rotate the ejector handles away from the center of the blade completely—approximately 45 degrees. Do not support the blade using the ejector handles. Orient the blade so that the handles are toward you and the flat metal side is facing down.
3. Follow these steps to insert the blade into the slot.

    a) Carefully push the blade into the slot using your thumbs or fingers on the blade faceplate.

    > ⚠️ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.

    When the blade face is about 2.54 cm (1 in.) from the chassis, you should feel resistance as the blade connectors meet the backplane connectors.

    b) Continue pushing with your thumbs or fingers until the ejectors move in toward the blade slightly, indicating that the connectors are engaged.

    c) Simultaneously push both ejector handles in toward the blade center with even pressure until the blade completely seats in the slot.

    Note: As you move the handles, you will hear connectors engaging the backplane connector and possibly a slight popping noise. This is normal and is due to the dense backplane.
4. Tighten the captive screw for each ejector using a #1 Phillips screwdriver.

    As the blade seats completely, amber blade status and green blade power LEDs illuminate.

Note: Be sure that the captive screws are tightened. If they are not tightened, high pressure from fan operation may unseat the blade from chassis connectors.

5. Observe the blade power and status LEDs and verify the following:

    a) Verify that the status LED on the blade shows amber until POST completes for the blade, and then turns off. If the status LED remains amber, the board may not be properly seated in the backplane or the board may be faulty.

    Note: The POST may take several minutes to complete on these blades.

    b) Verify that the power LED on the port blade is displaying a steady green light to indicate that the blade has power. If it does not turn on, ensure that the blade is firmly seated and the ejector captive screws are tightened.

6. Install the transceivers and cables in the blade.

7. Group and route the cables through the vertical cable management finger assemblies.

8. Allow sufficient time for the blade to initialize and for all ports to transition online.

9. Reinstall the chassis door. The door is required to meet EMI compliance.

Verifying blade operation

About this task

Perform the following tasks to verify the operation of the new blade:

Procedure

1. Check the LED indicators on the blade's front panel. For information on interpreting LED patterns, see Interpreting Core Routing Blade LEDs.

    Enter the slotShow command and note any error conditions:

2. Enter the following commands and note any error conditions:

    - slotShow – Displays the current data on each slot in the system, including blade type, blade ID, status, Brocade model name, and power usage.

    - tempShow – Displays temperature reading of blades.

    - sensorShow – Displays temperature reading of blades with fan and power supply status.

    - chassisShow – Displays information about each component in the system.

    - errDump – Displays the entire system error log.

    - errShow – Displays error log messages one at a time.

Example

For output examples and additional information on Fabric OS commands, see Using Monitoring Commands and the *Fabric OS Command Reference Manual*.

For more information on error messages, refer to the *Fabric OS Message Reference Manual*.

Chapter 9. Control processor blades

The CPX7 control processor blades are half the slot length of other SAN256B-7 Director blades. Two CPX7 control processor blades are inserted in the half slots located at the top of the chassis to provide CP redundancy. CP0 is installed in slot 1, while CP1 is installed in slot 2.

The control processor (CP) blade contains the control plane for the device and hosts the Fabric OS that manages all hardware within the device. It also provides the following external connections for device configuration, firmware downloads, service, management, and monitoring functions:

- USB port for firmware download and `supportsave` data.
- Serial console RJ-45 port.
- 10/100/1000Base-T RJ-45 Ethernet port for device management and configuration. This is an auto-sensing MDI port.

  Note: Half duplex operation is not supported at 10Mb/s or 100Mb/s speed.

- 10/100/1000Base-T RJ-45 Ethernet port for service. This is an auto-sensing MDI port.
- 10Gb/s Base-T RJ-45 Ethernet port (reserved for future use).

The two 10/100/1000Mb/s Ethernet ports are bound together as a single logical network interface. One port is selected as the active interface, while the other is select as the standby interface. All traffic is transmitted over the active port while no traffic is transmitted over the standby interface. If the primary Ethernet port fails (due to something other than power loss), the standby port becomes active and immediately takes over data transmission to retain link layer communication.

Note: Connecting the CP blades to a private network or VLAN is recommended.

The blade contains a blue LED to indicate active CP status, green LEDs on Ethernet ports to indicate link and activity, and green and amber LEDs to indicate blade power and status.

A bright, white beacon LED is located just to the right of the blade power and status LEDs. You can enable this LED to illuminate on both CP blades so that you can easily locate the blades and chassis in an equipment rack. To enable or disable beaconing on both blades, log on to the chassis and enter the `chassisbeacon` command as follows:

- To enable beaconing:

```
chassisX7:admin> chassisbeacon 1
chassisBeacon success 1
```

- To disable beaconing:

```
chassisX7:admin> chassisbeacon 0
chassisBeacon success 0
```

- To display beaconing status:

```
chassisX7:admin> chassisbeacon
Value = 0
```

For details on LED location and operation, see Interpreting Control Processor Blade LEDs.

CPX7 port identification

The following figure identifies connector ports on the CPX7 blade.
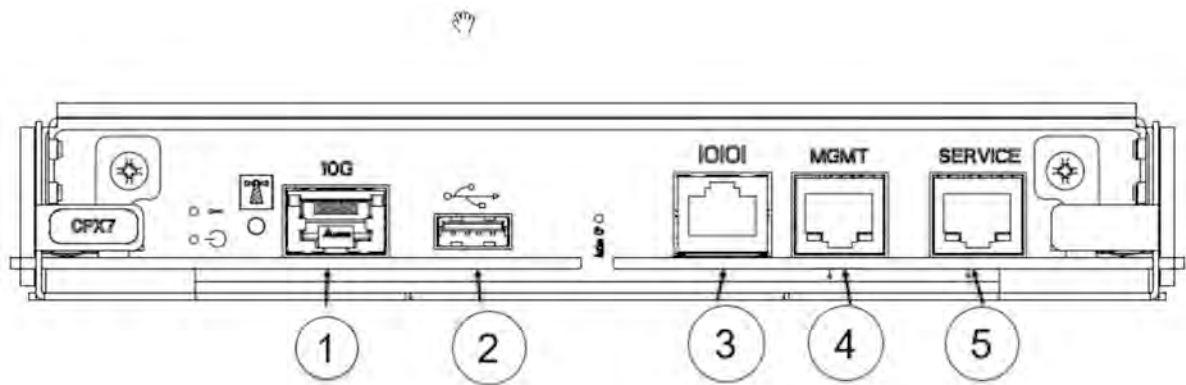
Figure 61. CPX7 Blade Port Identification

1. 10Gb/s BASE-T RJ-45 Ethernet Port (reserved for future use)
2. USB 4 Port for Firmware Download and Logs; test-verified USB models include:
   - SanDisk 32 CZ48 USB 3.0 Flash Drive (SDCZ48-032G-UAM46)
   - SanDisk 16 CZ48 USB 3.0 Flash Drive (SDCZ48-016G-UAM46)
   - Kingston 32GB DataTraveler 100 G3 USB 3.0 Flash Drive (DT100G3/32GB)
   - Kingston 32GB DataTraveler G4 USB 3.0 Flash Drive (DTIG4/32GB)
   - PNY Attache 3.0 4 USB 32GB Flash Drive
   - PNY Attache 3.0 4 USB 16GB Flash Drive
3. Serial Console RJ-45 Port (labelled IOIOI on the face plate)
4. 10/100/1000Base-T RJ-45 Ethernet Port for Chassis Management and Configuration
5. 10/100/1000Base-T RJ-45 Ethernet Port for Service

Blade-specific precautions

This document describes how to remove and replace a control processor (CP) blade. Each device has two CPX7 blades located in slots 1 and 2.

Observe the following precautions when replacing these blades:

- The CPX7 blade is compatible only with the SAN256B-7 and SAN512B-7 Director.
- Wear an appropriately grounded ESD wrist strap when handling and installing blades and cards. Follow electrostatic discharge (ESD) precautions. Wear a wrist grounding strap connected to chassis ground (if the chassis is plugged in) or a bench ground.
- Install CPX7 blades in slots 1 and 2, which are half the width of other slots in the device.
- The firmware upgrade policy for CP blades specifies testing for the current Fabric OS release and one version earlier. It is possible to upgrade by more than one version, but it is a very specific and detailed process. Read the directions under "Downloading firmware from a USB device" on page 140 and "Downloading firmware from an FTP server" on page 139 carefully.
- If the new CP blade does not have the same firmware as the active CP blade, the new blade must be upgraded to the same firmware version. After installing the new blade, you can determine the firmware version on the replacement blade and use the `firmwaresync` command to allow the active CP blade to copy current firmware to the replaced standby CP blade, if necessary. However, you must disable high availability (HA) before inserting the new blade.

⚠️ **DANGER:** For safety reasons, the ESD wrist strap should contain a series 1 megaohm resistor.

⚠️ **CAUTION:** If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

⚠️ **CAUTION:** Static electricity can damage the chassis and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

⚠️ **CAUTION:** Before plugging a cable into any port, be sure to discharge the voltage stored on the cable by touching the electrical contacts to ground surface.

⚠️ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.

Blade fault indicators

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

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

See Using Monitoring Commands and refer to the *Fabric OS Command Reference Manual* for output examples and additional information on Fabric OS commands.

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

Blade replacement task guide

This section contains a guide to more complete, detailed steps in this section for installing or replacing CP blades when the device is running (hot-swap) or must be powered off (cold swap). References are provided to the more detailed blade removal and installation steps for further information.

Replacing a CP Blade (Hot-Swap)

For hot-swap replacement, the chassis continues to operate while a CP blade is being replaced if the redundant CP blade is active and failover does not occur. You can prevent failover by entering the haDisable command. You can replace one blade or both blades one at a time using these steps. Follow all steps for one blade, and then repeat the same steps to replace the other blade.

1. Prepare for replacing the blade by following all steps under "Preparing for replacement" on page 134.
2. Remove the blade from the slot by following all steps under Removing a Blade.
3. Install a new blade into the empty slot by following all steps under "Installing a blade" on page 137.
4. Verify and synchronize firmware on both blades by following all steps under "Verifying and synchronizing firmware on blades" on page 138.

   If you need to download firmware to update the blades, follow the steps in one of the following sections:

   - "Downloading firmware from an FTP server" on page 139

- "Downloading firmware from a USB device" on page 140

5. Verify firmware installation by following all steps under "Completing the replacement" on page 143.

6. Verify operation of the replacement blade by following the steps under "Verifying blade operation" on page 143.

7. Repeat the preceding steps to replace the other CP blade if necessary.

Replacing a CP Blade (Cold-Swap)

Use this procedure to replace CP blades after removing power to the device.

1. Prepare for replacing the blade by following all steps under "Preparing for replacement" on page 134.

2. Remove the blade following all steps under Removing a Blade.

3. Install the blade following all steps under "Installing a blade" on page 142.

4. Verify firmware installation by following all steps under "Completing the replacement" on page 143.

5. Verify operation of the replacement blade by following the steps under "Verifying blade operation" on page 143.

Time and items required for replacement

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

- Electrostatic discharge (ESD) grounding strap
- Workstation computer
- Serial cable
- IP address of an FTP server for backing up the device configuration
- No. 1 Phillips screwdriver
- Replacement CP blade

Preparing for replacement

About this task

Use this procedure to prepare the system for CP blade replacement.

Procedure

1. Back up the device configuration before you replace a CP blade by uploading various device configuration files using a Telnet connection and saving them to a host computer. Before you upload a configuration file, verify that you can reach the FTP server from the device.

   Perform the following steps:

   a) Enter the `configupload -all` command, specifying a file name for saving configuration data.

      This saves all system configuration data including chassis and switch configuration for all logical switches to the file name specified. For more information, refer to the *Fabric OS Command Reference Guide*.

   b) Enter the `configupload -vf` command, specifying a file name, when prompted, for saving configuration data.

      This saves the backbone virtual fabric data to the file name specified. For more information, refer to the *Fabric OS Command Reference Guide*.

   c) In a FICON environment, log on as root and enter `configupload --map` to upload port-to-area mapping information. Specify a folder name, when prompted.

This command saves the port-to-area addressing mode configuration files to the folder specified. Be sure to upload the configuration using the `-map` option for a FICON-enabled device if port-bound addressing is used. For more information, refer to the *Fabric OS Command Reference Guide.*

2. Connect to the device and log on as `admin` using a serial console connection.

3. Enter haShow to determine which CP blade is active.

```
Gen7-4:admin> hashow
Local CP (Slot 1, CP0): Active, Warm Recovered
Remote CP (Slot 2, CP1): Standby, Healthy
HA enabled, Heartbeat Up, HA State synchronized
```

4. Enter all remaining commands from the serial console for the active CP blade, unless otherwise indicated. For more information about commands, refer to the *Fabric OS Command Reference Guide.*

5. If the active CP blade is faulty, automatic failover to the standby CP blade should have occurred. Perform the following steps:

   a) Confirm that the standby CP blade is active using the haShow command.

   b) Power off the faulty CP blade by loosening the captive screws on both ejector handles on the blade using a No. 1 Phillips screwdriver. This disconnects power from the blade. The spring-loaded captive screws will pop out from the slot .63 cm (.25 in.) when fully disengaged.

   c) Log on to the now active CP blade.

   d) Skip to Step "8" on page 135.

   If automatic failover has not occurred, manually fail over the faulty blade by loosening the captive screws on both ejector handles. As the screws loosen, the blade fails over and the amber status LED will illuminate. Log on to the standby CP blade, and skip to Step "8" on page 135.

6. If both CP blades are healthy and you want to replace the standby CP blade, log on to the active CP blade and skip to Step "8" on page 135.

7. If both CP blades are healthy and you want to replace the active CP blade, log on to the active CP blade and run the following steps:

   a) Run the `haFailover` command to make the standby CP blade the active blade. The currently active CP blade becomes the standby blade. Wait until the status LED on the currently active CP blade is no longer illuminated.

   b) Confirm the completion of the failover by running the haShow command.

   c) Log on to the new active CP blade.

8. Run `firmwareShow` to note the firmware version of the active CP blade.

   The `firmwareshow` command will display a warning message if the firmware versions on the two CP blades are not the same.

```
WARNING: The local CP and remote CP have different versions
of firmware, please retry firmwaredownload command.
Chassis_1:admin>
```

9. Run `haDisable` from the active CP blade to prevent failover or communication between the CP blades during the replacement.

Replacing a CP blade

Use the following procedures in this section to replace CPX7 blades:

- Hot-swap procedure. Use this procedure to replace a single CP blade or both CP blades, one at a time, while the device power is on. The device continues to operate while replacing a blade if the redundant blade is active and failover does not occur.

- Cold-swap procedure. Use this procedure to replace CP blades after removing power to the device.

Hot-swap procedure

Use this procedure to replace CP blades, one at a time, while the device power is on. The device continues to operate while replacing a blade if the redundant blade is active and failover does not occur. You can prevent failover by entering the haDisable command.

To replace both CP blades with power off, see Cold-Swap Procedure .

Removing a blade

About this task

Complete the following steps to remove a CP blade.

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

Procedure

1. Remove the chassis door.
2. Log on to the active CP as the admin user. You can use a serial cable or telnet, Web Tools, or Fabric Manager. Determine which CP is active using the haShow command or view the active LED on the front of the CP.
3. Perform one of the following steps to ensure that the faulty blade is the standby blade.

   - If the faulty blade is the standby CP blade, skip to Step 4.
   - If the faulty blade is the active CP blade, issue the haFailover command. Wait until the failover has completed. Use the haShow command to verify the CPs are synchronized and the failover is complete.

     Depending on the nature of the failure, it is possible that the haFailover command may not work. Proceed to the next step anyway.

4. Enter the haDisable command. This is required before physically removing and replacing a CP blade.
5. Disconnect all cables from the faulty (standby) CP blade.
6. Loosen the captive screws for both ejector handles on the blade using a No. 1 Phillips screwdriver.

   Loosening the screws initiates a hot-swap request and disconnects power from the blade. The spring-loaded captive screws will pop out from the slot .63 cm (.25 in.) when fully disengaged. Do not eject the blade using blade handles until screws disengage from the slot and the power LED is off.

7. Grasp both ejector handles and simultaneously pull them away from the center of the blade using equal pressure to approximately 45 degrees (fully open).

   As you move the handles, you will hear connectors disengaging from the backplane connector and possibly a slight popping noise. This is normal and is due to the dense backplane. The blade will move out approximately 1.27 cm (.5 in.) from the slot when fully disengaged.

8. Pull the blade out from the slot slightly using the ejector handles until you can grasp the blade edges with your hands. Make sure that the blade has cooled sufficiently to touch.

   ⚠️ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.

9. Continue pulling the blade from the slot by the blade edges. As you slide out the blade, place one hand under it for support. Do not support the blade by the injector handles after removal.
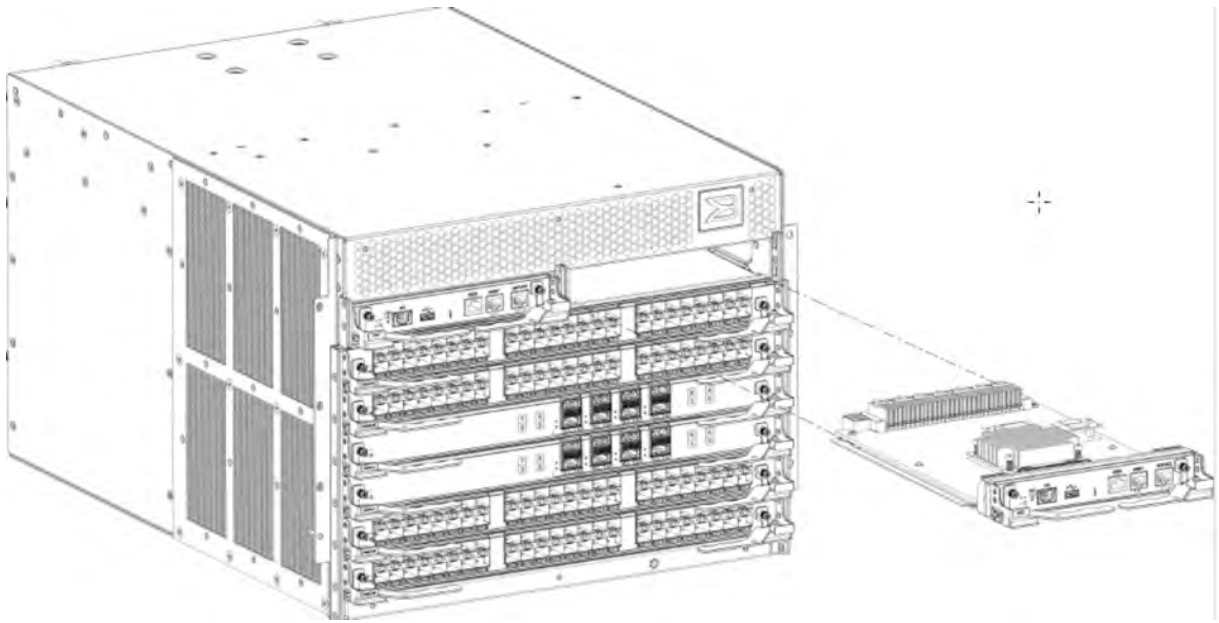
Figure 62. Removal and Replacement of the Control Processor Blade (CPX7) on an SAN256B-7 Director

10. If the blade is not being replaced by another blade, install a filler panel and reinstall the chassis door. The filler panel is required for proper chassis cooling. The door is required to meet EMI compliance.

