IBM Storage Networking SAN512B-6

Installation, Service, and User Guide

MTM Service information: 8961-F08

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Read this first

Summary of changes

This is the first edition of the IBM® Storage Networking SAN512B-6 Installation, Service, and User Guide.

Getting help

For the latest version of your product documentation, visit the web at http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi.

For more information about IBM SAN products, see the following Web site:http://www.ibm.com/servers/storage/san/

For support information for this product and other SAN products, see the following Web site:http://www.ibm.com/servers/storage/support/san

For detailed information about the Fibre Channel standards, see the Fibre Channel Industry Association (FCIA) Web site at: www.fibrechannel.org/

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

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 at: http://www.ibm.com/planetwide/.

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.

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Safety and environmental notices

This section contains information about:
- "Safety notices and labels"
- "Rack safety" on page xx
- "Environmental notices" on page xx

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":** These statements indicate situations that can be potentially hazardous to you.
- **"Danger notices" on page xv:** 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 xviii 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:
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, sides, 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:
Remove the 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 device with AC or DC systems, use a ground wire of at least 2 AWG. The ground wire should have an agency-approved crimped connector (provided with the device) attached to one end, with the other end attached to building ground. The connector must be crimped with the proper tool, allowing it to be connected to both ground screws on the enclosure. Before crimping the ground wire into the provided ground lug, ensure that the bare copper wire has been cleaned and antioxidant is applied to the bare wire. In addition, anti-rotation devices or lock washers must be used with all screw connections for the grounding wire.

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 service personnel through the use of a special tool, lock and key, or other means of security.

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:
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.

Cautions related to equipment weight

18-32 kg (39.7-70.5 lbs)   svc00167

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.

18-32 kg (39.7-70.5 lbs)   svc00167

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.**

DANGER

> **Be careful not to accidently insert your fingers into the fan tray while removing it from the chassis. The fan may still be spinning at a high speed.**

DANGER

This equipment is suitable for mounting on concrete or other noncombustible surfaces only.

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.
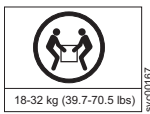
DANGER

A completely empty chassis weighs approximately 35.61 kg (78.5 lb) and requires a hydraulic or assisted lift to install it.

DANGER

A fully populated chassis weighs approximately 145.83 kg (321.5 lbs) and requires a hydraulic or assisted lift to install it.

DANGER

If a lift tool with a capacity of at least 350 lbs is not available, the director chassis must be depopulated completely before installing it into the rack. Remove the power supplies, fan modules, all of the blades, the cable management comb, and the chassis door (if equipped). Install the empty chassis into the rack following the chassis installation instructions. The weight of the empty chassis is 78.5 lbs (35.6 kg) and must be lifted by minimum 3 people. After securing the chassis to the rack, reinstall the power supplies, fan modules, and the blades and proceed with the installation.

Electrical dangers

DANGER

Make sure that the power source circuits are properly grounded, 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 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.

DANGER

High Touch Current. Earth connection essential before connecting supply.

Laser dangers

DANGER

All fiber-optic interfaces use Class 1 lasers.

Class I

DANGER

Use only optical transceivers that are qualified by IBM and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 825 and EN60825. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

Class I

DANGER

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

Class I

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)

Do not service, there are no serviceable parts.

DANGER

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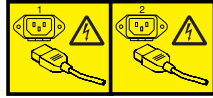
DANGER

Multiple power cords. This product might be equipped with multiple power cords. To remove all power to the device, disconnect all power cords. (L003)
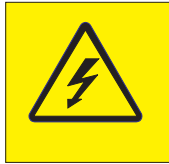
DANGER

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

CAUTION:
High energy present (L005)

>240 VA

Use Only Professional Movers!

يجـب الاسـتعانة بـخبرات نقـل متخـصصة
Utilizar somente transportadores profissionals
Faire appel à des professionnels seulement pour déplacer l'équipement.
只能使用专业搬运机.
Maak gebruik van professionele verhuizers
Faites exclusivement appel à des déménageurs professionnels
Nur professionelle Transportunternehmen mit der Durchführung beauftragen.
Να μετακινείται μόνο από επαγγελματίες μεταφορείς
העזר במובילים מקצועיים בלבד
Csak hivatásos szállítóval költöztesse
Avvalersi solo di trasportatori esperti
機器を移動する際には本門の業者に依頼してください。
전문 운송 인력만이 이동시킬 수 있습니다.
Należy korzystać wyłącznie z usług wyspecjalizowanych firm.
El traslado del equipo debe realizarlo personal especializado
Trebaju raditi samo profesionalni transportni radnici
Použijte pouze profesionální stěhováky
Brug kun professionelle flyttefolk.
Käytä vain ammattitaitoista kuljetusliikettä
Utstyret må kun flyttes av godkjent flyttepersonell
Contacte apenas transportadoras profissionais
Используйте только профессиональных грузчиков
Na presun použite len profesionálov
Använd endast professionell flyttpersonal

> 500 lbs. (> 227 kg.)

Use Only
Professional Movers!

DANGER

Heavy Equipment - Personal injury or equipment damage may result if mishandled (D006)

CAUTION:
Hazardous moving parts nearby (L008)

CAUTION:
Pinch hazard. (L012)

or

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

Environmental notices

Use the environmental statements and warning in this section to guide you when using this product and in properly disposing of the product and its components.

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 SAN512B-6 (machine type-models 8961-F08 Switch). Throughout this document, the product is referred to as the *SAN512B-6*, or simply the *switch*.

This document has been created to include information specific to SAN512B-6 switches running on Fabric OS version 8.0.1 or later. This document does not support all Fabric OS versions. It is specific to Fabric OS v8.0.1 or later. Refer to the Fabric OS Release Notes for more information.

Product documents

The following documents contain information related to this product. The documentation may be printed material or may be on the documentation CD that is shipped with the product.

- *IBM Storage Networking SAN512B-6 Installation, Service, and User Guide*, SC27-8966 (this document)
- *IBM Storage Networking SAN512B-6 Quick Start Guide*, GI13-4550
- Safety Notices
- *IBM Systems Environmental Notices and User Guide*, Z125-5823
- *Warranty Information*, 45W6626

Newer versions of product documentation may be available through the IBM Publications Center website www.ibm.com/shop/publications/order. Search by publication title or publication number.

Newer versions may also be available through the IBM Support Portal www.ibm.com/supportportal. Enter your product machine type (8961) or product name in the search field, and then select **Documentation** from the displayed page.

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*

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. Table 1 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 G620	SAN64B-6	8960 Models F64 and N64
Brocade X6-4 Director	SAN256B-6	8961 Models F04
Brocade X6-8 Director	SAN512B-6	8961 Models F08
Brocade 6520	SAN96B-5	2498 Models F96 and N96
Brocade 6505	SAN24B-5	2498 Model X24
Brocade 6510	SAN48B-5	2498 Model F48
Brocade DCX 8510-4	SAN384B-2	2499 Model 416
Brocade DCX 8510-8	SAN768B-2	2499 Model 816
Brocade 7800	SAN06B-R	2498 Model R06
Brocade 7840	SAN42B-R	2498 Model R42
Brocade 300	SAN24B-4	2498 Models B24 and 24E

Chapter 1. Introducing the SAN512B-6

This chapter provides the following information:
- "Product features"
- "Hardware components" on page 2
- "Port-side view of device" on page 3
- "Port-side slot numbering" on page 5
- "Nonport-side view of the device" on page 5

Product features

Key product features for this device include the following:
- Redundant and hot-swappable SFP, SFP+, SFP28, and 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.
- Up to 384 32-Gbps external ports and 32 4x32-Gbps QSFP (ICL) ports in a single chassis, enabling high density SAN configurations with reduced footprint.
- Up to 192 32-Gbps external ports and 16 4x32-Gbps QSFP (ICL) ports in a single chassis, enabling high density SAN configurations with reduced footprint.
- Support for 48 4-, 8-, 16-, and 32-Gbps autosensing Fibre Channel ports on FC32-48 port blades. Trunking technology groups up to eight ports to create high performance 256-Gbps ISL trunks between switches using 32-Gbps ports.
- 10-Gbps FC-type SFPs on FC32-48 port blades and 10-GbE SFPs on the SX6 application blades. The two types of SFPs are not interchangeable. The 10-Gbps transceivers can be used for any port on the FC32-48 port blades.
- Support for 16 Fibre Channel ports supporting 4-, 8-, 16-, and 32-Gbps; 16 GbE ports supporting 1 or 10 Gbps; and two GbE ports supporting 40 Gbps on SX6 extension blades. Trunking technology groups up to eight ports to create high performance 256-Gbps ISL trunks between switches using 32-Gbps ports.
- Support for FC quad SFP (QSFP) ports supporting 4x16 Gbps and 4x32 Gbps on core CR blades. Up to nine chassis in a full-mesh topology and 12 chassis in a core-to-edge topology can be connected using these Fibre Channel ports for inter-chassis links (ICLs).
- Universal ports that self-configure as E_Ports, F_Ports, EX_Ports, M_Ports (mirror ports), and FICON ports. The 10-Gbps ports on the 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.
- The SX6 blades perform as extension platforms to support Fibre Channel (FC) and FICON data flows and IP-based storage data flows over an IP WAN.

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, and consists of the following:

- Up to eight slots for hot-swappable port blade assemblies, providing up to 384 32-Gbps Fibre Channel ports.
- 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:
  - CR blade interconnects all port blades.
  - Up to 32 4x32-Gbps QSFP (ICL) ports.
  - ICL ports allow interconnection with neighboring chassis
  - Both CR blades are active.
- Up to four slots for modular, hot-swappable 34-port SX6 extension blades. Blades provide 16 32– Gbps Fibre Channel (FC) ports supporting 8, 16, and 32 Gbps or 16 16-Gbps FC ports supporting 4, 8, and 16 Gbps; 16 GbE ports supporting 1 or 10 Gbps; and 2 GbE ports supporting 40 Gbps. Extension blades enable long-distance communication over an existing IP infrastructure.
- Modular, hot-swappable field-replaceable units (FRUs):
  - Three fan assemblies, available with nonport-side intake (NPI) or nonport-side exhaust (NPE) airflow.
  - Up to four power supply assemblies, available with nonport-side intake (NPI) or nonport-side exhaust (NPE) airflow. The power supplies are approved for 100–120 VAC and 200–240 VAC.
    - At 100–120 VAC (nominal): Four power supply assemblies are required for high availability. Refer to the "Power requirements" section in the Appendix B, "Product specifications," on page 235 for specific high availability–requirements.
    - 200–240 VAC (nominal) is recommended for efficiency. Depending on quantity ordered, three or four power supply assemblies are provided. Refer to the "Power requirements" section in the Appendix B, "Product specifications," on page 235 for specific high-availability requirements.
    - Redundant AC primary power connections ensure high availability. Each power supply assembly has its own connector, so four is the number of primary power connections for optimum efficiency and redundancy.
  - Two World Wide Name (WWN) cards located on the nonport side of the device behind the WWN card bezel.
  - Blades use small form-factor pluggable (SFP+ and QSFP+) optical transceivers.
    - The 10-Gbps speed must be manually set and requires special 10-Gbps FC SFP+ transceivers.
    - The 32-Gbps SFP+ transceivers support speeds of 8, 16, and 32 Gbps.
    - The 16-Gbps SFP+ transceivers support speeds of 4, 8, and 16 Gbps.
    - The 4x32-Gbps QSFP+ transceivers on the core routing blades provide four 32–Gbps inter-chassis links (ICL) clustered in a single quad connector and cable.

- The 4x16-Gbps QSFP+ transceivers on the core routing blades provide four 16–Gbps inter-chassis links (ICL) clustered in a single quad connector and cable).

- Chassis door. This door must be installed to meet EMI compliance certification.
- A cable management comb. These are installed on the chassis below the blades for cable management.

Port-side view of device

The following illustration shows the port-side view of the SAN512B-6 with installed blades identified. Note that SX6 extension blades are not shown in the following illustration, but would install in the same slots as the FC32-48 port blade. A maximum of four SX6 blades are supported.
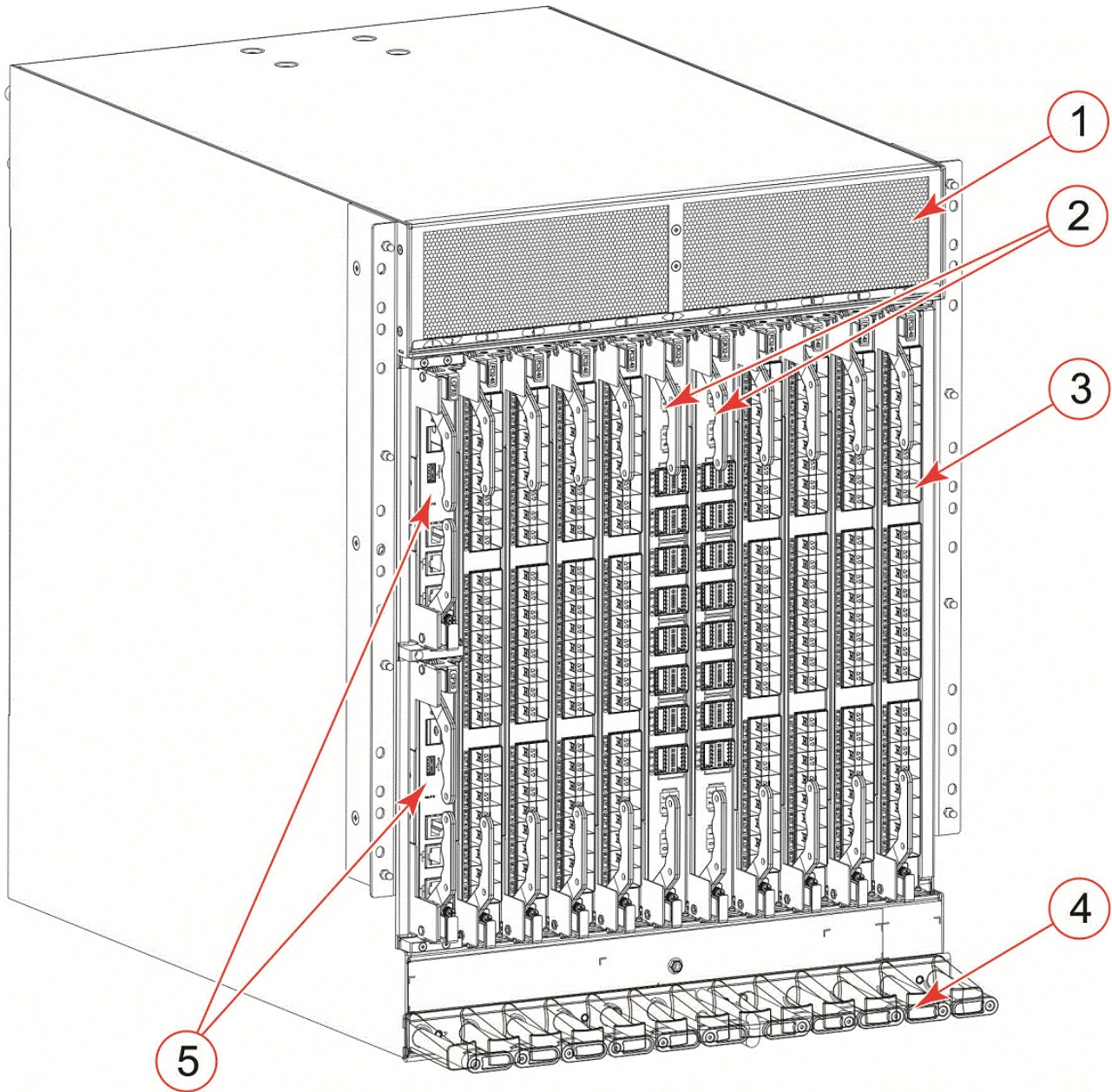
1 - Air vent

2 - Core routing blades (CR32-8)

3 - Port blades (FC32-48)

4 - Cable management comb

5 - Control processor blades (CPX6) – slot 1 (upper), slot 2 (lower)

Figure 1. Port side of the SAN512B-6 (sample configuration)

Notes:

- Depending on the fans and power supplies installed, airflow can be from the port side to the nonport side of chassis or from the nonport side to the port side of the chassis.
- Do not attempt to lift the chassis by the protective cover attached over the air vents at the top of the chassis.

Port-side slot numbering

The SAN512B-6 contains 10 full-height slots and two half-height slots, for a total of 12 slots. Facing the port side of the device, the half-height slots are on the left, numbered 1 (top slot) and 2 (bottom slot). The remaining full-height slots are numbered 3 through 12, counting from left to right of 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 3–6 and slots 9–12 are restricted to port and extension blades.
* Slots 7– 8 are restricted to CR32-8 blades.

Nonport-side view of the device

The following illustration shows the nonport-side view of the SAN512B-6 with all fan and power supply assemblies installed.
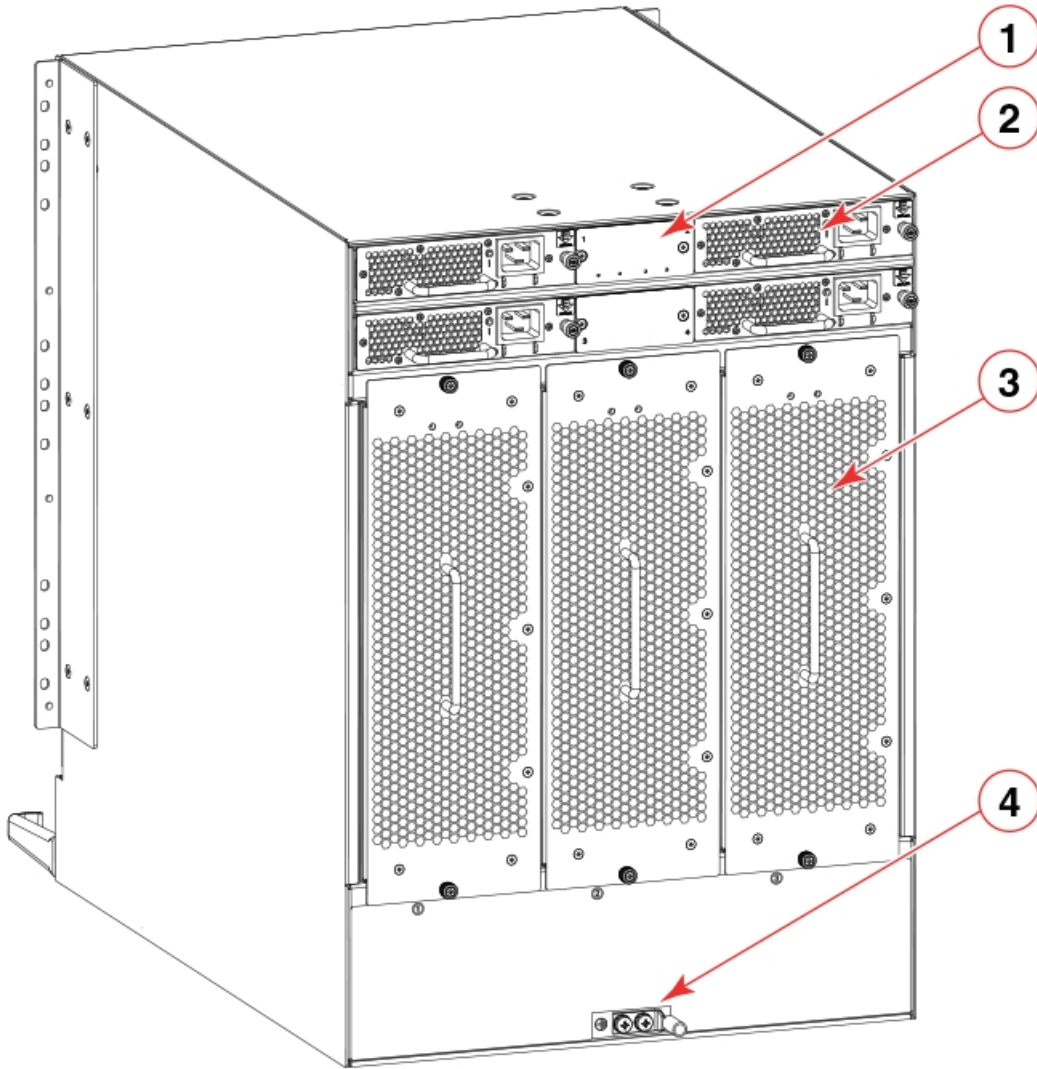
Figure 2. Nonport side of the SAN512B-6 (sample configuration)

1 - WWN bezel (WWN cards behind)

2 - Power supply assembly

3 - Fan assembly

4 - 2AWG Panduit LCD2-14AF lug for building ground connection

Depending on fans and power supplies installed, airflow can be from the port side to the nonport side of the chassis or the nonport side to the port side of chassis.

Although not illustrated, the chassis label containing the serial number, SKU, and WWN is located on the lower portion of the chassis, below the fan assemblies.

Chapter 2. Preparing for the Installation

This chapter provides the following information:

- "Safety precautions"
- "Facility requirements" on page 10
- "Time and items required for installation" on page 11
- "Quick installation checklists" on page 13
- "Items shipped" on page 15

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.

Refer to the Cautions and Danger Notices at the end of this guide for translations of safety notices for this product.

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, sides, 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

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 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, 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.

Lifting precautions
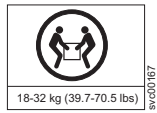
CAUTION:
Use safe lifting practices when moving the product.

18-32 kg (39.7-70.5 lbs)

CAUTION:
A fully populated chassis weighs approximately 145.83 kg (321.5 lbs) and requires a hydraulic or assisted lift to install it.

18-32 kg (39.7-70.5 lbs)

Note: Do not attempt to lift the device by the protective cover attached to the air vents on the nonport-side of the chassis.

18-32 kg (39.7-70.5 lbs)

DANGER

If a lift tool with a capacity of at least 350 lb is not available, the director chassis must be depopulated completely before installing it into the rack. Remove the power supplies, fan modules, all of the blades, the cable management comb, and the chassis door (if equipped). Install the empty chassis into the rack following the chassis installation instructions. The weight of the empty chassis is 78.5 lb (35.6 kg) and must be lifted by minimum 3 people. After securing the chassis to the rack, reinstall the power supplies, fan modules, and the blades and proceed with the installation.

18-32 kg (39.7-70.5 lbs)

Laser precautions

DANGER

All fiber-optic interfaces use Class 1 lasers.

Class I

DANGER

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

Class I

DANGER

Use only optical transceivers that are qualified by Brocade Communications Systems, Inc. and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 825 and EN60825. Optical products that do not comply with these standards might emit light that is hazardous to the eyes.

Class I

Facility requirements

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

Table 2. Facility requirements

Type	Requirements
Device specifications	Ensure that the facility can accommodate system, power, and environmental specifications for this device as outlined in the Appendix B, "Product specifications," on page 235.
Electrical	Ensure that there are dedicated electrical branch circuits with the following characteristics are available: • 200–240 VAC, 50-60 Hz, four branch circuits are recommended for high availability and maximum blade usage. • 110–120 VAC, 50–60 Hz, four branch circuits are highly recommended. • Four cables for 110–120 VAC or 200–240 VAC service. • Protected by a circuit breaker in accordance with local electrical codes. • Supply circuit, line fusing, and wire size adequate to the electrical rating on the chassis nameplate. • Location close to the chassis and easily accessible. • Grounded outlets installed by a licensed electrician and compatible with the power cords. Ensure that all equipment in rack is grounded through a reliable branch circuit connection. Make sure that power distribution units (PDUs) can handle maximum input amperage of power supplies. Use cables with adequate amperage rating from PDUs to power source.
Thermal	Ensure that the air intake and exhaust vents have a minimum of 5.1 cm (2 in.) of airspace. 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 these 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 port side to 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: • 14 rack units (14U) high. 1U is equal to 4.45 cm (1.75 inches). • 61.29 cm (24.09 inch) deep. • 43.74 cm (17.22 inch) wide. Ensure that the rack meets these additional requirements: • Additional weight of chassis will not exceed the rack's weight limits. • The rack is secured to ensure stability in case of unexpected movement.

Time and items required for installation

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

• As a standalone unit on a flat surface.
• In a 19-inch Electronic Industries Association (EIA) rack or in a telecommunications (Telco) rack using a rack mount kit. Refer to"Mounting options" on page 17 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
Site preparation and unpacking the device.	30 minutes	1/2-in. socket wrench (optional). #1 and #2 Phillips screwdrivers. Pallet jack. Hydraulic or assisted lift with a minimum raise of 140 cm (55 in.) and a minimum capacity of 158.76 kg (350 lb) To find the weight of your device fully populated with the required port blades, refer to Appendix B, "Product specifications," on page 235.
Installing rack mount kit .	30 minutes	Refer the procedures for your rack mount kit located in this guide.
Mounting and securing the device in rack.	30 minutes	
Installing power cables and powering on the device.	20 minutes	Power cables. These are ordered and shipped separately based on country where device is installed.
Establishing serial connection, logging in 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. Verify and back up configuration.	20 minutes	Ethernet cabling (optional) for Telnet access. Refer to the *Fabric OS Administrator's Guide*.
Installing transceivers as needed.	20-30 minutes or longer if you are using high-density port blades.	SFP+ and QSFP28 optical transceivers as needed.
Attaching fiber-optic cables, cable ties, and cable guides.	2-3 hours	Fiber-optic cables, cable ties, and cable management comb.

Quick installation checklists

These checklists provides a high-level overview of the basic installation process from the planning stage to the point where the device comes online and is ready to be deployed. Completing all the tasks in the suggested order ensures successful installation. It is recommended that you print these checklists and take them to the installation site.

Pre-installation tasks

Review all installation requirements ahead of time as part of your site preparation. Careful planning and site preparation ensures 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. Refer to "Items shipped" on page 15.	
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 you have gathered all necessary components required: • *Mounting the Device* • *Initial Setup and Verification* • *Port and Extension Blades* (if required to install) • *Power Supplies* (if required to install)	
Review the safety precautions.	Refer to "Safety precautions" on page 7.	
Plan the installation.	Obtain the appropriate rack mount kit. Refer to "Mounting options" on page 17.	
Review and verify installation requirements.	Verify that the following requirements are met. Refer to "Facility requirements" on page 10. • 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	Completed
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 #1 Phillips screwdriver for captive screws to lock these FRUs into place.	

Table 5. Installation and basic system configuration (continued)

Task	Task details or additional information	Completed
Mount the device	Choose one of the following mounting options: • Mount the device in a four-post rack. Refer to the instructions in this guide for mounting your device in a four-post rack. • Mount the device in a two-post rack. Refer to 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, refer to "Fan and power supply airflow" on page 162.	
Gather all components required for the initial setup	Refer to "Items required" on page 38.	
Provide power to the device	Refer to "Providing power to the device" on page 39.	
Attach a management station, establish a serial connection, and change the default passwords (optional)	Refer to "Establishing a serial connection to the device" on page 46. After completing this task, log in to the serial port to configure the device.	
Set the IP address, 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. Refer to "Configuring the IP addresses" on page 48.	
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. Refer to "Setting the date and time" on page 50 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. Refer to"Customizing the chassis and switch name" on page 53 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 IBM Network Advisor. Refer to"Establishing an Ethernet connection to the device" on page 49.	
Optional: Configure the DNS service	Use the **dnsconfig** command to create DNS server entries. Refer to the*Fabric OS Administrator's Guide*.	
Optional: Customize the domain ID	Use the **configure** command to change the domain ID (default ID is 1). Refer to"Setting the domain ID" on page 50 for more information.	

Table 5. Installation and basic system configuration (continued)

Task	Task details or additional information	Completed
Verify that the device operates correctly	• Check the LEDs to verify operation of functional parts. Refer to the *Monitoring the Device* section of this guide. • The following commands can be useful to establish an operational baseline for the device. Refer to the *Fabric OS Command Reference* for more information on these commands. – `psshow` – `fanshow` – `tempshow` – `historyshow` – `errdump`	
Back up the configuration	Use the interactive `configupload` command to back up the configuration. Refer to "Backing up the configuration" on page 55 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. Refer to "Powering down the chassis" on page 56 for more information.	

Items shipped

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

Packaged in device shipping carton:
• SAN512B-6 switch with shipping tray
• Packing foam
• Antistatic plastic
• Inner foam

Packaged in device shipping carton or separate carton.
• Door (for EMI compliancy)
• Power cords as ordered for installed power supplies
• Serial cable
• ESD wrist strap
• SFP extraction tool
• Power cord retainer clips
• Cable management comb assembly
• China-RoHS Hazardous/Toxic Substance statement
• Network Advisor web pointer card
• IBM documentation web pointer card
• Rack mount kit for your device
• Ground lug kit

Chapter 3. Mounting the Device

This chapter provides the following information:
- "Mounting options"
- "Mounting precautions"
- "Unpacking and transporting the device" on page 19
- "Port-side slot numbering" on page 5
- "Installing the 14U Rack Mount Kit for Four-Post Racks" on page 20
- "Installing the 14U Chassis Mid-Mount Rack Kit for Two-Post Racks" on page 28
- "Removing the protective cover" on page 34

Mounting options

You can mount the device in the following locations:
- In a four-post 19 in. (48.3 cm) EIA rack:
  - Use the 14U rack mount kit for four-post racks (XBR-DCX-0120), which contains shelf brackets that telescope from 27 in. (68.58 cm) to 31 in. (78.74 cm) to fit the majority of racks.
  - Use the 14U rack mount kit for four-post racks (XBR-DCX-0152), which contains 22 in. (55.88 cm) fixed shelf brackets designed for specific racks.
  - Refer to "Installing the 14U Rack Mount Kit for Four-Post Racks" on page 20 for instructions.
- In a two-post Telco rack:
  - Use the 14U mid-mount rack kit for two-post racks (XBR-DCX-0121).
  - Refer to "Installing the 14U Chassis Mid-Mount Rack Kit for Two-Post Racks" on page 28 for instructions .

Note: Review the "Mounting precautions" before mounting the device and ensure that all "Facility requirements" on page 10 are met.

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.

DANGER

Make sure the airflow around the front, sides, 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.

18-32 kg (39.7-70.5 lbs)

DANGER

Use safe lifting practices when moving the product.

18-32 kg (39.7-70.5 lbs)

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.

18-32 kg (39.7-70.5 lbs)

CAUTION:

Do not attempt to lift the chassis by the protective cover attached over the air vents on the port side.

18-32 kg (39.7-70.5 lbs)

CAUTION:

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

Unpacking and transporting the device

About this task

Use the following procedure to unpack and install your device.

DANGER

> **A fully populated chassis weighs approximately 145.83 kg (321.5 lbs) and requires a hydraulic or assisted lift to install it.**
>
> **If a lift tool with a capacity of at least 350 lb is not available, the director chassis must be depopulated completely before installing it into the rack. Note any possible interconnecting cables so that you will be able to reconnect them correctly. Remove the power supplies, fan modules, all of the blades, the cable management comb, and the chassis door (if equipped). Install the empty chassis into the rack following the chassis installation instructions. The weight of the empty chassis is 78.5 lb (35.6 kg) and must be lifted by minimum 3 people. After securing the chassis to the rack, reinstall the power supplies, fan modules, the blades and any possible interconnecting cables and proceed with the installation.**

Procedure

1. Unpack the device.
   a. Cut the bands that encircle the packaging.
   b. Open the top of the shipping box and remove accessory kit, rack mount kits, and foam from the top of the device.
   c. Lift the cardboard shipping container and inner cardboard sleeve off the device.
   d. Remove the antistatic plastic off the device.
   e. Leave the device on top 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 "Items shipped" on page 15.
   g. Save 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. Doorways must be wider than 36 in. (91 cm) to accommodate the device.
3. Remove the chassis door if installed.
4. Remove the cable management comb if attached to the device.
5. 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.

   Note: Do not attempt to lift the device by the protective cover attached to over the air vents on the port side of the chassis.

   Note: Orient the device on the lift so that you can slide it into correct side of 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, refer to"Fan and power supply airflow" on page 162.

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

7. 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.

8. Reinstall the cable management comb if you removed it.

9. Install the vertical cable management fingers on the rack's upright posts.

10. Reinstall the chassis door. The door must be installed to meet EMI compliance.

Port-side slot numbering

The SAN512B-6 contains 10 full-height slots and two half-height slots, for a total of 12 slots. Facing the port side of the device, the half-height slots are on the left, numbered 1 (top slot) and 2 (bottom slot). The remaining full-height slots are numbered 3 through 12, counting from left to right of 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 3–6 and slots 9–12 are restricted to port and extension blades.
- Slots 7– 8 are restricted to CR32-8 blades.

Installing the 14U Rack Mount Kit for Four-Post Racks

Use the following instructions to install a modular device in a 19-in. (48.3 cm) EIA rack using the 14U Rack Mount Kit for Four-Post Racks. Any updates to these instructions will be added to the hardware installation guide for your product.

Two rack-mount kits are available.

1. Contains shelf brackets that telescope from 27 in. (68.58 cm) to 31 in. (78.74 cm) to fit the majority of racks.

2. Contains 22 in. (55.88 cm) fixed shelf brackets that are designed for specific racks.

Note: 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 when installing the 14U Rack Mount Kit for Four-Post Rack:

- Torque screwdriver with #2 Phillips screwdriver tip

- Slotted (flat blade) screwdriver
- Hydraulic or assisted lift with a minimum raise of 140 cm (55 in.) and a minimum capacity of 158.76 kg (350 lbs)

  DANGER

  > **If a lift tool with a capacity of at least 350 lbs is not available, the director chassis must be depopulated completely before installing it into the rack. Note any possible interconnecting cables so that you will be able to reconnect them correctly. Remove the power supplies, fan modules, all of the blades, the cable management comb, and the chassis door (if equipped). Install the empty chassis into the rack following the chassis installation instructions. The weight of the empty chassis is 78.5 lbs (35.6 kg) and must be lifted by minimum 3 people. After securing the chassis to the rack, reinstall the power supplies, fan modules, the blades and any possible interconnecting cables and proceed with the installation.**

Parts list

The following table lists the parts supplied in the 14U Chassis Rack Mount Kit. for Four-Post Racks.

Note:

Depending on the device and installation, not all parts may be used on the device type.
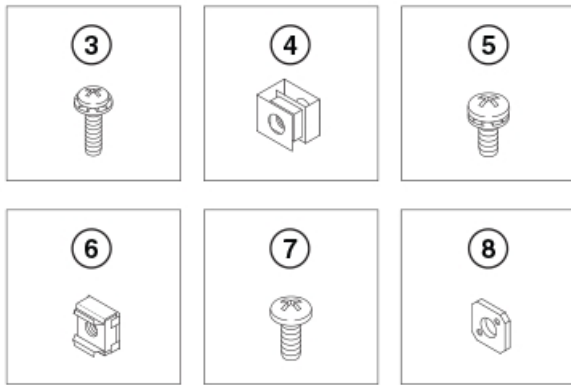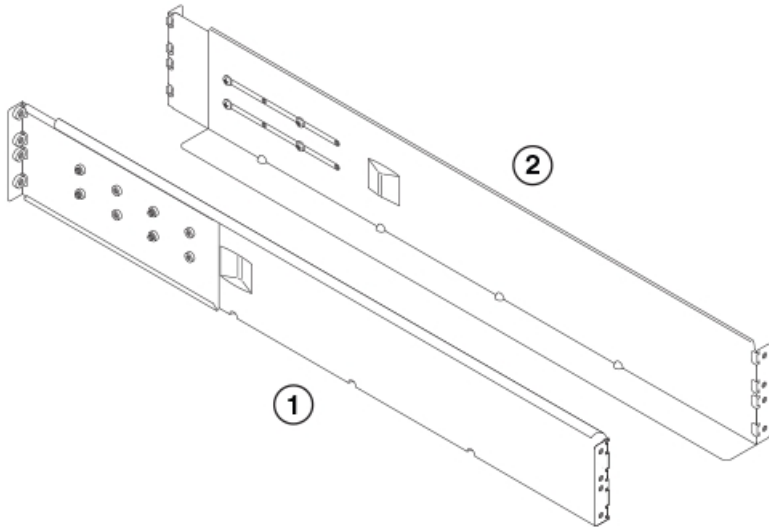
1 - Left rack mount shelf bracket

2 - Right rack mount shelf bracket

3 - 10-32 x 5/8 in. (1.58 cm) panhead Phillips screw and washer

4 - 10-32 clip nut for racks that have rails with round holes

5 - 1/4-20 x 1/2 in. (1.27 cm) panhead Phillips screw with lock washer for racks that have rails with round holes

6 - 10-32 retainer nut for racks that have rails with square holes

7 - 1/4-20 x 1/2 in. (1.27 cm) panhead Phillips screw with thread locker for racks that have rails with square holes

8 - 3/8 in. (0.953 cm) alignment washer for racks that have rails with square holes

Figure 3. Rack kit parts

Parts list – NEBS kit

The following table lists the parts supplied in the NEBS KIT to help direct airflow away from the rack area. This kit is only supported for specific devices, and may not apply to the device that you are installing.

Note: Depending on the device and installation, not all of the parts may be used.

Verify that the items listed in the following figure are included in the NEBS kit.
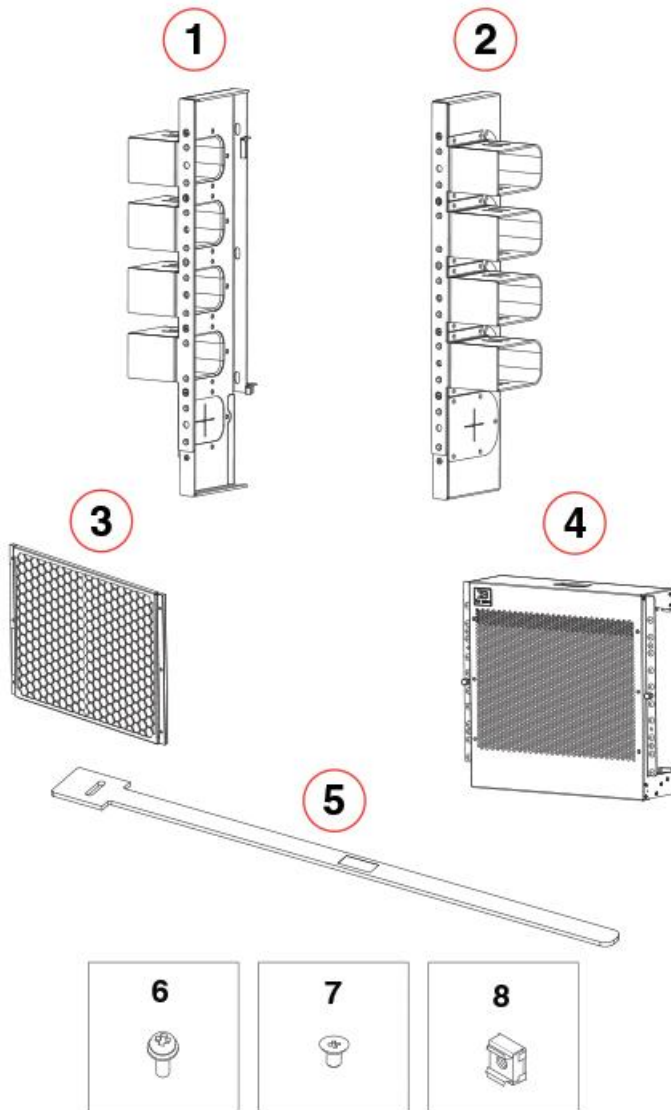
Figure 4. NEBS kit parts list

1. Left cable comb assembly (1)
2. Right cable comb assembly (1)
3. Air filter (1)
4. Chassis door (1)
5. Velcro strap (8)
6. Screw, 10-32 x .63-in., square cone washer (10)
7. Screw, 8-32 x .312 in., flathead (20)
8. Nut retainer (6)

Assembling the rack hardware
About this task

Attach the left and right rack mount shelf brackets to the rack rails.

Note: If cables are to be routed down through the cable management comb, allow space below the brackets for cable management.

Procedure

1. Locate the shelf brackets in the device.
2. Locate and loosen the screws on the adjustable ends of the brackets (see the following figure) to allow for adjustment to rack depth.
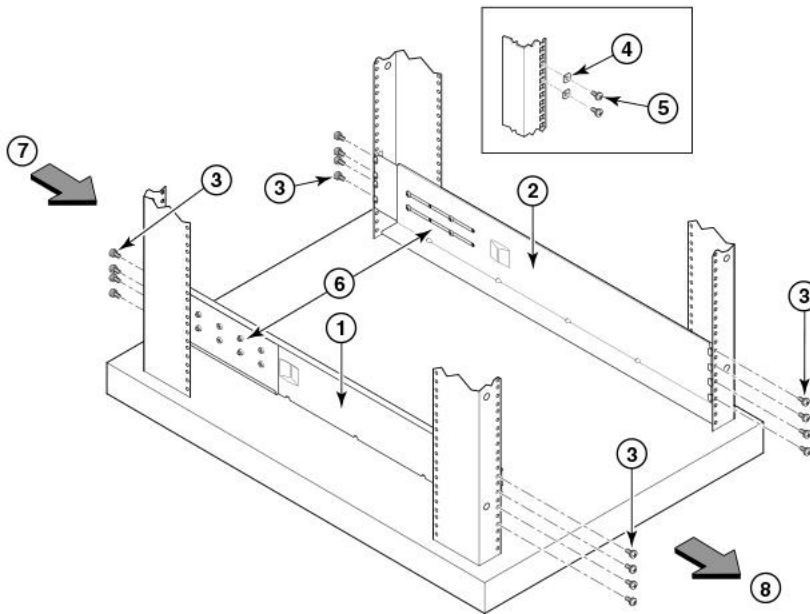
Figure 5. Left and right shelf brackets installed on rails

1 - Left rack mount shelf bracket

2 - Right rack mount shelf bracket

3 - 1/4-20 x 1/2 in. (1.27 cm) panhead Phillips screw with lock washer for rails with round holes (4 on each end of each bracket, 16 total)

4 - 3/8 in. (0.953 cm) alignment washer for rails with square holes (4 on each end of each bracket, 16 total)

5 - 1/4-20 x 1/2 in. (1.27 cm) panhead Phillips screw with thread locker for rails with square holes (4 on each end of each bracket, 16 total)

6 - Adjustable ends of shelf brackets

7 - Intake air direction

8 - Exhaust air direction

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

3. Position the shelf brackets with the adjustable ends on the intake air aisle side of the rack (see the previous figure).
   - For rails with round holes, do the following:
     – Position the left and right rack mount shelf brackets and attach them to the rack rails. Use eight screws with lock washers per bracket (four on each end). Tighten the screws to a torque of 80 in-lb (92 cm-kg).
   - For rails with square holes, do the following:

– Position the left and right rack mount shelf brackets and attach them to the rack rails. Use eight screws and alignment washers per bracket (four on each end). Tighten the screws to a torque of 80 in-lb (92 cm-kg).
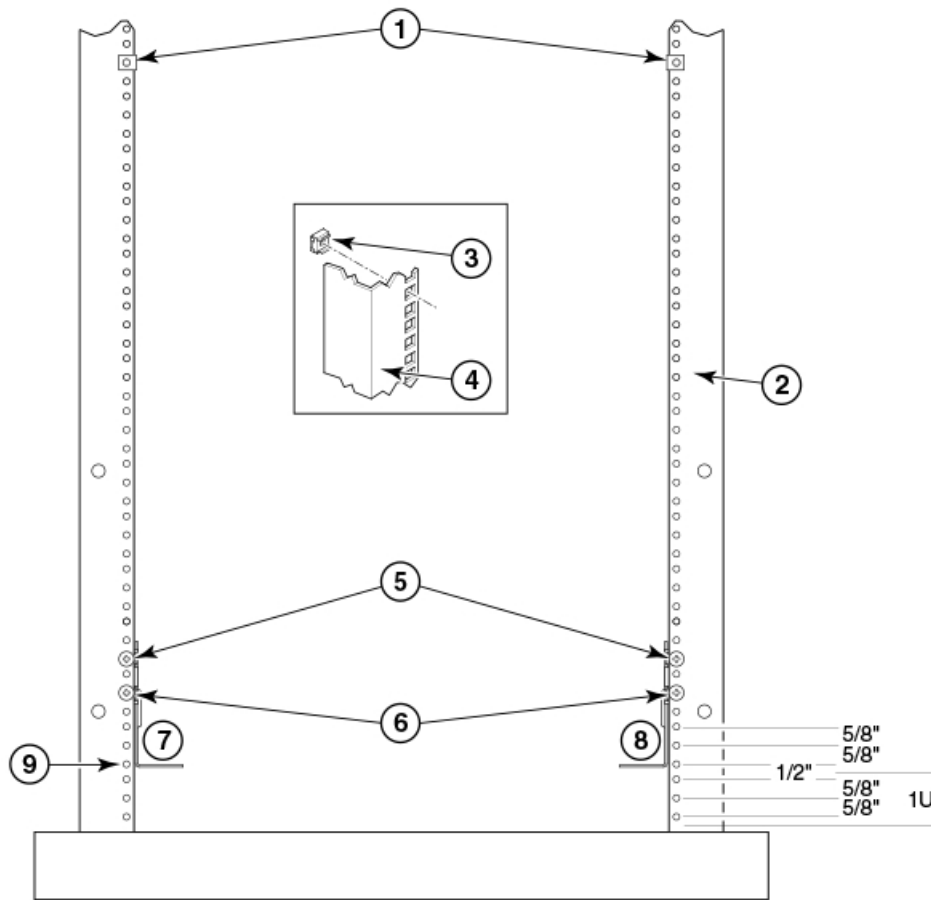
Figure 6. Nut and screw locations for mounting the device

1 - 10-32 clip nuts (for round holes)

2 - Rail

3 - 10-32 retainer nut (for square holes)

4 - Rail

5 - Top screws in shelf bracket

6 - Bottom screws in shelf bracket

7 - Left rack mount shelf bracket

8 - Right rack mount shelf bracket

9 - Hole 1

Note: Standard EIA rails have holes in sets of three; spaces between the holes are 5/8 in, 5/8 in, and 1/2 in. (1.58 cm, 1.58 cm, and 1.27 cm).

4. Tighten the adjusting screws on the sliding portion of the rack mount shelf brackets to a torque of 32 in-lb (37 cm-kg).

5. Attach the clip nuts (for rails with round holes) or retainer nuts (for rails with square holes) to the vertical rails on the exhaust aisle side of the rack (see the previous figure). These clip nuts are used for securing the port side of the

device to the rack rails with 10-32 x 5/8 inch screws. Use three clips on each rail. Place the clips in optimum locations for securing the device to the rails.

Note: Do not align the clip or retainer nuts with the top or bottom holes of the mounting bracket because the screw heads will interfere with the door.

Installing the device in the rack
About this task

Use the following procedure to install the device in the rack.

DANGER

| **Use safe lifting practices when moving the product.** |

18-32 kg (39.7-70.5 lbs)
svc00167

Procedure

1. Ensure that the door, if installed, is removed from the port side of the device. For instructions, refer to instructions for removing and replacing the device door in the device installation guide.
2. Use a lift to raise the device to the level of the shelf brackets.
3. Move the lift as close as possible to the rack, with the air-intake side of the device facing the front of the rack (see the following figure).
4. If applicable, lock the wheels of the lift.
5. Gently slide the device onto the shelf brackets, ensuring that it remains supported during the transfer.
6. Fasten the port side of the device to the rack rails. Use three 10-32 x 5/8 inch (1.58 cm) screws per rail. Tighten the screws to a torque of 32 in-lb (37 cm-kg). Refer to Figure 5.

   Note: Do not use the top or bottom holes of the mounting bracket because the screw heads will interfere with the door.
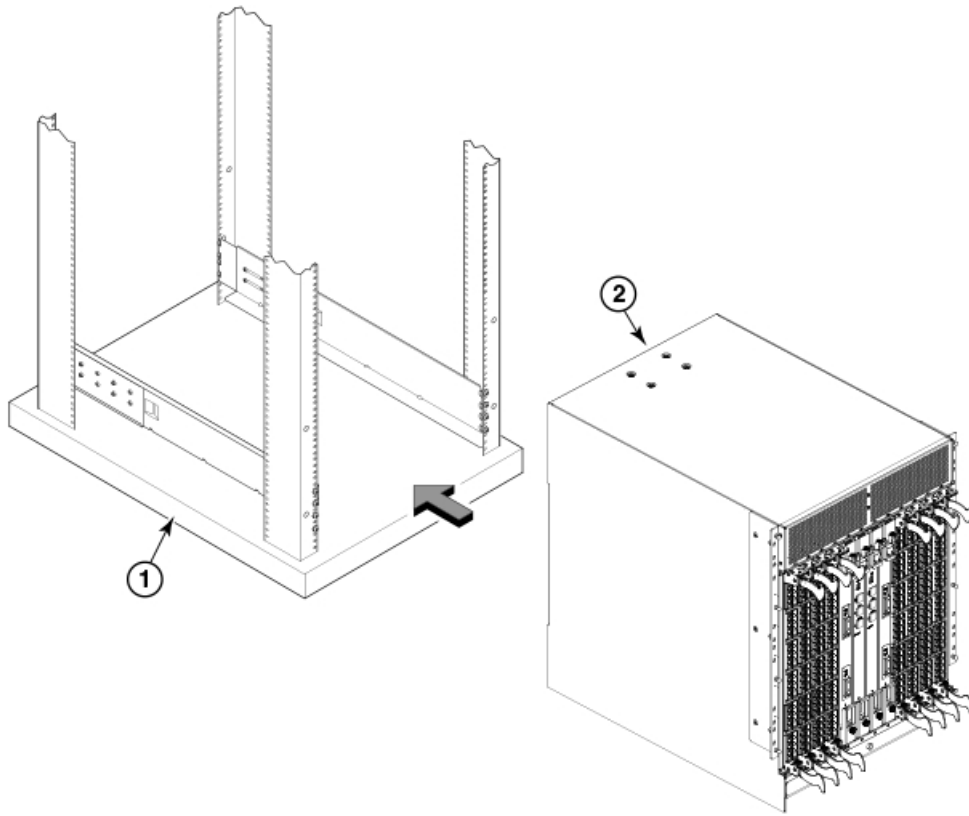
Figure 7. Positioning the device for installation in a rack

1 - Rack

2 - Nonport side of device
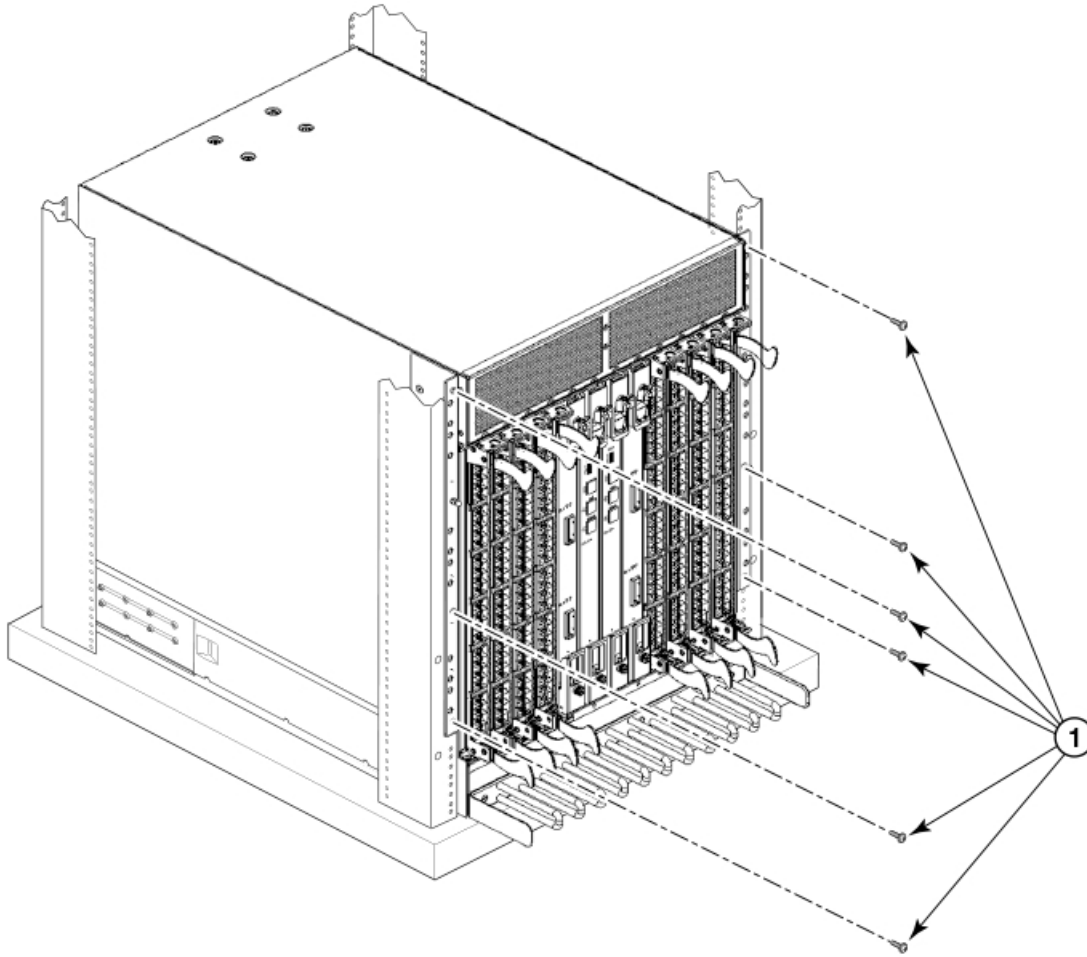
Figure 8. Attaching port side of device to rack rails

1 - 10-32 x 5/8 in. (1.58 cm) panhead Phillips screw with washer

7. Reinstall the device door if removed from your device. For instructions, refer to the door removal and replacement procedures in your device installation guide.