Installing a blade

About this task

Note: Read all of the instructions for replacing the CP blade before beginning the procedure. Make sure that the same version of Fabric OS is installed on both CP blades. Using different versions is not supported and may cause malfunctioning. If the replacement CP blade has a different version of Fabric OS, bring both blades to the same firmware version. Once you have installed the replacement CP blade, determine the version of firmware on the replacement CP blade and upgrade it if necessary.

Complete the following steps to install a CP blade.

Procedure

1. If a protective sleeve is covering the blade connectors, remove the sleeve.
2. Follow these steps to insert the blade into the slot.
   a) Carefully push the blade into the slot using your thumbs or fingers on the blade faceplate.

   ⚠ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.

   When the blade face is about 2.54 cm (1 in.) from the chassis, you should feel resistance as the blade connectors meet the backplane connectors.
   b) Continue pushing with your thumbs or fingers until the ejectors move in towards the blade slightly indicating that the connectors are engaged.
   c) Simultaneously push both ejector handles in towards the blade center with even pressure until the blade completely seats in the slot.

   Note: As you move the handles, you will hear connectors engaging the backplane connector and possibly a slight popping noise. This is normal and is due to the dense backplane.
3. Tighten the captive screw for each ejector using a No. 1 Phillips screwdriver.

   As the blade seats completely, the amber blade status and the green blade power LEDs illuminate.

Note: Be sure that the captive screws are tightened. If they are not tightened, high pressure from fan operation may unseat blade from chassis connectors.

4. Observe the blade power and status LEDs and verify the following:

    a) The amber status LED on the blade illuminates until POST completes for the blade. The LED remains amber until the blade has gained sync with the active CP. This can take a few minutes to complete depending on the configuration. If the status LED remains amber for an extended period, the board may not be properly seated in the backplane or the board may be faulty.

    b) The power LED on the port blade should displays a steady green. If it does not turn on, ensure that the blade is firmly seated and blade ejector screws are tightened.

5. Connect the cables to the new CP blade.

6. Remain logged in to the active CP and continue to .

Verifying and synchronizing firmware on blades

About this task

At this point, the active blade is up and running. The replacement blade is the standby blade. Next, you must ensure that boot and POST are complete on the newly installed CP blade, that the CP blade has achieved failover redundancy, and that firmware levels are synchronized on the installed blades.

Perform the following steps.

Procedure

1. Enter `slotShow`. The command output shows the new CP blade as "enabled."

    If the standby CP is unresponsive, you can try unplugging the new CP blade, running `haDisable` on the active CP blade, and plugging the new CP blade back in. At that point, you can repeat Step 1 to begin the verification process again.

2. Log on to each CP blade and enter the haShow command to display the CP status. Verify the CP state, status, health, and that the HA state is synchronized. Remedy any issues before proceeding. For more information on haShow output, refer to the *Fabric OS Command Reference Manual*.

3. Determine the firmware version of installed CP blades by entering `firmwareShow`. If the serial console on the replacement CP blade is connected, issue the `firmwareShow` command there. More information is available through the console.

4. If the firmware versions for both CP blades are the same, skip to .

    If the firmware version on the replacement (standby) and active CP blades do not match, a warning message appears with the results of the `firmwareshow` command.

    ```
    WARNING: The local CP and remote CP have different versions
    of firmware, please
    ```

5. Bring the replacement blade firmware to the same firmware level as the active blade using one of the following procedures:

    • Run the `firmwaresync` command on the active CP blade to copy all firmware from the active CP blade to the standby CP blade.

       Note: To use this command, you must restart the existing telnet, secure telnet, or SSH sessions to the standby CP blade.

    • Run the `firmwareDownload -s` command or `firmwaresync` command (if versions are compatible) to update firmware on the replacement blade to bring it up to the proper level.

6. Perform one of the following tasks to download firmware:

    • If you are using an FTP server to download the firmware, skip to the procedure for downloading firmware from an FTP server.

- If you are using a USB device to download the firmware, skip to the procedure for downloading firmware from a USB device. If the firmware on the standby CP blade is more than one level down from the level on the active CP blade, you must have formatted USB devices for each of the versions you will need to upgrade.

For details on supported upgrade paths and steps to upgrade through multiple versions of Fabric OS, refer to the *Fabric OS Release Notes* and the *Fabric OS Software Upgrade User Guide*.

Downloading firmware from an FTP server

About this task

For this task, determine the correct sequence of upgrading firmware versions to reach your target version.

Complete the following steps to download the firmware from an FTP server to the replacement blade.

Procedure

1. Log on to the standby CP blade as `admin`. If you need to know the IP address of the standby blade, run `ipaddrshow`.

   You should remain logged on to the active CP blade in order to monitor it.

2. Run `firmwareDownload -s` to download the firmware to the replacement (standby) CP blade. The `-s` option also disables the auto-reboot, so you will have to manually issue a reboot after the download finishes to initiate a `firmwarecommit`. Enter all requested information (use default values).

3. When the download process finishes, run `firmwareDownloadStatus` to verify that the firmware has been updated. The command displays a running account of the progress of the `firmwareDownload` command (if it is still running) until the command has completed. The final message is similar to the following and will appear with a date and time stamp.

   ```
   Slot 1 (CP0, active): Firmwaredownload command has completed successfully. Use firmwareshow
   to verify the firmware versions.
   ```

4. On the standby CP blade (the blade for which you just changed the firmware level), run `reboot`. The reboot of the standby CP will initiate a `firmwarecommit` to the secondary partition and log you out.

   ```
   Chassis_1:admin> reboot
   Broadcast message from root (ttyS0) Fri Jun 17 14:49:45 2016...
   The system is going down for reboot NOW !!
   INIT: Switching to runlevel: 6
   INIT: Sending processes the TERM signal Chassis_1:admin> HAMu Heartbeat down, stop FSS
   Unmounting all f##exiting due to signal: 9, pending signals: 0x20000, 0x0
   ilesystems.
   Please stand by while rebooting the system...
   Restarting system.
   The system is coming up, please wait...
   .
   .
   .
   Fri Jun 17 14:53:13 2016: Doing firmwarecommit now.
   Please wait ...
   Fri Jun 17 14:55:27 2016: Firmware commit completes successfully.
   Validating the filesystem ...
   Fri Jun 17 22:36:05 2016: Doing firmwarecommit now.
   Please wait ...
   Fri Jun 17 22:36:48 2016: Firmware commit completes successfully.
   2016/06/17-14:56:50, [SULB-1004], 908, SLOT 2 | CHASSIS, INFO, Brocade_X6, Firmwarecommit
   has completed.
   2016/06/17-14:56:50, [SULB-1036], 909, SLOT 2 | CHASSIS, INFO, Brocade_X6, The new Version:
   Fabric OS [version]
   2016/06/17-14:56:50, [SULB-1002], 910, SLOT 2 | CHASSIS, INFO, Brocade_X6, Firmwaredownload
   command has completed successfully.
   ```

5. Log back on to the standby CP blade and run `firmwareDownloadStatus` on the standby CP blade to validate a successful commit. This may take 10 minutes.

6. If you are upgrading through several levels of the Fabric OS, repeat Step through Step as often as necessary based on the path outlined in the preceding table. Otherwise, proceed to Step .
7. Log out of the standby CP blade and log on to the active CP blade.
8. Proceed to the procedures for verifying operation of the new CP blade.

Downloading firmware from a USB device

About this task

For this task, determine the correct sequence of upgrading firmware versions to reach your target version.

This section assumes that the new firmware has already been copied onto the USB device. Although folders are optional, if an administrator desires to use them, the folder structure on the USB device might be as follows:

- IBM>
  - config
  - firmware (Contains the specific release you are installing)
  - firmwareKey
  - support

Complete the following steps to download the firmware from a USB device to the replacement blade.

Procedure

1. Insert the USB device into the active CP blade.
2. Attach a serial cable from the PC to the active CP blade.
3. Log on to the active CP blade as `admin` if you are not still logged on and enter `usbStorage -e` to enable the USB device.
4. Remove the serial cable from the active CP blade and attach it to the standby CP blade and log on as `admin`.
5. Run `firmwareDownload -s` to download the firmware to the standby CP blade. Enter all requested information. The `-s` option disables the autoreboot, so you need to manually issue a reboot after the download finishes to initiate a `firmwarecommit`. Use all default values, except for USB [Y]. (This ensures that USB is used for downloading.)
6. When the download process finishes, run `firmwareDownloadStatus` to verify that the firmware has been updated. The command displays a running account of the progress of the `firmwareDownload` command until the command has completed. The final message is similar to the following and will appear with a date and time stamp.

```
Slot 1 (CP0, active): Firmwaredownload command has completed successfully. Use firmwareshow
to verify the firmware versions.
```

7. Ensure that you are still logged on to the standby CP blade (the blade for which you just changed the firmware level) and type `reboot`. The reboot of the standby CP will initiate a `firmwarecommit` to the secondary partition and log you out.

```
Chassis_1: admin> reboot
Broadcast message from root (ttyS0) Fri Jun 17 14:49:45 2016...
The system is going down for reboot NOW !!
INIT: Switching to runlevel: 6
INIT: Sending processes the TERM signal Chassis_1:admin> HAMu Heartbeat down, stop FSS
Unmounting all ##exiting due to signal: 9, pending signals: 0x20000, 0x0
ilesystems.
Please stand by while rebooting the system...
Restarting system.
The system is coming up, please wait...
.
.
```

```
.
Fri Jun 17 14:53:13 2016: Doing firmwarecommit now.
Please wait ...
Fri Jun 17 14:55:27 2016: Firmware commit completes successfully.
Validating the filesystem ...
Fri Jun 17 22:36:05 2016: Doing firmwarecommit now.
Please wait ...
Fri Jun 17 22:36:48 2016: Firmware commit completes successfully.
2016/06/17-14:56:50, [SULB-1004], 908, SLOT 2 | CHASSIS, INFO, Brocade_X6, Firmwarecommit
has completed.
2010/06/17-14:56:50, [SULB-1036], 909, SLOT 2 | CHASSIS, INFO, Brocade_X6, The new Version:
Fabric OS [version]
2010/06/17-14:56:50, [SULB-1002], 910, SLOT 2 | CHASSIS, INFO, Brocade_X6, Firmwaredownload
command has completed successfully.
```

Note: The time stamp on the co-CPU may not be in sync with the main CPU on the blade. This is not a cause for concern.

8. Log back on to the standby CP blade and enter `firmwareDownloadStatus` on the standby CP blade to validate a successful commit. This may take 10 minutes.

9. If you are upgrading through several levels of the Fabric OS, repeat Step "5" on page 140 through Step "8" on page 141 as often as necessary based on the path outlined in the preceding table. Otherwise, proceed to Step "10" on page 141.

10. Log out of the standby CP blade and log on to the active CP blade.

11. Proceed to the procedures for "Completing the replacement" on page 143

Cold-swap procedure

Use this procedure to replace both CP blades while the device power is off. You must power off the device to replace both CP blades.

Removing a blade
Use the following procedure to power down the device and remove the CP blades. You can replace a single CP blade or both blades one at a time.

Procedure

1. Be sure to perform all steps under "Preparing for replacement" on page 134.

2. Power down the device.

3. Remove the chassis door.

4. Disconnect all cables from the CP blades.

5. Loosen the captive screws for both ejector handles on the blade using a No. 1 Phillips screwdriver.

   Loosening the screws initiates a hot-swap request and disconnects power from the blade. The spring-loaded captive screws will pop out from the slot .63 cm (.25 in.) when fully disengaged. Do not eject the blade using blade handles until screws disengage from the slot and the power LED is off.

6. Grasp both ejector handles and simultaneously pull them away from the center of the blade using equal pressure to approximately 45 degrees (fully open).

   As you move the handles, you will hear connectors disengaging from the backplane connector and possibly a slight popping noise. This is normal and is due to the dense backplane. The blade will move out approximately 1.27 cm (.5 in.) from the slot when fully disengaged.

7. Pull the blade out from the slot slightly using the ejector handles until you can grasp the blade edges with your hands. Make sure that the blade has cooled sufficiently to touch.

   ⚠️ **CAUTION:** To avoid damaging blade and chassis, do not push the blade into a slot or pull the blade from a slot using the ejector handles.

8. Continue pulling the blade from the slot by the blade edges. As you slide out the blade, place one hand under it for support. Do not support the blade by the injector handles after removal.
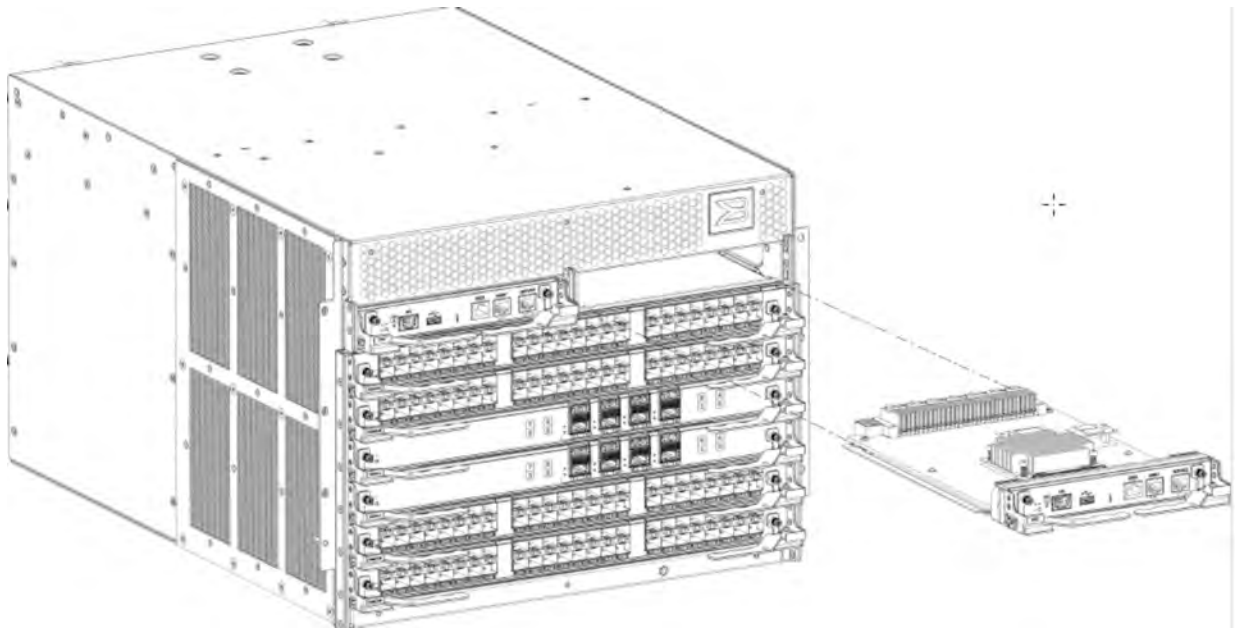
Figure 63. Removal and Replacement of the Control Processor Blade (CPX7) on an SAN256B-7 Director

9. If the blade is not being replaced by another blade, install a filler panel and reinstall the chassis door. The filler panel is required for proper chassis cooling. The door is required to meet EMI compliance.

Installing a blade

About this task

Use the following steps to install both CP blades when the device power is off (cold-swap procedure).

Procedure

1. Tighten the captive screws for each ejector using a No. 1 Phillips screwdriver.

   Note: Be sure that the captive screws are tightened. If they are not tightened, high pressure from fan operation may unseat the blade from chassis connectors.

2. Power up the device.
3. Connect the cables to the new CP blades.
4. Enter `chassisDisable`.
5. Enter `configDownload -vf` to download device virtual fabric data to the local system.

   The device reboots and partitions are restored.

6. Enter `chassisDisable`.
7. Enter `configDownload -map` to download port-to-area addressing mode configuration files to the local system.
8. Power-cycle the chassis.

   The system recovers.

9. Enter `chassisDisable`.
10. Enter `configDownload -all` to download system configuration data, including chassis and switch configuration for all logical switches, to the local system.

    All the licenses, configurations, and FCIP tunnels are restored.

11. Enter `reboot`.

    The device becomes fully functional with the new CP blades.

12. Verify that each blade's power LED is green. If they are not green, ensure that the CP blade has power and is firmly seated and that the ejectors are in the locked position.

Completing the replacement

About this task

Complete the following steps to complete the CP blade replacement procedure.

Procedure

1. Enter haEnable to re-enable HA on the active CP blade.

   Note: The haEnable command will cause the standby CP blade to reboot. Wait until POST completes —when the status LED on the CP blade returns to a steady green state—before moving to the next step.

2. Enter haShow and verify that the command output includes "HA Enabled, Heartbeat Up". If the output does not include this phrase, re-enter the command until you have verified that redundancy is achieved.

   Note: The haEnable command will cause the standby CP blade to reboot.

   ```
   Chassis_1:admin> hashow
   Local CP (Slot 2, CP1) : Active
   Remote CP (Slot 1, CP0) : Standby, Healthy
   HA Enabled, Heartbeat Up, HA State Synchronized
   ```

3. Enter firmwareShow to verify that the firmware version has been updated and that the versions are the same on the two CP blades.

   If you have one or more port or extension blades in the device, the Fabric OS automatically detects mismatches between the active CP firmware and the blade's firmware and triggers the auto-leveling process. This auto-leveling process automatically updates the application blade firmware to match the active CP blade. At the end of the auto-leveling process, the active CP and extension blades will run the same version of the firmware.

4. Enter the chassisEnable command to enable all user ports in the chassis and enable a virtual, fabric-aware chassis.

5. Replace the chassis door. The door is required to meet EMI compliance.

6. Pack the faulty CP blade in the packaging provided with the new CP blade, and contact the switch supplier to determine the return procedure.

Verifying blade operation

About this task
Perform the following tasks to verify operation of new blade:

Procedure

1. Check the LED indicators on the blade's front panel. For information on interpreting LED patterns, see Interpreting Control Processor Blade LEDs.

2. Enter the following commands and note any error conditions:
   - slotShow – Displays the current data on each slot in the system, including blade type, blade ID, status, Brocade model name, and power usage.
   - haShow – Displays control processor (CP) status.
   - tempShow – Displays temperature reading of blades.
   - sensorShow – Displays temperature reading of blades with fan and power supply status.
   - errDump – Displays the entire system error log.
   - errShow –Displays error log messages one at a time.

Example

See Using Monitoring Commands and the *Fabric OS Command Reference Manual* for output examples and additional information on Fabric OS commands.

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

Chapter 10. WWN card

Two WWN cards are located behind the WWN bezel (logo plate) between the power supplies on the nonport side of the device. WWN 1 is located on the left side, and WWN 2 is located on the right side. The WWN cards store critical configuration data, such as WWN, IP addresses, part and serial numbers, and license IDs for the device.

Identical data must be maintained on each WWN card at all times so that if one card fails, the system can use the other card to provide valid system operation. To maintain data and ensure its integrity, the system audits both WWN cards one hour after the first system bootup, every 24 hours after bootup, and any time a WWN card is inserted to compare the critical data.

If a data mismatch is detected during the audit, messages in the RASlog will provide a summary of all errors detected and prompt you through a data recovery process. The `wwnrecover` utility permits recovery of WWN card data in the event of corruption. The data recovery mechanism may vary depending on the error encountered and the data being compared. Problems such as a mismatch between license IDs cannot be fixed with `wwnrecover`, and the output will direct you to call Brocade Technical Support. For other problems, running `wwnrecover` can pinpoint the problem and, in some cases, permit you to fix it. Mismatched data can be resolved, and corrupt data can sometimes be recovered. For more information on the `wwnrecover` utility, see "Using the wwnrecover utility" on page 148.