Installing the 14U Chassis Mid-Mount Rack Kit for Two-Post Racks

Use the following instructions to install a modular device in a telecommunications (Telco) rack, using the 14U Chassis Mid-Mount Rack Kit for Two-Post Racks.

The kit is compatible with rack rails that are either 3 inches or 5 inches wide (adapters are provided for 3-in. rails). Any updates to these instructions will be added to the hardware installation guide for your product.

Note: 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 chassis in a rack.

The following tools are required when installing the 14U Chassis Mid-Mount Rack Kit for Two-Post Racks.

* Torque wrench with #2 Phillips screwdriver tip.

- Flathead screwdriver.
- Hydraulic or assisted lift with a minimum raise of 140 cm (55 in.) and a minimum capacity of 158.76 kg (350 lbs)

  DANGER

  > **If a lift tool with a capacity of at least 350 lbs is not available, the director chassis must be depopulated completely before installing it into the rack. Remove the power supplies, fan modules, all of the blades, the cable management comb, and the chassis door (if equipped). Install the empty chassis into the rack following the chassis installation instructions. The weight of the empty chassis is 78.5 lbs (35.6 kg) and must be lifted by minimum 3 people. After securing the chassis to the rack, reinstall the power supplies, fan modules, and the blades and proceed with the installation.**

Parts list

The following parts are provided with the 14U Chassis Mid-Mount Rack Kit for Two-Post Racks.
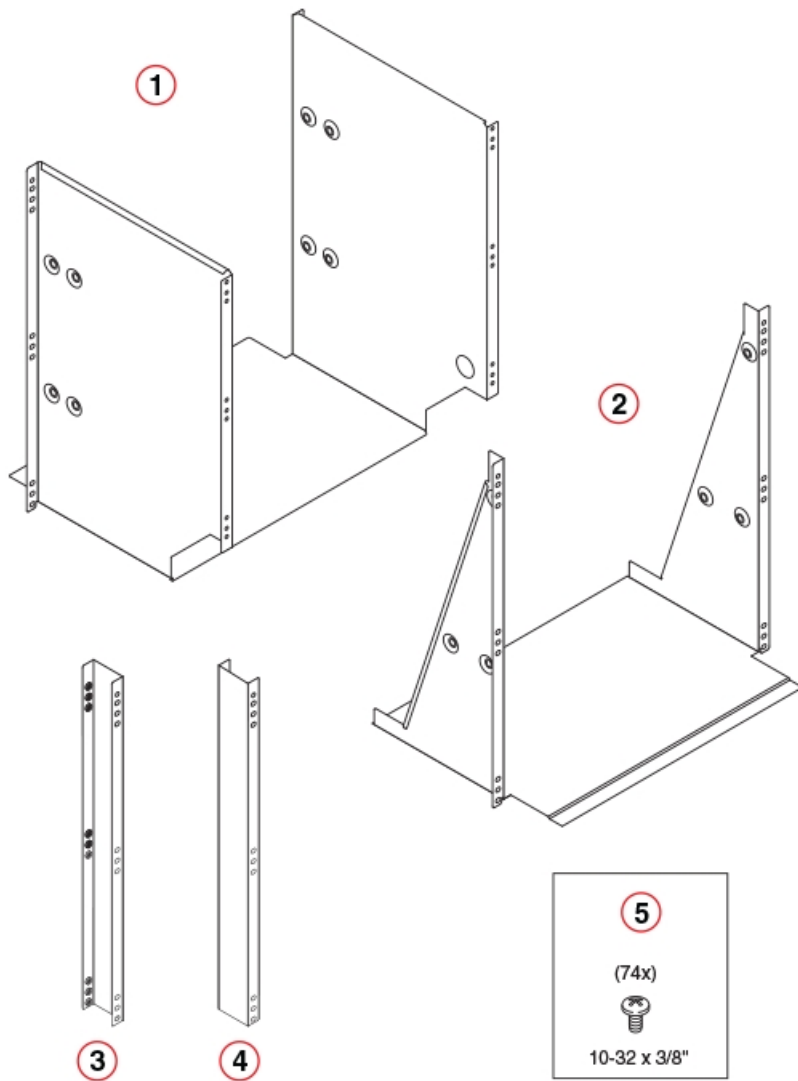
Figure 9. Rack kit parts

1 - Tray, front, mid-mount, chassis

2 - Tray, rear, mid-mount, chassis

3 - Adapter, rear, mid-mount, right

4 - Adapter, rear, mid-mount, left

5 - Screw, 10-32 x 3/8", pan head Phillips, ST, zinc (requires a torque of 32 inch-pounds)

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

Assembling the rack hardware
About this task

Perform the following steps to assemble the rack hardware.

Procedure

1. Attach the rear tray (with or without adapter, as required) to both rack rails. Orient the tray (refer the following figure) and use nine screws (Item E) for each rail.
2. Attach the front tray to both rack rails. Orient the tray (Figure 3) and use nine screws (Item E) for each rail.
3. Verify that the rear edge of the front tray is seated into the front edge of the rear tray.
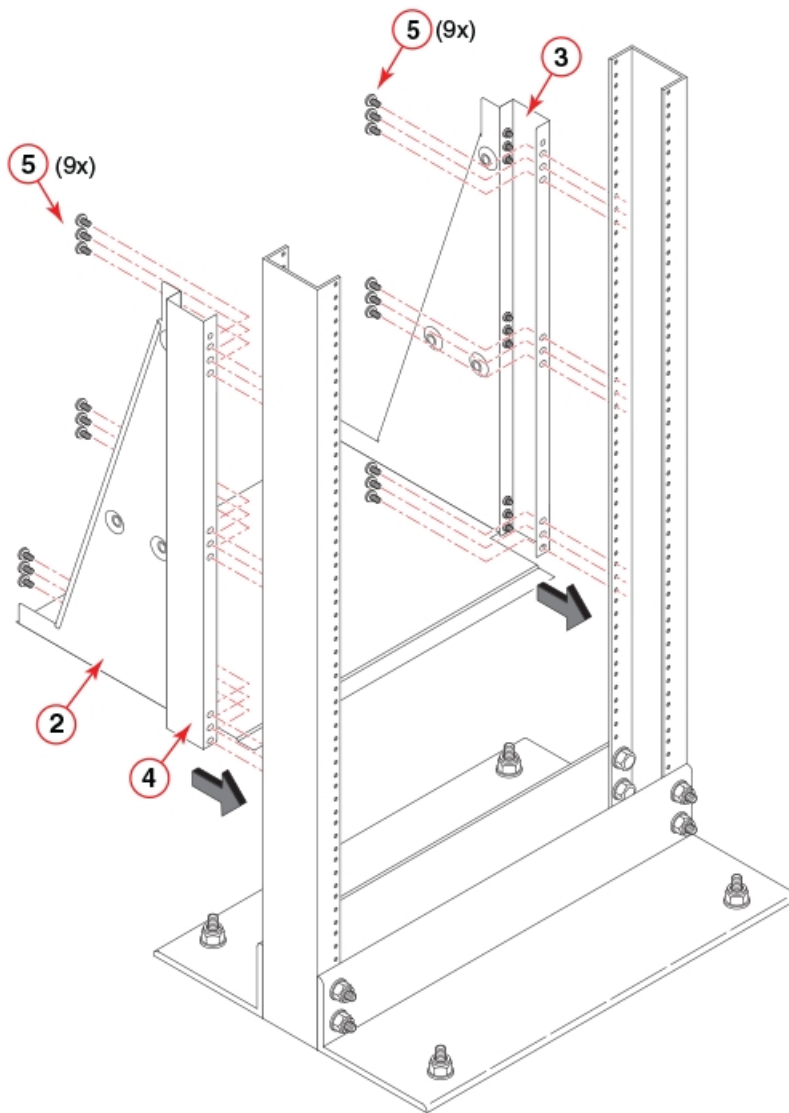
1 - Tray, rear, mid-mount, chassis

2 - Adapter, rear, mid-mount, right

3 - Adapter, rear, mid-mount, left

4 - Screws

Figure 10. Attaching the rear tray to the rack rails
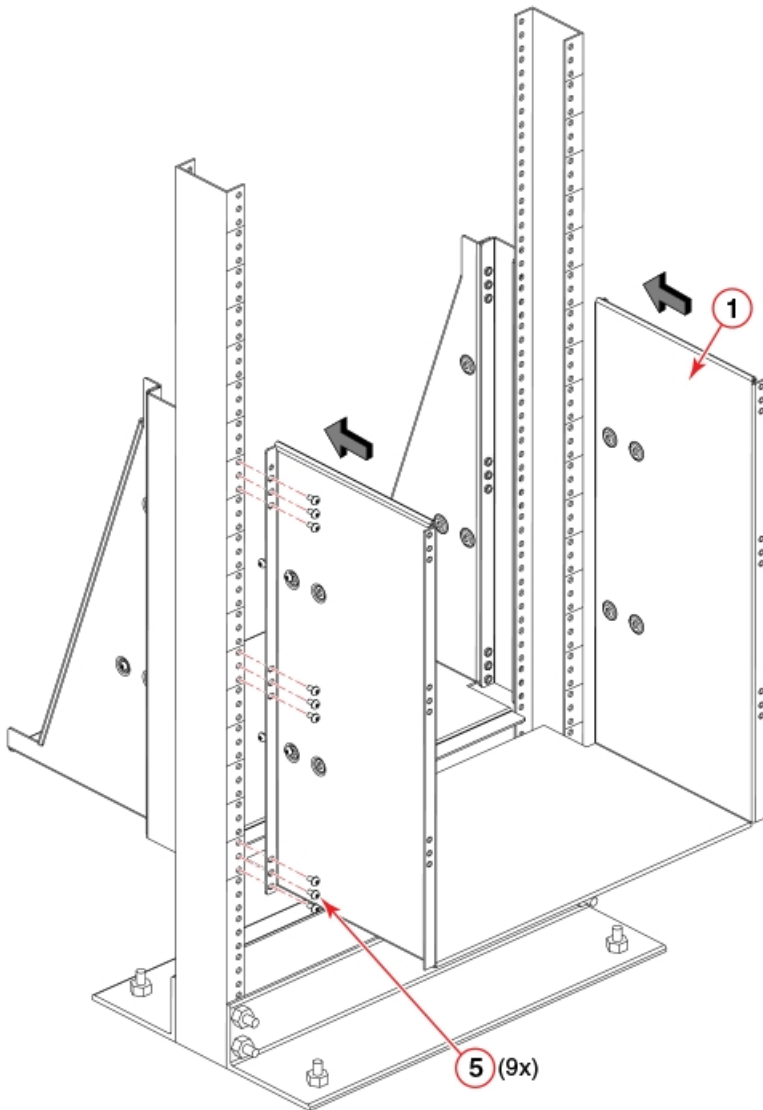
1 - Tray, front, mid-mount, chassis

2 - Screws

Figure 11. Attaching the front tray to the rack rails

Installing the device in the rack
About this task

	DANGER
18-32 kg (39.7-70.5 lbs)	**Use safe lifting practices when moving the product.**

Note: A fully populated device requires a hydraulic or assisted lift to install into a rack.

Perform the following steps to load the device into the mid-mount trays.

Procedure

1. Ensure that the door is removed from the port side of the device. For instructions, refer to the door removal and replacement procedures in your device installation guide.
2. Orient the device (refer the following figure) and use a hydraulic lift to raise it to the level of the trays.
3. If applicable, lock the wheels of the lift.
4. Slide the device into the trays until the front edge of the device is seated against the front tray.
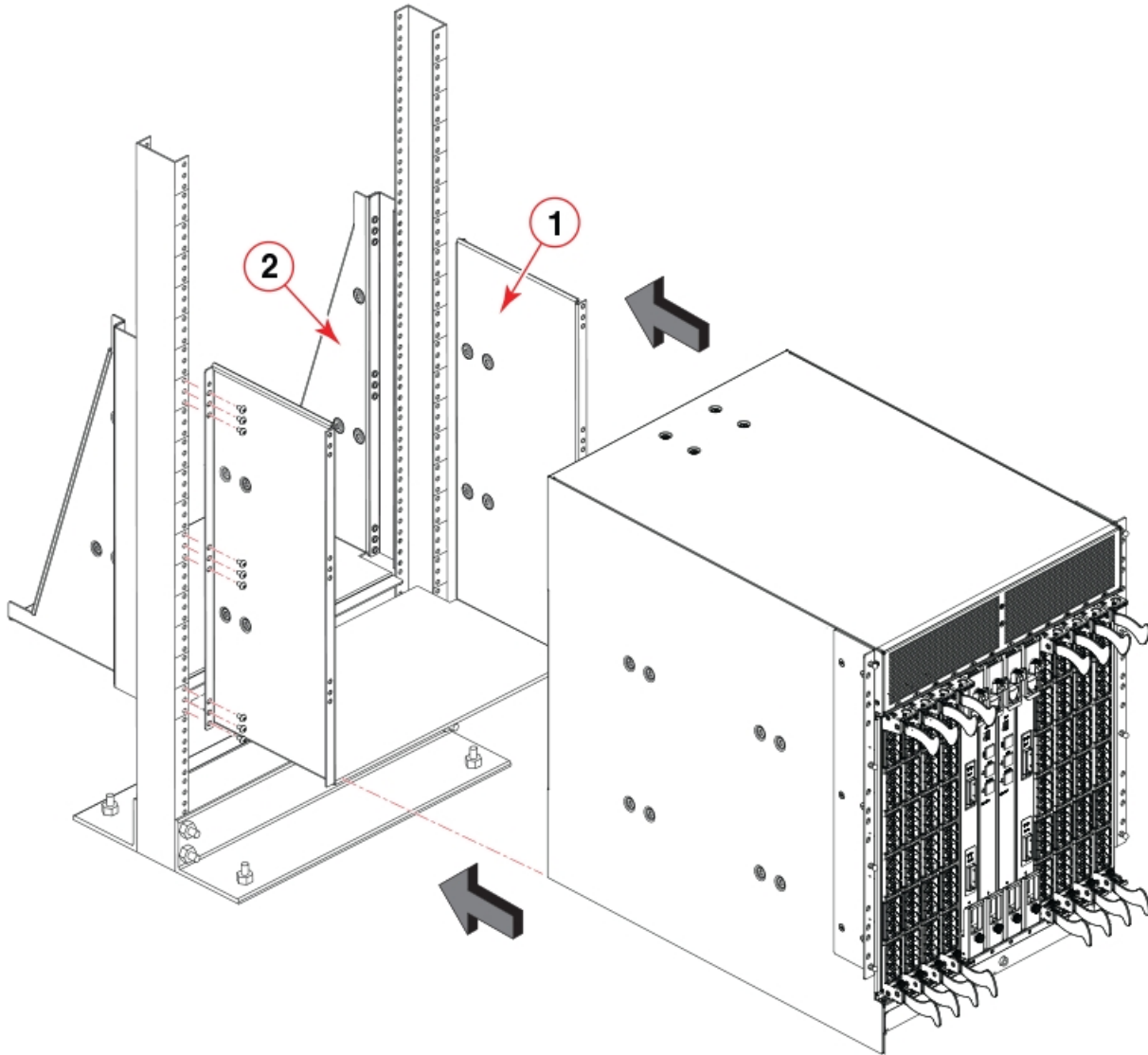
Figure 12. Placing the device in the trays

1 - Tray, front, mid-mount, chassis

2 - Tray, rear, mid-mount, chassis

5. Use three screws (Item 5) to attach each side of the rear tray to the device (refer the following figure).

    Note: The screw holes in the device walls have pem nuts on the inside surface.

6. Use four screws (Item 5) to attach each side of the front tray to the device

7. Use six screws (Item 5) to attach the lip on each side of the front tray to the lip on the front of the device.

Note: Do not use the top or bottom holes of the mounting bracket because the door will interfere with the screw heads.
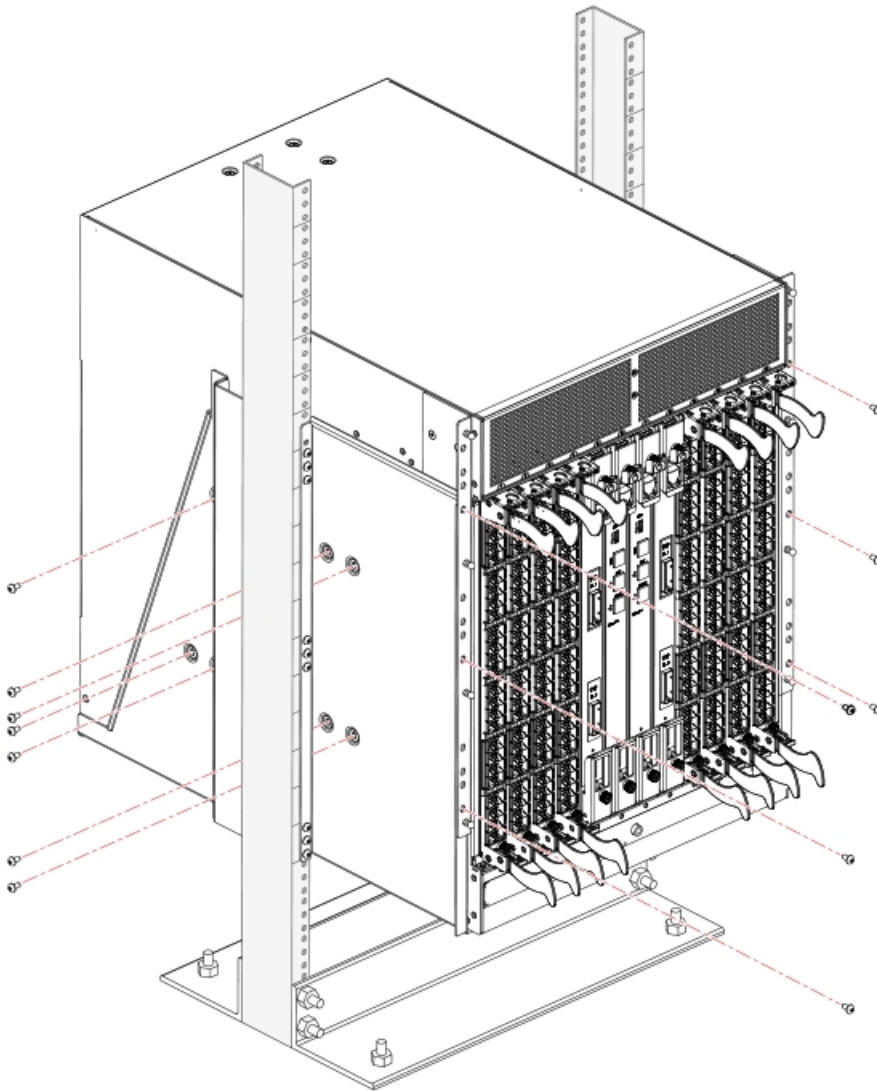
Figure 13. Attaching trays to the device

8. Reinstall the device door. For instructions, refer to the door removal and installation instructions in your device installation guide.

Removing the protective cover

About this task

The chassis ships with a protective cover installed over the air vents at the top of the port side of the chassis.

CAUTION:
You must remove the protective cover on the port side of the chassis before applying power to the chassis. The chassis can overheat if air vents are blocked with this cover.

Remove this cover by removing the Phillips screws securing it to the mounting bracket on each side of the chassis.
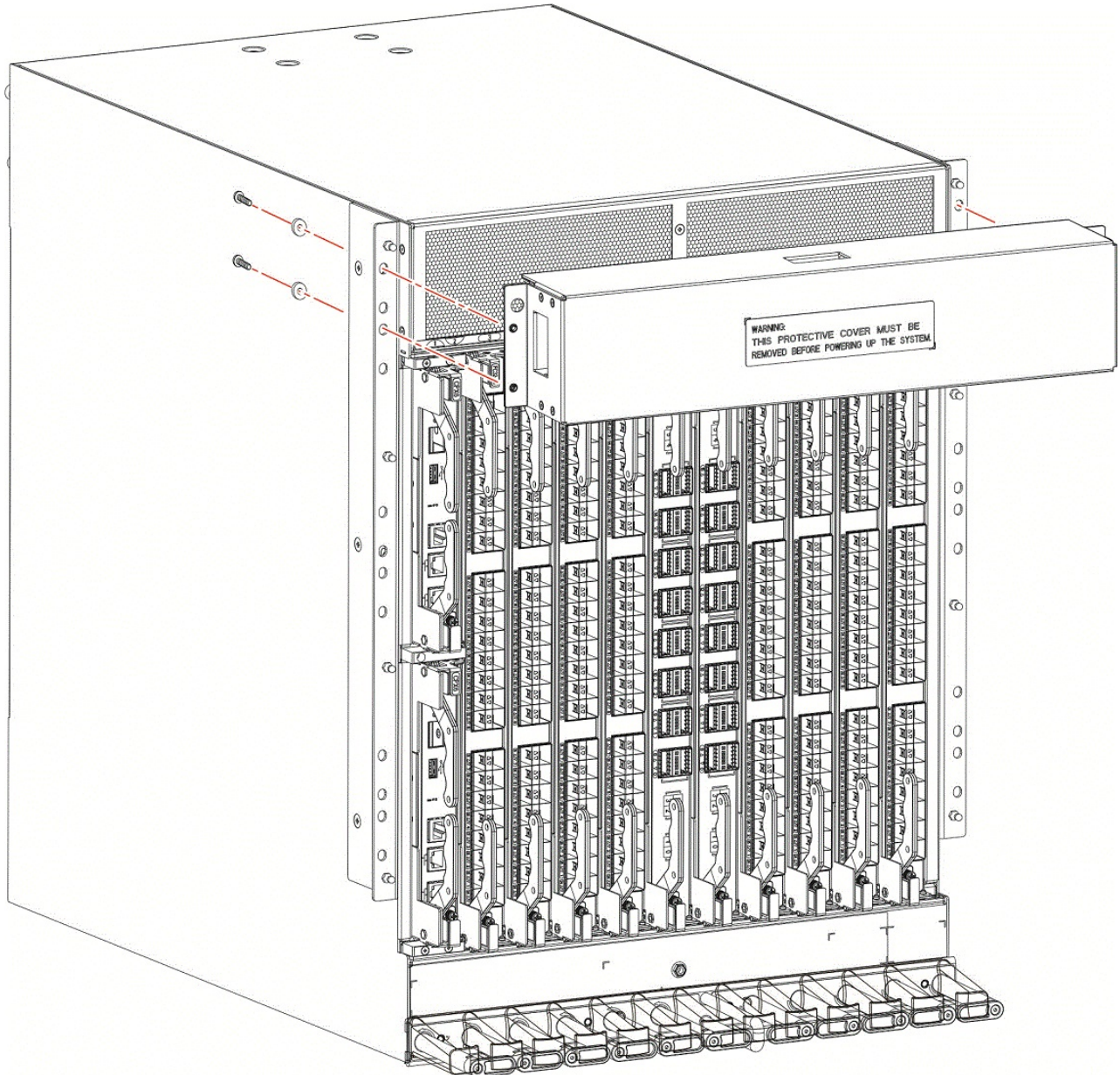
Figure 14. Removing protective cover from SAN512B-6

Note: Do not attempt to lift or support the chassis by the protective cover.