Note: The device will operate with one WWN card but will be in a degraded condition. If you have removed a card, be sure to replace it as soon as possible.

WWN card location and numbering

The WWN cards are located behind the WWN bezel (logo bezel) on the nonport side of the device between the power supplies. The bezel must be removed to access the card trays. The following figure illustrates the WWN card location and numbering.
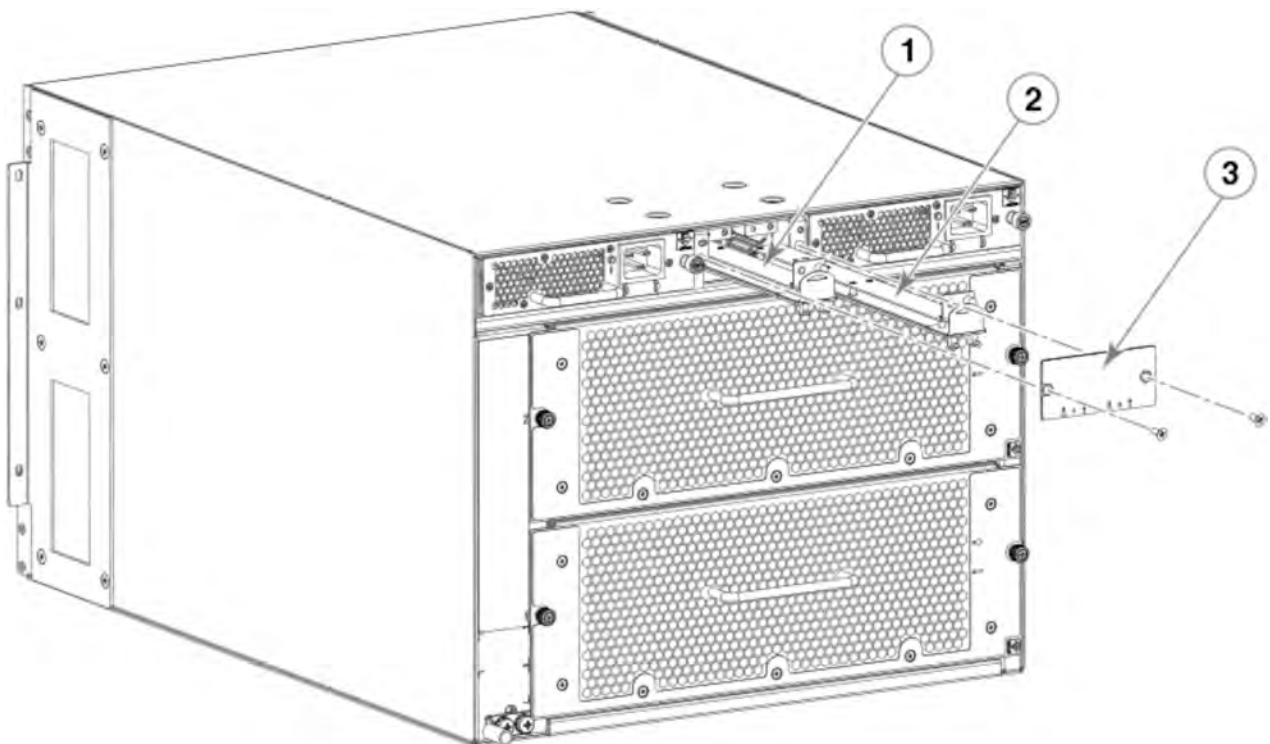
Figure 64. WWN Card Location and Numbering

  1. WWN Card 1

2. WWN Card 2

Precautions specific to WWN cards

Observe the following precautions for these cards:

- Wear an appropriately grounded ESD wrist strap when handling and installing device blades and cards. Follow electrostatic discharge (ESD) precautions. Wear a wrist grounding strap connected to chassis ground (if the chassis is plugged in) or a bench ground.
- The device will operate with one WWN card, but will be in degraded condition. If you have removed a card, be sure to replace as soon as possible.

Note: Do not use steps in the WWN card and WWN card bezel removal procedures to disable logical switches and power down the device.

⚠ **DANGER:** For safety reasons, the ESD wrist strap should contain a series 1 megaohm resistor.

⚠ **CAUTION:** Static electricity can damage the chassis and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

WWN card fault indicators

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

- RASlog messages may occur during periodic WWN card audit routines, alerting you of data or license mismatches between WWN cards and other errors. Some of these messages may direct you to contact technical support or to run the `wwnrecover` command. You can use this command to further verify or to fix problems. If an EM-1220 or EM-1222 error message occurs due to WWN card data corruption or data mismatches across WWN cards, data recovery may be possible using this command. For more information on using `wwnrecover`, see "Using the wwnrecover utility" on page 148. If recovery is not possible, the command output directs you to replace the affected card(s).
- Status LEDs on the WWN bezel do not reflect the actual status of the WWN cards or indicate a problem. For information on interpreting LED patterns, see "Interpreting WWN card LEDs" on page 90. Note that the LED patterns may temporarily change during POST and other diagnostic tests.
- You might experience problems viewing or modifying the data stored on the WWN card.
- Error messages might be observed regarding WWN units in `chassisshow` output.

Error messages that may indicate problems with a WWN card are summarized in the following table.

Table 31. Messages That May Indicate WWN Card Failure

Type of Message	Sample Error Message

WWN unit fails its field-replaceable unit (FRU) header access.	`0x24c (fabos): Switch: switchname, error`
	`EM-I2C_TIMEOUT, 2, WWN 1 I2C`
	`timed out: state 0x4`

WWN unit fails to power on.	`<timestamp>, [EM-1004],`
	`<sequence-number>, CRITICAL,`
	`<system-name>, WWN # failed to power`
	`onor<timestamp>, [EM-1043],`
	`<sequence-number>, WARNING,`
	`<system-name>, Can't power <FRU Id>`
	`<state (on or off)>.`

Table 31. Messages That May Indicate WWN Card Failure (continued)

Type of Message	Sample Error Message
| WWN unit is faulted. | ```
0x24c (fabos): Switch: switchname
, Critical EM-WWN_UNKNOWN, 1, Unknown
WWN #2 is being faultedor<timestamp>,
[EM-1003], 40, SLOT 7 | FFDC | CHASSIS,
CRITICAL, Brocade_Chassis, WWN 2 has unknown
hardware identifier: FRU faultedor<timestamp>,
[EM-1034], <sequence-number>, ERROR,
<system-name>, WWN # set to faulty,
rc=<return code>
``` |
| WWN unit is not present or is not accessible. | ```
0x24c (fabos): Switch:
switchname, Error EM-WWN_ABSENT, 2,
WWN #1 not presentor<timestamp>,
[EM-1036], <sequence-number>, WARNING,
<system-name>, <FRU Id> is not
accessible.
``` |
| Writing to the FRU history log (hilSetFruHistory) has failed. | ```
0x24c (fabos): Switch: switchname, Error EM-HIL_FAIL, 2, HIL
Error: hilSetFruHistory failed, rc=-3 for SLOT 3
``` |

WWN card replacement task guide

This section contains a guide to more complete, detailed steps in this section for installing or replacing WWN cards when the device is running (hot-swap) or must be powered off (cold-swap). References are provided to more detailed WWN removal and installation steps for further information.

Replacing WWN Cards (Hot-Swap)

Use this procedure to replace WWN cards with system power on. You can use this procedure to replace one WWN card assembly at a time while power is on. To replace both cards, follow all steps for one card, and then repeat the same steps to replace the other card assembly.

1. Save settings and system data and order replacement WWN card(s) by following all steps under "Preparing for WWN card replacement" on page 149.
2. Replace a card by following all steps under "Hot-swap replacement" on page 150. Repeat these steps to replace the second WWN card if necessary.
3. Verify WWN card operation using the steps under "Verifying WWN card operation" on page 154.

Replacing WWN Cards (Cold-Swap)

Use this procedure to replace WWN cards with system power off. You can use this procedure to replace one or both WWN cards.

1. Save settings and system data and order the replacement WWN card by following all steps under "Preparing for WWN card replacement" on page 149.
2. Replace the card by following all steps under "Cold-swap replacement" on page 151.
3. Verify WWN card operation using the steps under "Verifying WWN card operation" on page 154.

Time and items required for replacement

If there is a need to replace one or both WWN cards, allow approximately 20 minutes. See "Using the wwnrecover utility" on page 148 and "WWN card fault indicators" on page 146before replacement.

The following items are needed to replace the WWN cards:

- Electrostatic discharge (ESD) grounding strap
- No. 1 Phillips screwdriver
- Workstation computer

Using the wwnrecover utility

The `wwnrecover` utility permits a recovery of WWN card data in the event of corruption. Recovery is not possible if hardware issues prevent access to either WWN card or if the primary and backup copy of the license ID on either card is corrupted.

Identical data must be maintained on each WWN card at all times so that if one card fails, the system can use the other card to provide valid system operation. To maintain data and ensure its integrity, the system audits both WWN cards one hour after the first system boot-up, every 24 hours after boot-up, and any time a WWN card is inserted to compare the critical data.

If a data mismatch is detected during the audit, messages in the RASlog will provide a summary of all errors detected and prompt you through a data recovery process. The data recovery mechanism may vary depending on the error encountered and the data being compared. Problems such as a mismatch between license IDs cannot be fixed with `wwnrecover`, and the output will direct you to call Brocade Technical Support. For other problems, running `wwnrecover` can pinpoint the problem and, in some cases, permit you to fix it. Mismatched data can be resolved, and corrupt data can sometimes be recovered.

The following table lists RASlog messages that can occur during the WWN card audit routine.

Table 32. RASlog Messages from WWN Card Audit	
Error Message	**Issue**
`[EM-1220]...M1, ERROR ... A problem was found on one or both CID cards (x), please run the wwnrecover tool to get more information and recovery options.`	Some kind of error or mismatch has been detected in the WWN card audit.
`[EM-1221], ... M1, INFO, ... A WWN card has been inserted, a WWN verification audit will be run to detect any mismatches or other problems.`	A second WWN card is enabled and the WWN card audit will be run. If an error is detected during the audit, EM-1220 and EM-1222 messages are generated.
`[HIL-1650], CHASSIS, ERROR...Unable to detect WWN cards in chassis. Access to WWN halted...`	The WWN card has been removed from the device. Replace the card as soon as possible since the system is in a degraded state.
`[EM-1222], ... M1, WARNING, ... A WWN card access problem has been encountered, please run the wwnrecover tool to get more information and recovery options.`	An error is detected during normal access to the WWN cards; typically, one of the cards is corrupted or inaccessible.
`Recovery is not possible. Please contact Brocade Technical Support for replacement of the corrupted or inaccessible WWN(s).`	The license ID on the two WWN cards does not match.

The `wwnrecover` utility must be used to maintain data integrity when replacing one or both WWN cards using instructions in the WWN card removal and replacement section. To run `wwnrecover`, log on as admin and enter the following command:

```
switch:admin# wwnrecover
```

For more information on `wwnrecover` and command syntax, refer to the *Fabric OS Command Reference Manual*.

Preparing for WWN card replacement

About this task

If the WWN cards require replacement, complete the following steps. Follow electrostatic discharge (ESD) precautions.

Procedure

1. Open a Telnet session to the device and log on to the active CP blade as admin. The default password is "password".
2. Verify that you are logged on to the active CP blade. Run the haShow command to determine the active CP blade.
3. Run the `supportSave`command on the active CP blade to capture all settings. These settings will be referenced to verify the settings have been correctly programmed after WWN replacement.
4. Run the following commands on the device before replacing the cards so that the data can be verified after the replacement:

   - `chassisname`
   - `chassisshow` (look at the WWN and chassis information in the example below)
   - `configupload -all`
   - `configupload -vf`
   - `ficonshow switchrnid` (FICON/mainframe environments only)
   - `ipaddrshow`
   - `licenseidshow`
   - `switchname`
   - `wwncardshow ipdata`

   The factory serial number and the sequence number in the following output from the `chassisShow` command should match. In the `ficonshow switchrnid` output, a sequence number indicates the logical switch number, if virtual fabrics are enabled:

```
switch:FID128:admin> chassisshow
<output truncated>
WWN  Unit: 1
System AirFlow:        Non-portside Intake
Header Version:        2
Power Consume Factor:  -1W
Factory Part Num:      60-1003194-02
Factory Serial Num:    DZH0331L039
Manufacture:           Day:  3  Month: 10  Year: 15
Update:                Day:  0  Month:  0  Year: 0
Time Alive:            24 days
Time Awake:            0 days


WWN  Unit: 2
System AirFlow:        Non-portside Intake
Header Version:        2
Power Consume Factor:  -1W
Factory Part Num:      60-1003194-02
Factory Serial Num:    DZH0331L032
Manufacture:           Day:  3  Month: 10  Year: 15
```

```
Update:                  Day:  0  Month:  0  Year: 0
Time Alive:              24 days
Time Awake:              0 days

Chassis Factory Serial Num: AFY2530G00S

switch:admin> ficonshow switchrnid
{
 {Switch WWN              Flag Parm
  10:00:00:05:1e:95:b1:00  0x00 0x200a00
  Type number:          SLKWRM
  Model number:         DCX
  Manufacturer:         BRD
  Plant of Manufacture: CA
  Sequence Number:      0AFX2533G001
  tag:                  b6ff
 }
}
```

5. Contact Brocade Technical Support for the replacement of WWN cards. Brocade support will request the partner or OEM to send WWN cards from FRU inventory to the nearest Brocade Support office to be reprogrammed. Brocade Support will require that the Supportsave data were taken in the previous step so that the replacement cards can be reprogrammed prior to shipping to the partner or your site. If Brocade support has determined that both WWN cards need replacing, you must replace both WWN cards as a matched pair.

Hot-swap replacement

You may replace one WWN card assembly at a time with the system powered on using the following steps to avoid interruption of system operation.

About this task

Use this procedure if Brocade Customer Support has determined that a WWN card needs replaced and you have received replacement cards. These procedures require that you use the wwnrecover utility.

Procedure

1. Remove the defective WWN card assembly using procedures under "Removing the WWN card and bezel" on page 153.

   Removing a WWN card assembly will result in RASlog messages indicating that a WWN card cannot be detected. Since the system will be in a degraded state, replace the WWN card as soon as possible.

2. Install the replacement WWN card assembly into the empty slot using the following steps:

   a) Holding the card assembly by its edges with both hands along its length, slide it into the chassis slot.

   b) Push with your thumb on the end of the assembly to fully seat it into the backplane connector.

   c) Use a Phillips screwdriver to tighten the captive screw and secure the card assembly to the chassis.

   Note: Be sure that the captive screws are tightened. If they are not tightened, high pressure from fan operation may unseat cards from chassis connectors.

3. Verify that the WWN card is correctly connected by noting if the LEDs on the card reflect the status of the components.

4. Address any issues flagged by any RASlog EM-1220 and EM-1222 messages that display for the new card before proceeding.

   Note: To avoid invalid WWN data, errors, and operating problems, issues relating to data recovery on new WWN cards must be resolved at this point before proceeding. If EM-1220 messages indicate that IP addresses on installed WWN cards do not match, follow instructions in the message to recover the IP address so that both cards use the same address.

5. Determine the active CP blade by entering the haShow command.

6. On the active CP blade, run the `wwnrecover` command and specify the WWN card that you replaced (WWN 2 or WWN 1) when prompted.

7. If `wwnrecover` messages prompt for a system reboot, reboot both CP blades to ensure the system is running with valid WWN card data.

8. Enter the `hafailover` command to force failover so that the standby CP blade becomes the active CP blade.

   This command is necessary so that the correct IP address for the new card displays for the `ipaddrshow` command. For more information on these commands, refer to the *Fabric OS Command Reference Manual*.

9. Verify the new card settings by running the following commands and comparing the output with the original `supportsave` data:

   • `chassisname`

   • `chassisshow` (look at the WWN and chassis information at the bottom)

   • `ipaddrshow`

   • `licenseidshow`

   • `switchname`

   • `wwncardshow ipdata`

10. If replacing the second WWN card, repeat the previous steps in this procedure for the other card.

11. Install the WWN bezel on the chassis.

    a) Orient the bezel on the chassis.

    b) Insert and tighten both screws using a Phillips screwdriver.

12. Pack faulty WWN cards in the packaging provided with the replacement cards, and return them to Brocade Support for failure analysis (FA).

Cold-swap replacement

About this task

Use this procedure when you can interrupt system operation and replace one or both WWN cards with the system powered down. You can replace one WWN card or both WWN cards, one at a time, with system power on using steps under "Hot-swap replacement" on page 150.

Note: Be aware that if replacing both WWN cards, the IP addresses on the new WWN cards will be in effect when the device powers up. If these IP addresses are different from the previous cards, then you will not be able to establish SSH or other sessions that use the previous IP addresses. You can change IP addresses on the new cards using the `ipaddrset` command.

Procedure

1. Unpack the replacement WWN card assembly and save the packaging for the faulty WWN card(s).

   The WWN card assemblies are labeled #1 for the left slot and #2 for the right slot.

2. Perform the following steps.

   a) Log on to the device and execute the `switchcfgpersistentdisable` command on the main switch and other logical switches. The `switchcfgpersistentdisable` command disables the switches and ensures they remain disabled after the power is cycled. This allows you to check all the settings so that you can verify them before placing the device back into production.

   ```
   switch:admin> switchcfgpersistentdisable
   Switch's persistent state set to 'disabled'
   ```

   If there are other logical switches on your chassis, use the `setcontext` command to connect to all the other switches and then run `switchcfgpersistentdisable` on these switches as well.

3. Enter the `sysShutdown` command. When command output indicates that the device has completed shut-down, remove power cords from all power supply assemblies.

4. Remove defective WWN card assemblies using steps under "Removing the WWN card and bezel" on page 153, and then continue with Step 5.

   Note: There are two WWN card assemblies located behind the WWN bezel (logo plate). As you are facing the bezel, WWN 1 is located on the left side, and WWN 2 is on the right.

5. Install replacement WWN card assemblies into the empty slot using the following steps:

   a) Holding the card assembly by its edges with both hands along its length, slide it into the device slot.

   b) Push with your thumb on the end of the assembly to fully seat into the backplane connector.

   c) Use a No. 1 Phillips screwdriver to tighten the captive screw and secure the card assembly to the chassis.

      Note: Be sure that the captive screws are tightened. If the captive screws have not been tightened, high pressure from fan operation may unseat cards from chassis connectors.

6. Power on the device and wait for five minutes for the device to boot.

7. Verify that the new WWN cards are correctly connected by checking the LED functions. For details on LED operation, see "Interpreting WWN card LEDs" on page 90.

   Note: The LEDs may take up to two minutes after WWN card installation to begin functioning.

8. Resolve any issues flagged by RASlog EM-1220 and EM-1222 messages that display for the new card(s) before proceeding.

   Note: Issues relating to data recovery on new WWN cards must be resolved at this point before proceeding to avoid invalid WWN data, errors, and operating problems.

9. Determine the active CP blade by entering the `haShow` command.

10. On the active CP blade, run the `wwnrecover`command and specify WWN 2 card for recovery when prompted in `wwnrecover` output messages. See "Using the wwnrecover utility" on page 148 for more information on this command.

11. If `wwnrecover` messages prompt for a system reboot, reboot both CP blades to ensure that the system is running with valid WWN card data.

12. Verify the new card settings by running the following commands and comparing the output with the original `supportsave` data:

    - `chassisname`
    - `chassisshow` (look at the WWN and chassis information at the bottom)
    - `ipaddrshow`
    - `licenseidshow`
    - `switchname`
    - `wwncardshow ipdata`

13. Run the `switchcfgpersistentenable` command to persistently enable each logical switch that was disabled before removing the WWN card(s):

    ```
    switch:admin> switchcfgpersistentenable
    Switch's persistent state set to 'enabled'
    ```

14. Install the WWN bezel on the chassis.

    a) Orient the bezel on the chassis.

    b) Insert and tighten both screws using a Phillips screwdriver.

15. Pack faulty WWN card assemblies in the packaging provided with the replacement cards, and return them to Brocade Support for failure analysis (FA).

Removing the WWN card and bezel

About this task

Two WWN cards are located behind the WWN bezel. As you face the bezel on the nonport side of the device, WWN 1 is located on the left side, and WWN 2 is on the right. When cards have been determined faulty and the replacement WWN cards have been received, complete the following steps to remove the bezel and faulty WWN cards.

Note: Unless the device is powered down and not operational, do not perform these steps without first performing procedures under either "Hot-swap replacement" on page 150 or "Cold-swap replacement" on page 151.

Procedure

1. Remove the two screws from the WWN bezel on the back of the device using a Phillips screwdriver. Pull the bezel away from the chassis and set it aside. The ends of both WWN card assemblies with pull tabs are now visible.
2. Unscrew the captive screw for the WWN card assembly using a Phillips screwdriver until the assembly releases from chassis.
3. Grasp the pull tab for a WWN card assembly and gently pull to release the assembly from backplane connector. Carefully slide the card assembly out from the chassis slot.

   Use both hands to support the card assembly along its length as you remove it from the slot.

Figure 65. Removing and Installing WWN Cards

4. Depending on the WWN card assembly removed, label the assembly with No. 1 for the left-side assembly and No. 2 for the right-side assembly for future reference.
5. Set the WWN card assembly on a static-free surface, such as a grounding pad.

Configuring the airflow direction on WWN cards

About this task

All fan and power supply assemblies installed in the chassis must provide the same airflow direction, either nonport-side intake (NPI) or nonport-side exhaust (NPE), and the airflow must be neutral.

A mismatch of between the system and fan and power supply airflow direction may occur when installing new WWN cards into an existing chassis with fan and power supply assemblies already installed or when installing fan and power supply assemblies into a replacement chassis. Replacement chassis are shipped with new WWN cards installed, and the airflow direction is not configured on these cards.

The system detects the airflow direction of the chassis at system boot based on the airflow direction of installed power supply and fan assemblies. Normally, if there is a mismatch between airflow direction set on WWN cards and airflow direction of the installed fan and power supply assemblies, the system will automatically configure the established airflow direction on the WWN cards, provided *all* installed fan and power supply assemblies have the same airflow direction. RASLOG messages such as the following will occur during this automatic configuration:

```
...[HIL-1630], 449, SLOT 1 CHASSIS, INFO, chassis1, Auto-configuring
system airflow direction to Non-portside Exhaust
```

```
[HIL-1630], 449, SLOT 1 CHASSIS, INFO, chassis1, Auto-configuring
 system airflow direction to Non-portside Intake
```

If airflow direction for power supply and fan assemblies does not match, WWN cards will not automatically reconfigure and the fan or power supply assembly with mismatched airflow will fault. In this case, you must replace fan or power supply assemblies to achieve matching airflow direction for all, and then reboot the system.

Verifying WWN card operation

About this task
Perform the following tasks to verify operation of the WWN cards:

Procedure

1. Check the LED indicators on the WWN card bezel, located between the power supplies on the nonport side of the device. The LED patterns may temporarily change during POST and other diagnostic tests. For information on interpreting LED patterns, see "Interpreting WWN card LEDs" on page 90.
2. Enter the errDump command. This displays the system error log. Refer to the *Fabric OS Messages Reference Manual* for more information on the messages in this log.

Chapter 11. Power supply assemblies

This device supports the following AC power supply assemblies. All power supplies installed in the device must be of the same type and must match the airflow of installed fan assemblies.

- The power supply model supporting nonport-side air intake (NPI) provides 1450W (100–120 VAC) and 2870W (200–240 VAC). This assembly has two fans that move the air from the nonport side to the port side of the device.
- The power supply model supporting nonport-side air exhaust (NPE) provides 1450W (100–120 VAC) and 2870W (200–240 VAC). This assembly has two fans that move the air from the port side to the nonport side of the device.

The following figure illustrates the power supply assembly components.

Figure 66. AC Power Supply Assembly

1. Fan 1
2. Fan 2
3. Handle
4. Status LED
5. AC Power Cable Receptacle
6. Airflow Label
7. Captive Screw

The SAN256B-7 Director has two power supplies installed. The use of the high-voltage line (200 to 240 VAC) is highly recommended because of better power conversion efficiency. See "Power Supply Requirements" in the Appendix A, "Product specifications," on page 191 for minimum power supplies required for AC low and high voltage line operation, redundancy in case of power supply failure, and other specifications.

Redundant AC primary power connections ensure high availability. Each power supply has its own connector, so two primary power connections are required for the SAN256B-7 Director for optimum efficiency and redundancy.

Power supplies can be removed and replaced without special tools. If replacing one power supply, the device can continue operating during replacement if procedures are followed in this guide.

Power cords for these power supplies are available from Brocade that meet your site and country requirements.

HVAC/HVDC power supply overview

The SAN256B-7 and SAN512B-7 chassis support a dual-function high-voltage AC, high-voltage DC (HVAC/HVDC) power supply assembly. This power supply converts AC or DC input to the required DC output power required for device operation.

Each HVAC/HVDC power supply assembly provides the following power outputs in Watts at the indicated AC and DC input rated voltages:

- 1450W (100–120 VAC)
- 2870W (200–277 VAC)
- 2870W (240–380 VDC)

The following HVAC/HVDC power supply models are supported:

- Power supply model supporting nonport-side air intake (NPI). This assembly has two fans that move the air from the nonport side to the port side of the device.
- Power supply model supporting nonport-side air exhaust (NPE). This assembly has two fans that move the air from the port side to the nonport side of the device.

Consider the following important notes about installing this power supply:

- You cannot upgrade from standard voltage AC power supplies in an existing chassis to HVAC/HVDC power supplies. You must order a new base chassis and the required HVAC/HVDC power supplies.
- You cannot mix HVAC/HVDC and standard voltage AC power supplies in the same SAN256B-7 or SAN512B-7 chassis. All power supplies must be the same type.
- All HVAC/HVDC power supplies installed in the device must be all either NPI or NPE models. The airflow direction must match the airflow direction of installed fans.

The following figure illustrates power supply assembly components.

Figure 67. HVAC/HVDC Power Supply Assembly

1. Fan 1
2. Fan 2
3. Handle
4. Status LED
5. HVAC/HVDC Power Cable Receptacle
6. Airflow Label
7. Captive Screw

8. Power Cable Restraint Cover

Consider the following information when connecting AC power:

- The SAN256B-7 Director has two power supplies installed. The use of the high-voltage line (200 to 277 VAC) is advised because of better power conversion efficiency. See "Power Supply Requirements" in the Brocade X7 Director Technical Specifications for minimum power supplies required for AC low and high voltage line operation, redundancy in case of power supply failure, and other specifications.

- Redundant AC primary power connections ensure high availability. Each power supply has its own connector, so two primary power connections are required for the SAN256B-7 Director for optimum efficiency and redundancy.

Power supplies can be removed and replaced without special tools. If you are replacing one power supply in a configuration with N+1 or greater redundancy, the director can continue operating during the replacement if procedures in this guide are followed. Otherwise, installed blades may power off. See "Power supply requirements" in Brocade X7 Director Technical Specifications for more information about power supply redundancy.

Power cords are available from Brocade. Power cords are 6m (19.68 ft.) long and contain three colored 14 AWG unterminated wires, which are described in the following table:

Table 33. HVAC/HVDC Power Cable Wiring

Label (Color)	Function
(black)	Negative (-)
(green with yellow stripe)	Earth ground (PE)
(red)	Return positive (+)

Power cords have an Anderson Saf-D-Grid 400 connectors on the power supply end and unterminated wires on the other end for attaching to AC or DC power sources. Either attach an AC power plug to these wires that meet your facility and local code requirements or connect wires to appropriate DC power terminal blocks.

Power supply assembly numbering

The following figure illustrates the location and number identification of power supply assemblies in the chassis.

Figure 68. HVAC/HVDC Power Supply Assembly Numbering

1. Power Supply 1
2. Power Supply 2

Fan and power supply airflow

All fans and power supply FRUs installed in this device must have either NPI (nonport-side intake) or NPE (nonport-side exhaust) airflow. You must order a replacement FRU with the same part number (P/N) as the FRU being replaced to provide the same airflow. The manufacturing P/N, located on the top of the FRU, contains either NPI or NPE. If a mismatched power source or fan assembly is installed by mistake, a RASlog message occurs indicating that a mismatch in fan or power supply airflow has occurred and the FRU is faulted.

Note: If airflow direction for a power supply assembly does not match the chassis airflow direction as stored on WWN cards, the power supply will have a "fault" status. However, the LED operation for the power supply will not indicate a fault. If the airflow direction for a fan assembly does not match the chassis airflow direction, the fan LED will indicate a fault condition.

Power supply and fan assemblies are labeled with a green "E" or orange "I" airflow symbol. All fans and power supplies in a chassis must have the same label affixed to guarantee airflow direction is consistent.

Figure 69. Airflow Labels

The orange I symbol indicates an intake FRU. This unit pulls air in from the nonport side of the device and exhausts it out the port side. This symbol should appear on FRUs with part numbers that contain an NPI.

The green E symbol indicates an exhaust FRU. This unit pulls air in from the port side of the device and exhausts it out the nonport side. This symbol should appear on FRUs with part numbers that contain an NPE.

Ensure that the airflow direction of power supply and fan assemblies matches. If the power supply or fan airflow direction does not match, the FRU will fault. Faulty fans can cause an increase in temperature.

Airflow direction can be verified by entering the `chassisShow` command. The following output shows an example from command output indicating mismatching airflow. WWN units should indicate "Nonport side Intake".

```
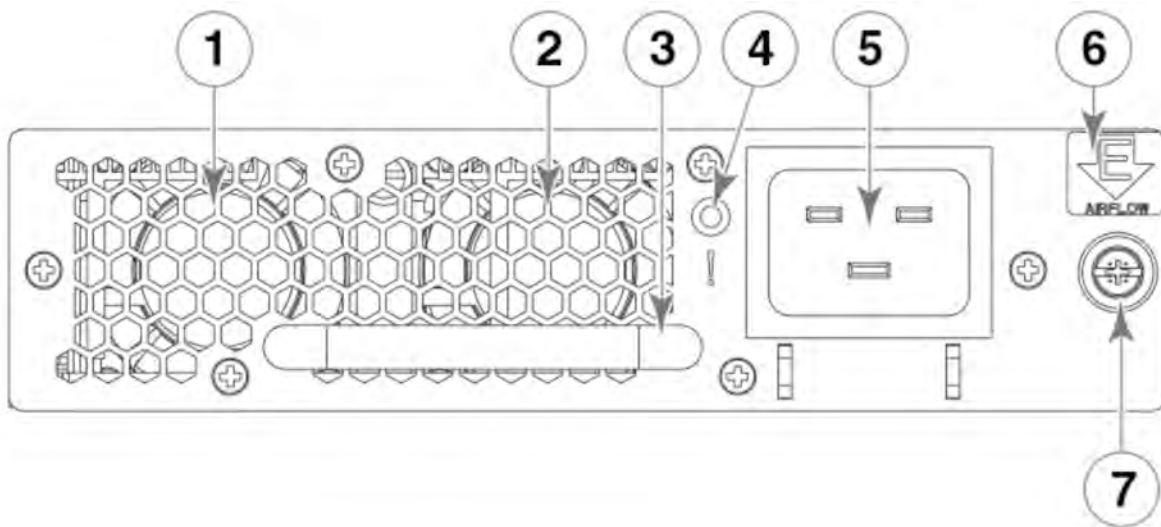POWER SUPPLY   Unit: 1
Power Source:            AC
Fan Direction:           Non-portside Intake
...
FAN   Unit: 2
Fan Direction:           Non-portside Intake
...
WWN   Unit: 1
System AirFlow:          Non-portside Exhaust
...
WWN   Unit: 2
System AirFlow:          Non-portside Exhaust
```

Note: Ensure that the captive screws securing the fan and power supply assemblies are tightened. If they are not tightened, the air pressure inside the chassis may unseat these FRUs from chassis connectors.

Precautions specific to power supply assembly

Observe the following precautions when replacing the power supply assembly:

Note: Depending on the blade configuration of the device and the number of power supplies installed, the device may be able to continue operating while replacing a power supply. See "Power Supply Requirements" in the Appendix A, "Product specifications," on page 191 for minimum power supplies required for AC low and high voltage line operation, redundancy in case of power supply failure, and other specifications. If there is insufficient power, the device will start powering down blades until the power demand can be met.

Note: A device with slots for eight port blades can have up to four power supplies installed. If you are adding additional power supplies, you can use the procedures in this section under "Installing a power

supply" on page 161 to install the new power supplies. Be sure to follow the steps on those procedures to enable sending notifications if the additional power supplies should fail.

Note: Make sure that captive screws securing power supply assemblies to chassis are tightened. If not, high pressure from fans' operation may unseat power supply assemblies from chassis connectors.

See "Safety precautions" on page 7 for caution and danger notices related to installing power supplies.

Power supply assembly fault indicators

Use one of the following methods to determine if a power supply is faulty:

- Check the power supply status LED.

  – The LED may take up to 10 seconds to illuminate. If the LED does not illuminate, the power supply has no incoming power. Check if the power supply is properly seated in the backplane connector. Check the power source to the power cord.

  – If the LED is flashing green, the power supply may be faulty.

  For more information on LED operation, see "Interpreting power supply LEDs" on page 91.

- Enter psShow. If the status of power supply displays absent or faulty, check if power supply assembly is seated in chassis. If it is, the power supply could be faulty.

- Enter sensorShow to determine if a power supply is running above average temperatures of other installed power supplies.

- Enter errDump to display the system error log. Refer to the *Fabric OS Message Reference Manual* for more information on the messages in this log.

See the Using Monitoring Commands and the *Fabric OS Command Reference Manual* for output examples and additional information on Fabric OS commands.

For more information on error messages, refer to the *Fabric OS Message Reference Manual*.

Power supply assembly task guide

This section contains a guide to more complete, detailed steps in this section for installing or replacing power supply assemblies when the chassis is running (hot-swap) or must be powered off (cold-swap). References are provided for more detailed information.

Note: Depending on the blade configuration of the chassis and the number of power supplies installed, the chassis may be able to continue operating while you replace a power supply. See "Power Supply Requirements" in Appendix A, "Product specifications," on page 191 for the minimum power supplies required for AC low and high voltage line operation, redundancy in case of power supply failure, and other specifications. If there is insufficient power, the chassis will start powering down blades until the power demand can be met.

Installing an Additional Power Supply (Hot-Install)

If your chassis is up and running, has empty slots for power supplies, and you want to install additional power supplies, complete the following steps:

1. Remove the filler panel from the empty power supply assembly slot.
2. Insert the new power supply assembly.
3. Plug the power cord into the new power supply assembly from the power source.
4. Verify the power supply assembly status LED.

Replacing a Power Supply Assembly (Hot-Swap)

If your chassis is up and running, but the power supply has failed, complete the following steps:

Note: Removing more than one power supply could result in insufficient system power, which could cause some blades to power down. Ensure that there is an adequate number of active power supply

assemblies when removing a single power unit during hot-swapping. See "Power Supply Specifications" and "Power Supply Requirements" in Appendix A, "Product specifications," on page 191 for minimum power supplies required for low and high voltage line operation.

1. Unplug the power cable from failed power supply assembly.
2. Remove the power supply assembly.
3. Insert new power supply assembly.
4. Plug the power cord into a new power supply assembly from the power source.
5. Verify the power supply assembly status LED.

Replacing or Installing a Power Supply Assembly (Cold-Install or Cold-Swap)

If your chassis is up and running, but you want to power down the chassis to install additional power supply assemblies or replace failed power supply assemblies, complete the following steps:

1. Shut down the system using the `sysShutdown` command.
2. Unplug power cords from all power supply assemblies.
3. If adding a power supply assembly, remove the filler panel from the empty power supply assembly slot.
4. Install or replace power supply assemblies.
5. Plug power cords into all power supply assemblies from power sources.
6. Verify the power supply assembly status LEDs.

Time and items required

The procedure to remove or install a each power supply takes less than five minutes. A power supply unit or filler panel is required for the power supply replacement.

Removing a power supply

About this task

To remove a power supply, complete the following steps:

Procedure

1. Before removing a power supply assembly, verify whether you can remove the power supply and leave the chassis operating (hot-swap replacement) or whether you must power down the chassis (cold-swap replacement).

   Note: Depending on the blade configuration of the chassis and the number of power supplies installed, the chassis may be able to continue operating while replacing a power supply. See "Power Supply Specifications" and "Power Supply Requirements" in Appendix A, "Product specifications," on page 191 for the minimum power supplies required for low and high voltage line operation, redundancy in case of power supply failure, and other specifications. If there is insufficient power, the chassis will power down blades until the power demand can be met.

2. Perform one of the following steps:

   • If you need to power down the chassis to remove a power supply, enter the `sysShutdown` command. See "Powering down the chassis" on page 58 for detailed procedures. When the chassis completes shut-down, remove power cords from all power supply assemblies.

      Note: To remove a power cord from an HVAC/HVDC power supply, you must remove the power cord retainer cover, if attached under the power cord connector, and then unlatch the power cord release latch located under the power cord connector.

   • If you can leave the chassis in operation and replace a power supply, unplug the power cord from the power supply assembly that you are replacing.

Note: Be sure to replace the power supply as soon as possible.

3. Loosen the captive screw on the right side of the power supply assembly until the screw releases from the chassis.

   The captive screw is located just below the airflow label on the right side of the power supply assembly. If necessary, use a Phillips screwdriver.

4. Grasp the handle and pull, sliding the power supply from the chassis and supporting the power supply from beneath as you remove it.

Figure 70. Removing and Installing a Power Supply Assembly

5. If you are not replacing the power supply and can leave the chassis operating, insert a filler panel into the slot and tighten the captive screw to secure to chassis.

Installing a power supply

About this task

To install a power supply, complete the following steps:

Procedure

1. If a filler panel is installed over the slot where you are installing the power supply, remove the panel by loosening the captive screw located on the right side of the panel. When the screw releases from chassis, pull on the screw to lift the panel from the chassis slot.

2. Grasp the handle and slide the new power supply into the chassis while supporting the power supply from beneath. Push the power supply into the slot until the connectors seat in the chassis backplane.

3. Verify that the power supply assembly is seated by gently pushing on the handle.

4. Push in a captive screw, and then tighten it with your fingers to secure the power supply assembly to the chassis.

   Note: Make sure that the captive screws securing the power supply assembly to the chassis are tightened. If they are not tightened, high pressure from fan operation may unseat the power supply assembly from chassis connectors.

5. Connect power to the power supply using the steps in Providing Power to the Device .

6. Verify that the power LED on the power supply displays steady green when power is fully applied.

Verifying power supply operation

About this task

Perform the following tasks to verify the operation of the power supply:

Procedure

1. Check the LED indicator on the power supply. The LED patterns may temporarily change during POST and other diagnostic tests. For information on interpreting LED patterns, see "Interpreting power supply LEDs" on page 91. Be sure to check all the power supply modules.
2. Check the power supply status by entering the following commands:

   - psShow — Displays the status of each power supply as OK, Absent, or Faulty. If a power supply displays absent or faulty, contact the device supplier to order replacement parts. Both physically absent or faulty could also be the result of the power supply not being properly seated or being turned off.
   - sensorShow — Displays current temperature and status of fan and power supply sensors located on the chassis.
   - errDump — Displays all system error log messages.
   - errShow — Displays error log messages one at a time.

Example

See Using Monitoring Commands and the *Fabric OS Command Reference Manual* for output examples and additional information on Fabric OS commands.

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

Chapter 12. Fan assemblies

The following list shows important details that you should note about fan assemblies:

- Two fan assemblies are installed in the chassis, containing two fans each, for a total of four fans.
- The chassis requires three fans out of four functioning fans for operation.
- Fan assemblies with the following airflow directions can be installed. All fan assemblies must have the same airflow direction and match the airflow direction of installed power supplies.
  - Fan assembly with nonport-side air intake: Fans move air from the nonport side to the port side of the chassis.
  - Fan assembly with nonport-side air exhaust: Fans move air from the port side to the nonport side of the chassis.
- Fan assemblies can be removed and replaced without special tools.
- The chassis can continue operation while one fan assembly is replaced if the fan assembly is replaced immediately.

The following figure illustrates fan assembly components.

Figure 71. Fan Assembly

1. Power LED
2. Captive Screw
3. Status LED
4. Airflow Label
5. Air Vent
6. Handle
7. Captive Screw

Fan and power supply airflow

All fans and power supply FRUs installed in this device must have either NPI (nonport-side intake) or NPE (nonport-side exhaust) airflow. You must order a replacement FRU with the same part number (P/N) as the FRU being replaced to provide the same airflow. The manufacturing P/N, located on the top of the FRU, contains either NPI or NPE. If a mismatched power source or fan assembly is installed by mistake, a RASlog message occurs indicating that a mismatch in fan or power supply airflow has occurred and the FRU is faulted.

Note: If airflow direction for a power supply assembly does not match the chassis airflow direction as stored on WWN cards, the power supply will have a "fault" status. However, the LED operation for the power supply will not indicate a fault. If the airflow direction for a fan assembly does not match the chassis airflow direction, the fan LED will indicate a fault condition.

Power supply and fan assemblies are labeled with a green "E" or orange "I" airflow symbol. All fans and power supplies in a chassis must have the same label affixed to guarantee airflow direction is consistent.

Figure 72. Airflow Labels

The orange I symbol indicates an intake FRU. This unit pulls air in from the nonport side of the device and exhausts it out the port side. This symbol should appear on FRUs with part numbers that contain an NPI.

The green E symbol indicates an exhaust FRU. This unit pulls air in from the port side of the device and exhausts it out the nonport side. This symbol should appear on FRUs with part numbers that contain an NPE.

Ensure that the airflow direction of power supply and fan assemblies matches. If the power supply or fan airflow direction does not match, the FRU will fault. Faulty fans can cause an increase in temperature.

Airflow direction can be verified by entering the `chassisShow` command. The following output shows an example from command output indicating mismatching airflow. WWN units should indicate "Nonport side Intake".