Chapter 4. Initial Setup and Verification

This chapter provides the following information:
- "Configuration and verification task guide"
- "Items required" on page 38
- "Providing power to the device" on page 39
- "Establishing a serial connection to the device" on page 46
- "Configuring the IP addresses" on page 48
- "Establishing an Ethernet connection to the device" on page 49
- "Setting the date and time" on page 50
- "Customizing the chassis and switch name" on page 53
- "Veifying the PID mode" on page 53
- "Verifying installed licenses and license key" on page 54
- "Verifying correct operation" on page 54
- "Backing up the configuration" on page 55
- "Powering down the chassis" on page 56

Configuration and verification task guide

Before connecting the device to the fabric, use the following tasks to initially configure and setup 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 6. Configuration and verification tasks

Task	Task details or additional information
Establish a serial connection to the device (chassis).	Connect a serial cable to the console port on 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 in 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.

Table 6. Configuration and verification tasks (continued)

Task	Task details or additional information
Establishing 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 NTP server.
Customize a 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 (**chassisname** "chassis_002").
Verify installed licenses and license key	Enter the **licenseShow** command to determine display enabled licenses and the license key. Enter the **licenseIdShow** command to obtain the chassis ID. Record the license key and chassis ID for future reference.
Verify correct operation of device.	Check LEDs on blades and FRUs, and use the following commands to verify operation: • **psShow** • **fanShow** • **switchShow** • **fabricShow** • **slotShow** • **tempShow** • **historyShow** • **errdump**
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, 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 (provided) with an RJ-45 connector.
- 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 USB drive for collecting **supportsave** output data (optional)

Providing power to the device

Before you begin

Before connecting power, refer the following.
- Electrical caution and danger statements in "Safety precautions" on page 7 and "Facility requirements" on page 10
- Power supply specifications section in the Appendix B, "Product specifications," on page 235 for power supply requirements of your device.

About this task

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

Procedure

1. Connect each power supply to a different power source or circuit to provide full redundancy.
2. 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.
3. Remember that power is supplied to the device as soon as the first power supply is connected to a power source.

Connecting 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, refer to the power supply specifications and requirements in Appendix B, "Product specifications," on page 235.

Procedure

1. Remove the protective cover if it is still installed over the top air vents on the port side of the chassis.

   ⚠ **CAUTION:**
   Remove the 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.

2. Install all power supplies provided for your device if not already installed. Refer to "Installing a power supply" on page 169 for procedures.
3. When installing device in a rack, route power cables from power distribution units (PDUs) so they do not cover air vents in chassis.

4. Connect the provided AC power cords to a power source with voltage of 200–240 VAC, 50/60 Hz or optionally to a power source with voltage of 100–120 VAC, 50/60 Hz.

DANGER

High Touch Current. Earth connection essential before connecting supply.

Note: 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, refer to "Power supply requirements" and "Power consumption" tables in the Appendix B, "Product specifications," on page 235.

5. 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.

6. 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.

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

For information about LED patterns, refer to Chapter 6, "Monitoring the switch," on page 69.

8. Ground the chassis by attaching a ground wire from building 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 power cord to HVAC/HVDC power supplies
About this task

Use 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.

CAUTION:
The maximum input voltage for connection to the HVAC power supply must not exceed 305VAC.

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, refer to "Using HVAC/HVDC power cords" on page 45.

2. Ground the chassis by attaching a ground wire from building 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.

3. Remove the protective cover if it is still installed over the top air vents on the port side of the chassis.

   CAUTION:
   Remove the 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.

4. Install all power supplies provided for your device if not already installed. Refer to "Installing a power supply" on page 169 for procedures.

5. When installing the device in a rack, route power cables from power distribution units (PDUs) so they do not cover air vents in chassis.

6. 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.

   CAUTION:
   When removing the metal cable restraint cover under the high voltage power supply inlet, remove the 2 Torx head screws only.
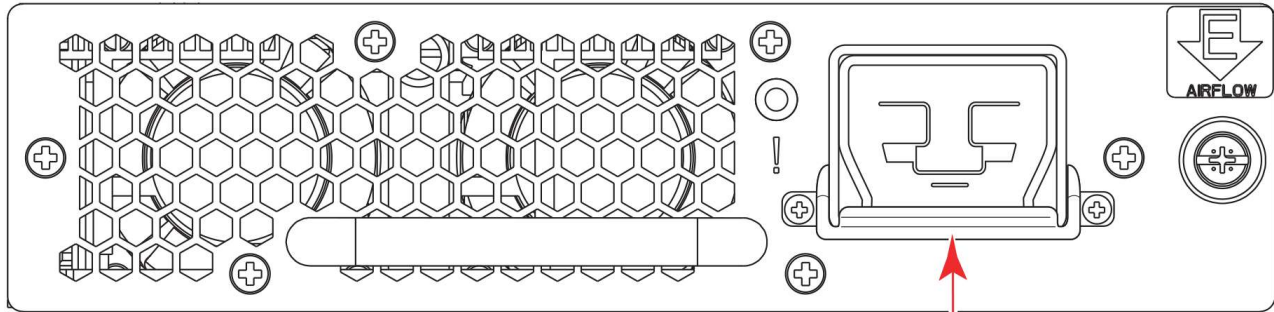
1. Torx head screws
2. Metal cable restraint cover

7. 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.
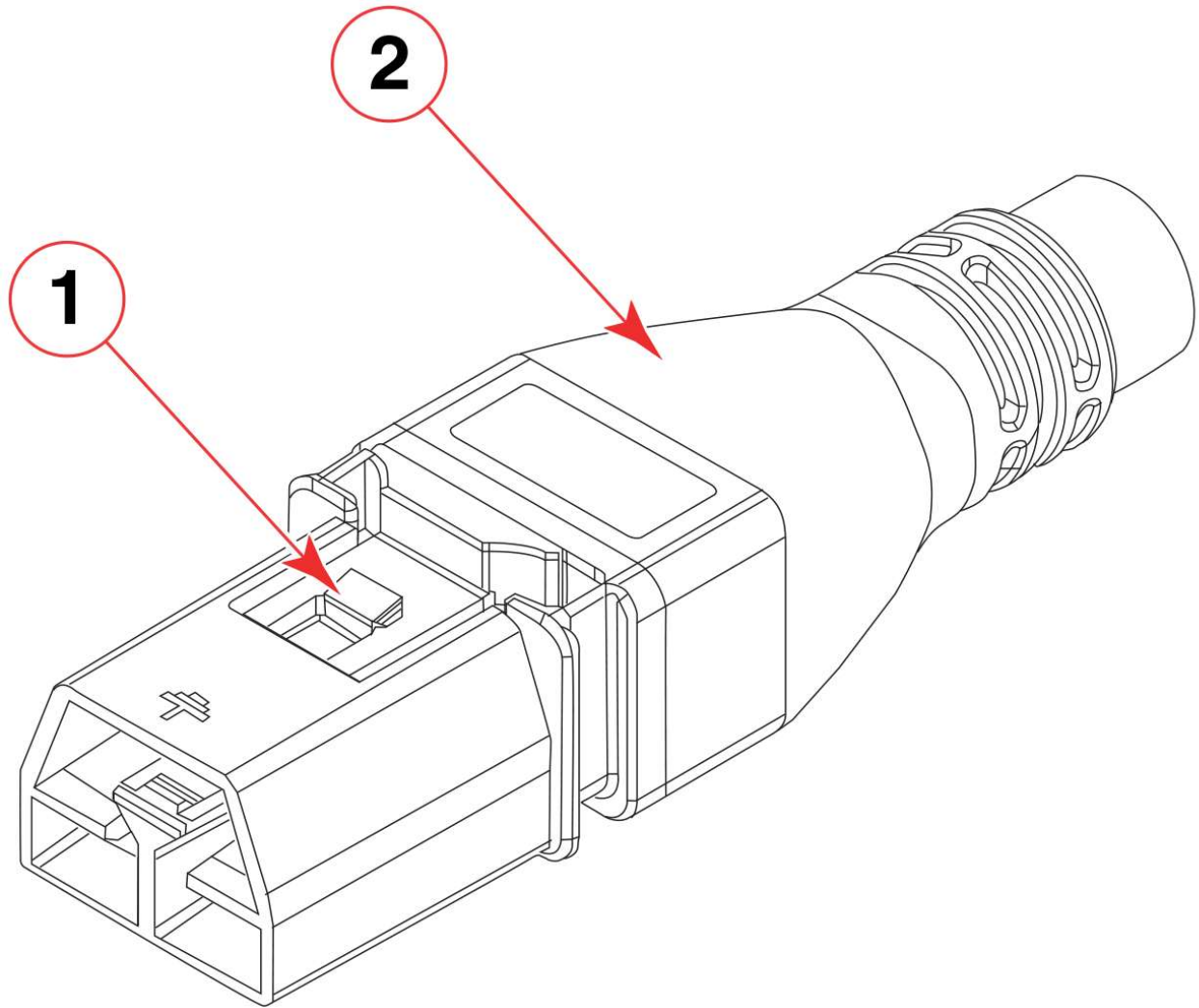
1. Power cable

2. Connector latch

8. Attach the cable restraint cover under the power cord connector using its two torx head screws (refer to step 4).

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

9. If connecting to an AC power source, use the following steps. (If connecting to a DC power source, go on to step 8.)

   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 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, refer to "Using HVAC/HVDC power cords" on page 45.

DANGER

> **Make sure that the power source circuits are properly grounded, 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, refer to "Power supply requirements" and "Power consumption" tables in the Appendix B, "Product specifications," on page 235.

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.

10. 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, refer to "Using HVAC/HVDC power cords" on page 45.

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.

11. 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.

12. 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.

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

For information about LED patterns, refer to Chapter 6, "Monitoring the switch," on page 69.

14. Ground the chassis by attaching a ground wire from facilities 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 7. 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.
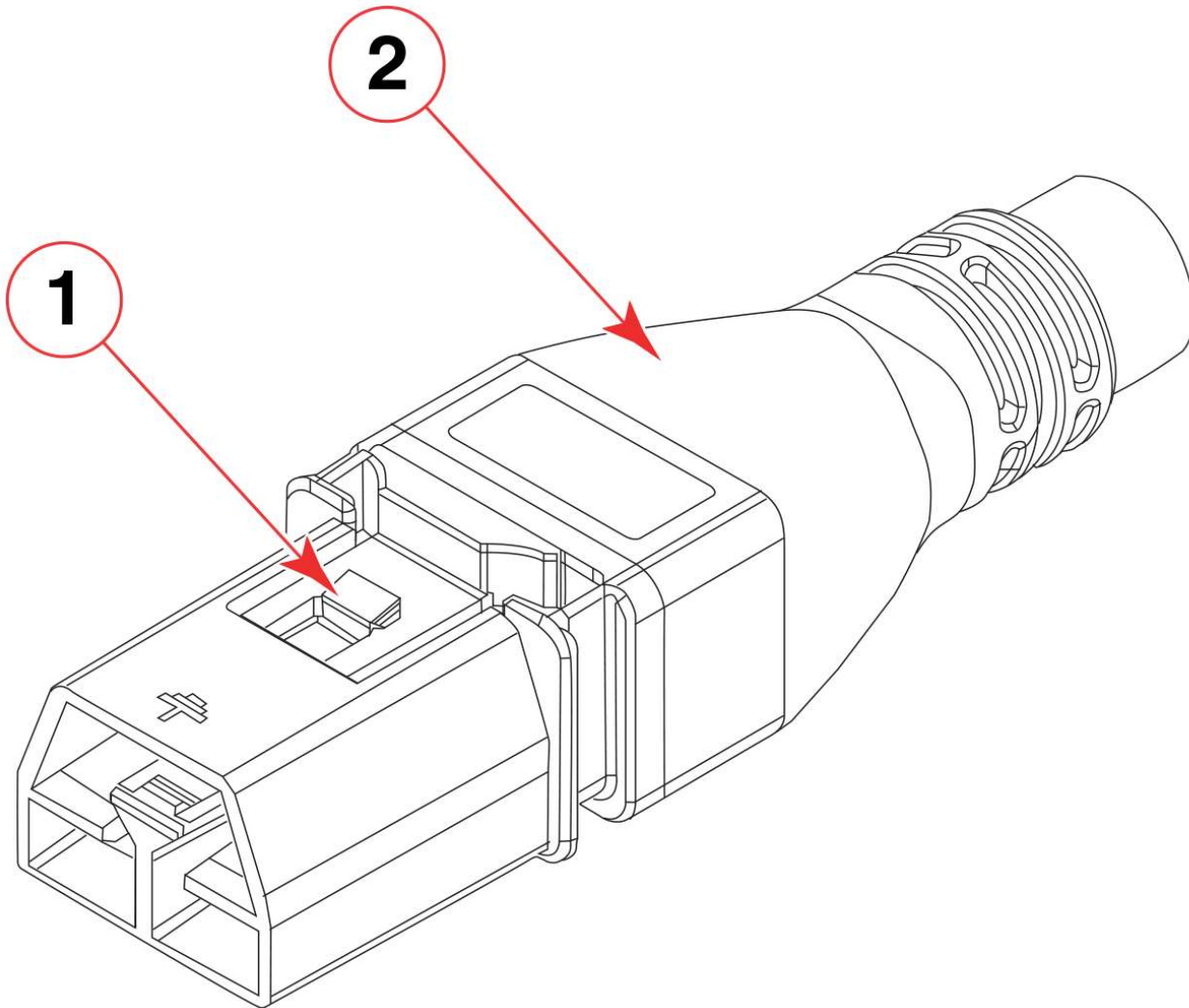
1. Power cable
2. Connector latch

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 (I0I0) 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 the serial cable provided with the device 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
Data bits	8
Parity	None
Stop bits	1
Flow control	None

   Note: Flow control is not supported on the serial consoles when 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 login 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 in to the console using *admin* as the default login name and *password* as the default password. As login 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 Administrator's 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.

The default IP addresses and host names for the device are:
- 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 you 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 into 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 through a console port, you can determine whether you are logged into the active or standby CP by entering **hashow** at the prompt. The following example shows local login at CP1, which is the active blade.

   ```
   swDir:admin> hashow
   Local CP (Slot 2, CP1) : Active, Warm 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 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 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 required information at the prompts. Following is 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 required information at the prompts. Following is 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 IBM 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 BaseT LAN.
4. Complete any additional device configuration procedures for the device using one of the following steps:
   - Log into the device using a serial console connection and **admin** login.

- Log into the device through a Telnet session using the chassis management IP address and **admin** login.

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 into 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 into 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 logging events, 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 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 into 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 into 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 into 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 into 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 **tsTimeZone --interactive** command, enter the appropriate number as shown in the following example, 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 8. Example: tsTimeZone command parameter selection for the US time zones

Local time	tsTimeZone parameter (difference from UTC)
Atlantic Standard	-4,0
Atlantic Daylight	-3,0
Eastern Standard	-5,0
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 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 that of an external NTP server.

Procedure
1. Log into 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 into 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

The switch name of the device can be up to 31 characters long and must begin
with a letter. It can include letters, numbers, hyphens, and underscore characters.

The chassis name and switch name of the device can be up to 31 characters long;
can include letters, numbers, hyphens, and underscore characters; and must begin
with a letter. The name cannot include spaces.

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

Procedure

1. Log into 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 into 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 next login. You can enter **switchName** to verify the new name after
   login.
5. Record the new names for future references.

Veifying the PID mode

About this task

Before connecting the device to the fabric, verify that the WWN-based persistent
port identifier (PID) feature on the device matches the other switches in the fabric.
This parameter must be identical for all switches in the fabric and is set using the
configure command.

Procedure

1. Log into 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 into the device using *admin* as your password. If you have not changed the default password, use *password*.

3. Check the PID setting using the **configshow** command as in the following example. You can use the | grep -i *pid* qualifier to pinpoint the PID information.

```
switch:admin> configshow | grep -i pid
fabric.ops.mode.pidFormat:1
fabric.wwnPidMode:1
```

The 1 indicates that the WWN-based persistent PID feature is enabled. The default value is 0 for disabled.

4. Set the PID mode if necessary using the **configure** command.

Refer to the "Fabric Parameters" section under the "Configure" command in the *Fabric OS Command Reference* for details on configuring WWN Based persistent PID.

Verifying installed licenses and license key

About this task

Depending on the vendor agreement, certain licenses are factory installed on the device. Use the following steps to list installed licenses and to record your license key and chassis ID for future reference.

Procedure

1. Log into 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 into the device using *admin* as your password. If you have not changed the default password, use *password*.

3. Enter the **licenseShow** command to determine which licenses are enabled. This will list installed licenses and display a license key, such as aNYtMJg7tcMZrTZ9JTXBC4SXWLJMY3QfBKYHG.

4. Enter the **licenseIdShow** command on the active CP blade to obtain the chassis ID. The chassis ID is required to obtain and activate licenses for the device.

5. Record the license key and chassis ID for future reference.

What to do next

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

Backing up the configuration

About this task

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.

Observe the following notes about configuration data:
- Passwords are not saved in the configuration file, and are not uploaded during a configuration upload.
- Besides saving configuration files to an FTP server or local file system, you can save to a USB device by using the **usbstorage** command.

Procedure

1. Log into 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 into 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.

```
sb_70:admin> configupload
Protocol (scp, ftp, local) [ftp]:
Server Name or IP Address [host]: 192.168.0.100
User Name [user]: anonymous
Path/Filename [<home dir>/config.txt]: /dumps/supportsave/pz/switch85/G20-1.txt
Section (all|chassis|switch [all]): 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 command, refer to the *Fabric OS Command Reference*.

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.

Chapter 5. Installing Transceivers and Cables

This chapter provides the following information:

- "Supported transceivers and cables"
- "Time and items required" on page 60
- "Precautions specific to transceivers and cables" on page 61
- "Cleaning the fiber-optic connectors" on page 61
- "Cable management" on page 62
- "Installing an SFP+ transceiver" on page 62
- "Replacing an SFP+ transceiver" on page 64
- "Installing a QSFP transceiver" on page 65
- "Replacing a QSFP transceiver" on page 66
- "Verifying the operation of new transceivers" on page 68

Supported transceivers and cables

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

Table 9. Supported transceivers and cables

Blade	Transceiver Type	Auto-negotiate/ Fixed	Speeds supported (Gbps)
FC32-48 port blade	32 Gbps SFP28, SWL, LWL	Auto negotiate	8, 16, 32
	16 Gbps SFP+, SWL, LWL, ELWL	Auto negotiate	4, 8, 16
	10 Gbps SFP+, SWL, LWL	Fixed	10
SX6 extension blade	32 Gbps SFP28, SWL, LWL	Auto negotiate	8, 16, 32
	16 Gbps SFP+, SWL, LWL, ELWL	Auto negotiate	4, 8, 16
	10 Gbps, SFP+, SWL, LWL	Fixed	10
	10 GbE SFP+, SR, LR	Fixed	10
	10GBase-ZRD tunable SFP+	Fixed	10
	1 GbE SFP, Copper	Fixed	1
	1 GbE SX SFP, LX SFP, and CWDM SFP+	Fixed	1
	1 GbE CWDM SFP+	Fixed	1
	40 GbE QSFP, SR4/LR4/ER4	Fixed	40
CR32-8 core routing blade	4x16 Gbps QSFP, SWL,	Fixed (each 16 Gbps channel)	16
	4x32 Gbps QSFP28, SWL	Fixed (each 32 Gbps channel)	32
	4x16 Gbps 2 km QSFP, LWL	Fixed (each 16 Gbps channel)	16

The following notes apply to QSFP transceivers on core routing blades.

* You cannot connect an ICL between a 4x32 Gbps QSFP on a SAN512B-6 core blade and a 16-Gbps QSFP on a DCX 8510 core routing blade. You must use a 4x16 Gbps QSFP on the SAN512B-6 blade.
* The 4x32 Gbps QSFP28 transceiver has four links that operate at 32 Gbps to achieve a 128 Gbps link speed. The 4x16 Gbps QSFP+ transceiver has four links that operate at 16 Gbps to achieve a 64 Gbps link speed. The cables come in specific predetermined fixed lengths that are qualified by IBM.

For current information on transceivers and cables supported by this device, refer to the *Fibre Channel Transceiver Support Matrix* on www.brocade.com and to the current *Fabric OS Release Notes*:

Core routing blades

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

Following are 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.
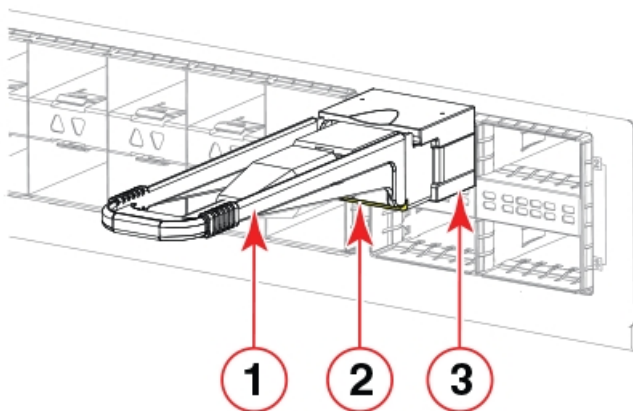
Figure 15. QSFP transceiver with separate cable

  1 - Pull tab

  2 - QSFP cable

  3 - QSFP transceiver

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

* 2 km LWL 16 Gbps QSFP transceiver with integrated MTP cable. The transceiver is inserted into the blade port connector and integrated cable plugs into a QSFP on the other end of the ICL, a patch panel, or a patch cable.
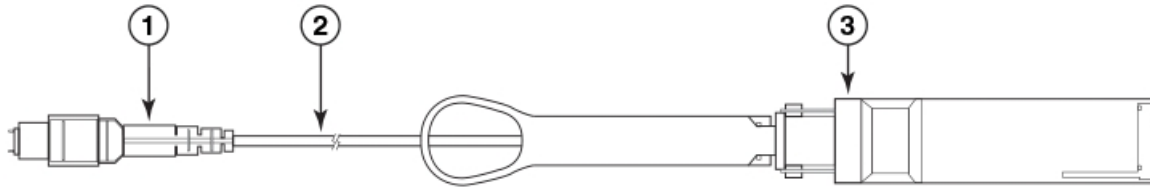
Figure 16. 2 km QSFP 16 Gbps with integrated cable

1 - MTP 1x12 fiber male connector

2 - Integrated 3 meter MTP cable

3 - Transceiver with pull-tab

Follow these guidelines for using QSFPs when connecting ICLs. Refer to"Installing a QSFP transceiver" on page 65 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 SAN512B-6 and SAN256B-6 switches forming the ICL connection. Up to nine neighboring switches can be connected with the MTP cables.

- The 32 Gbps QSFP28 transceivers on SAN512B-6 core routing blades only operate at 32 Gbps and cannot be configured at 16 Gbps for Fabric OS v8.0.1. Therefore, you cannot connect an ICL between a 32 Gbps transceiver on a SAN512B-6 core blade and a 16 Gbps QSFP transceiver on a SAN384B-2 or SAN768B-2 core routing blade. You must connect between 16 Gbps transceivers on each blade.

- An off-the-shelf MTP cable up to 100 meters can be used as an ICL cable when using the standard SWL optics. The 2 km 16 Gbps QSFP with LWL optics has an integrated 3 meter single-mode pigtail with a male MTP connector for connectivity to a patch panel or female terminated MTP patch cable to achieve up to 2 km distances.

- IBM supports fully populating a switch with ICL connections using a mixture of 50 and 100 m SWL optics and 16 Gbps 2 km LWL optics.

- Any number of ICL ports can be used for 2 km distances when using 2 km LWL 16 Gbps QSFPs and configuring 20 buffer credits per virtual channel. There are no limitations on the number of ICL ports if all ICL distances are a few hundred meters.