```
POWER SUPPLY  Unit: 1
Power Source:           AC
Fan Direction:          Non-portside Intake
...
FAN  Unit: 2
Fan Direction:          Non-portside Intake
...
WWN  Unit: 1
System AirFlow:         Non-portside Exhaust
...
WWN  Unit: 2
System AirFlow:         Non-portside Exhaust
```

Note: Ensure that the captive screws securing the fan and power supply assemblies are tightened. If they are not tightened, the air pressure inside the chassis may unseat these FRUs from chassis connectors.

Fan assembly numbering

The following figure illustrates the location and number identification of fan assemblies in the chassis.

Figure 73. Fan Assembly Numbering

1. Fan Assembly 1
2. Fan Assembly 2

Precautions specific to fan assemblies

Observe the following precautions when replacing fan assemblies.

Note: Each fan assembly contains two fans for a total of four fans for two installed fan assemblies. The device requires 3 fans out of 4 functioning fans for operation. If hot-swapping a fan assembly, be sure to have the replacement fan assembly ready to install before removing a faulty fan assembly and replace it as soon as possible.

Note: If a fan assembly has failed, do not remove it from the chassis unless an FRU is available for replacement. If the slot is left empty for an extended time period, this could cause chassis air-leakage and overheating.

Note: Make sure that the captive screws securing fan assemblies to the chassis are tightened. If they are not tightened, high pressure from fan operation may unseat the fan from chassis connectors.

Fan assembly fault indicators

Use one of the following methods to determine if a fan assembly is faulty:

• Check the fan status LED.

  – Steady amber – fan assembly has a failure (full or partial).
  – Slow-flashing amber (on 2 seconds, then off 2 seconds) – fan assembly is not seated correctly or is faulty.
  – Fast-flashing amber (on ½ second, then off ½ second) – environmental range exceeded.

- Enter `fanShow`. If the status of the fan assembly displays absent or faulty, check if the assembly is seated in the chassis. If it is seated, the power supply could be faulty or is not receiving power for some reason.
- Enter `sensorShow` to determine if a fan is running above average temperatures of other installed fan(s).
- Enter `errDump` to display the system error log.

For more information on LED operation, see "Interpreting fan assembly LEDs" on page 94.

For output examples and additional information on Fabric OS commands, see "Using monitoring commands" on page 97 and the *Fabric OS Command Reference Manual*.

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

Fan assembly task guide

This section addresses the steps for installing or replacing fan assemblies when the chassis is running (hot-swap) or must be powered off (cold-swap). References are provided for more details on removal and installation steps.

Note: Each fan assembly contains 2 fans for a total of 4 fans for two installed fan assemblies. The chassis requires 3 fans out of 4 functioning fans for operation. If hot-swapping a fan assembly, be sure to have the replacement fan assembly ready to install before removing a faulty fan assembly and replace as soon as possible.

Note: If a fan assembly has failed, do not remove it from the chassis unless an FRU is available for replacement. If the slot is left empty for an extended time period, this could cause chassis air leakage and overheating.

Note: Make sure that captive screws securing fan assemblies to the chassis are tightened. If the screws are not tightened, high pressure from fan operation may unseat the fan from chassis connectors.

Replacing a Fan Assembly (Hot-Swap)

If your chassis is up and running, but a fan assembly has failed, complete the following steps:

1. Remove fan assembly.
2. Insert new fan assembly into the empty slot as soon as possible.
3. Verify that the fan assembly status LED is green.

Replacing a Fan Assembly (Cold-Swap)

If your chassis is up and running, but you want to power down the chassis to replace a failed fan assembly, complete the following steps:

1. Shut down the system using the `sysShutdown` command.
2. Unplug power cords from receptacles on all power supply assemblies.
3. Remove faulty fan assembly.
4. Insert new fan assembly.
5. Plug the power cords into the all power supply assemblies from the power sources to the power chassis on.
6. Verify that the fan assembly status LEDs are green.

Time and items required

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

- Replacement fan assembly

- No. 1 Phillips screwdriver

Removing a fan assembly

About this task

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

Procedure

1. Before removing a fan assembly, refer to "Precautions specific to fan assemblies" on page 165 to verify whether you can remove the power supply and leave the chassis operating (hot-swap replacement).
2. Perform one of the following steps:
   - If you need to power down the chassis to remove a fan assembly, enter the `sysShutdown` command. When command output indicates the chassis has completed shut-down, remove power cords from all power supply assemblies.
   - If you can hot-swap the fan assembly, go on to the next step.

   Note: Replace fan as soon as possible to avoid overheating and eventual system shutdown.
3. Loosen the captive screw at each end of the fan assembly until the screw releases from the chassis. Use a No. 1 Phillips screwdriver if necessary.
4. Grasp the handle and pull, sliding the fan assembly from the chassis while supporting the fan assembly from beneath as you remove it.

Figure 74. Removing and Installing a Fan Assembly

5. If you are leaving power on for replacement (hot-swap), be sure to replace the fan assembly as soon as possible.

Installing a fan assembly

About this task

Complete the following steps to replace the fan assembly in a chassis:

Procedure

1. Grasp the handle and carefully slide the fan assembly into the chassis while supporting the fan assembly from beneath.
2. Push the fan assembly fully into the slot with your fingers until it seats in the backplane connectors.
3. Verify that the power LED displays a green light.
4. Push in on each captive screw and tighten with a No. 1 Phillips screwdriver to secure the fan assembly to the chassis.

   Note: Be sure that captive screws are tightened. If not, high pressure from fan operation may unseat fan from chassis connectors.

Chapter 13. Blade filler panels

Blade filler panels are required for storage drive vacant slots to maintain proper cooling and air flow. These panels need to be removed prior to installing a blade into the device.

Blade filler panel removal and replacement

When installing a blade into the device, you may need to first remove a blade filler panel. Be sure to keep all filler panels in a safe place in case you need to remove a blade for an indefinite period of time. Cover all empty slots with blade filler panels. Failure to do so will adversely affect device cooling.

⚠️ **CAUTION:** If you do not install a module or a power supply in a slot, you must keep the slot filler panel in place. If you run the chassis with an uncovered slot, the system will overheat.

Blade filler panels have a latch mechanism at each end of the panel. Both latches must be opened to remove and install the panel.

Note: Filler panels for SAN384B-2 and SAN768B-2 Directors are not interchangeable with filler panels for SAN256B-7 and SAN512B-7 Directors.

Note: SAN256B-7 and SAN512B-7 blade filler panels have been designed to meet the thermal specifications of a SAN256B-7 and SAN512B-7 chassis. Do not replace SAN256B-7 and SAN512B-7 blade filler panels with those from a SAN256B-6 or SAN512B-6 chassis.

Removing a filler panel

About this task

Complete the following steps to remove a filler panel from a blade slot:

Procedure

1. Remove the chassis door.
2. Pull out the spring-loaded latch release on the latch at each end of the cover using your thumb and forefinger and slide the latches toward the center of the cover.
   This action moves the latches away from the ends of the slot to unlatch the cover from chassis.
3. Using the latch pull tabs as handles, pull the filler panel out of the chassis.

Figure 75. Removing and Installing the Blade Filler Panel in an SAN256B-7 Director

    2. Latch Release

Note: Filler panels for SAN768B-2 and SAN384B-2 Directors are not interchangeable with filler panels for SAN256B-7 and SAN512B-7 Directors.

Installing a filler panel

Procedure

1. Pull out the spring-loaded latch release on the latch at each end of the cover using your thumb and forefinger and slide the latches toward the center of the cover.
2. Orient the filler panel over the empty slot and slide it into the slot.
3. Pull out the spring-loaded latch release at each end it of the cover and slide each latch toward the end of the cover.

   This action should slide the latches into the chassis and lock the panel in place. If not, the cover may not be seated fully into the slot. Try unlatching both ends, pushing the cover firmly into the slot, and then latching both ends again.

   Note: Be sure filler panels are securely latched. If not, high pressure from fan operation may unseat blade from chassis connectors.

Figure 76. Removing and Installing the Blade Filler Panel on an X7-4 Director

4. Reinstall the chassis door. The door must be installed to meet EMI compliance.

Chapter 14. Cable management fingers

The SAN256B-7 Director 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 blades in the device, the finger assemblies are attached to the uprights of the mounting rack.

Time and items required for removal and replacement

The replacement procedure for the cable management fingers takes less than five minutes. A No. 1 Phillips screwdriver is required.

Removing the cable management finger assembly

About this task

Complete the following steps to remove the cable management finger assemblies from rack uprights. Cable management finger assemblies are shown installed in the following figure.

Figure 77. Cable Management Fingers Installed on Rack Uprights on an SAN256B-7 Director

 1. Cable Management Finger Assemblies

Procedure

1. Remove the cables from the cable management finger assembly and rearrange the cables around the assembly.
2. Unscrew and save the three (3) screws that hold the finger assembly to the rack upright.
3. Remove the cable management finger assembly.
4. If necessary, repeat steps through for the other finger assembly.

Installing the cable management finger assembly

About this task

Complete the following steps to install the cable management finger assembly:

Procedure

1. Position and tighten the three (3) screws to secure the vertical cable management finger assembly to the rack upright. Cable management finger assemblies are shown installed in the following figure.

Figure 78. Cable Management Finger Assemblies in an SAN256B-7 Director

      1. Cable Management Finger Assemblies

2. Arrange the cables along with the cable management finger assembly.
3. If necessary, repeat steps 1 and 2 for the other cable management finger assembly.

Chapter 15. Chassis door

The chassis door must be installed to ensure that the device meets EMI and other regulatory certifications. A receiving hole is located on each corner on the back side of the door. Each hole snaps into a ball stud located on a matching corner of the chassis.

Time and items required

Removal and re-installation should take less than 5 minutes.

Required for installation are the door assembly, packaged separately from the chassis, and ball studs for the door. Ball studs are packaged with the door assembly.

The door assembly is packaged separately from the chassis.

Removing a chassis door

Support the door to prevent it from falling. Pull and remove the door. It will pop off the ball studs.

Figure 79. Removal and Replacement of the Chassis Door

Installing a chassis door

About this task

Complete the following steps to install the door on the port side of the chassis.

Procedure

1. Install six ball studs into the chassis at locations indicated in the following figure. Using your fingers, thread three ball studs into the holes located at the top of the chassis air vent and three ball studs into the holes located below the blades at the bottom of the chassis. Screw ball studs in finger tight.

   Note: The ball studs are packaged with the chassis in the accessory tray.

Figure 80. Installing Door Ball Studs into SAN256B-7 Chassis

2. Align the six ball stud attachment holes in the back of the door with the six ball studs in the chassis and push the door into place. It will snap onto the studs.

Figure 81. Installing Chassis Door

Chapter 16. Chassis replacement

Before replacing the chassis, you will need to remove all the blades and the FRUs, except the WWN cards, from the existing chassis. You will reinstall these in the replacement chassis.

Follow the procedures in this section exactly. Follow the procedures in this section exactly. Do not begin the removal process before you familiarize yourself with all of the steps in the procedure because you will need to save critical device and SAN information for these components before you disconnect the chassis from the network, fabric, and power.

After you reinstall components in the new chassis, follow the procedures exactly to reconnect the chassis to the network, fabric, and power. Then, download firmware, if necessary, and verify the system operation and configuration.

Note: New WWN cards are shipped preinstalled in the replacement chassis. Do not replace the WWN cards in the replacement chassis with the old WWN cards from chassis that you are replacing. This will result in licensing issues and return materials authorization (RMA) issues for your product. The original license will be transferred to the replacement chassis, based on the license identification (LID) of the new, preinstalled WWN card, through the RMA process. You should be provided a license for the new chassis through email. If you have not received this, contact your Brocade support representative.

Before beginning these procedures, perform the following tasks:

- Place the replacement chassis in close proximity to the old chassis.
- Provide a surface on which to place the old chassis, such as a second lift or the pallet originally provided with the chassis.
- Obtain all tools and other materials listed under "Time and items required" on page 178.

To unpack and transport the new chassis, follow procedures under "Unpacking and transporting the device" on page 16.

Precautions specific to chassis replacement

Observe the following precautions when replacing the chassis.

When removing components, wear a wrist grounding strap connected to bench ground.

⚠ **DANGER:** For safety reasons, the ESD wrist strap should contain a series 1 megaohm resistor.

⚠ **DANGER:** Disconnect the power cord from all power sources to completely remove power from the device.

⚠ **DANGER:** Use safe lifting practices when moving the product.

⚠ **DANGER:** Make sure the rack housing the device is adequately secured to prevent it from becoming unstable or falling over.

Chassis replacement task guide

About this task

The following are the basic tasks for removing and replacing the chassis with its backplane:

Note: The device must be removed from the fabric and powered off to perform these tasks. Contact your support provider if you have any questions about whether the chassis requires replacement.

Procedure

Chassis fault indicators

Verify that the replacement of the chassis is necessary. If error messages and LED operation indicates faulty components, ensure that the components are firmly seated. Contact your support provider with any questions about whether the chassis should be replaced.

Any of the following events might indicate the need to replace the chassis:

- Visible mechanical damage to the chassis, including damage to sheet metal or card guides, that prevents the correct installation of a blade.
- Bent or damaged connectors on the backplane (the surface inside the chassis to which the blades connect).
- One or more components (such as a power supply, blower assembly, port blade, control processor blade, core switch blade, or WWN card) do not function properly even after the component is replaced.
- Intermittent FAULTY codes for blades. Reseat the blade and visually inspect the ejector stiffening rails for possible wear or damage. It is important that the blade ejector handles not slip out during blade installation. If this happens, it is usually due to excessive wear or damage to the ejector stiffening rails.
- The psShow or fanShow commands continue to show a faulty component even though the component was replaced.
- The slotShow command continues to show a faulty control processor, core switch, or port blade even though the blade was replaced.

Time and items required

The chassis replacement takes approximately 3 to 4 hours.

The following items are required for the chassis replacement:

- Electrostatic discharge (ESD) grounding strap.
- ESD grounding pads for protecting all blades and WWN cards.
- Serial cable and workstation computer with a terminal emulator application (such as HyperTerminal for Windows systems or TIP for Solaris systems), required only if serial console session used.
- A pallet jack or hydraulic or assisted lift that raises a minimum of 140 cm (55 in.) and carries a minimum of 113 kg (250 lb).
- A surface on which to place the old chassis, such as a second lift or the pallet originally provided with the old chassis.
- No. 1 and No. 2 Phillips screwdrivers. Use a No. 1 Phillips screwdriver for removing and installing blades and FRUs in the chassis.

Preparing for replacement

Before beginning replacement procedures you must run a series of Fabric OS commands and record device information for safekeeping that may be required for installing and configuring the new chassis. This includes information on licenses, IP addresses, WWNs, serial numbers, switch IDs, location of

configuration files, and fabric details. It also includes information that might be required by Technical Support. "Recording critical device and SAN information" on page 179 instructs you to run the following commands and record specific output:

- `chassisShow`
- `configUpload - all`
- `configupload -vf`
- `fabricShow`
- `ipAddrShow -sw`
- `licenseShow`
- `nsAllShow`
- `nsShow`
- `supportShow`
- `switchShow -qsfp`

Before beginning replacement, you must also properly shut down the device and disconnect from the fabric and power using procedures under "Disconnecting from the network and fabric" on page 182.

Recording critical device and SAN information

About this task

Use a checklist, such as the following, to ensure that critical information is recorded for installing the new chassis. This information includes current chassis IP addresses, license keys, the new chassis serial number, and output from `supportShow`, `fabricShow`, and other commands. Save output from these commands to the text files listed in the table.

All commands must be entered from a CLI session (Telnet or serial) to the active CP blade unless otherwise indicated. For detailed information about Fabric OS commands, refer to the *Fabric OS Command Reference Manual*.

Table 34. Critical Information Checklist		
Checked?	**Data**	**Notes**
Configuration information		
	Location of `config-switch.txt` file	
	Location of `config-miscinfo.txt` file	
	IP address, subnet mask	
	WWN for the device	
SAN profile		
	Location of `ANbefor.txt` file	
	Notes regarding `nsshow` output	
	Notes regarding `nsallshow` output	

Table 34. Critical Information Checklist (continued)

Checked?	Data	Notes
	Notes regarding `switchshow` output	
	Notes regarding `fabricshow` output	
Output from `licenseshow` command		
	License keys and other licensing data for licensed products enabled on device.	
Output from `supportshow` command		
	Location of "spptshow.txt" file	
	Notes regarding `supportshow` output	
Information about the new chassis		
	New factory serial number	
	New serial number (if available)	

Procedure

1. Open a telnet session and log on to the device as `admin`. The default password is `password`. Enable the logging function on your telnet or serial console connection.

2. Back up the current configuration by entering the `configupload -all`. Enter the requested information at the prompts.

   Note: If you are using the Virtual Fabric feature, run `configupload -vf` before running the `configupload` command to save the logical switch configuration.

   This `configUpload -all` command uploads the device configuration to the customer-defined FTP server, making it available for downloading. Alternatively, you can save the configuration file to a USB device. For more information about this command, refer to the *Fabric OS Command Reference Manual*.

   ```
   switch:admin> configupload
   Protocol (scp or ftp) [ftp]: ftp
   Server Name or IP Address [host]: 123.123.123.123
   User Name [user]: Admin24
   File Name [config.txt]: config-switch0.txt
   Password:
   Upload complete
   switch:admin>
   ```

3. Record the WWN value: Enter wwn, and then copy the command output into a file named `config-miscinfo.txt`.

   ```
   switch:admin> wwn
   10:00:00:60:69:00:00:0a
   ```

4. Enter `ipAddrShow`, and then copy the command output into the `config-miscinfo.txt` file.

```
switch:admin> ipaddrshow
Chassis
Ethernet IP Address: 10.33.60.85
Ethernet Subnetmask: 255.255.240.0
CP0
Ethernet IP Address: 10.33.60.86
Ethernet Subnetmask: 255.255.240.0
Host Name: cp0
Gateway IP Address: 10.33.48.1
CP1
Ethernet IP Address: 10.33.60.87
Ethernet Subnetmask: 255.255.240.0
Host Name: cp1
Gateway IP Address: 10.33.48.1
Backplane IP address of CP0 : 10.0.0.5
Backplane IP address of CP1 : 10.0.0.6
IPv6 Autoconfiguration Enabled: Yes
Local IPv6 Addresses:
chassis 0 stateless fd00:60:69bc:63:205:1eff:fe39:e45a/64 preferred
chassis 0 stateless fec0:60:69bc:63:205:1eff:fe39:e45a/64 preferred
cp 0 stateless fd00:60:69bc:63:205:1eff:fe40:6230/64 preferred
cp 0 stateless fec0:60:69bc:63:205:1eff:fe40:6230/64 preferred
cp 1 stateless fd00:60:69bc:63:205:1eff:fe39:ff2a/64 preferred
cp 1 stateless fec0:60:69bc:63:205:1eff:fe39:ff2a/64 preferred
IPv6 Gateways:
cp 0 fe80:60:69bc:63::3
cp 0 fe80:60:69bc:63::1
cp 0 fe80:60:69bc:63::2
cp 1 fe80:60:69bc:63::1
cp 1 fe80:60:69bc:63::2
cp 1 fe80:60:69bc:63::3
```

5. Display and record the manufacturer serial numbers.

Enter `chassisShow`, and then copy the command output into the `config-miscinfo.txt` file.

"Factory Serial Num" and "Serial Num" are listed under "Chassis/WWN Unit 1" and "Chassis/WWN Unit 2". If the current WWN cards are the original cards, the factory serial number listed is the same as the chassis serial number.

6. Create a SAN profile by entering and recording the information provided by the following commands:

- `fabricShow`
- `nsAllShow`
- `nsShow`
- `switchShow -qsfp`

Copy the command output into a text file named "SANbefor.txt." After the device is restored to the fabric, this information can be used to verify that no unintentional changes have occurred to the fabric.

```
switch:admin> nsshow
Enter Pid COS PortName NodeName TTL
<output truncated>
switch:admin> nsallshow
    12 Nx_Ports in the Fabric
<output truncated>
switch:admin> switchshow
switchName: switch
<output truncated>
switch:admin> fabricshow
Switch ID Worldwide Name Enet IP Addr FC IP Addr Name
<output truncated>
switch:admin>
```

7. Enter `licenseShow`, and then copy the command output into a text file named `licenseshow.txt`.

```
Core-X7-8_Upgraded:admin> license --show
License Id : 10:00:00:27:f8:f2:76:f8
License 1 :
```

```
----------------------------------------------------------------
License serial number : FOS-01-0-01-11201881
License features : Inter Chassis Link (ICL)
License Capacity : 64 (16 QSFPs per CR blade or 32 QSFPs per chassis)
Generation date : 10/21/2019
License 2 :
----------------------------------------------------------------
License serial number : FOS-01-0-04-11201903
License features : Extended Fabric
Trunking
Fabric Vision and IO Insight
Generation date : 10/21/2019
```

8. Enter `supportShow`; then copy the command output into a text file named `spptshow.txt`.

   Note: The `supportShow` command has a very long output and time for completion. It may last 20 minutes or longer depending on the size of the SAN.

   This command displays support information from groups of preselected Fabric OS and Linux commands. Groups include os, exception, port, fabric, services, security, network, portlog, system, extend, filter, ficon, iswitch, asic_db, fcip, ag, dce_hsl, and crypto. This provides a backup of all the information that might be required by Technical Support and can be used after the device is restored to the fabric to verify that no unintentional changes have occurred to the fabric.

```
Core-X7-8:admin> supportshow
SS Create lscfg_test
VF
======================
Date:
Fri Mar 6 09:17:42 UTC 2020

Time Zone:
Time Zone Hour Offset: 0
Time Zone Minute Offset: 0


Version:
Kernel: 4.1.35rt41
Fabric OS: v9.0.0_bld85_clone
Made on: Thu Mar 5 18:50:41 2020
Flash: Fri Mar 6 00:10:28 2020
BootProm: 4.0.11-sb
(truncated)
```

9. Record the cable connections between the chassis and the target device and ports.
10. Run `supportSave` on the active CP blade.
11. Record the information that the supportSave command returns because it can be very important in case you have difficulties during the replacement process.

Disconnecting from the network and fabric

About this task

Complete the following steps to disconnect the chassis from the network:

Procedure

1. Shut down the device using the `sysShutdown` command on the active CP blade.

```
switch:admin> sysshutdown
This command will shutdown the operating systems on your switch.
You must power-cycle the switch in order to restore operation.
Are you sure you want to shutdown the switch [y/n]?y
HA is disabled
Stopping blade 1
Shutting down the blade....
Stopping blade 2
Shutting down the blade....
```

```
Stopping blade 8
Shutting down the blade....
Broadcast message from root (pts/1) Tue April 12 14:23:06 2008...
The system is going down for system halt NOW !!
```

⚠️ **DANGER:** Disconnect the power cord from all power sources to completely remove power from the device.

2. Power off the chassis by removing the power cords from the power supplies and the power outlets.

3. Remove the chassis door.

4. Label the cables connected to all blades and record the connections. For each connection, identify the director slot and port, the device connected, and the slot or port on the connected device.

5. Disconnect the cables from the transceivers in the extension, port, and core routing blades and set them aside. For transceivers with integrated cables, remove the transceivers and cables together and set them aside. Transceivers without integrated cables can be left in the blades or removed.

6. Disconnect all cables from the CP blades.

Removing components from the chassis

About this task

Follow electrostatic discharge (ESD) precautions when removing components. Wear a wrist grounding strap connected to a chassis ground (if the device is plugged in) or a bench ground.

Note: Do not remove WWN cards from the chassis as new WWN cards are shipped preinstalled in the replacement chassis. Do not replace the WWN cards in the replacement chassis with the old WWN cards as this will result in licensing and return materials authorization (RMA) issues for your product. The original license will be transferred to the replacement chassis, based on the license identification (LID) of the new, preinstalled WWN card, through the RMA process. You should be provided a license for the new chassis through email. If you have not received this, contact your Brocade support representative.

When removing components, wear a wrist grounding strap connected to a bench ground.

⚠️ **DANGER:** For safety reasons, the ESD wrist strap should contain a series 1 megaohm resistor.

Procedure

1. Remove the chassis door (Removing a Chassis Door) if not already removed.

2. Remove the port, extension, blades, or filler panels ("Removing a blade" on page 117 and "Removing a filler panel" on page 169).

3. Remove the core routing blades ("Removing a core routing blade" on page 128).

4. Remove the control processor blades (Removing a Blade).

5. Remove the power supply assemblies or filler panels ("Removing a power supply" on page 160).

6. Remove the fan assemblies ("Removing a fan assembly " on page 167).

Installing the replacement chassis

About this task

Complete the following steps to install the replacement chassis:

⚠️ **DANGER:** Use safe lifting practices when moving the product.

⚠️ **DANGER:** A completely empty chassis weighs approximately 35.61 kg (78.5 lb) and requires a hydraulic or assisted lift to install it.

⚠️ **DANGER:** Make sure the rack housing the device is adequately secured to prevent it from becoming unstable or falling over.

Procedure

1. If the chassis is in a rack, remove it from the rack.
2. Place the chassis on a lift or on the shipping pallet provided with the original chassis and transport it to a storage location.
3. Unpack the new chassis.

   a) Cut the bands that encircle the packaging.

   b) Open the top of the shipping box and remove the accessory kit, the rack mount kits, and the foam from the top of the chassis.

   c) Lift the cardboard shipping container and inner cardboard sleeve off the chassis.

   d) Remove the antistatic plastic off the chassis.

   e) Save the packing materials for use when returning the old chassis.

   f) Leave the chassis on top of the foam shipping tray and wood pallet if the chassis must be transported to the installation location.

   g) Verify the contents of the shipping carton by referring to "Shipped items" on page 11.

   h) Save the foam packing material and the wooden pallet for reuse.
4. Use a pallet jack or other assisted lift to transport the new chassis to the installation area. Doorways must be wider than 91 cm (36 in.) to accommodate the chassis on the pallet.
5. Use a lift to raise the chassis to the correct level. If installing the chassis in a rack, follow the instructions provided by the rack kit manufacturer.

Installing components into the chassis

About this task

Follow electrostatic discharge (ESD) precautions when installing new components. Wear a wrist grounding strap connected to a chassis ground (if the device is plugged in) or a bench ground.

Note: New WWN cards are shipped preinstalled in the replacement chassis. Do not replace the WWN cards in the replacement chassis with the old WWN cards from chassis that you are replacing. This will result in licensing and return materials authorization (RMA) issues for your product. The original license will be transferred to the replacement chassis, based on the license identification (LID) of the new, preinstalled WWN card, through the RMA process. You should be provided a license for the new chassis through email. If you have not received this, contact your Brocade support representative.

⚠ **DANGER:** For safety reasons, the ESD wrist strap should contain a series 1 megaohm resistor.

Procedure

1. Replace the fan assemblies ("Installing a fan assembly" on page 168).
2. Replace the power supplies or filler panels ("Installing a power supply" on page 161).
3. Replace the control processor (CP) blades (Replacing a CP Blade).
4. Replace the core routing (CR) blades ("Installing a blade" on page 142).
5. Replace the port and extension blades or filler panels ("Installing a blade" on page 118 and "Installing a filler panel" on page 170).
6. Plug in the power cords from the power source into all installed power supplies to power on the device. See Providing Power to the Device.

   The device performs a power-on self-test (POST). The POST takes a minimum of three minutes and is complete when LED activity returns to the standard state. The power supply LED will light green when power is applied. Note that after one power supply is plugged into AC power, LEDs on the remaining installed power supplies will flash green until they also have full power.
7. Verify that the device is powered on and POST is complete (all power LED indicators on the blades should be a steady green).

8. Verify that all components are functioning correctly by checking their LEDs. If the LEDs do not indicate correct operation, try reinstalling the corresponding component.

Synchronizing airflow direction on WWN cards

An airflow direction mismatch may occur if the airflow direction, nonport-side intake (NPI) or nonport-side exhaust (NPE), for installed fan and power supply assembly FRUs does not match the airflow direction set on the new WWN cards shipped with replacement chassis.

You can the check airflow direction for fans in the fan and the power supply assemblies installed in the device with the airflow direction set on the WWN cards by entering the `chassisShow` command. The airflow direction of the fans and the power supplies displays as "Fan Direction" under each fan or power supply unit. System airflow direction displays as "System Airflow" under the WWN card unit.

If the `chassisShow` command or RASlog messages indicate a mismatch between the system airflow direction and the airflow direction of the fan in the power supply or fan assemblies, see "Configuring the airflow direction on WWN cards" on page 154 for instructions on configuring correct airflow direction on WWN cards.

Note: Changing the chassis airflow allows you to synchronize the established chassis airflow direction from the installed fan and the power supply assemblies with the airflow direction configured on the WWN cards. This procedure may need to be used after replacing WWN cards. This procedure must be performed when replacing the director chassis, as replacement chassis are shipped with new WWN cards installed and airflow direction is not configured on these cards. This procedure is not supported for any other purpose.

Downloading the configuration

About this task

Once the chassis and its various components have been reassembled and powered back on, use the `configDownload` command to restore the original configuration. The `configDownload` command can be entered through a telnet or serial session, but the device must have an Ethernet connection to the server name or IP address of the host for the download process to complete. For more information, refer to the `help configDownload` command or the *Fabric OS Command Reference Manual*.

Complete the following steps to download the configuration:

Procedure

1. Log on to the device as `admin`.

   ```
   switch:admin> login
   login: admin
   password: xxxxxxxx
   switch:admin>
   ```

   Note: If you are using the Virtual Fabrics feature, you must run the `configdownload -vf` command *before* running the `configdownload` command to restore the logical switch configuration.

2. Enter the `chassisDisable` command.

3. Enter the `configDownload` command.

   ```
   switch:admin> configdownload -all
   Server Name or IP Address [host]: 123.123.123.123
   User Name [None]: Admin24
   File Name [config.txt]: config-switch.txt
   Password: xxxxxxxx
   download complete
   switch:admin>
   ```

4. Reboot the device.

5. Enter the `chassisEnable` command to enable all user ports and enable a virtual fabric-aware chassis.

Reconnecting the system to the network and fabric

About this task

Complete the following steps to reconnect the device to the network and fabric.

Procedure

1. Connect the CP blades to the local area network by following all steps in the following sections:
   - "Establishing a serial connection to the device" on page 49
   - "Configuring the IP addresses" on page 50
   - "Establishing an ethernet connection to the device" on page 52

   Note: Once an Ethernet connection is established, the device can be accessed by remote connection using any of the available management tools, such as Telnet or Web Tools.

2. Reconnect the transceivers and cables to the port blades.

   Note: The ports and cables used in trunking groups must meet specific requirements. For a list of these requirements, refer to the *Fabric OS Administration Guide*.

   a) Position one of the transceivers so that the key is oriented correctly to the port and insert the transceiver into the port until it is firmly seated and the latching mechanism clicks.

   b) Select the cable that corresponds to the port and position it 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.

   c) Repeat Step a and Step b for the remaining ports.

   d) Organize the cables as required.

   Note: Do not route cables in front of the air exhaust vents.

Verifying correct operation of the system

About this task

Complete the following steps to verify correct operation of the device:

Procedure

1. Log on to the device as `admin`.

   ```
   switch:admin> login
   login: admin
   password: xxxxxxxx
   switch:admin>
   ```

2. Enter the `chassisShow` command to verify that the airflow direction set on WWN cards matches the airflow direction for fans in fan and power supply assemblies installed in the device.

   The airflow direction of the fans and the power supplies displays as "Fan Direction" under each fan or power supply unit. The system airflow direction displays as "System Airflow" under the WWN card unit. The following example shows the mismatch of the system airflow and the airflow direction in the installed fan and the power supply.

   ```
   POWER SUPPLY  Unit: 1
   Power Source:          AC
   Fan Direction:         Non-portside Intake
   ...
   ```

```
FAN  Unit: 2
Fan Direction:          Non-portside Intake
...
WWN  Unit: 1
System AirFlow:         Non-portside Exhaust
...
WWN  Unit: 2
System AirFlow:         Non-portside Exhaust
```

The WWN units should indicate "Non-portside Intake." If there is a mismatch of airflow direction, RASlog messages will indicate a mismatch between the system airflow direction and the airflow direction of fan in power supply or fan assembly. See "Configuring the airflow direction on WWN cards" on page 154 for instructions on configuring correct airflow direction on WWN cards.

3. Enter the `slotShow -m` command and verify that all the installed cards are detected and that their status is operational (enabled).

4. Verify that the device is functioning correctly by entering the `switchShow` command or the `switchStatusShow` command.

   This `switchShow` command displays the device and port status information.

5. Verify that all the IP address information is correct by entering the `ipAddrShow` command and checking the results against the IP information recorded in the `config-miscinfo.txt` file.

```
switch:admin> ipaddrshow
SWITCH
Ethernet IP Address: xxx.xxx.xxx.12
Ethernet Subnetmask: 255.55.0.0
Fibre Channel IP Address: 1.2.3.4
Fibre Channel Subnetmask: 255.255.255.0
CP0
Ethernet IP Address: xxx.xxx.xxx.10
Ethernet Subnetmask: 255.55.0.0
HostName : cp0
Gateway Address: xxx.xxx.xxx.1
CP1
Ethernet IP Address: xxx.xxx.xxx.11
Ethernet Subnetmask: 255.55.0.0
HostName : cp1
Gateway Address: .1
Backplane IP address of CP0 : 10.0.0.4
Backplane IP address of CP1 : 10.0.0.5
switch:admin>switch:admin>
```

Verifying correct configuration of the fabric

About this task

Copy the command outputs from this section into a file. You must be logged in with Admin privileges.

Procedure

1. Create an after process SAN profile by entering the following commands and copying the output to a text file named SANafter.txt:

   - `fabricShow`

   - `lscfg --show` (if using the Virtual Fabrics feature)

   - `nsAllShow`

   - `nsShow`

   - `switchShow`

```
switch:admin> nsshow
Type Pid     COS      PortName NodeName TTL(sec)
 N    020f00;      3;10:00:00:01:73:00:29:46;10:00:00:01:73:00:29:46; na
     Fabric Port Name: 20:0f:00:60:69:90:03:f0
<output truncated>
```