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 Administrator's Guide*:

- ICL topologies

- ICL trunking

- Configuring ICLs between SAN512B-6 and SAN256B-6 switches

- Configuring ICLs between SAN512B-6 or SAN256B-6 switches and SAN384B-2 or SAN768B-2 switches

2 km LWL QSFPs

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

The 2 km LWL QSFP, is a hot-swappable, low-voltage (3.3 V) digital diagnostic optical transceiver that supports high-speed serial links over parallel single-mode optical fibers at signaling rates up to 4×14.025 Gbps. The QSFP is integrated with a 3 m ribbon fiber cable with a male MTP 1x12 connector. The QSFP supports 2 km link length on parallel single-mode fiber.
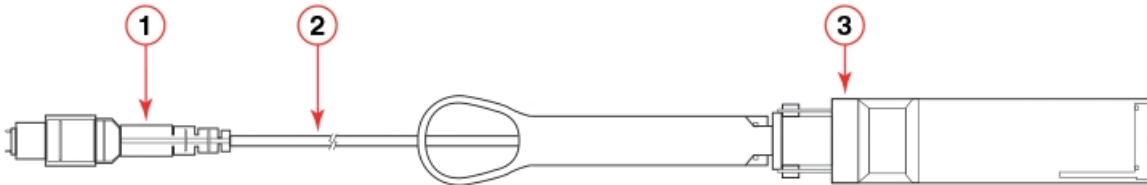
Figure 17. 2 km LWL QSFP transceiver with integrated cable

1 - MTP 1x12 fiber male connector

2 - Integrated 3-meter MTP cable

3 - Transceiver with pull-tab

Following are cabling options and recommendations:

- Connect the 3-meter integrated single mode transceiver cable directly to a female-terminated connector in a patch panel or patch cable using a key-up/key-down MPO/MTP coupler.
- Use female-to-female patch cable with the following specifications:
  - Single-mode (not OM3 MMF or OMM MMF)
  - MTP/MPO 1x12 fiber
  - MTP female angled polished connector (APC)
  - Key-up/key-down connectors for polarity

Figure 18. Female-to-female patch cable for QFSP connections

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 IBM-branded transceivers
- Required number of compatible fiber-optic cables
- Optical transceiver extraction tool (for 10 Gbps transceiver only)

Note: Most devices come with a transceiver extraction tool and holster. The extraction tool is designed to remove transceivers from modules where the space is limited.

Figure 19. Optical transceiver extraction tool

Precautions specific to transceivers and cables

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

CAUTION:
Use only optical transceivers that are qualified by IBM and comply with the FDA Class 1 radiation performance requirements defined in 21 CFR Subchapter I, and with IEC 825 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

To avoid problems with the connection between the fiber-optic transceiver (SFP+ or QSFP) and the fiber cable connectors, IBM strongly recommends cleaning 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.

A fiber-optic reel-type cleaner is recommended for cleaning the fiber cable connectors. 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 rack space required for cable management before installing the switch.
- Leave at least 1 m (3.28 ft) of slack for each port cable. This provides room to remove and replace the switch, allows for inadvertent movement of the rack, and helps prevent the cables from being bent to less than the minimum bend radius.
- If you are using 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.
- The cable management comb attaches to the lower part of the chassis and allows for simple cable management. The comb can be installed without service disruption.

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

The device supports only IBM-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 16 Gbps and 32 Gbps transceivers as they might be hot.

Procedure

1. Perform one of the following steps, depending on your transceiver type.
   - If transceiver has a pull tab (16- and 32-Gbps SFP+ transceivers), use the pull tab to help push the transceiver into the port until it is firmly seated and the latching mechanism clicks.
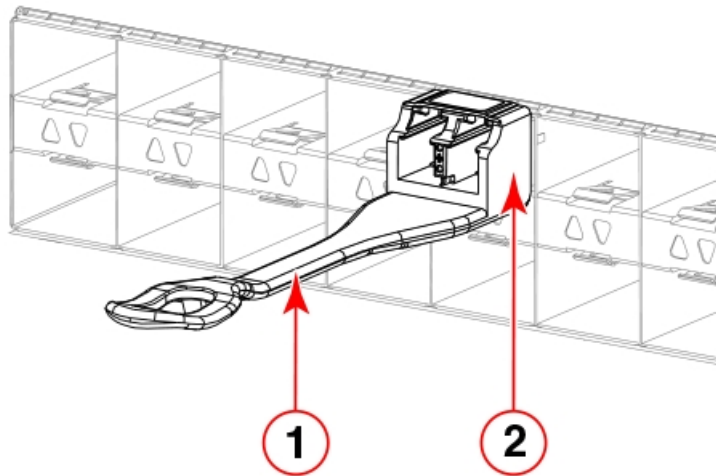
Figure 20. Installing an SFP+ transceiver with pull tab into blade port

1 - Pull tab

2 - Transceiver

- If transceiver has a bail latch mechanism (10 GbE 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.
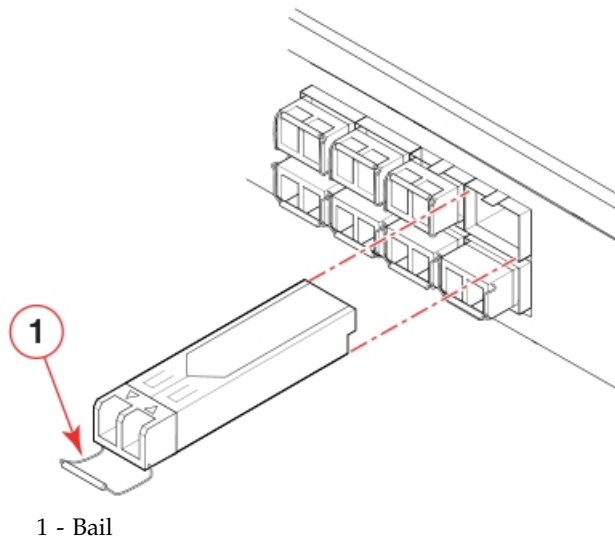
1 - Bail

Figure 21. Installing an SFP+ transceiver with bail latch into blade port

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

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

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 an other 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 16- and 32-Gbps SFP+ transceivers do not have bails but pull tabs. Always use the pull tab to insert or remove the SFP+ transceivers, as 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 transceiver has a pull tab (16- and 32-Gbps 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. As the transceiver may be hot, avoid touching it.
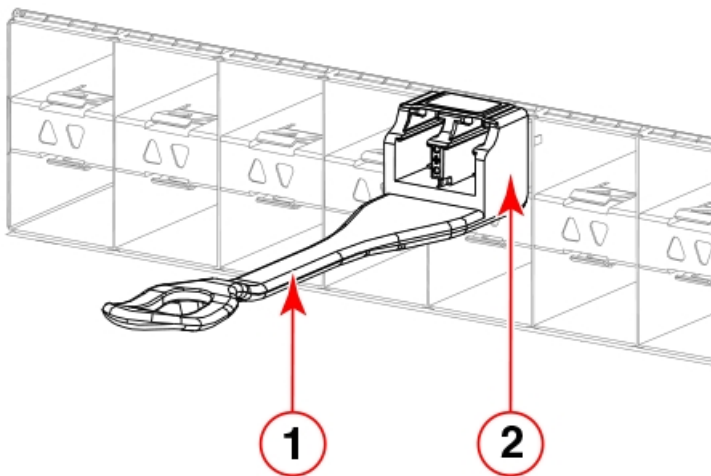
Figure 22. Replacing a SFP+ optical transceiver with pull tab into blade port

   1 - Pull tab

   2 - Transceiver

   - If transceiver has a bail latch mechanism (10 GbE 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.
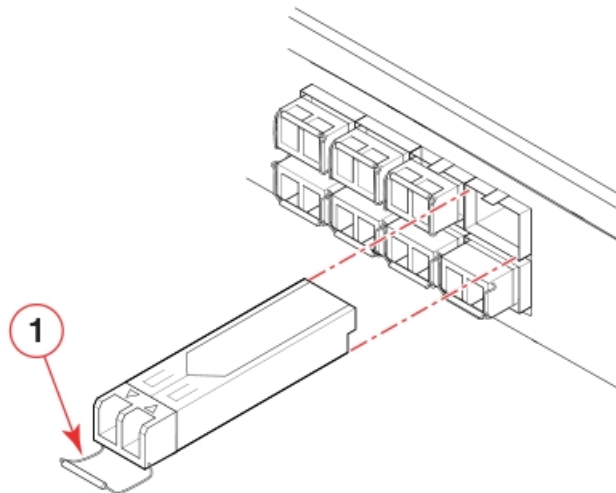
Figure 23. Installing an SFP+ transceiver with bail latch into blade port

1 - Bail

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

   - If transceiver has a pull tab (16 and 32 Gbps 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 transceiver has a bail latch mechanism (10 GbE 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 IBM-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. Also note the following:

- Each QSFP contains four individual 16 Gbps or 32 Gbps 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.

- Some QSFPs, such as the 4x16 Gbps 2 km QSFP, have an integrated cable attached. You do not need to install a separate cable.

To insert an 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 only be inserted 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.
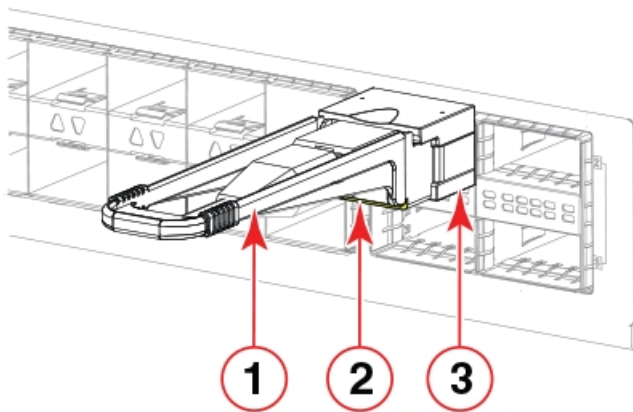
Figure 24. Installing a QSFP transceiver into blade port

> 1 - Pull tab
>
> 2 - QSFP cable
>
> 3 - QSFP transceiver

   The port LED initially blinks amber after installation, 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 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 an other type of transceiver into a regular QSFP transceiver. You may damage the cable as well as the transceiver.

3. Organize cables to avoid covering LEDs and air vents. Refer to "Cable management" on page 62.

Replacing a QSFP transceiver

About this task

The device supports only IBM-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. Also note the following:

- Each QSFP contains four individual 16 Gbps or 32 Gbps 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.
- Some QSFPs, such as the 4x16 Gbps 2 km QSFP, have an integrated cable attached. You do not need to install a separate cable.

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

Procedure

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

   Note: If your transceiver has an integrated cable, you cannot remove the cable.

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. As 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 only be inserted 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.
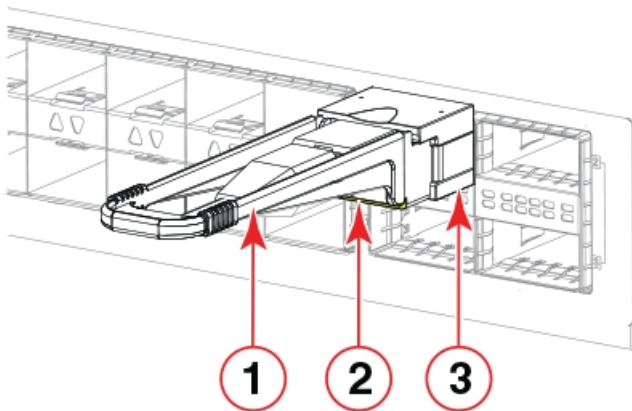
Figure 25. Installing a QSFP optical transceiver into blade port

   1 - Pull tab

   2 - QSFP cable

   3 - QSFP transceiver

   The port's status LED initially blinks amber after installation, 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 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. Refer to "Cable management" on page 62.

Verifying the operation of new transceivers

About this task

You can use the following commands to verify if the transceivers are working correctly:
- **sfpShow**
- **switchShow**
- **switchshow-slot** *slot*, where *slot* is slot number
- **switchshow -qsfp**
- **errDump**
- **fabricShow**

Example

For output examples and additional information on Fabric OS commands, refer to "Using monitoring commands" on page 85 and the *Fabric OS Command Reference*.

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

Chapter 6. Monitoring the switch

This switch 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 *Web Tools Administrator's Guide* and the *Fabric OS Administrator's Guide* for additional information.

This chapter provides the following information:
- "Interpreting port blade LEDs"
- "Interpreting extension blade LEDs" on page 72
- "Interpreting control processor blade LEDs" on page 74
- "Interpreting core routing blade LEDs" on page 77
- "Interpreting WWN card LEDs" on page 78
- "Interpreting power supply LEDs" on page 79
- "Interpreting fan assembly LEDs" on page 82
- "Interpreting POST and boot results" on page 84
- "Using monitoring commands" on page 85
- "Running diagnostic tests" on page 103

Interpreting port blade LEDs

Refer to the following illustration and table to interpret the LED patterns for the FC32-48 blade. The LED patterns will temporarily change during POST and other diagnostic tests.
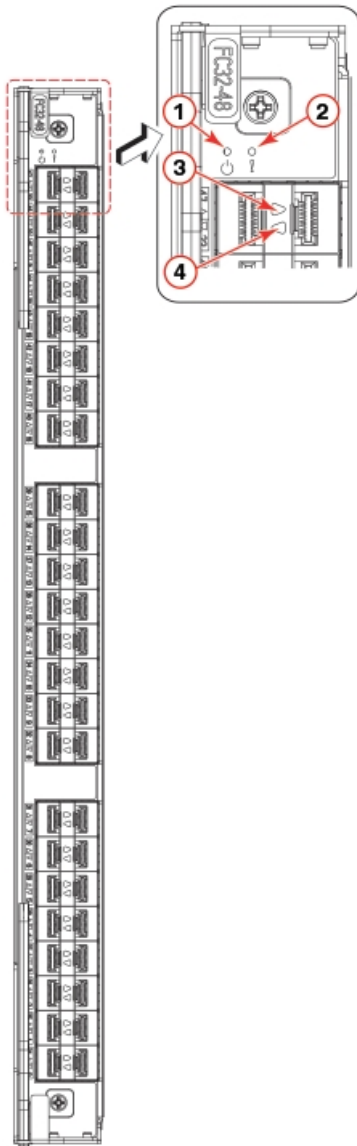
Figure 26. FC32-48 port blade LEDs

1 - Blade power LED

2 - Blade status LED

3 - Status LED for right FC port

4 - Status LED for left FC port

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

Table 10. Port blade LED descriptions

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

Table 10. Port blade LED descriptions (continued)

LED purpose	Color	Status	Recommended action
Status ⚠	No light (LED is off)	Blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	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)	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 exceeded.	Check for out-of-bounds environmental condition and correct it.
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.
		Connected device is configured in an offline state.	Verify the status of the connected device.
	Steady green	Port is online (connected to an external device) but has no traffic.	No action required.
	Slow-flashing green (on 1 second, then off 1 second)	Port is online but segmented, indicating a loopback plug or cable or an incompatible switch.	Verify that the correct device is attached to the chassis.
	Fast-flashing green (on 1/4 second, then off 1/4 second)	Port is in internal loopback (diagnostic).	No action required.
	Flickering green	Port is online, with traffic flowing through port.	No action required.
	Steady amber	Port is receiving light or signal carrier, but it is not online yet.	Reset 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 `portDisable` or `portCfgPersistentEnable` command.	Reset the port from the workstation using the `portEnable` or `portCfgPersistentEnable` command.
	Fast-flashing amber (on 1/2 second, then off 1/2 second)	Transceiver or port is faulty.	Change the transceiver or reset the switch from the workstation.
	Alternating green/amber	Port is beaconing.	No action.

Interpreting extension blade LEDs

Refer to the following illustration and table to interpret the LED patterns on the SX6 extension blade. The LED patterns may temporarily change during POST and other diagnostic tests.
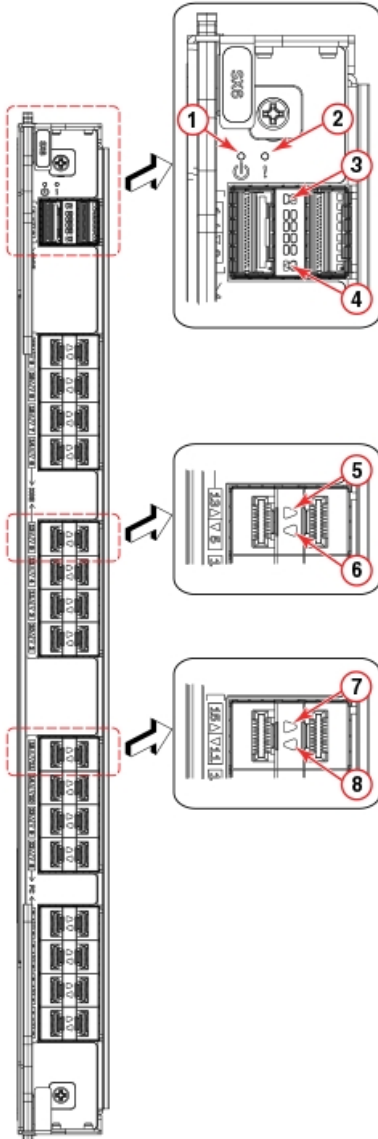
Figure 27. SX6 Extension blade LEDs

1 - Blade power LED

2 - Blade status LED

3 - Right 40 GbE QSFP (port 0) status LED

4 - Left 40 GbE QSFP (port 1) status LED

5 - Right 1 or 10 GbE port status LED

6 - Left 1 or 10 GbE port status LED

7 - Right FC port status LED

8 - Left FC port status LED

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

Table 11. Extension blade LED descriptions

LED purpose	Color	Status	Recommended action
Power	Steady green	Blade is operational.	No action required.
	No light (LED is off)	Blade is not powered on.	Ensure that the blade is firmly seated, with ejectors pushed in fully to center of blade and captive screw for each ejector fully tightened.
Status	No light (LED is off)	Blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	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. Blade is not seated correctly or is faulty.	Pull the blade out and reseat it. If LED continues to flash, replace the blade.
	Green	Blade is operational.	No action required.
GbE port status	No light (LED is off)	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 required.
	Blinking green	Port is online, with traffic flowing through port.	No action required.
	Steady amber	Transceiver or port has error or is faulty.	Change the transceiver or reset the switch from the workstation.

Table 11. 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.
		Connected device is configured in an offline state.	Verify the status of the connected device.
	Steady green	Port is online (connected to an external device) but has no traffic.	No action required.
	Slow-flashing green (on 1 second, then off 1 second)	Port is online but segmented, indicating a loopback plug or cable or an incompatible switch.	Verify that the correct device is attached to the chassis.
	Fast-flashing green (on 1/4 second, then off 1/4 second)	Port is in internal loopback (diagnostic).	No action required.
	Flickering green	Port is online, with traffic flowing through port.	No action required.
	Steady amber	Port is receiving light or signal carrier, but it is not online yet.	Reset 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 **portDisable** or **portCfgPersistentEnable** command.	Reset the port from the workstation using the **portEnable** or **portCfgPersistentEnable** command.
	Fast-flashing amber (on 1/2 second, then off 1/2 second)	Transceiver or port has error or is faulty.	Change the transceiver or reset the switch from the workstation.
	Alternating green and amber	Port is bypassed.	Reset the port from the workstation using the **portEnable** or **portCfgPersistentEnable** command.

Interpreting control processor blade LEDs

Refer to the following illustration and table to interpret the LED patterns on the CPX6 blade. The LED patterns may temporarily change during POST and other diagnostic tests.
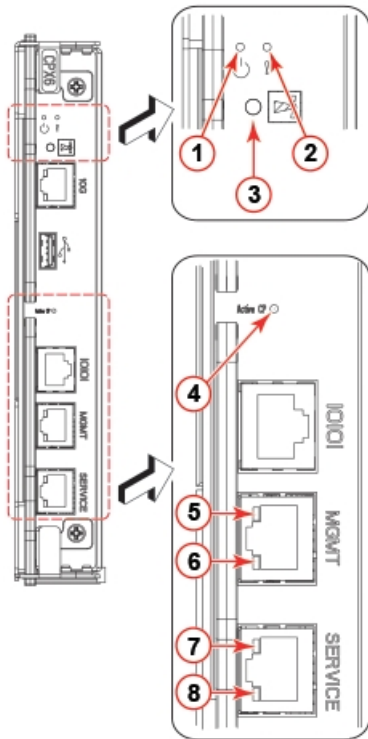
Figure 28. Control processor blade (CPX6)

   1 - Blade power LED

   2 - Blade status LED

   3 - Chassis beacon LED

   4 - Active (blue) CP LED

   5 - 10/100/1000 Mb/s Ethernet port (MGMT) link status LED

   6 - 10/100/1000 Mb/s Ethernet port (MGMT) link activity LED

   7 - 10/100/1000 Mb/s Ethernet port (SERVICE) link status LED

   8 - 10/100/1000 Mb/s Ethernet port (SERVICE) link activity LED

Note: The 10 Gbps Base-T RJ45 Ethernet port, shown below the blade beacon LED, is reserved for future use.

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

Table 12. CP blade LED descriptions

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

Table 12. CP blade LED descriptions (continued)

LED purpose	Color	Status	Recommended action
Attention ⚠	No light (LED is off)	CP blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	If 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)	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 exceeded.	Check for out-of-bounds environmental condition and correct it.
Beacon	Steady white	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 required.
Ethernet link status (10 Gb/s port)	No light (LED is off)	Either an Ethernet link is not detected, or the blade does not have incoming power.	Ensure that the blade has power, the Ethernet cable is firmly seated, and the connected device is functioning.
	Blinking green	Activity is present on link.	No action required.
Ethernet link activity (10 Gb/s port)	No light (LED is off)	No activity on link.	Ensure that the blade has power, the Ethernet cable is firmly seated, and the connected device is functioning.
	Blinking green	Activity is present on link.	No action required.
Active CP	Steady blue	Active CP blade.	No action required.
	No light (LED is off)	CP blade is either booting, negotiating to be active, or is the standby CP blade.	No action required.
Ethernet link status (10/100/1000 Mb/s port)	No light (LED is off)	Ethernet link speed is 10 Mb/s or link is not established.	Ensure that the CP has power. **NOTE:** To force a persistent Ethernet link speed, enter the **ifModeSet** command.
	LED is on	Ethernet link speed is 100/1000 Mb/s. Ethernet link is healthy and traffic is flowing through port.	No action required.

Table 12. CP blade LED descriptions (continued)

LED purpose	Color	Status	Recommended action
Ethernet link activity (10/100/1000 Mb/s port)	No light (LED is off)	No activity on link.	Ensure that the blade has power, the Ethernet cable is firmly seated, and the connected device is functioning.
	Blinking green	Activity is present on link.	No action required.

Interpreting core routing blade LEDs

Refer to the following illustration and table to interpret the LED patterns on the CR32-8 blade. The LED patterns may temporarily change during POST and other diagnostic tests.
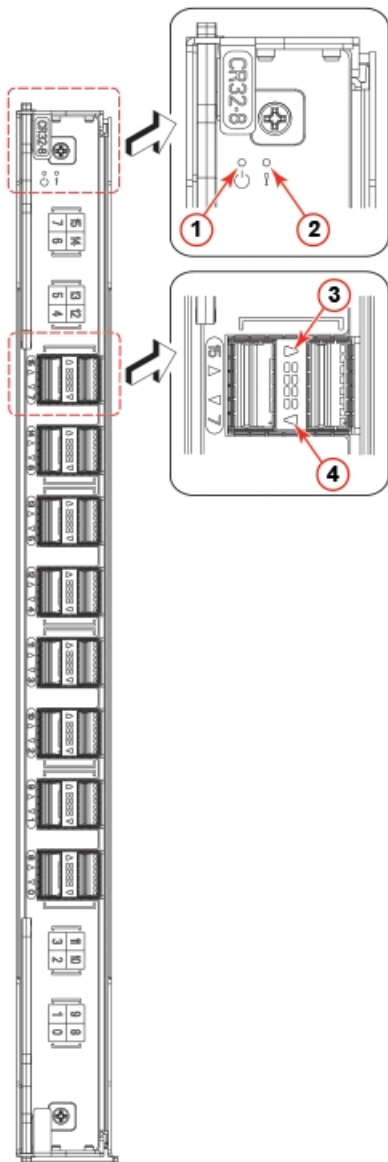

Figure 29. CR32-8 core routing blade LEDs

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 13. Core routing blade LED descriptions

LED purpose	Color	Status	Recommended action
Power ⏻	Steady green	Blade is on.	No action required.
	No light (LED is off)	Blade is not on.	Ensure that the blade is firmly seated and has power.
Status ⚠	No light (LED is off)	Blade is either healthy or does not have power.	Verify that the power LED is on.
	Steady amber	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 device.
	Slow-flashing amber (on 2 seconds, then off 2 seconds)	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 exceeded.	Check for out-of-bounds environmental condition and correct it.
QSFP port status LED	No light (LED is off)	No QSFP module, all four QSFP ports are disabled	No action needed if the QSFP is not installed or verify that the QSFP is fully inserted.
	Steady amber	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 device.
	Blinking amber	Port is disabled or faulted, FC link activity, segmented, loopback mode, also during transition between cable plug in and all four ports online.	Check for console messages or wait for all four ports to come online.
	Steady green	QSFP module is in and all ports are online.	No action needed.

Interpreting WWN card LEDs

Refer to the following illustration 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 bezel between the power supplies on the nonport side of the device. The LED patterns may temporarily change during POST and other diagnostic tests.
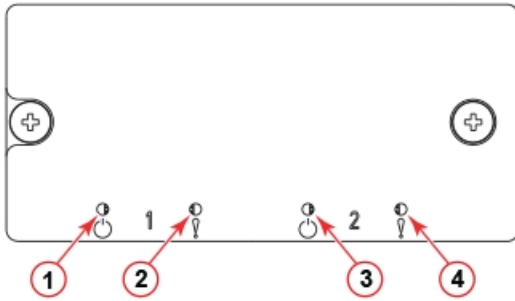
Figure 30. WWN card LEDs on bezel

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 14. WWN card LED descriptions

LED purpose	Color	Status	Recommended action
Power	No light (LED is off)	Card is not receiving power.	Ensure that device power supplies are firmly seated, power cables are connected, and that cables are connected to power source.
	Steady green	Card is receiving power.	No action required.
Status	No light (LED is off)	Card is either healthy or does not have power.	No action required.
	Steady amber	Card is faulty	Replace card.