```
switch:admin> nsallshow
{
 020f00 021fda 021fdc 021fe0 021fe1
5 Nx_Ports in the Fabric}
switch:admin> switchshow
switchName: rsl8-st03-01
<output truncated>
switch:admin> fabricshow
Switch ID Worldwide Name Enet IP Addr FC IP Addr Name
<output truncated>
switch:admin>lscfg --show
Created switches: 128(ds) 1 2(bs)
Port             0   1   2   3   4    5     6     7     8     9
-------------------------------------------------------------------
FID              1 | 1 | 1 | 1 | 1 | 128 | 128 | 128 | 128 | 128 |
<output truncated>
switch:admin>
```

2. Determine any differences between the information in the SANafter.txt file and the information in the SANbefor.txt file created earlier. In particular, look for differences in the following:

   • Device types

   • Number of devices

   • ISL and port states

   • Number of switches in the fabric

3. If an SCC policy exists on the active fabric where you are connecting the new chassis, modify the policy to include the WWN of the new chassis.

   • Refer to the *Fabric OS Administration Guide* for information on SCC policy.

   • Use the wwn command to determine the WWN of the chassis.

   • Use the secPolicyAdd command to modify an existing policy.

4. Resolve any issues or unintentional changes to the device or fabric:

   • If there are any mechanical problems, try re-seating the associated component.

   • If the configuration information is not correct for the device, modify as required.

   • If other issues exist, contact your support provider.

Chapter 17. Removing the battery

⚠️ **CAUTION:** The battery contains lithium. To avoid possible explosion, do not burn or charge the battery. Do not:

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

Local regulations may require removing the battery prior to disposing of or recycling this product. Complete these steps to remove the battery.

1. Disconnect all power and communication cables.
2. Remove all transceivers.
3. Remove the power supplies and fans.
4. Unscrew the fasteners and remove the sheetmetal cover from the chassis.
5. On the main circuit board, go to location **1** shown in Figure 82 on page 189 and remove the BR1225 battery from the holder.

Figure 82. Location of battery holder

6. Recycle the battery as appropriate, following local regulations.

Refer to the *Environmental Notices and User Guide* shipped with the product for more information on battery recycling and disposal.

Appendix A. Product specifications

System Specifications

System Component	Description
Enclosure	SAN256B-7 Director: 8 blade slots, 8U rack-mountable chassis; 27–31 in. rail, 18–24 in. rail, and airflow diversion rack mount kits for four-post rack; mid-mount kit for the two-post rack.
Control processor	Redundant (active/standby) control processor blades.
Scalability	Full fabric architecture: a maximum of 239 switches.
Performance	• 4Gb/s line speed, full duplex • 8Gb/s line speed, full duplex • 10Gb/s line speed, full duplex • 10GbE line speed, full duplex • 16Gb/s line speed, full duplex • 25GbE line speed, full duplex • 32Gb/s line speed, full duplex • 40GbE line speed, full duplex • 64Gb/s line speed, full duplex Auto sensing of 4, 8, 16, 32, and 64Gb/s port speeds depending on transceiver used. Speed matching between 4, 8, 16, 32, and 64Gb/s port speeds. 10Gb/s port speeds with dedicated SFPs. The 10GbE speed is accomplished using a 40GbE QSFP transceiver in breakout mode to provide 4x10GbE speed. The 25GbE speed is accomplished using a 100GbE transceiver in breakout mode to provide 4x25GbE speed.
Slot bandwidth	3,072Gb/s (data rate).
Local switching bandwidth	2Tb/s for FC32-64: 64 ports x 32Gb/s (data rate).
Chassis bandwidth	SAN256B-7 Director: 15.5 Tb/s per chassis (192 device ports with 64Gb/s data rate plus 16 4x50Gb/s Gen7 ICLs).
ISL trunking	Can use up to 8 ports in a trunk group to form a 256-Gbps trunk.
Power inlet	C20: AC power supply. Anderson Saf-D-Grid® 400: HVAC/HVDC power supply. Power from nonport side, all power supplies.
Power supplies: SAN256B-7 Director	Up to two modular, hot-swappable 3000 W AC power supplies (100-240 VAC autosensing or HVAC/HVDC autosensing), 1 + 1 redundancy.

System Component	Description
Cooling	SAN256B-7 Director: Two fan assemblies, nonport-side exhaust or intake, for 1+1 redundancy. Each assembly contains 2 fans for total of 4. System requires 3 out of 4 functioning fans for operation. One fan assembly can be hot-swapped, but must be replaced immediately.
System architecture	Nonblocking shared memory.
System processors	FreeScale P4080 (8 core), 1.5 GHz.
Aggregate bandwidth	SAN256B-7 Director: 15.5Tb/s when populated with 192 x 64Gb/s ports and using 16 ICL ports at 128Gb/s (including 2Tb/s of ICL bandwidth).
Switch latency	FC64-48 port blade: < 900 ns (including FEC) any port to any port local switching and 2.7 μsec blade to blade (including FEC) at 32Gb/s, cut-through routing. FC32-X7-48 blade: < 900 ns (including FEC) any port to any port local switching and 2.7 μsec blade to blade (including FEC) at 32Gb/s, cut-through routing. FC32-64 port blade: < 900 ns (including FEC) any port to any port local switching and 2.7 μsec blade to blade (including FEC) at 32Gb/s, cut-through routing. FC32-48 blade: < 900 ns (including FEC) any port to any port local switching and 2.7 μsec blade to blade (including FEC) at 32Gb/s, cut-through routing. SX6 blade: FC-to-FC < 900 ns (including FEC) and 2.7 μsec any port to any port at 32Gb/s, cut-through routing.
Maximum frame size	2112-byte payload.
Frame buffers	15,384 per ASIC.
Port types	CR64-8 and CR64-4 CR blades: E_Port, EX_Port, and D_Port FC32-X7-48 and FC64-48 port blades: F_Port, E_Port, EX_Port, M_Port, SIM, and D_Port. FC32-48 and FC32-64 port blades: F_Port, E_Port, EX_Port, M_Port, SIM, and D_Port. SX6 extension blade: F_Port, FL_Port, E_Port, SIM, and EX_Port on FC, and VE_Port on GbE. **Note:** Self-discovery is based on switch type (U_Port) with an optional port type control.
Data traffic types	Fabric switches supporting unicast, multicast (255 groups), and broadcast.

System Component	Description
Media types	FC64-48 port blade: Supports IBM hot-pluggable 4x32Gb/s SWL QSFP+, 4x16Gb/s SWL QSFP+, 128Gb/s CWDM4 2 km QSFP28 for 4x32GbE connectivity, 40GbE-QSFP+ for 40GBASE SR4 10GBASE 4x10GbE SR CNA connectivity, 40GbE QSFP+ for bidirectional 40GbE SR CNA connectivity, and 100GbE QSFP28 for 4x25GbE SR4 CNA connectivity.

FC32-X7-48 port blade: Supports IBM hot-pluggable 32 Gb/s SWL/LWL/ELWL SFP28, 16 Gb/s SWL SFP+ and 10 Gb/s SWL/LWL SFP

FC32-64 port blade: Supports IBM hot-pluggable 4x32Gb/s SWL QSFP+, 4x16Gb/s SWL QSFP+, 128Gb/s CWDM4 2 km QSFP28 for 4x32GbE connectivity, 40GbE-QSFP+ for 40GBASE SR4 10GBASE 4x10GbE SR CNA connectivity, 40GbE QSFP+ for bidirectional 40GbE SR CNA connectivity, and 100GbE QSFP28 for 4x25GbE SR4 CNA connectivity.

FC32-48 port blade: Supports IBM hot-pluggable 32Gb/s SWL/LWL/ELWL SFP28, 16Gb/s SWL/LWL/ELWL SFP+, 10Gb/s SWL/LWL SFP.

SX6 extension blade: Supports hot-pluggable IBM 32Gb/s SWL/LWL SFP28, 16Gb/s SWL/LWL/ELWL SFP+, 10Gb/s SWL/LWL SFP, 1GbE copper SFP, 1GbE 1000Base-SX/LX/CWDM SFP, 10GbE SR/LR SFP+, 10GbE tunable DWDM 80-km SFP+, and 40GbE SR4/LR4/ER4 QSFP.

CR64-4 and CR64-8 core routing blades: Supports IBM, hot-pluggable Gen 7 ICL SWL QSFP, 4x32 Gb/s SWL QSFP and 4x32 Gbp/ 2KM QSFP for ICL connections. 16G QSSPs are not supported. |
USB	One USB port per control processor for firmware download, support save, and configuration upload or download.
Fabric services	Adaptive Networking (Ingress Rate Limiting, Traffic Isolation, QoS); Advanced Performance Monitoring; BB credit recovery; Advanced Zoning (default zoning, port/WWN zoning, broadcast zoning); Dynamic Path Selection (DPS); Extended Fabrics; Fabric Vision; FDMI; FICON CUP; Flow Vison; Frame Redirection; FSPF; Integrated Routing; IPFC; ISL Trunking; Management Server; N_Port Trunking; NPIV; NTP v3; Port Fencing; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Simple Name Server (SNS); syslog; Virtual Fabrics (logical switch, logical fabric); target-driven zoning; peer zoning.
Extension	Supports DWDM, CWDM, and FC-SONET devices; Fibre Channel, in-flight compression (LZO) BB credit recovery; Extension trunking, FICON Extension, IP Extension, Adaptive Rate Limiting (ARL), data compression, Fast Write, read/write Tape Pipelining, QoS.
FICON	FICON cascading; support for lossless DLS; FICON CUP; Advanced Accelerator for FICON (IBM z/OS Global Mirror and read/write Tape Pipelining). FICON connectivity is not supported on the FC32-64 blade.
Inter-chassis link (ICL)	Chassis-to-chassis linkage through connectors on the core routing (CR) blade.

Fibre Channel

System Component	Description
Fibre Channel ports	SAN256B-7 Director: Up to 192 64Gb/s or 256 32Gb/s ports, universal FC (E_Port, EX_Port, F_Port, M_Port, D_Port, FICON) and Ethernet.

System Component	Description
Classes of service	Class 2, Class 3, Class F (interswitch frames).
ANSI Fibre Channel protocol	FC-PH (Fibre Channel Physical and Signalling Interface standard).
Fabric initialization	Complies with FC-SW 5.0.
IP Extension (IP over Fibre Channel)	Complies with FC-IP 2.3 of the FCA profile.
Port to port latency	Local switching: 900 ns (including FEC) any port to any port. Blade to blade: 2.7 microseconds (including FEC) E_Port to E_Port.
Switching capacity	An aggregate switching capacity of 13.5 billion frames per second (for Class 2, Class 3, and Class F frames for a 384- or 512-port chassis).

LEDs

System Component	Description
Port status	Bicolor (green and amber) Fibre Channel port status LED on port blades displaying nine different LED states based on FC port activity and status. Bicolor (green and amber) QSFP ICL port LED on core routing blades displaying four different states based on the activity and status of all four lanes. Bicolor (green and amber) Fibre Channel port status on extension blades displaying eight different LED states based on port activity and status. Bicolor (green and amber) Ethernet port status on extension blades displaying four different LED states based on port activity and status.
Blade power and status	Unicolor (green) displaying power-off and power-on condition. Unicolor (amber) LED displaying four different LED states based on blade operation.
CP blade status	Unicolor (green) Ethernet link status displaying two different states depending on link operation. Unicolor (green) Ethernet link activity displaying two different states depending on link operation. Unicolor (blue) control processor (CP) displaying two different states depending on active or standby status. Unicolor (bright white) illuminates to indicate blade location (beacon).
WWN card status	Unicolor (green) displaying power-off and power-on condition. Unicolor (amber) fault LED.
Fan status	Unicolor (green) displaying power-off and power-on condition. Unicolor (amber) displaying four different LED states based on fan operation.

System Component	Description
Power supply status	Unicolor (green) displaying nine different LED states based on power supply operation.

Management Connectors

System Component	Description
RJ-45 to DB9 adapter	The RS-232 cable has an adapter at one end that can be removed to provide an RJ-45 style connector for the serial port.
RJ-45 connector	For the 10/100/1000 Ethernet management port and 10-Gb/s Ethernet port on control processor (CP) blades. **Note:** The 10Gb/s port is reserved for future use.

Weight and Physical Dimensions

Model	Height	Width	Depth	Weight (Empty)	Weight (Fully Loaded)
SAN256B-7 Director	34.45 cm 13.56 in.	43.74 cm 17.23 inches	61.04 cm 24.04 in.	24.49 kg 54 lb	68.95 kg 152.0 lb Weight includes all blades and two power supplies.
SAN256B-7 Director with Airflow Diverter and Port Side Exhaust Kit	40.00 cm 15.75 in.	43.74 cm 17.22 inches	61.29 cm 24.09 in.		
SAN256B-7 Director with door	34.45 cm 13.56 in.	43.74 cm 17.23 in.	73.20 cm 28.82 in.		

Blade	Description	Height	Length	Depth	Weight
CPX7 blade	Control processor blade.	3.28 cm 1.29 in.	20.55 cm 8.09 in.	34.46 cm 13.57 in.	1.93 kg 4.25 lb
CR64-4 blade (without media)	Core routing blade for SAN256B-7 Director.	3.63 cm 1.43 in.	42.06 cm 16.56 in.	34.13 cm 13.44 in.	3.81kg 8.40 lb
FC32-X7-48 port blade (without media)	48-port port blade supporting 10/32Gb/s.	3.63 cm 1.43 in.	42.06 cm 16.56 in.	34.13 cm 13.44 in.	3.95 kg 8.7 lb

Blade	Description	Height	Length	Depth	Weight
FC64-48 port blade (without media)	64-port port blade supporting 64/32/10Gb/s.	3.88 cm 1.53 in.	42.06 cm 16.56 in.	33.32 cm 13.12 in.	3.95 kg 8.70 lb
FC32-48 port blade (without media)	48-port port blade supporting 8/10/16/32Gb/s.	3.63 cm 1.43 in.	42.06 cm 16.56 in.	34.13 cm 13.44 in.	4.35 kg 9.6 lb
FC32-64 port blade (without media)	64-port port blade supporting 4x32, 4x16, 4x8, 4x4Gb/s; 4x25, 4x10, and 40GbE.	3.88 cm 1.53 in.	42.06 cm 16.56 in.	33.32 cm 13.12 in.	3.96 kg 8.75 lb
SX6 extension blade (without media)	Enables FC extension functionality over existing IP infrastructure. Has 16 FC ports supporting 8/10/16/32 Gbps, 16GbE ports supporting 1 or 10Gb/s, and 2GbE ports supporting 40Gb/s.	3.63 cm 1.43 in.	42.06 cm 16.56 in.	34.13 cm 13.44 in.	5.22 kg 11.5 lb

Environmental Requirements

Condition	Operational	Nonoperational (Storage)
Ambient temperature	0°C to 40°C (32°F to 104°F)	-25°C to 70°C (-13°F to 158°F)
Relative humidity (noncondensing)	5% to 93% at 40°C (104°F) with a maximum gradient of 10% per hour	10% to 93% at 70°C (158°F)
Altitude (above sea level)	0 to 3000m (10,000 feet)	0 to 12000 m (40,000 feet)
Shock	10 G, 11 ms, half-sine wave	20 G, 11 ms, half-sine wave
Vibration	Random vibration is 5-10Hz @ +5db/Oct; 10-200Hz @ 0.0005 Grms; 200-500Hz @ -5db/Oct. Scale 0.05 Grms	Random vibration is 3–10Hz @ +5db/Oct; 10-200Hz @ 0.0065 Grms; 200-500Hz @ -5db/Oct. Scale 1.12 Grms

Condition	Operational	Nonoperational (Storage)
Air flow	SAN256B-7 Maximum: 953 cmh (561 cfm) SAN256B-7 Nominal: ~486 cmh (~286 cfm)	N/A
Heat dissipation	SAN256B-7: refer to Watts and Btu/hr values under VAC inputs in Typical, Idle, and Maximum Power Consumption tables.	N/A
Power Supply Efficiency	80 Plus Platinum 	
Operating noise	SAN256B-7: 64.2 dB	N/A

Power Supply Specifications (per PSU)

Power Supply Model	Maximum Output Power Rating (DC)	Output Power vs. Input Voltage	Input Line Frequency	Maximum Input Current	Input Line Protection	Maximum Inrush Current
AC power supply FRU numbers: XBR-X6-RACNPIPSU-0104 XBR-X6-RACNPEPSU-0104	1450/2870 W	1450W Output 100–120 VAC (nominal) 90–132 VAC (range) 2870W Output 200–240 VAC (nominal) 180–264 VAC (range)	50–60 Hz (nominal)	16A	Line & Neutral Fused	35A peak for < 10 ms at cold or warm start 25A peak for cycles 10 ms–150 ms Less than fuse rating for > 150 ms
HVAC/HVDC power supply FRU numbers: XBR-X6-HVNPIPSU-0104 XBR-X6-HVNPEPSU-0104	2870W	180–305 VAC (range) 2870W Output 240–380 VDC (nominal) 192–400 VDC (range)	50–60 Hz (nominal)	16 A	Line & Neutral Fused	35A peak for < 10 ms at cold or warm start 25A peak for cycles 10 ms–150 ms Less than fuse rating for > 150 ms

Power Supply Requirements

The minimum number of power supplies needed in your system for operation and to achieve redundancy depends on the blade and port configuration and on the AC or DC input voltage level. N is the minimum number of power supplies to operate the configuration; N+N doubles the number of power supplies for

full AC or DC input and DC output redundancy; and N+1 adds an additional power supply for DC output redundancy in the case of a single power supply failure. Although examples for different port and blade configurations are provided, for more information and help with determining the actual number of power supplies for your deployment, contact your local IBM representative.

Note: In the following table, HVAC and HVDC indicate voltages from the high-voltage AC and high-voltage DC power supply.

Model Name	Configured Ports	Input Connection	Minimum Power Supplies for Operation	Number of Power Supplies for Redundancy
IBM SAN256B-7 Director	4xFC32-X7-48, 192 32Gb/s ports	100-120 VAC (low line)	2	Not supported
		200–240 VAC (high line) 200–277 HVAC (high line) 240–380 HVDC	1	2 (N+N)
200–240 VAC (high line) 200–277 HVAC (high line) 240–380 HVDC	1	2(N+N)		
200–240 VAC (high line) 200–277 HVAC (high line) 240–380 HVDC	2	3 (N+N)		
200–240 VAC (high line) 200–277 HVAC (high line) 240–380 HVDC	2	4 (N+N)		
200–240 VAC (high line) 200–277 HVAC (high line) 240–380 HVDC	2	3 (N+1)		
200–240 VAC (high line) 200–277 HVAC (high line) 240–380 VDC	2	4 (N+N)		

Model Name	Configured Ports	Input Connection	Minimum Power Supplies for Operation	Number of Power Supplies for Redundancy
200–240 VAC (high line) 200–277 HVAC (high line) 240–380 HVDC	2	3 (N+1)		
200–240 VAC (high line) 200–277 HVAC (high line) 240–380 HVDC	2	4 (N+N)		

Power Consumption for AC Power Supplies (Typical 1 Configuration)

The typical power consumption configuration features fans at nominal speed and the FC32-X7-48 port blade configured with 32G optics operating in 50% of the ports, an ambient temperature of 25C, and fans at nominal speed (5000 RMP).

Model Name	@ 100 VAC Input	@ 200 VAC Input	@ -48 VDC Input	Minimum Number of Power Supplies	Notes
IBM SAN256B-7 Director	14207W 4846 Btu/hr	1374W 4691 Btu/hr	Not supported	See maximum configuration.	SAN256B-7 Director fully loaded: 2 CP blades, 2 CR blades, 4 FC32-48, FC32-X7-48, or FC64-48 port blades with 32G optics, and 2 fan assemblies
	TBD	TBD	Not supported	See maximum configuration.	Same configuration as above, but port blades are FC32-64.
	TBD	Not supported	See maximum configuration	Same configuration as above, but port blades are FC32-64.	

Power Consumption for AC Power Supplies (Typical 2 Configuration)