Interpreting power supply LEDs

Refer to the following illustration and table to interpret the LED patterns on the power supply. The LED patterns may temporarily change during POST and other diagnostic tests. The SAN512B-6 can have up to four power supplies.
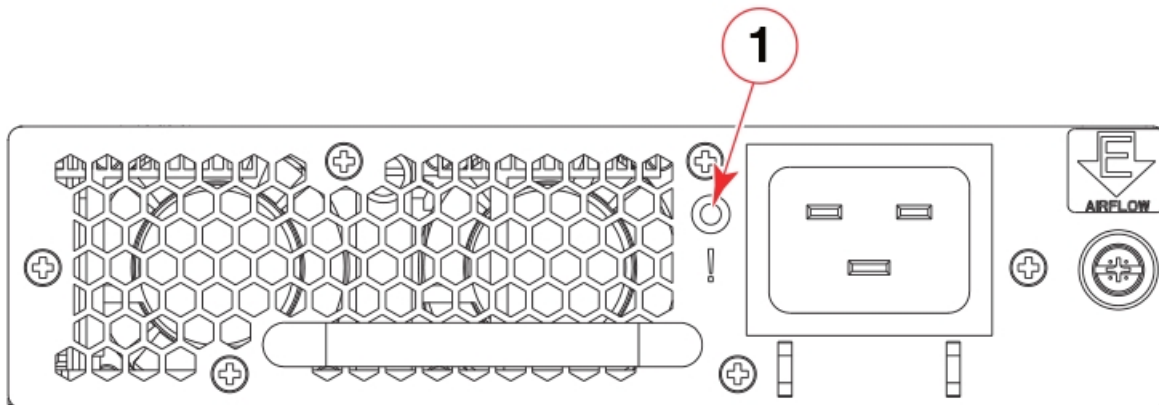
Figure 31. 2870 W AC Power supply LED

1 - Power status LED

The following table describes 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 15. 2870 W AC Power supply LED descriptions

LED purpose	Color	Status	Recommended action
Power status ⚠	No light (LED is off)	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, power cable is connected, and that power cable is connected to power source. Disconnect power cable from power supply, remove and reinsert power supply, and then reconnect power cable to restart. If status persists, replace power supply assembly.
	Steady green	Power supply has incoming power and is providing power to the device.	No action required.
	Flashing on one-half second, and then off one-half second.	AC power is disconnected from the power supply assembly, but additional power supply installed in device is powered on.	Check power connection at power supply, cable, and AC power source. If these check out, disconnect power cable from power supply, remove and reinsert power supply, and then reconnect power cable to restart. If status persists, replace power supply assembly.
	Flashing on two times, and then off 5 seconds.	48V is out of range.	Disconnect power cable from power supply, remove and reinsert power supply, and then reconnect power cable to restart. If status persists, replace power supply assembly. If status persists, replace power supply.
	Flashing on three times, and then off 5 seconds.	12V is out of range.	Disconnect power cable from power supply, remove and reinsert power supply, and then reconnect power cable to restart. If status persists, replace power supply assembly.
	Flashing on four times, and then off 5 seconds.	AC input is under voltage.	Verify voltage in power distribution unit (PDU) or system providing power to power supply assembly. Check cabling and voltage between PDU and switch. Correct the voltage as necessary. If correct voltage is verified, replace power supply assembly.

Table 16. 2870 W AC Power supply LED descriptions (continued)

LED purpose	Color	Status	Recommended action
Power status ⚠	Flashing on five times, and then off 5 seconds.	Power supply assembly fan is faulty.	Replace power supply.
	Flashing on six times, and then off 5 seconds.	Over temperature protection.	Check for blocked air flow or high ambient temperature at power supply. If status persists, replace power supply.
	Flashing on seven times, and then off 5 seconds.	Power supply is disabled.	Disconnect power cable from power supply, remove and reinsert power supply, and then reconnect power cable to restart. If status persists, replace power supply assembly. If status persists, replace power supply.

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, LED operation for the power supply will not indicate a fault.

Interpreting fan assembly LEDs

Refer to the following illustration and table to interpret the LED patterns on fan assemblies. The LED patterns may temporarily change during POST and other diagnostic tests. The SAN512B-6 has three fan assemblies.
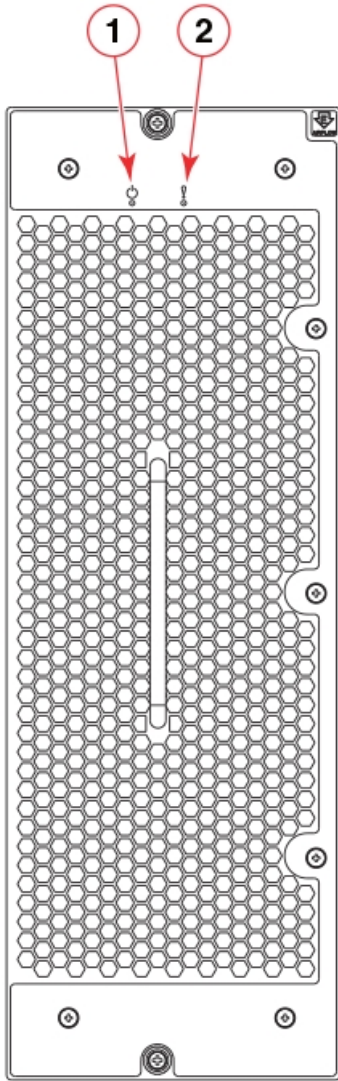
Figure 32. Fan assembly LEDs

1 - Power LED

2 - Status LED

Table 17. Fan assembly LED descriptions

LED purpose	Color	Status	Recommended action
Power ⏻	No light (LED is off)	Fan assembly does not have power.	Ensure that the fan assembly is firmly seated and has power.
	Steady green	Fan assembly has power.	No action required.

Table 17. Fan assembly LED descriptions (continued)

LED purpose	Color	Status	Recommended action
Status ⚠	No light (LED is off)	Fan assembly is either healthy or does not have power.	Ensure that the fan assembly has power.
	Steady amber	Fan assembly is being initialized or has a failure (full or partial).	Wait to see if fan fully initializes. If LED remains amber, replace the fan assembly.
	Slow-flashing amber (on 2 seconds, then off 2 seconds)	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)	Fan is disabled.	Run the `fanEnable` command to enable the fan.
	Fast-flashing amber (on ½ second, then off ½ second)	Environmental range exceeded.	Check for out-of-bounds environmental condition, resolve any problems, and reseat the unit. If the LED continues to flash, replace the unit.

Note: If LED operation indicates fault or no power, verify that fan is fully seated in chassis and that captive screws securing fan in chassis are fully tightened. If screws are loose, blowback from fans may unseat fan from chassis connectors.

Interpreting POST and boot results

The device performs 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` to reboot each CP individually) or `fastBoot` commands. The `fastBoot` command reboots the switches without running POST. If the active CP blade is rebooted, it fails over to the standby CP blade.

POST

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:

• 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 Administrator's 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 Message Reference*.

POST includes the following steps:

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

Boot

About this task

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

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

Using monitoring commands

This section provides example output and 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:
- switchShow
- chassisShow
- haShow
- tempShow
- psShow
- sensorShow
- sfpShow
- fanShow
- errDump
- HistoryShow
- SupportSave

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

chassisShow

The **chassisShow** 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.

```
chassis:admin> chassisshow
Chassis Family:         SAN512B-6
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:


SW BLADE  Slot: 5
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: 6
Header Version:         2
Power Consume Factor:   -420W
Power Usage:            -286W
Factory Part Num:       60-1003373-01
Factory Serial Num:     EAL0339L019
Manufacture:            Day: 23  Month: 10  Year: 2015
Update:                 Day: 12  Month:  3  Year: 2016
Time Alive:             63 days
Time Awake:             0 days
ID:

CORE BLADE  Slot: 7
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: 8
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: 9
Header Version:         2
Power Consume Factor:   -245W
Power Usage:            -154W
Factory Part Num:       60-1003200-07
Factory Serial Num:     DYJ0332L035
Manufacture:            Day: 26  Month:  9  Year: 2015
Update:                 Day: 15  Month:  3  Year: 2016
Time Alive:             80 days
Time Awake:             0 days
ID:


SW BLADE  Slot: 10
```

```
Header Version:        2
Power Consume Factor:  -245W
Power Usage:           -154W
Factory Part Num:      60-1003325-01
Factory Serial Num:    DYJ0339L00J
Manufacture:           Day:  4  Month: 10  Year: 2015
Update:                Day: 12  Month:  3  Year: 2016
Time Alive:            78 days
Time Awake:            0 days
ID:

SW BLADE  Slot: 11
Header Version:        2
Power Consume Factor:  -245W
Power Usage:           -154W
Factory Part Num:      60-1003325-01
Factory Serial Num:    DYJ0339L00J
Manufacture:           Day:  4  Month: 10  Year: 2015
Update:                Day: 12  Month:  3  Year: 2016
Time Alive:            78 days
Time Awake:            0 days
ID:

SW BLADE  Slot: 12
Header Version:        2
Power Consume Factor:  -245W
Power Usage:           -154W
Factory Part Num:      60-1003325-01
Factory Serial Num:    DYJ0339L00J
Manufacture:           Day:  4  Month: 10  Year: 2015
Update:                Day: 12  Month:  3  Year: 2016
Time Alive:            78 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:    DUC2M35L092
Manufacture:           Day: 25  Month:  8  Year: 2015
Update:                Day: 15  Month:  2  Year: 2016
Time Alive:            57 days
Time Awake:            2 days
ID:

POWER SUPPLY  Unit: 2
Power Source:          AC
Fan Direction:         Non-portside Intake
Header Version:        2
Power Consume Factor:  2870w
Factory Part Num:      23-0000161-01
Factory Serial Num:    DUC2M33L06V
Manufacture:           Day: 10  Month:  8  Year: 2015
Update:                Day: 15  Month:  2  Year: 2016
Time Alive:            68 days
Time Awake:            2 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:    DYL0329L04R
```

```
Manufacture:           Day:  3  Month: 10  Year: 15
Update:                Day: 15  Month:  2  Year: 2016
Time Alive:            68 days
Time Awake:            2 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:    DYL0329L02E
Manufacture:           Day: 10  Month: 10  Year: 15
Update:                Day: 15  Month:  2  Year: 2016
Time Alive:            68 days
Time Awake:            2 days
ID:

FAN  Unit: 3
Fan Direction:         Non-portside Intake
Header Version:        2
Power Consume Factor:  -300w
Factory Part Num:      60-1003203-03
Factory Serial Num:    DYL0329L055
Manufacture:           Day: 10  Month: 10  Year: 15
Update:                Day: 15  Month:  2  Year: 2016
Time Alive:            68 days
Time Awake:            2 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: BAF0289K00H
```

errDump and errShow

Use the **errShow** command 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.

Following is a partial example of **errDump** output.

```
chassis: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 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 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 this command to display the current status and speed of each installed fan. The following is an example of **fanShow** output.

```
chassis:admin> fanshow
Fan 1 is Ok, speed is 6993 RPM
Fan 2 is Ok, speed is 6993 RPM
```

haShow

Use this 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.

```
chassis: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 this 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.

```
chassis: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 this command to display the current status of installed power supplies. The
following is an example of **psShow** output.

```
chassisX6-8:admin> psshow
Power Supply #1 is OK
V10M03,   DUE2M03M04P  ,23-0000163-01,21,DELTA,ECD16020044  ,S1,DUE2M03M
Power Supply #2 is OK
V10L35,   DUC2M35L0CL  ,23-0000161-01,31,DELTA,ECD16020042  ,S5,DUC2M35L
Power Supply #3 is OK
V10L41,   DUC2M41L0JJ  ,23-0000161-01,32,DELTA,ECD16020042  ,S6,DUC2M41L
Power Supply #4 is OK
V10M03,   DUE2M03M04S  ,23-0000163-01,21,DELTA,ECD16020044  ,S1,DUE2M03M
```

sensorShow

Use this 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.

```
chassis: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
```

slotShow

Use this 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, IBM 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.

```
chassis: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    178    FC32-48       ENABLED
  5      AP BLADE    186    SX6           ENABLED
  6      SW BLADE    178    FC32-48       DISABLED
  7      CORE BLADE  176    CR32-8        ENABLED
  8      CORE BLADE  176    CR32-8        ENABLED
  9      SW BLADE    178    FC32-48       ENABLED
 10      UNKNOWN                          VACANT
 11      SW BLADE    178    FC32-48       ENABLED
 12      SW BLADE    178    FC32-48       ENABLED
switch:admin>
```

sfpShow

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

Following is example of **sfpShow** output.

```
chassis:admin> sfpshow

Slot  3/Port  0: --
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  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  5/Port  0: --
Slot  5/Port  1: --
Slot  5/Port  2: --
Slot  5/Port  3: --
Slot  5/Port  4: --
Slot  5/Port  5: --
Slot  5/Port  6: --
```

```
Slot  5/Port   7: --
Slot  5/Port   8: --
Slot  5/Port   9: --
Slot  5/Port  10: --
Slot  5/Port  11: --
Slot  5/Port  12: --
Slot  5/Port  13: --
Slot  5/Port  14: --
Slot  5/Port  15: --
Slot  6/Port   0: --
Slot  6/Port   1: --
Slot  6/Port   2: --
Slot  6/Port   3: --
Slot  6/Port   4: --
Slot  6/Port   5: --
Slot  6/Port   6: --
Slot  6/Port   7: --
Slot  6/Port   8: --
Slot  6/Port   9: --
Slot  6/Port  10: --
Slot  6/Port  11: --
Slot  6/Port  12: --
Slot  6/Port  13: --
Slot  6/Port  14: --
Slot  6/Port  15: --
Slot  9/Port   0: --
Slot  9/Port   1: --
Slot  9/Port   2: --
Slot  9/Port   3: --
Slot  9/Port   4: --
Slot  9/Port   5: --
Slot  9/Port   6: --
Slot  9/Port   7: --
Slot  9/Port   8: --
Slot  9/Port   9: --
Slot  9/Port  10: --
Slot  9/Port  11: --
Slot  9/Port  12: --
Slot  9/Port  13: --
Slot  9/Port  14: --
Slot  9/Port  15: --
Slot 10/Port   0: --
Slot 10/Port   1: --
Slot 10/Port   2: --
Slot 10/Port   3: --
Slot 10/Port   4: --
Slot 10/Port   5: --
Slot 10/Port   6: --
Slot 10/Port   7: --
Slot 10/Port   8: --
Slot 10/Port   9: --
Slot 10/Port  10: --
Slot 10/Port  11: --
Slot 10/Port  12: --
Slot 10/Port  13: --
Slot 10/Port  14: --
Slot 10/Port  15: --
Slot 11/Port   0: --
Slot 11/Port   1: --
Slot 11/Port   2: --
Slot 11/Port   3: --
Slot 11/Port   4: --
Slot 11/Port   5: --
Slot 11/Port   6: --
Slot 11/Port   7: --
Slot 11/Port   8: --
Slot 11/Port   9: --
Slot 11/Port  10: --
Slot 11/Port  11: --
Slot 11/Port  12: --
Slot 11/Port  13: --
Slot 11/Port  14: --
Slot 11/Port  15: --
Slot 12/Port   0: --
Slot 12/Port   1: --
Slot 12/Port   2: --
Slot 12/Port   3: --
Slot 12/Port   4: --
Slot 12/Port   5: --
Slot 12/Port   6: --
```

```
Slot 12/Port  7: --
Slot 12/Port  8: --
Slot 12/Port  9: --
Slot 12/Port 10: --
Slot 12/Port 11: --
Slot 12/Port 12: --
Slot 12/Port 13: --
Slot 12/Port 14: --
Slot 12/Port 15: --
Slot  5/Port 16: --
Slot  5/Port 17: --
Slot  5/Port 18: --
Slot  5/Port 19: --
Slot  5/Port 20: --
Slot  5/Port 21: --
Slot  5/Port 22: --
Slot  5/Port 23: --
Slot  5/Port 24: --
Slot  5/Port 25: --
Slot  5/Port 26: --
Slot  5/Port 27: --
Slot  5/Port 28: --
Slot  5/Port 29: --
Slot  5/Port 30: --
Slot  5/Port 31: --
Slot  6/Port 16: --
Slot  6/Port 17: --
Slot  6/Port 18: --
Slot  6/Port 19: --
Slot  6/Port 20: --
Slot  6/Port 21: --
Slot  6/Port 22: --
Slot  6/Port 23: --
Slot  6/Port 24: --
Slot  6/Port 25: --
Slot  6/Port 26: --
Slot  6/Port 27: --
Slot  6/Port 28: --
Slot  6/Port 29: --
Slot  6/Port 30: --
Slot  6/Port 31: --
Slot 10/Port 16: --
Slot 10/Port 17: --
Slot 10/Port 18: --
Slot 10/Port 19: --
Slot 10/Port 20: --
Slot 10/Port 21: --
Slot 10/Port 22: --
Slot 10/Port 23: --
Slot 10/Port 24: --
Slot 10/Port 25: --
Slot 10/Port 26: --
Slot 10/Port 27: --
Slot 10/Port 28: --
Slot 10/Port 29: --
Slot 10/Port 30: --
Slot 10/Port 31: --
Slot 11/Port 16: --
Slot 11/Port 17: --
Slot 11/Port 18: --
Slot 11/Port 19: --
Slot 11/Port 20: --
Slot 11/Port 21: --
Slot 11/Port 22: --
Slot 11/Port 23: --
Slot 11/Port 24: --
Slot 11/Port 25: --
Slot 11/Port 26: --
Slot 11/Port 27: --
Slot 11/Port 28: --
Slot 11/Port 29: --
Slot 11/Port 30: --
Slot 11/Port 31: --
Slot 12/Port 16: --
Slot 12/Port 17: --
Slot 12/Port 18: --
Slot 12/Port 19: --
Slot 12/Port 20: --
Slot 12/Port 21: --
Slot 12/Port 22: --
```

```
Slot 12/Port 23: --
Slot 12/Port 24: --
Slot 12/Port 25: --
Slot 12/Port 26: --
Slot 12/Port 27: --
Slot 12/Port 28: --
Slot 12/Port 29: --
Slot 12/Port 30: --
Slot 12/Port 31: --
Slot  5/Port 32: --
Slot  5/Port 33: --
Slot  5/Port 34: --
Slot  5/Port 35: --
Slot  5/Port 36: --
Slot  5/Port 37: --
Slot  5/Port 38: --
Slot  5/Port 39: --
Slot  5/Port 40: --
Slot  5/Port 41: --
Slot  5/Port 42: --
Slot  5/Port 43: --
Slot  5/Port 44: --
Slot  5/Port 45: --
Slot  5/Port 46: --
Slot  5/Port 47: --
Slot  6/Port 32: id (sw) Vendor: BROCADE    Serial No: JAF315420000114   Speed: 8,16,32_Gbps
Slot  6/Port 33: id (sw) Vendor: BROCADE    Serial No: JAF315410000NDL   Speed: 8,16,32_Gbps
Slot  6/Port 34: id (sw) Vendor: BROCADE    Serial No: JAF31542000010P   Speed: 8,16,32_Gbps
Slot  6/Port 35: id (sw) Vendor: BROCADE    Serial No: JAF315410000NNZ   Speed: 8,16,32_Gbps
Slot  6/Port 36: --
Slot  6/Port 37: --
Slot  6/Port 38: --
Slot  6/Port 39: --
Slot  6/Port 40: id (sw) Vendor: BROCADE    Serial No: HAA1121210791A2   Speed: 4,8,16_Gbps
Slot  6/Port 41: id (sw) Vendor: BROCADE    Serial No: HAF112150000W4H   Speed: 4,8,16_Gbps
Slot  6/Port 42: id (sw) Vendor: BROCADE    Serial No: HAF110530000GN1   Speed: 4,8,16_Gbps
Slot  6/Port 43: id (sw) Vendor: BROCADE    Serial No: HAF110530000GN4   Speed: 4,8,16_Gbps
Slot  6/Port 44: --
Slot  6/Port 45: --
Slot  6/Port 46: --
Slot  6/Port 47: --
Slot 10/Port 32: --
Slot 10/Port 33: --
Slot 10/Port 34: --
Slot 10/Port 35: --
Slot 10/Port 36: --
Slot 10/Port 37: --
Slot 10/Port 38: --
Slot 10/Port 39: --
Slot 10/Port 40: id (sw) Vendor: BROCADE    Serial No: HAA21505108WZH2   Speed: 4,8,16_Gbps
Slot 10/Port 41: --
Slot 10/Port 42: --
Slot 10/Port 43: --
Slot 10/Port 44: --
Slot 10/Port 45: --
Slot 10/Port 46: --
Slot 10/Port 47: --
Slot 11/Port 32: --
Slot 11/Port 33: --
Slot 11/Port 34: --
Slot 11/Port 35: --
Slot 11/Port 36: --
Slot 11/Port 37: --
Slot 11/Port 38: --
Slot 11/Port 39: --
Slot 11/Port 40: --
Slot 11/Port 41: --
Slot 11/Port 42: --
Slot 11/Port 43: --
Slot 11/Port 44: --
Slot 11/Port 45: --
Slot 11/Port 46: --
Slot 11/Port 47: --
Slot 12/Port 32: --
Slot 12/Port 33: --
Slot 12/Port 34: --
Slot 12/Port 35: --
Slot 12/Port 36: --
Slot 12/Port 37: --
Slot 12/Port 38: --
```

```
Slot 12/Port 39: --
Slot 12/Port 40: --
Slot 12/Port 41: --
Slot 12/Port 42: --
Slot 12/Port 43: --
Slot 12/Port 44: --
Slot 12/Port 45: --
Slot 12/Port 46: --
Slot 12/Port 47: --
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: --
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: --
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: --
Slot  8/Port 23: --
Slot  8/Port 24: --
Slot  8/Port 25: --
Slot  8/Port 26: --
Slot  8/Port 27: --
Slot  8/Port 28: --
Slot  8/Port 29: --
Slot  8/Port 30: --
Slot  8/Port 31: --
Slot  7/Port 32: --
Slot  7/Port 33: --
Slot  7/Port 34: --
Slot  7/Port 35: --
Slot  7/Port 36: --
Slot  7/Port 37: --
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  7/Port 48: --
Slot  7/Port 49: --
Slot  7/Port 50: --
Slot  7/Port 51: --
Slot  7/Port 52: --
Slot  7/Port 53: --
Slot  7/Port 54: --
Slot  7/Port 55: --
Slot  7/Port 56: --
Slot  7/Port 57: --
Slot  7/Port 58: --
Slot  7/Port 59: --
Slot  7/Port 60: id 15/0 (id) Vendor: FINISAR CORP   Serial No: DU8000J       Speed:
Slot  7/Port 61: id 15/1 (id) Vendor: FINISAR CORP   Serial No: DU8000J       Speed:
Slot  7/Port 62: id 15/2 (id) Vendor: FINISAR CORP   Serial No: DU8000J       Speed:
Slot  7/Port 63: id 15/3 (id) Vendor: FINISAR CORP   Serial No: DU8000J       Speed:
Slot  8/Port 32: id  8/0 (sw) Vendor: BROCADE        Serial No: ZTA11539000007E  Speed: 32_Gbps
Slot  8/Port 33: id  8/1 (sw) Vendor: BROCADE        Serial No: ZTA11539000007E  Speed: 32_Gbps
Slot  8/Port 34: id  8/2 (sw) Vendor: BROCADE        Serial No: ZTA11539000007E  Speed: 32_Gbps
Slot  8/Port 35: id  8/3 (sw) Vendor: BROCADE        Serial No: ZTA11539000007E  Speed: 32_Gbps
Slot  8/Port 36: --
Slot  8/Port 37: --
Slot  8/Port 38: --
Slot  8/Port 39: --
Slot  8/Port 40: --
Slot  8/Port 41: --
Slot  8/Port 42: --
Slot  8/Port 43: --
Slot  8/Port 44: --
Slot  8/Port 45: --
Slot  8/Port 46: --
Slot  8/Port 47: --
Slot  8/Port 48: --
Slot  8/Port 49: --
Slot  8/Port 50: --
Slot  8/Port 51: --
Slot  8/Port 52: --
Slot  8/Port 53: --
Slot  8/Port 54: --
Slot  8/Port 55: --
Slot  8/Port 56: --
Slot  8/Port 57: --
Slot  8/Port 58: --
Slot  8/Port 59: --
Slot  8/Port 60: id 15/0 (sw) Vendor: BROCADE   Serial No: ZTA11539000006R  Speed: 32_Gbps
Slot  8/Port 61: id 15/1 (sw) Vendor: BROCADE   Serial No: ZTA11539000006R  Speed: 32_Gbps
Slot  8/Port 62: id 15/2 (sw) Vendor: BROCADE   Serial No: ZTA11539000006R  Speed: 32_Gbps
Slot  8/Port 63: id 15/3 (sw) Vendor: BROCADE   Serial No: ZTA11539000006R  Speed: 32_Gbps
GE: Slot  3/Port  0: --
GE: Slot  3/Port  1: --
GE: Slot  3/Port  2: --
GE: Slot  3/Port  3: --
GE: Slot  3/Port  4: --
GE: Slot  3/Port  5: --
GE: Slot  3/Port  6: --
GE: Slot  3/Port  7: --
GE: Slot  3/Port  8: --
GE: Slot  3/Port  9: --
GE: Slot  3/Port 10: --
GE: Slot  3/Port 11: --
GE: Slot  3/Port 12: --
GE: Slot  3/Port 13: --
GE: Slot  3/Port 14: --
GE: Slot  3/Port 15: --
GE: Slot  3/Port 16: --
GE: Slot  3/Port 17: --
GE: Slot  4/Port  0: --
GE: Slot  4/Port  1: --
GE: Slot  4/Port  2: --
GE: Slot  4/Port  3: --
GE: Slot  4/Port  4: --
```

```
GE: Slot  4/Port  5: --
GE: Slot  4/Port  6: --
GE: Slot  4/Port  7: --
GE: Slot  4/Port  8: --
GE: Slot  4/Port  9: --
GE: Slot  4/Port 10: --
GE: Slot  4/Port 11: --
GE: Slot  4/Port 12: --
GE: Slot  4/Port 13: --
GE: Slot  4/Port 14: --
GE: Slot  4/Port 15: --
GE: Slot  4/Port 16: --
GE: Slot  4/Port 17: --
GE: Slot  9/Port  0: --
GE: Slot  9/Port  1: --
GE: Slot  9/Port  2: --
GE: Slot  9/Port  3: --
GE: Slot  9/Port  4: --
GE: Slot  9/Port  5: --
GE: Slot  9/Port  6: --
GE: Slot  9/Port  7: --
GE: Slot  9/Port  8: --
GE: Slot  9/Port  9: --
GE: Slot  9/Port 10: --
GE: Slot  9/Port 11: --
GE: Slot  9/Port 12: --
GE: Slot  9/Port 13: --
GE: Slot  9/Port 14: --
GE: Slot  9/Port 15: --
GE: Slot  9/Port 16: --
GE: Slot  9/Port 17: --
```

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 output has been truncated to reduce duplicate information.

```
chassisSAN512B-6:admin> switchshow
switchshow>     switchshow
switchName:     switch1_SW
switchType:     166.0
switchState:    Online
switchMode:     Native
switchRole:     Subordinate
switchDomain:   1
switchId:       fffc01
switchWwn:      10:00:00:25:f8:f1:15:80
zoning:         ON (MPR4k)
switchBeacon:   OFF
FC Router:      OFF
FC Router BB Fabric ID: 128
Address Mode:   0
Fabric Name:    BB1
HIF Mode:       OFF

Index Slot Port Address Media  Speed   State    Proto
==============================================================
    0   3    0  010000   id    N32   Online    FC  F-Port  86:0d:00:11:0d:06:00:00
    1   3    1  010100   id    N32   Online    FC  F-Port  86:24:00:11:0d:07:00:00
    2   3    2  010200   id    N32   Online    FC  F-Port  86:0c:00:11:0d:05:00:00
    3   3    3  010300   id    N32   Online    FC  F-Port  86:25:00:11:0d:08:00:00
    4   3    4  010400   id    N32   Online    FC  F-Port  21:00:00:24:ff:90:55:30
    5   3    5  010500   id    N32   Online    FC  F-Port  21:00:00:24:ff:90:55:31
    6   3    6  010600   id    N32   Online    FC  F-Port  21:00:00:24:ff:90:55:9e
    7   3    7  010700   id    N32   ONline    FC  F-Port  21:00:00:24:ff:90:55:9f
    8   3    8  010800   id    N32   Online    FC  E-Port  10:00:00:27:f8:f2:c8:b8
    9   3    9  010900   id    N32   Online    FC  E-Port  10:00:00:27:f8:f2:c6:b8 "ras010" (Trunk master)
   10   3   10  010a00   id    N32   Online    FC  E-Port  10:00:00:27:f8:f2:c7:b8 "ras010" (Trunk master)
   11   3   11  010b00   id    N32   Online    FC  E-Port  10:00:00:27:f8:f2:c8:b8 "ras010" (Trunk master)
   12   3   12  010c00   --    N32   No_Module FC
   13   3   13  010d00   --    N32   No_Module FC
   14   3   14  010e00   --    N32   No_Module FC
   15   3   15  010f00   --    N32   No_Module FC
  128   3   16  018000   --    N32   No_Module FC
  129   3   17  018100   --    N32   No_Module FC
  130   3   18  018200   id    N32   Online    FC  E-Port  10:00:50:eb:1a:f6:6c:68 "ras006" (Trunk master)
  131   3   19  018300   id    N32   Online    FC  E-Port  10:00:51:ee:1a:f6:6c:68 "ras006" (Trunk master)
```

```
        132   3   20   018400   id   N32   Online     FC  E-Port  10:00:52:ee:1a:f6:6c:68 "ras006" (Trunk master)
---------------output truncated ----------------------------------------------------------------------------------
```

supportSave

Use this 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.

Following is an example of **supportSave** output. This output assumes that the **supportFtp** 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.

```
chassis: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 this 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

Following is an example of **tempShow** output.

```
chassisX6-8:admin> tempshow
Sensor  Slot    Sensor  State          Centigrade    Fahrenheit
  ID            Index
====================================================================
  1       3       0     Ok               30            86
  2       3       1     Ok               53           127
  3       4       0     Ok               31            87
  4       4       1     Ok               50           122
  5       5       0     Ok               29            84
  6       5       1     Ok               29            84
  7       5       2     Ok               40           104
  8       5       3     Ok               46           114
  9       6       0     Ok               29            84
 10       6       1     Ok               30            86
 11       6       2     Ok               42           107
 12       6       3     Ok               46           114
 13       1       0     Ok               41           105
 14       1       1     Ok               36            96
 15       1       2     Ok               38           100
 16       1       3     Ok               36            96
 17       2       0     Ok               37            98
 18       2       1     Ok               32            89
 19       2       2     Ok               35            95
 20       2       3     Ok               33            91
 21       7       0     Ok               30            86
 22       7       1     Ok               58           136
 23       7       2     Ok               51           123
 24       7       3     Ok               48           118
 25       7       4     Ok               43           109
 26       8       0     Ok               30            86
 27       8       1     Ok               59           138
 28       8       2     Ok               52           125
 29       8       3     Ok               48           118
 30       8       4     Ok               42           107
 31       9       0     Ok               31            87
 32       9       1     Ok               55           131
 33      10       0     Ok               29            84
 34      10       1     Ok               30            86
 35      10       2     Ok               42           107
 36      10       3     Ok               48           118
 37      11       0     Ok               29            84
 38      11       1     Ok               30            86
 39      11       2     Ok               40           104
 40      11       3     Ok               46           114
 41      12       0     Ok               29            84
 42      12       1     Ok               30            86
 43      12       2     Ok               43           109
 44      12       3     Ok               50           122
```

Note the following 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 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 Administrator's 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 with long wavelength media and copper media.

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

Chapter 7. Port and Extension Blades

This chapter provides the following information:
- "Port blade overview"
- "Extension blade overview" on page 107
- "Precautions specific to the blade" on page 110
- "Faulty blade indicators" on page 111
- "Removing a blade" on page 111
- "Installing a blade" on page 114
- "Verifying blade operation" on page 115

Port blade overview

The FC32-48 port blade contains 48 ports capable of Fibre Channel (FC) speeds up to 32 Gbps. Port blades connect to core routing blades through backplane ports. Each core routing blade provides 96 backplane ports for port blade connection. The port blade supports port-based in-flight encryption/decryption and compression/decompression.

Port and extension blades can be mixed in device slots 3-6 and 9-12, but CR32-8 blades must be installed in slots 7 and 8. Up to eight hot-swappable port blades can be installed in a single chassis to provide up to 384 32 Gbps FC ports.

The following optics can be installed in the blade's FC ports:
- 32 Gbps SFP+ transceivers supporting speeds 8,16, and 32 Gbps.
- 16 Gbps SFP+ transceivers supporting speeds of 4, 8, and 16 Gbps.
- 10 Gbps SFP+ transceivers supporting 10 Gbps.

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, refer to "Interpreting port blade LEDs" on page 69.

FC32-48 blade port numbering and trunking

The following illustration shows how ports are numbered and port trunking groups are arranged on the blade.
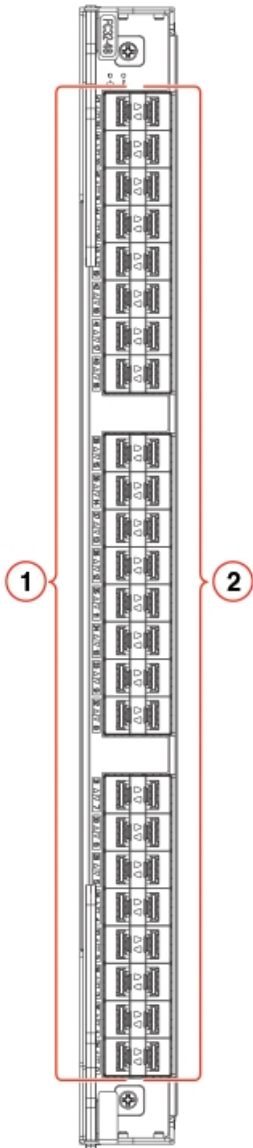
Figure 33. FC32-48 blade port numbering

1 - FC ports 0–23 (numbered bottom to top)

2 - FC ports 24–47 (numbered bottom to top)

Following are 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.

- 0–7
- 8–15
- 16–23
- 24–31
- 32–39
- 40–47

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 1–8 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 switches (or adapters in the case of F_Port trunking). 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 SX6 Extension blade is intended as an extension platform to support Fibre Channel (FC), FICON, and IP based storage data flows. IBM Extension enables you to use the existing IP wide area network (WAN) infrastructure to connect Fibre Channel and IP fabrics. 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-6 or with a 7840 Extension Switch.

Port and extension blades can an be mixed in in device slots 3–6 and 9–12, but CR32-8 blades must be installed in slots 7 and 8. You can install a maximum of four SX6 blades in the device.

The SX6 blade have the following external ports:
- 16 Fibre Channel (FC) SFP+ ports that support Fibre Channel Routing Services and connection to FC devices for the IBM Extension feature. These ports support 32 Gbps transceivers operating at 8, 16, or 32 Gbps, 16 Gbps transceivers operating at 4, 8, or 16 Gbps, and 10 Gbps transceivers operating at fixed 10 Gbps. FC ports can autonegotiate speeds with connecting ports.
- 16 10 or 1 GbE SFP+ and two 40 GbE QSFP ports. These ports allow connection of blades to IP WANs and allow Fibre Channel and IP I/O to pass through the IP WAN using extension tunnels. The 10 or 1 GbE ports operate at 10 Gbps or 1 Gbps fixed speeds with appropriate 10 Gbps or 1 Gbps transceivers installed. The 40 GbE QSFP ports operate at 40 Gbps fixed speed.

Extension blades have the following LED indicators:
- Green blade power LED
- Amber blade status LED
- Bicolor green/amber 40 GbE and 10 or 1 GbE port status LEDs
- Bicolor green/amber FC port status LEDs

For details on interpreting LED operation, refer to "Interpreting extension blade LEDs" on page 72.

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 Administrator's Guide*.

- Connectivity with another SX6 extension blade or the 7840 Extension Switch.
- Multiple logical extension tunnels with maximum tunnel bandwidth up to 40 Gbps (FCIP mode) allow for scalable connections between sites.
- Extension trunking feature allows multiple IP source and destination address pairs (defined as circuits) via multiple 10 GbE or 40 GbE interfaces to provide 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.
- ARL feature meets minimum bandwidth guarantee for each tunnel while making the full utilization of the available network bandwidth without adverse throughput performance impact at 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 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 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 deliver, latency, and other network conditions. It helps 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 10 Gbps, whether configured on a 10 GbE or 40 GbE port.
- FCIP and hybrid mode (FC + IP) modes.

SX6 blade port numbering and trunking

The following illustration shows how ports are numbered on the blade. Ports are labeled as 10GE, 40 GbE, and FC on the blade.
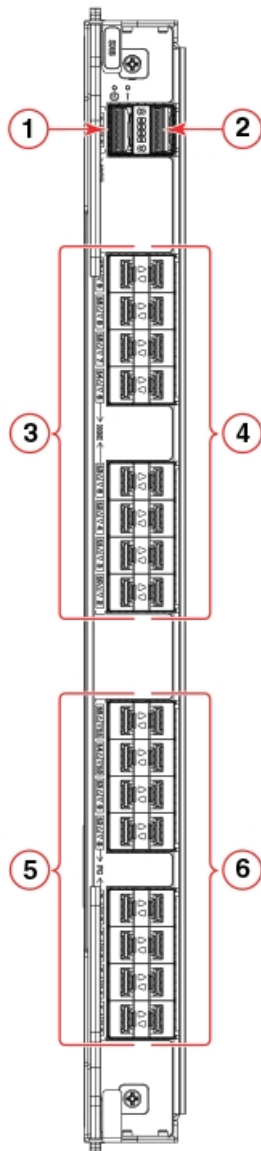
Figure 34. SX6 extension blade port numbering

1 - 40 GbE port 0

2 - 40 GbE port 1

3 - 10/1 GbE ports 2–9 (bottom to top)

4 - 10/1 GbE ports 10–17 (bottom to top)

5 - FC ports 0, 1, 2, 3, 8, 9, 10, 11 (bottom to top)

6 - FC ports 4, 5. 6, 7, 12, 13, 14, 15 (bottom to top)

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 1–8 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 switches (or adapters in the case of F_Port trunking). 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 Administrator's Guide*.

Precautions specific to the blade

This topic describes how to remove and replace a port or extension blade.

Observe the following precautions when replacing these blades:

- The SX6 extension and FC32-48 port blade can only be installed in SAN512B-6 and SAN256B-6 switches.
- 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 3–6 and 9–12. Slots 7 and 8 are reserved for CR32-8 blades. These blades cannot be installed in other slots as guide pins and connectors in each slot allow only specific blade types.

CAUTION:
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 use ejector handles to push the blade into or pull the blade out from a slot.

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.
* errShow - 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, refer to "Using monitoring commands" on page 85 and the *Fabric OS Command Reference*.

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

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
* #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 device, refer to Chapter 5, "Installing Transceivers and Cables," on page 57.

Removing a blade

Before you begin

* 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

Use the following steps to remove a port or extension blade from the unit while 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 a 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-xxxxxx-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 *Fabric OS Command Reference* 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 screws disengage from 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 35. Removing and replacing 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. Rotate the ejector handles away from center of blade completely - approximately 45 degrees. Do not support the blade using 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. Align the blade in the slot with the flat metal side of the blade at the bottom (blade power and status LEDs are on the left).
   b. Carefully push the blade into the slot using your thumbs or fingers on the blade faceplate. 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.

      CAUTION:
      To avoid damaging blade and chassis, do not use ejector handles to push the blade into or pull the blade out from a slot.
   c. Continue pushing the blade into slot using your thumbs or fingers until the ejectors move in towards the blade slightly indicating that the connectors are engaged.
   d. 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.
4. Tighten the captive for each ejector using a #1 Phillips screwdriver. As blade seats completely, amber blade status and green blade power LEDs illuminate.

   Note: Be sure that captive screws are tightened. If not, high pressure from fan operation may unseat 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. The status LED should then display green to indicate that the blade has power. If the status LED remains amber, the board may 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.
6. Install the transceivers and cables in the blade.
7. Group and route the cables through the cable management comb.
8. Replace the chassis door. The door is required to meet EMI compliance.

Verifying blade operation

About this task

Perform the following tasks to verify operation of blade:

Procedure

1. Check the LED indicators on the blade's front panel. For information on interpreting LED patterns, refer to one of the following sections of this guide:
   - "Interpreting port blade LEDs" on page 69.
   - "Interpreting extension blade LEDs" on page 72.
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 IBM 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, refer to "Using monitoring commands" on page 85 and the *Fabric OS Command Reference*.

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

Chapter 8. Core Routing Blades

This chapter provides the following information:

Core routing blade overview

Two CR32-8 core routing blades are installed in device slots 7 and 8. Core routing blades contain ASICs that allow switching between up to eight port blades. Core routing blades connect to port blades through Fibre Channel backplane ports. Each core switch blade provides 192 backplane ports for port blade connections. Each core routing blade also has 64 front-end ports that are mapped to 16 QSFP transceivers on the blade's front panel. These transceivers can create ICL connections for up to nine separate switches in a full-mesh topology and 12 switches in a core-to-edge topology. Each transceiver provides four 32 Gbps FC links for a total of 128 Gbps per connection. This core switch blade is compatible only with the SAN512B-6.

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, refer to "Interpreting core routing blade LEDs" on page 77.

CR32-8 port numbering

The following illustration shows how ports are numbered and port trunking groups are arranged on the blade.
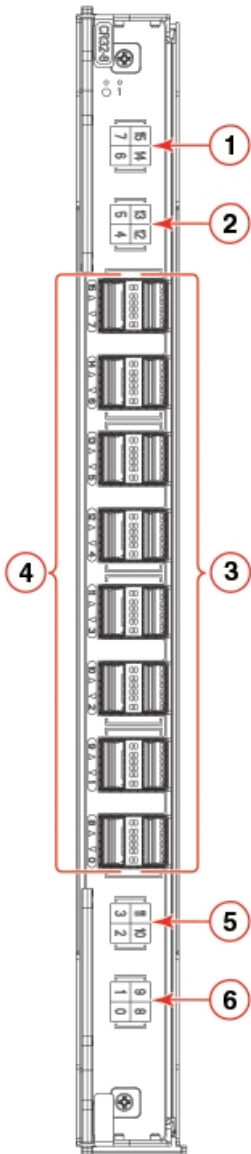
Figure 36. CR32-8 core routing blade port numbering

1 - Map showing ports 6, 7, 14, and 15

2 - Map showing ports 4, 5, 12, and 13

3 - QSFP ports 8-15 (bottom to top)

4 - QSFP ports 0-7 (bottom to top)

5 - Map showing ports 2, 3, 10, 11

6 - Map showing ports 0, 1, 8, 9

QSFP ports are numbered from 0 through 7 on the left side from bottom to top and 8 through 15 on the right side from bottom to top. For information on supported QSFP transceivers, refer to "Supported transceivers and cables" on page 57.

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 to indicate ports belonging to the same trunking groups.

Each numbered QSFP port on the blade provides four 32 Gbps FC ports to obtain a total link speed of 128 Gbps. The following table shows the mappings from the numbered QSFP ports on the face of the core blade to the individual FC port numbers.

Table 18. External port to `slotShow` port mapping for core blades

External port number	FC port numbers	External port number	FC port numbers
0	0-3	8	32-35
1	4-7	9	36-39
2	8-11	10	40-43
3	12-15	11	44-47
4	16-19	12	48-51
5	20-23	13	52-55
6	24-27	14	56-59
7	28-31	15	60-63

ICL trunking groups

Multiple switches can be connected through inter-chassis links (ICLs) between 4x32-Gbps QSFPs on core routing blades installed in these devices. Each QSFP connection between two devices provides 128 Gbps 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 maintaining in-order delivery of data and avoiding I/O retries if one link within the trunk fails.

Each QSFP provides four 32 Gbps FC ports. 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 has to be formed from individual FC ports in different QSFP ports. These QSFP ports 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 using ICLs.

Each CR32-8 blade on theSAN512B-6 has four ICL trunking groups consisting of the following QSFP ports.
- 0, 1, 8, and 9
- 2, 3, 10, and 11
- 4, 5, 12, and 13
- 6, 7, 14, and 15

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 GEN6 and GEN5 switches, refer to the "Inter-Chassis Links" in the *Fabric OS Administrator's Guide*.

For more information recommended cabling topologies for ICLs, refer to "ICL cabling configurations."

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.

ICL cabling configurations

The following figures show acceptable cabling configurations for the inter-chassis link (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 switches. This provides ICL trunking between switches, ensuring redundancy. Parallel connections between core blades are recommended.

The following are the maximum number of directors that can e connected using 4x32-Gbps quad SFP (QSFP) inter-chassis links (ICLs):

• Up to nine X6 (GEN6) directors can be connected in a full-mesh topology.
• Up to six directors are recommended in a full-mesh topology if connecting a mixture of X6 and GEN5 directors.
• Up to 12 directors can be connected in a core-to-edge topology.
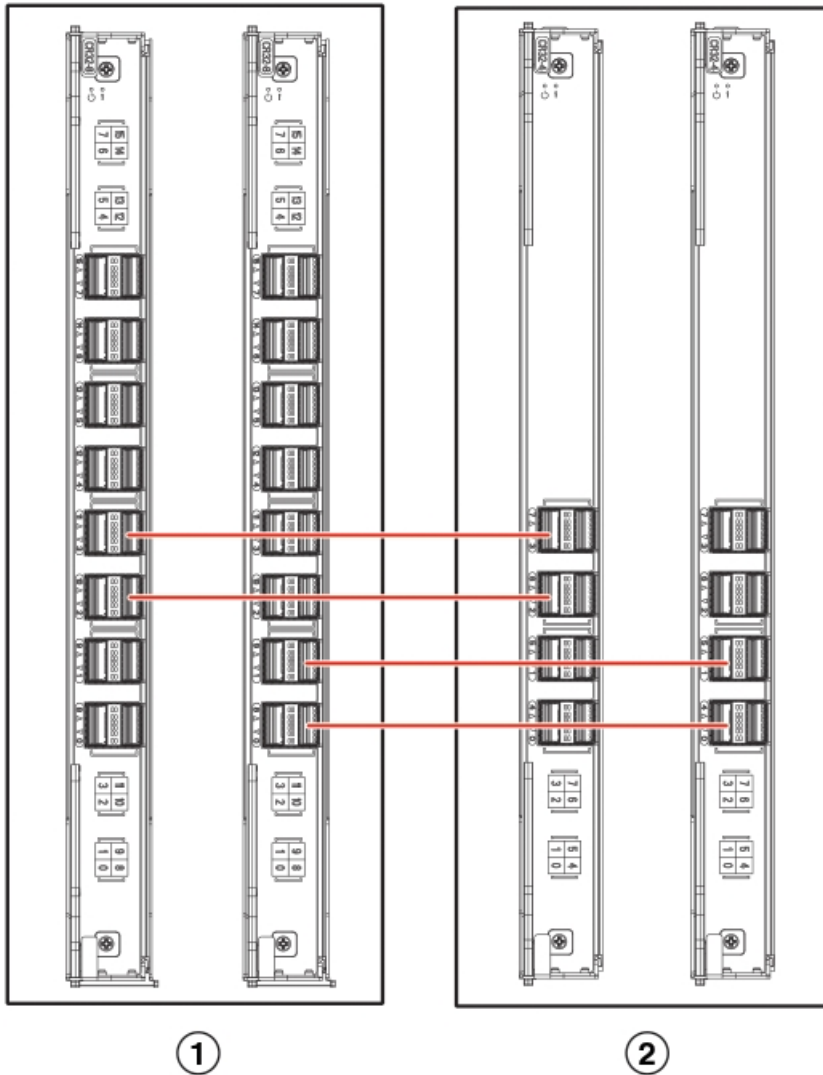
Figure 37. ICL cable connections (sample configuration)

> 1 - Chassis 1 - SAN512B-6
> 2 - Chassis 2 - SAN256B-6

To connect multiple switches 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 switches, additional ICL connections should be added in pairs (one on each core blade). ICLs and ISLs are not concurrently supported between a single pair of switches.

The switch can be connected in a core-edge configuration. The following figure shows two core and four edge devices. Although SAN512B-6 switches are shown in the figure, the device can be either SAN256B-6 or SAN512B-6 switches. 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.
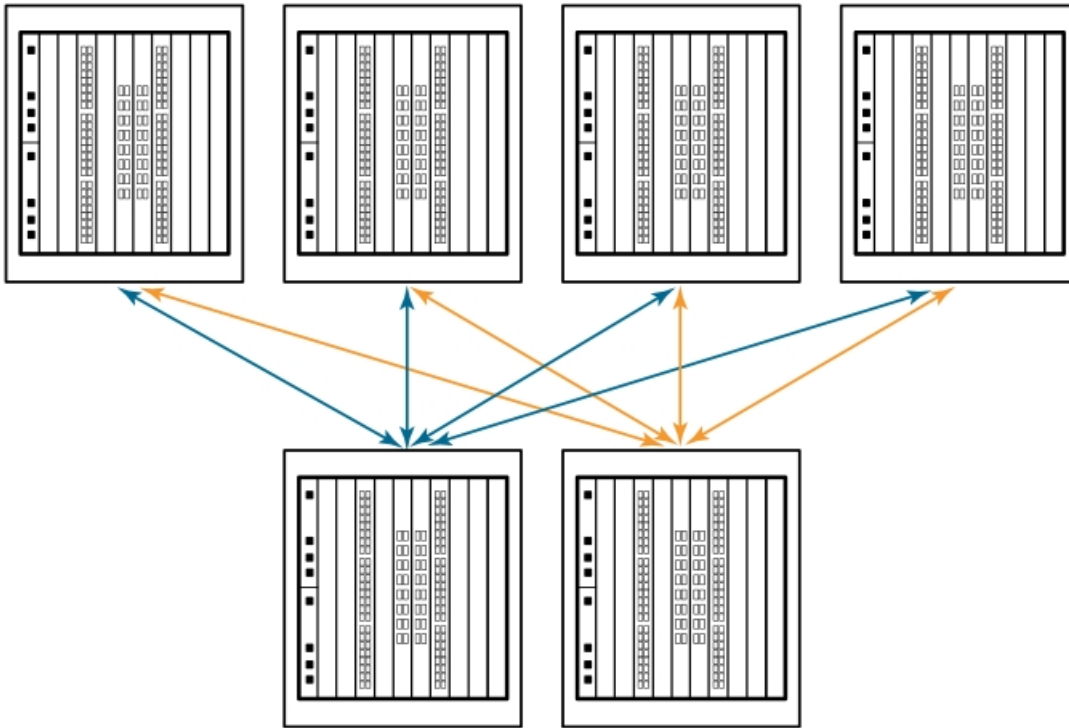
Figure 38. Core-edge ICL topology

SAN512B-6 and SAN384B-2 or SAN768B-2 can also be connected in a full-mesh configuration.