The typical power consumption configuration features the FC32-X7-48 port blade configured with 32G optics in 100% of the ports at a 50% traffic rate, an ambient temperature of 25C, and fans at nominal speed (5000 RPM).

Model Name	@ 100 VAC Input	@ 200 VAC Input	@ -48 VDC Input	Minimum Number of Power Supplies	Notes
SAN256B-7 Director	1652W 5637Btu/hr	1615W 5513Btu/hr	Not supported	See maximum configuration.	SAN256B-7 Director fully loaded: 2 CP blades, 2 CR blades, 4 FC32-48, FC32-X7-48, or FC64-48 port blades with 32G optics, and 2 fan assemblies
	1656W 5653Btu/hr	1620W 5528Btu/hr	Not supported	See maximum configuration.	Same configuration as above, but port blades are FC32-64.
3237W 11048Btu/hr	3166W 10806Btu/hr	Not supported	See maximum configuration.	me configuration as above, but port blades are FC32-64.	

Power Consumption for AC Power Supplies (Idle Configuration)

The idle power consumption configuration features no optics or connections, ports are disabled, the system has booted, an ambient temperature of 25C, and fans at low speed (4000RPM).

Model Name	@100 VAC Input	@200 VAC Input	@-48 VDC Input	Minimum Number of Power Supplies	Notes
SAN256B-7	840W 2867 Btu/hr	822W 2806 Btu/hr	Not supported	2 power supplies for AC low line (100–120 VAC)* 1 power supply for AC high line (200–240 VAC) One power supply provides system power, but two must be installed to provide power efficiency and redundancy. 2 power supplies for AC low line are not supported as an HA (redundant) configuration.	IBM SAN256B-7 Director fully loaded: 2 CP blades, 2 CR blades, 4 FC32-48, FC32-X7-48, or FC64-48 port blades, and 2 fan assemblies
	1209W 4126 Btu/hr	1182W 4036 Btu/hr	Not supported	Same power supplies as above.	Same configuration as above, but port blades are FC64-48.

Model Name	@100 VAC Input	@200 VAC Input	@-48 VDC Input	Minimum Number of Power Supplies	Notes
2252W 7685 Btu/hr	2202W 7516 Btu/hr	Not supported	Same power supplies as above.	Same configuration as above, but port blades are FC64-48.	

Power Consumption for AC Power Supplies (Maximum Configuration)

The maximum power consumption configuration features fans at maximum speed (10000 RPM), the FC32-X7-48 blade installed with 32G optics in 100% of the ports at a 100% traffic rate, and an ambient temperature is 40°C (104°F). Maximum power is used for all supported optics. Power specifications do not include the power draw for the SX6 extension blade.

Note: Volt-ampere (VA) power measurement is provided only for power consumption using the maximum chassis configuration. For VA power measurements for your configuration, contact your IBM representative.

Model Name	@100 VAC Input	@200 VAC Input	@-48 VDC Input	Minimum Number of Power Supplies	Notes
SAN256B-7	2126W 7256Btu/hr	2079 W 7096Btu/hr	Not supported	2 power supplies for AC low line (100–120 VAC), redundancy not supported. 1 power supply for AC high line (200-240 VAC). 1 power supply provides system power, but 2 must be installed to provide power efficiency and redundancy.	IBM SAN256B-7 Director fully loaded: 2 CP blades, 2 CR blades, 4 FC32-X7-48 or FC64-48 port blades with 32G optics, and 2 fan assemblies.
	2921W 9971Btu/hr	2857W 9752Btu/hr	Not supported	Same power supplies as above.	Same configuration as above, but port blades are FC32-64.

Model Name	@100 VAC Input	@200 VAC Input	@-48 VDC Input	Minimum Number of Power Supplies	Notes
5992W 20452Btu/hr	5860W 20002Btu/hr	Not supported	4 power supplies for AC low line (100-120 VAC), redundant configuration not supported. 2 power supplies for AC high line (200-240 VAC). 2 power supplies provide system power, but 3 or 4 must be installed to provide power efficiency and redundancy	Same configuration as above, but port blades are FC32-64.	

Power Consumption for HVAC/HVDC Power Supplies (Typical Configuration)

The typical power consumption configuration features fans at nominal speed and the FC32-X7-48 port blade configured with optics operating at 50 percent line rate and random packets (does not include the power draw for the SX6 extension blade).

Model Name	@ 100 VAC Input	@ 380 VDC Input @ 240 or 277 VAC Input	Minimum Number of Power Supplies	Notes
SAN256B-7	1407 W 4802 Btu/hr	1376 W 4696 BTU/hr	1 power supply for DC input (192-400 VDC) 2 power supplies for AC low line (100–120 VAC) 1 power supply for AC high line (200–277 VAC) 1 power supply provides system power, but 2 must be installed to provide power efficiency and redundancy. 2 power supplies for AC low line are not supported as an HA (redundant) configuration.	IBM SAN256B-7 Director fully loaded: 2 CP blades, 2 CR blades, 4 FC32-48, FC32-X7-48, or FC64-48 port blades, and 2 fan assemblies
	1600W 5461 Btu/hr	1565W 5341 BTU/hr	Same power supplies as above.	Same configuration as above, but port blades are FC64-48.
3034W 10,354 Btu/hr	2967W 10,127 Btu/hr	Same power supplies as above.	Same configuration as above, but port blades are FC64-48.	

Power Consumption for HVAC/HVDC Power Supplies (Idle Configuration)

The idle power consumption configuration features no optics or connections, ports are disabled, the system has booted, and fans are at low speed.

Model Name	@ 100 VAC Input	@ 380 VDC Input @ 240 or 277 VAC Input	Minimum Number of Power Supplies	Notes
SAN256B-7	840W 2867 Btu/hr	822W 2806 Btu/hr	1 power supply for DC input (192–400 VDC) 2 power supplies for AC low line (100–120 VAC) 1 power supply for AC high line (200–277 VAC) 1 power supply provides system power, but 2 must be installed to provide power efficiency and redundancy. 2 power supplies for AC low line are not supported as an HA (redundant) configuration.	IBM SAN256B-7 Director fully loaded: 2 CP blades, 2 CR blades, 4 FC32-48, FC32-X7-48, or FC64-48 port blades, and 2 fan assemblies
	1209W 4126 Btu/hr	1182W 4036 Btu/hr	Same power supplies as above.	Same configuration as above, but port blades are FC64-48.
2252W 7685 Btu/hr	2202W 7516 Btu/hr	Same power supplies as above.	Same configuration as above, but port blades are FC64-48.	

Power Consumption for HVAC/HVDC Power Supplies (Maximum Configuration)

The maximum power consumption configuration features fans at maximum speed and the FC32-48 blade installed with optics. Traffic is at full line rate, the smallest packet is 64 bytes, the ambient temperature is 40°C (104°F), and maximum power is used for all supported optics. Power specifications do not include the power draw for the SX6 extension blade.

Note: Volt-ampere (VA) power measurement is provided only for power consumption using the maximum configuration.

Model Name	@ 100 VAC Input	@ 380 VDC Input @ 240 or 277 VAC Input	Minimum Number of Power Supplies	Notes
SAN256B-7	2889W 9681 Btu/hr 3010 VA	2385W 8139 Btu/hr 2484 VA	1 power supply for DC input (192–400 VDC) 2 for AC low line (100–120 VAC) 1 for AC high line (200–277 VAC) 1 power supply provides system power, but 2 must be installed to provide power efficiency and redundancy. 2 power supplies for AC low line are not supported as an HA (redundant) configuration.	IBM SAN256B-7 Director fully loaded: 2 CP blades, 2 CR blades, 4 FC32-48,FC32-X7-48, or FC64-48 port blades, and 2 fan assemblies
	3076W 10,500 Btu/hr 3205 VA	3009W 10,269 Btu/hr 3134 VA	Same power supplies as above.	Same configuration as above, but port blades are FC32-64.
5616W 19,167 Btu/hr 5850 VA	5492W 18,746 Btu/hr 5721 VA	Same power supplies as above.	Same configuration as above, but port blades are FC32-64.	

Power Consumption (Modules)

For blades in the following table:

• Idle: Configuration features no optics or connections, ports are disabled, the system has booted, ambient 25C and fans at low speed.

• Typical 1: Configuration features the FC32-G7-48 port blade configured with 32G optics in half the ports and 50% traffic rate, ambient 25C and fans at nominal speed.

• Typical 2: Configuration features the FC32-G7-48 port blade configured with 32G optics in all the ports and 50% traffic rate, ambient 25C and fans at nominal speed.

• Maximum: Consumption configuration features the FC32-G7-48 port blade configured with 32G optics in all the ports and 100% traffic rate, ambient 40C and fans at highest speed required.

Module Name	Module Description	Power Consumption
CPX7	Control Processor Blade	Idle = 50W Typical 1 = 50W Typical 2 = 50W Maximum = 50W

Module Name	Module Description	Power Consumption
CR64-4	Core Routing Blade for SAN256B-7	Idle = 50W Typical 1 = 195W Typical 2 = 240W Maximum = 255W244W
CR64-8	Core Routing Blade for SAN512B-7	Idle = 80W Typical 1 = 420W Typical 2 = 480W Maximum = 505W
SX6	Extension Blade	Idle = 300W Typical 1 = TBD Typical 2 = 340W Maximum = 420W
FC64-48	10, 32, and 64Gb/s Port Blade	Idle = TBD Typical 1 = TBD Typical 2 = TBD Maximum = TBD
FC32-X7-48	10 and 32Gb/s Port Blade	Idle = 180W Typical 1 = 180W Typical 2 = 202W Maximum = 210W
FC32-48	10, 16, and 32Gb/s Port Blade	Idle = 95 W Typical = TBD Typical = 160W Maximum = 245W
FC32-64	64 x 32Gb/s, 64 x 16Gb/s, 64 x 8Gb/s, 64 x 4Gb/s, 64 x 25GbE, 16 x 40GbE, and 64 x 10GbE Port Blade	Idle = 177W Typical 1 = TBD Typical 2 = 203W Maximum = 387W
WWN card	World Wide Name card	Idle = 1W Typical 1 = 1W Typical 2 = 1W Maximum = 1W

Module Name	Module Description	Power Consumption
Fan assembly	Fan assembly containing two fans	4000 RPM = 25W 5000 RPM = 40W 6000 RPM = 65W 10000 RPM = 220W,X7-4 12000 RPM = 375,X7-8

Fibre Channel Data Transmission Ranges

Port Speed (Gb/s)	Cable Size (Microns)	Short Wavelength (SWL)	Long Wavelength (LWL)	Extended Long Wavelength (ELWL)
4	50	150m (492 ft) (OM2) 380m (1,264 ft) (OM3) 400m (1,312 ft) (OM4)	N/A	N/A
	62.5	70 m (229 ft)	N/A	N/A
	9	N/A	30 km (18.6 miles)	N/A
8	50	50m (164 ft) (OM2) 150m (492 ft) (OM3) 190m (623 ft) (OM4)	N/A	N/A
	62.5	21m (68 ft)	N/A	N/A
	9	N/A	10 km (6.2 miles)	N/A
10	50	82m (269 ft) (OM2) 300m (984 ft) (OM3) 550m (1,804 ft) (OM4)	N/A	N/A
	62.5	33 m (108 ft)	N/A	N/A
	9	N/A	10 km (6.2 miles)	N/A
16	50	35m (115 ft) (OM2) 100m (328 ft) (OM3) 125m (410 ft) (OM4)	N/A	N/A
	62.5	15m (49 ft)	N/A	N/A
	9	N/A	10 km (6.2 miles)	N/A

Port Speed (Gb/s)	Cable Size (Microns)	Short Wavelength (SWL)	Long Wavelength (LWL)	Extended Long Wavelength (ELWL)
32	50	20m (65.6 ft) (OM2) 70m (230 ft) (OM3) 100m (328 ft) (OM4)	N/A	N/A
	62.5	10m (32.8 ft)	N/A	N/A
	9	N/A	10 km (6.2 miles)	N/A
Gen 7 ICL	50	70 (230 ft) (OM3) 100m (328 ft) (OM4)	N/A	N/A

Data Port Specifications (Fibre Channel)

Model	Port Type	Number of Ports	Description
SAN256B-7	4x32Gb/s QSFP28	256	E, F, D, M, and EX Fibre Channel ports using four FC32-64 Fibre Channel port blades.
	4x16Gb/s QSFP+	256	E, F, D, M, and EX Fibre Channel ports using four FC32-64 Fibre Channel port blades.
	32Gb/s SFP+	192	E, F, D, M, and EX Fibre Channel ports using four FC64-48, FC32-X7-48, and FC32-48 Fibre Channel port blades.
		64	E, F, D, M, and EX Fibre Channel ports using four SX6 extension blades.
	16Gb/s SFP+	192	E, F, D, M, and EX Fibre Channel ports using four FC32-48 Fibre Channel port blades.
		64	E, F, D, M, and EX Fibre Channel ports using four SX6 extension blades.
	10Gb/s SFP+ (FC operation only)	192	E, F, D, M, and EX Fibre Channel ports using four FC64-48, FC32-X7-48, and FC32-48 Fibre Channel port blades.
		64	E, F, D, M, and EX Fibre Channel ports using four SX6 extension blades.
4x16Gb/s QSFP+	512	E, F, D, M, and EX Fibre Channel ports using eight FC32-64Fibre Channel port blades.	

Model	Port Type	Number of Ports	Description
32Gb/s SFP+	384	E, F, D, M, and EX Fibre Channel ports using eight FC64-48, FC32-X7-48, and FC32-48 Fibre Channel port blades.	
	64	E, F, D, M, and EX Fibre Channel ports using eight SX6 extension blades.	
16Gb/s SFP+	384	E, F, D, M, and EX Fibre Channel ports using eight FC32-48 Fibre Channel port blades.	
	64	E, F, D, M, and EX Fibre Channel ports using four SX6 extension blades.	

Model	Port Type	Number of Ports	Description
10Gb/s SFP+ (FC operation only)	384	E, F, D, M, and EX Fibre Channel ports using eight FC64-48, FC32-X7-48, and FC32-48Fibre Channel port blades.	
	64	E, F, D, M, and EX Fibre Channel ports using four SX6 extension blades.	

Data Port Specifications (Ethernet)

Model	Port Type	Number of Ports	Description
SAN256B-7	40GbE	64	Up to 64 40GbE ports supported with 4 FC64-48 port blades for FCoE applications using QSFP-to-QSFP connections.
	25GbE	256	Up to 256 25GbE ports supported with 4 FC32-X7-64 port blades for FCoE applications. The 256 ports are provided by 16 100GbE transceivers installed on each blade operating in 4x25 breakout mode.
	10GbE	256	Up to 256 10GbE ports supported with 4 FC32-G7-64 port blades. The 256 ports are provided by 16 40GbE transceivers installed on each blade operating in 4x10 breakout mode.
	40GbE	8	Up to 8 40GbE ports supported with 4 SX6 extension blades.
	10GbE	64	Up to 64 10GbE ports supported with 4 SX6 extension blades.
	1GbE	64	Up to 64 1GbE ports supported with 4 SX6 extension blades.
25GbE	512	Up to 512 25GbE ports supported with 8 FC32-G7-64 port blades for FCoE applications. The 512 ports are provided by 16 100GbE transceivers installed on each blade operating in 4x25 GbE breakout mode.	

Model	Port Type	Number of Ports	Description
10GbE	512	Up to 512 10GbE ports supported with 8 FC32-G7-64 port blades for FCoE applications. The 256 ports are provided by 16 40GbE transceivers installed on each blade operating in 4x10 breakout mode.	
40GbE	8	Up to 8 40GbE ports supported with 4 SX6 extension blades.	
10GbE	64	Up to 64 10GbE ports supported with 4 SX6 extension blades.	
1GbE	64	Up to 64 1GbE ports supported with 4 SX6 extension blades.	

Class 1M Transceiver Specifications

Specification	Standards Approval	Description
Class 1M	Pass	Radiation output and standards information
< 3.1 mW	N/A	Max output of laser radiation
N/A	N/A	Pulse duration
840–860 nm	N/A	Emitted wavelength(s)

Specification	Standards Approval	Description
IEC 60825-1:2007 IEC 60825-2:A2/2010	Pass	The name and publication date of the standard

Serial Port Specifications (Pinout RJ-45)

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

Serial Port Specifications (Protocol)

Parameter	Value
Baud	9600
Data bits	8
Parity	None
Flow control	None **Note:** Flow control is enabled on customer terminal servers.

Memory Specifications (Per CP Blade)

Memory	Type	Size
Main memory	DDR3 MiniDIMM	16 GB
Boot flash	On-board NAND	4 MB
Compact flash	eUSB	16 GB

Regulatory Compliance (EMC)

- 2014/30/EU
- AS/NZS CISPR 32 (Australia) (Class A)

- CISPR 32
- CNS 13438
- EN 55024, EN 55035
- EN 55032 (Class A)
- EN 61000-3-2
- EN 61000-3-3
- FCC Part 15, Subpart B (Class A)
- ICES-003 (Canada)
- KN 32
- KN 35
- VCCI-32 (Japan)

Regulatory Compliance (Environmental)

- 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation, and Restriction of Chemicals (EU REACH).
- 2006/66/EC – Batteries and accumulators and waste batteries and accumulators (EU battery directive).
- 2011/65/EU – Restriction of the use of certain hazardous substances in electrical and electronic equipment (EU RoHS).
- 2012/19/EU – Waste electrical and electronic equipment (EU WEEE).
- 30/2011/TT-BCT – Vietnam circular.
- 94/62/EC – Packaging and packaging waste (EU).
- Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 - U.S. Conflict Minerals.
- SJ/T 11363 – 2006 Requirements for Concentration Limits for Certain Hazardous Substances in EIPs (China).
- SJ/T 11364 – 2006 Marking for the Control of Pollution Caused by EIPs (China).

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This product is in conformity with the protection requirements of Directive 2014/30/EU of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

Warning: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

Germany Notice

Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2014/30/EU zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaatenund hält die Grenzwerte der EN 55032 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung von IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung von IBM gesteckt/eingebaut werden.

EN 55032 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:
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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten
Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)." Dies ist die Umsetzung der EU-Richtlinie 2014/30/EU in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC Richtlinie 2014/30/EU) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV-Vorschriften ist der Hersteller:

International Business Machines Corp.
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Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

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Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55032 Klasse A.

People's Republic of China Notice

Taiwan Notice

IBM Taiwan Contact Information:

Taiwan Contact Information

This topic contains the product service contact information for Taiwan.

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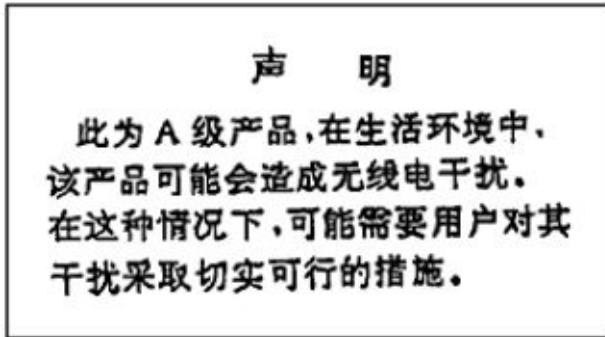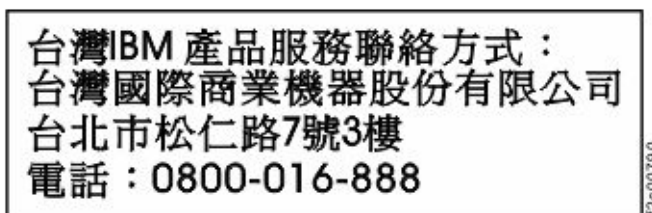IBM Taiwan Product Service Contact Information:
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VCCI−A

Japan Electronics and Information Technology Industries Association (JEITA) Notice

（一社）電子情報技術産業協会　高調波電流抑制対策実施
要領に基づく定格入力電力値：Knowledge Centerの各製品の
仕様ページ参照

This statement applies to products less than or equal to 20 A per phase.

高調波電流規格　JIS C 61000-3-2 適合品

This statement applies to products greater than 20 A, single phase.

高調波電流規格　JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対
策ガイドライン」対象機器（高調波発生機器）です。
・ 回路分類：6（単相、ＰＦＣ回路付）
・ 換算係数：0

This statement applies to products greater than 20 A per phase, three-phase.

高調波電流規格　JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対
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・ 換算係数：0

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В жилых помещениях оно может создавать
радиопомехи, для снижения которых необходимы
дополнительные меры

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