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

- ICL topologies
- ICL trunking
- Configuring ICLs between SAN512B-6 and SAN256B-6
- Configuring ICLs between SAN512B-6 or SAN256B-6 and SAN384B-2 or SAN768B-2 models

Precautions specific to the blade

This document describes how to remove and replace a core routing blade.

Observe the following precautions when replacing these blades:

- The CR32-8 core routing blade is compatible only with the SAN512B-6 .
- 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 core routing blades only in slots 7-8. 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 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 the **errShow** output or **errShowAll** command 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

Refer to "Using monitoring commands" on page 85 and the *Fabric OS Command Reference* for output examples and additional information on Fabric OS commands.

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

Time and items required

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

- Electrostatic discharge (ESD) grounding strap
- Workstation computer
- Replacement blade or filler panel
- #1 Phillips screwdriver
- QSFP transceivers (as needed)
- Optical cables (as needed)

Note: For information about the transceivers that are qualified for this device, refer to Chapter 5, "Installing Transceivers and Cables," on page 57.

Removing a core routing blade

About this task

Complete the following steps to remove the core routing blade.

Note: The device continues to operate while a core routing blade is being replaced.

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 a 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-xxxxxx-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. 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 #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 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 39. Removing and installing a core routing 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 core routing blade

About this task

Complete the following steps to replace the core routing blade.

Note: The device continues to operate while a core routing blade is being replaced.

Procedure

1. If a protective sleeve is covering the blade connectors remove the sleeve.
2. Rotate the ejector handles away from center of blade completely - approximately 45 degrees. Do not support the blade using 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. Align the blade in the slot with the flat metal side of the blade at the bottom (blade power and status LEDs are on the left).
   b. 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 use ejector handles to push the blade into or pull the blade out from a slot.

      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.
   c. Continue pushing with your thumbs or fingers until the ejectors move in towards the blade slightly indicating that the connectors are engaged.
   d. 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.
4. Tighten the captive for each ejector using a #1 Phillips screwdriver. As blade seats completely, amber blade status and green blade power LEDs illuminate.

   Note: Be sure that captive screws are tightened. If not, high pressure from fan operation may unseat 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, 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: 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 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. Reinstall the chassis door. The door is required to meet EMI compliance.

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, refer to "Interpreting core routing blade LEDs" on page 77. 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, 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, refer to "Using monitoring commands" on page 85 and the *Fabric OS Command Reference*.

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

Chapter 9. Control Processor Blades

This chapter provides the following information:
- "Control processor blade overview"
- "Precautions specific to the blade" on page 131
- "Blade fault indicators" on page 131
- "Blade replacement task guide" on page 132
- "Time and items required for replacement" on page 133
- "Preparing for replacement" on page 133
- "Replacing a CP blade" on page 134
- "Verifying blade operation" on page 144

Control processor blade overview

The CPX6 control processor blades are half the slot height of other SAN512B-6 blades. Two CPX6 control processor blades are stacked vertically in the half slots on the left side 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 RJ45 port.
- 10/100/1000Base-T RJ45 Ethernet port for device management and configuration.

    Note: Half duplex operation is not supported at 10 or 100 Mbps speed.
- 10/100/1000Base-T RJ45 Ethernet port for service.
- 10 Gbps Base-T RJ45 Ethernet port (reserved for future use).

The two 10/100/1000 Mbps 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 beneath 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 into the chassis and enter the **chassisbeacon** command as follows:

- To enable beaconing:

```
chassis:admin> chassisbeacon 1
chassisBeacon success 1
```

- To disable beaconing:

```
chassis:admin> chassisbeacon 0
chassisBeacon success 0
```

- To display beaconing status:

Note: *Value* in the following example shows 0 when beaconing is off and 1 if beaconing is on.

```
chassis:admin> chassisbeacon
Value = 0
```

For details on LED location and operation, refer to "Interpreting control processor blade LEDs" on page 74.

CPX6 port identification

The following illustration identifies connector ports on the CPX6 blade.
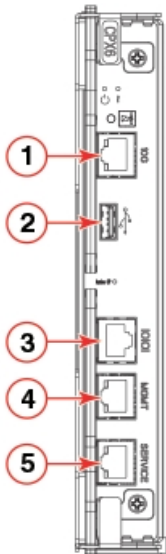
1 - 10 Gbps Base-T RJ45 Ethernet port (reserved for future use)

2 - USB port for firmware download and logs

3 - Serial console RJ45 port

4 - 10/100/1000Base-T RJ45 Ethernet port for chassis management and configuration

5 - 10/100/1000Base-T RJ45 Ethernet port for service

Figure 40. CPX6 blade port identification

Precautions specific to the blade

This document describes how to remove and replace a control processor (CP) blade. Each device has two CPX6 blades located in slots 1 and 2.

Observe the following precautions when replacing these blades:
- The CPX6 blade is compatible only with the SAN512B-6.
- 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 CPX6 blades in slots 1 and 2, which are half the height 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 USB device" on page 139 and "Downloading firmware from FTP server" on page 138 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.

CAUTION:
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 use ejector handles to push the blade into or pull the blade out from a slot.

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. Refer to "Interpreting control processor blade LEDs" on page 74 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

Refer to"Using monitoring commands" on page 85 and the*Fabric OS Command Reference* for output examples and additional information on Fabric OS commands.

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

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 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 a 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 133.
2. Remove the blade from the slot by following all steps under "Removing a blade" on page 135.
3. Install a new blade into the empty slot by following all steps under "Installing a blade" on page 136.
4. Verify and synchronize firmware on both blades by following all steps under "Verifying and synchronizing firmware on blades" on page 137.

   If you need to download firmware to update the blades, follow steps in one of the following sections:
   - "Downloading firmware from FTP server" on page 138
   - "Downloading firmware from USB device" on page 139
5. Verify firmware installation by following all steps under "Completing the replacement" on page 143.

6. Verify operation of replacement blade by following steps under "Verifying blade operation" on page 144.

7. Repeat 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."

2. Remove blade(s) following all steps under "Removing a blade" on page 135.

3. Install blade(s) 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 replacement blade by following steps under "Verifying blade operation" on page 144.

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
- #1 Phillips screwdriver
- Replacement CP blade

Preparing for replacement

About this task

Use the following steps to prepare the system for CP blade replacement by backing up the device configuration, connecting to the device with a serial connection, determining the active CP blade, failing over the blade to replace, determining the firmware version on the active blade, and uploading configuration data to the active blade.

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*.

   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*.

   c. In a FICON environment, log in 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*.

2. Connect to the device and log in as **admin**, using a serial console connection.

3. Enter **haShow** to determine which CP blade is active.

```
Chassis_1:admin> haShow
Local CP (Slot 1, CP1) : Active
Remote CP (Slot 2, CP0) : 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*.

5. If the active CP blade is faulted, automatic fail over 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 faulted CP blade by loosening the captive screws on both ejector handles on the blade using a #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 into the now active CP blade.

   d. Skip to step 8.

   If automatic fail over 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 into the standby CP blade, and skip to step 8.

6. If both CP blades are healthy and you want to replace the standby CP blade, log in to the active CP blade and skip to step 8.

7. If both CP blades are healthy and you want to replace the active CP blade, log in 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 in 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:root>
```

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 CPX6 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, refer to the cold-swap replacement procedures.

Removing a blade

Use the following procedure to power down the device and remove CP blades. You can replace a single CP blade or both blades one at a time using the hot-swap procedure.

Procedure

1. Be sure to perform all steps under "Preparing for replacement" on page 133.
2. Power down the device.
3. Remove the chassis door.
4. Disconnect all cables from the CP blades.
5. Loosen the captive screws for each ejector handle 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 screws disengage from slot and the power LED is off.
6. Grasp each ejector handle on blade and simultaneously pull the handles away from the blade to approximately 45 degrees. 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. Slowly pull the blade from the slot. Do not support blade fully using injector handles after removal. As you slide out the blade, place one hand under blade for support. Be sure 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.

Figure 41. Removal and replacement of the control processor blade (CPX6)

8. 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. Open the ejector handles completely to approximately 45 degrees. 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. Align the blade in the slot with the flat metal side of the blade at the bottom (blade power and status LEDs are on the left).
   b. Carefully slide the blade into the slot using your thumbs on the blade face. When the blade is about 2.54 cm (1 in.) from the chassis, you should feel resistance as the blade connectors meet the backplane connectors.
      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.
   c. Continue pushing with your thumbs until the ejectors move in towards the blade slightly indicating that the connectors are engaged.
   d. Push the ejector handles fully in towards the blade simultaneously to seat it completely in the slot. 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 blade seats completely, amber blade status and green blade power LEDs illuminate.

   Note: Be sure that captive screws are tightened. If not, high pressure from fan operation may unseat blade from chassis connectors.
5. 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.
6. Connect the cables to the new CP blade.
7. Remain logged in to the active CP and continue to "Verifying and synchronizing firmware on blades."

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. To verify that boot and POST are complete on a 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 into 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*.

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 "Completing the replacement" on page 143.

   If the firmware version on the replacement (standby) blade does not match that on the active CP blade, 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: Using this command requires that existing telnet, secure telnet, or SSH sessions to the standby CP blade to be restarted.
   - 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 Upgrade Guide*.

Downloading firmware from 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 in 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 in 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 autoreboot, so you will have to manually issue a reboot after the download finishes to initiate **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,
                                       ...Firmwarecommit has completed.
   2016/06/17-14:56:50, [SULB-1036], 909, SLOT 2 | CHASSIS, INFO,
                                       ...The new Version: Fabric OS [version]
   2016/06/17-14:56:50, [SULB-1002], 910, SLOT 2 | CHASSIS, INFO,
                                       ...Firmwaredownload command completed successfully.
   ```

5. Log back in 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 2 through step 5 as often as necessary based on the path outlined in the preceding table. Otherwise, proceed to step 7.

7. Log out of the standby CP blade and log in to the active CP blade.

8. Proceed to the procedures for verifying operation of the new CP blade.

Downloading firmware from 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. The folder structure on the USB device must be as follows in order to allow the device to be enabled:

- 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 in to the active CP blade as **admin** if you are not still logged in 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 in 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 will have to manually issue a reboot after the download finishes to initiate firmwarecommit. Use all default values, except use USB [Y] so that USB will be 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 in 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,
                                        ...Firmwarecommit has completed.
   2010/06/17-14:56:50, [SULB-1036], 909, SLOT 2 | CHASSIS, INFO,
                                        ...The new Version: Fabric OS [version]
   2010/06/17-14:56:50, [SULB-1002], 910, SLOT 2 | CHASSIS, INFO,
                                        ...Firmwaredownload command 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 in 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 through step 8 as often as necessary based on the path outlined in the preceding table. Otherwise, proceed to step 10.

10. Log out of the standby CP blade and log in to the active CP blade.

11. Proceed to the procedures to "Completing the replacement."

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. To replace a single blade, refer to the hots-swap replacement procedures.

Removing a blade

Use the following procedure to power down the device and remove CP blades. You can replace a single CP blade or both blades one at a time using the hot-swap procedure.

Procedure

1. Be sure to perform all steps under "Preparing for replacement" on page 133.

2. Power down the device.

3. Remove the chassis door.

4. Disconnect all cables from the CP blades.

5. Loosen the captive screws for each ejector handle 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 screws disengage from slot and the power LED is off.

6. Grasp each ejector handle on blade and simultaneously pull the handles away from the blade to approximately 45 degrees. 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. Slowly pull the blade from the slot. Do not support blade fully using injector handles after removal. As you slide out the blade, place one hand under blade for support. Be sure 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.

Figure 42. Removal and replacement of the control processor blade (CPX6)

8. 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. Open the ejector handles completely to approximately 45 degrees. Orient the blade so that the handles are toward you and the flat metal side is facing down.

2. Follow these steps to insert each blade into the slot.

   a. Align the blade in the slot with the flat metal side of the blade at the bottom (blade power and status LEDs are on the left).

   b. Carefully slide the blade into the slot using your thumbs on the blade face. When the blade is about 2.54 cm (1 in.) from the chassis, you should feel resistance as the blade connectors meet the backplane connectors.

   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.

   c. Continue pushing with your thumbs until the ejectors move in towards the blade slightly indicating that the connectors are engaged.

   d. Push the ejector handles fully in towards the blade to seat it completely in the slot. 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 for each ejector using a #1 Phillips screwdriver.

   Note: Be sure that captive screws are tightened. If not, high pressure from fan operation may unseat blade from chassis connectors.

4. Power up the device.

5. Connect the cables to the new CP blades.

6. Enter `chassisDisable`.

7. Enter `configDownload -vf` to download device virtual fabric data to the local system. The device reboots and partitions are restored.

8. Enter `chassisDisable`.

9. Enter `configDownload -map` to download port-to-area addressing mode configuration files to the local system.

10. Power-cycle the chassis. The system recovers.

11. Enter `chassisDisable`.

12. 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.

13. Enter `reboot`. The device becomes fully functional with the new CP blades.

14. Verify that each blade's power LED is green. If not, ensure that the CP blade has power and is firmly seated and that the ejectors are in the locked position.

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 before moving to the next step. POST is complete when the status LED on the CP blade returns to a steady green state.

2. Enter **haShow** and verify that the command output includes "HA Enabled, Heartbeat Up". If it is not yet enabled, 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.

   ```
   chassis:admin> firmwareshow -v
   Slot NameAppl Primary/Secondary VersionsStatus
   ------------------------------------------------------------

   1CP0FOSv8.0.1STANDBY
    v8.0.1
   2CP1FOSv8.0.1ACTIVE *
    v8.0.1
   3SX6FOSv8.0.1
    v8.0.1
   4SX6FOSv8.0.1
    v8.0.1
   7SX6FOSv8.0.1
    v8.0.1
   8SX6FOSv8.0.1
    v8.0.1
   ```

   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, refer to "Interpreting control processor blade LEDs" on page 74.

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, 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 system error log.
- **errShow** - Displays error log messages one at a time.

Example

For output examples and additional information on Fabric OS commands, refer to "Using monitoring commands" on page 85 and the *Fabric OS Command Reference*.

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

Chapter 10. WWN Cards

This chapter provides the following information:

WWN card overview

Two WWN cards are located behind the WWN bezel between the power supplies on the nonport side of the device. WWN 1 is located on the left side and WWN 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 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 **wwnrecover** utility permits a 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 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, refer to "Using the wwnrecover utility" on page 151.

Note: 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.

WWN card location and numbering

WWN card are located behind the WWN 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 WWN card location and numbering.
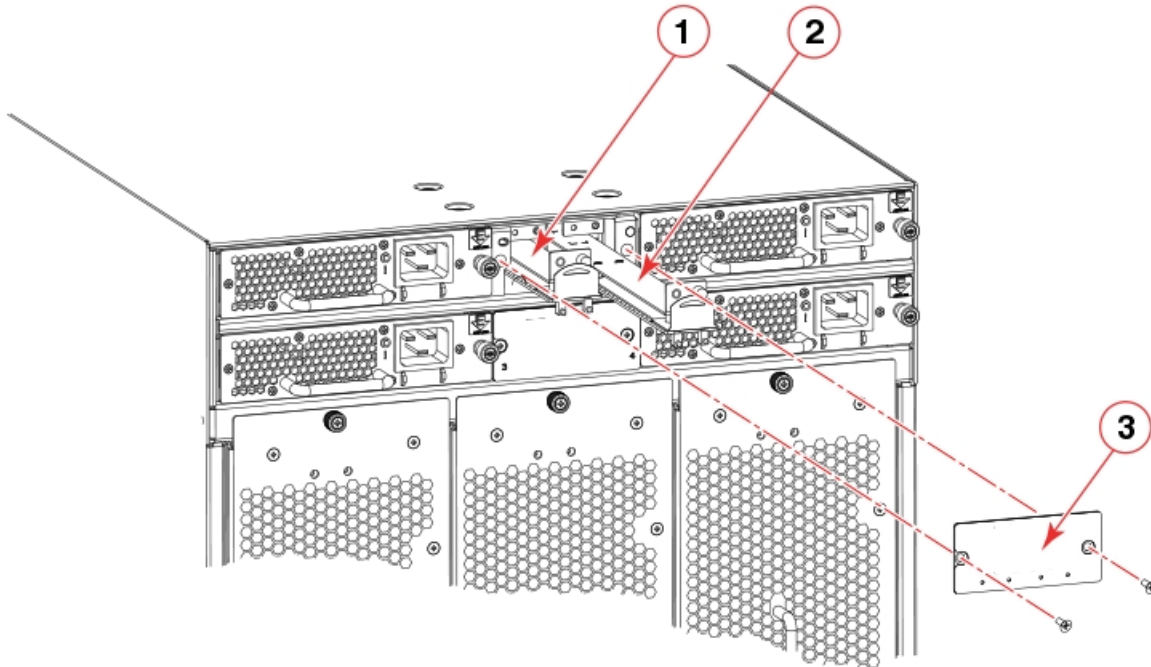
Figure 43. WWN card location and numbering

> 1 - WWN card 1
>
> 2 - WWN card 2
>
> 3 - WWN card bezel

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.

> **CAUTION:**
> **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 mis-matches across WWN cards, data recovery may be possible using this command. For more information on using **wwnrecover**, refer to "Using the wwnrecover utility" on page 151. If recovery is not possible, command output will direct 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, refer to "Interpreting WWN card LEDs" on page 78. Note that the LED patterns may temporarily change during POST and other diagnostic tests.
- Problems viewing or modifying the data stored on the WWN card.
- Error messages regarding WWN units in **chassisshow** output.

Error messages that may indicate problems with a WWN card are summarized in the following table.

Table 19. 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)>.`
WWN unit is being 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, 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 careds when the device is running (hot swap) or must be powered off (cold swap). References are provided to the 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 152.
2. Replace a card by following all steps under "Hot-swap replacement" on page 153. Repeat these steps to replace the second WWN card if necessary.
3. If RASlog messages indicate a mismatch between fan and system airflow direction, follow steps under "Configuring airflow direction on WWN cards" on page 157.
4. Verify WWN card operation using steps under "Verifying WWN card operation" on page 159.

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 replacement WWN card(s) by following all steps under "Preparing for WWN card replacement" on page 152.
2. Replace card(s) by following all steps under "Cold-swap replacement" on page 154.
3. If RASlog messages indicate a mismatch between fan and system airflow direction, follow steps under "Configuring airflow direction on WWN cards" on page 157.
4. Verify WWN card operation using steps under "Verifying WWN card operation" on page 159.

Time and items required for replacement

If there is a need to replace one or both WWN cards, allow approximately 20 minutes. Refer to "Using the wwnrecover utility" on page 151 and "WWN card fault indicators" on page 148 before replacement.

The following items are needed to replace the WWN cards:
- Electrostatic discharge (ESD) grounding strap
- #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 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 20. 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 card in chassis. Access to WWN halted...	WWN card has been removed from the device. Replace as soon as possible since system is in 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 Technical Support for replacement of the corrupted or inaccessible WWN(s).	The license ID on the two WWN cards do 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 in 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*.

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 in to the active CP blade as admin. The default password is "password".
2. Verify that you are logged in 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:
   - **licenseidshow**
   - **ipaddrshow**
   - **switchname**
   - **chassisname**
   - **wwncardshow ipdata**
   - **chassisshow** (look at the WWN and chassis information at the bottom)
   - **ficonshow switchrnid** (FICON/mainframe environments only)
   - **configupload -all**
   - **configupload -vf**

   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 is 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:          SAN768B
  Manufacturer:          BRD
  Plant of Manufacture: CA
  Sequence Number:       0AFX2533G001
  tag:                   b6ff
 }
```

5. Contact IBM Support for replacement of WWN cards. IBM Support will request the partner or OEM to send WWN cards from FRU inventory to the nearest IBM Support office to be reprogrammed. IBM Support will require the **Supportsave** data taken in the previous step so that the replacement cards can be reprogrammed prior to shipping to the partner or your site. If support has determined that both WWN cards need replaced, 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 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. For more information on this utility, refer to "Using the wwnrecover utility" on page 151.

You can use this procedure to replace one WWN card assembly at a time while power is on. Follow all steps for one card, and then repeat the same steps to replace the other card assembly. To replace both WWN card assemblies simultaneously, use procedures under "Cold-swap replacement" on page 154.

Procedure

1. Remove the defective WWN card assembly using procedures under "Removing the WWN card and bezel" on page 156. 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 assembly to fully seat 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 captive screws are tightened. If not, 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 reflects 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: 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. 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*.

9. Verify the new card settings by running the following commands and comparing the output with the original **supportsave** data:
   - **licenseidshow**
   - **ipaddrshow**
   - **switchname**
   - **chassisname**
   - **wwncardshow ipdata**
   - **chassisshow** (look at the WWN and Chassis information at the bottom)

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 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 153.

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 in 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 the settings 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 156, and then continue with step 5.

   Note: There are two WWN card assemblies located behind the WWN bezel. 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 assembly to fully seat into the backplane connector.

   c. Use a #1 Phillips screwdriver to tighten the captive screw and secure the card assembly to the chassis.

   Note: Be sure that captive screws are tightened. If not, 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 new WWN cards are correctly connected by checking LED function. For details on LED operation, refer to "Interpreting WWN card LEDs" on page 78.

   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. Refer to "Using the wwnrecover utility" on page 151 for more information on this command.

11. If **wwnrecover** messages prompt for a system reboot, reboot both CP blades to ensure 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:
    - `licenseidshow`
    - `ipaddrshow`
    - `switchname`
    - `chassisname`
    - `wwncardshow ipdata`
    - `chassisshow` (look at the WWN and chassis information at the bottom)

13. Run the **switchcfgpersistentenable** command to persistently enable each logical switch, that was disabled before removing the WWN card(s):

    ```
    switch:FID128:root> 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 Support for failure analysis (FA).

Removing the WWN card and bezel

About this task

Two WWN cards located behind the WWN bezel. As you are facing the bezel on the non-port-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 153 or "Cold-swap replacement" on page 154.

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.
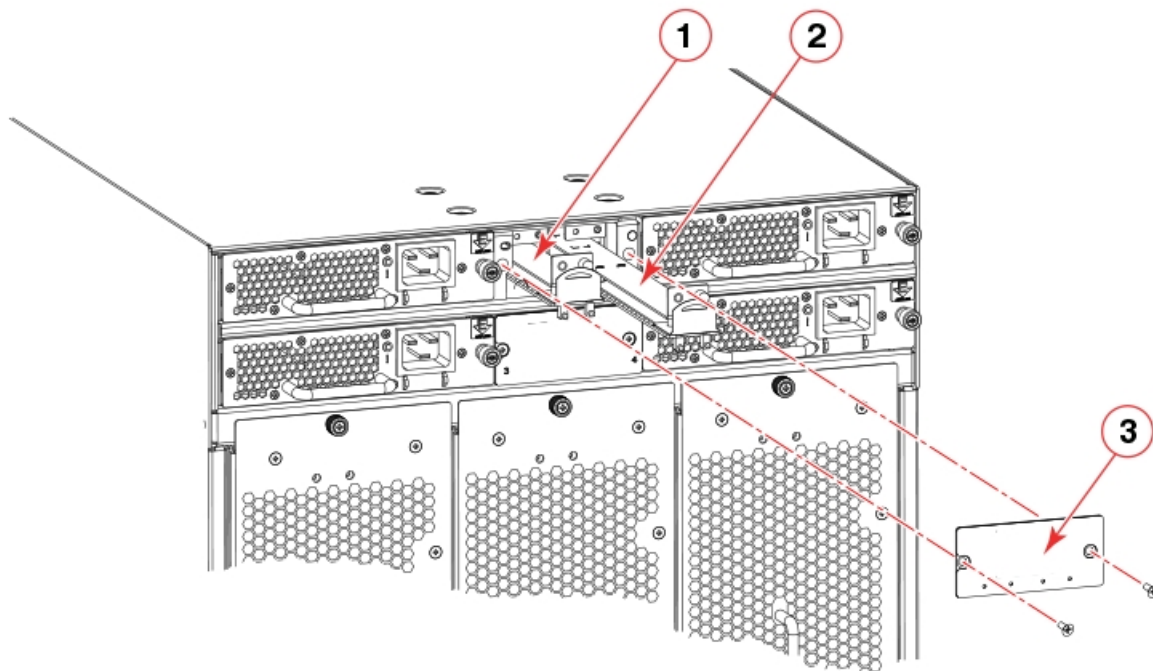
Figure 44. Removing and installing WWN cards

1 - WWN card 1

2 - WWN card 2

3 - WWN card bezel

4. Depending on the WWN card assembly removed, label the assembly with #1 for the left-side assembly and #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 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). In a factory-configured system, this airflow direction will match the airflow direction configured for the chassis on the installed WWN cards.

A mismatch of between 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 airflow direction is not configured on these cards.

The system detects airflow direction of the chassis at system boot based on 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.

The following procedure is provided if you need to manually synchronize airflow direction on WWN cards with airflow direction of installed fan and power supply assemblies.

Note: Changing chassis airflow is only supported to synchronize established airflow direction of installed fan and power supply assemblies with airflow direction configured on WWN cards. Changing airflow direction from NPI to NPE or NPE to NPI is not supported in a customer environment.

Procedure

1. Enter **chassisShow** to display airflow direction programmed in WWN cards and airflow direction of installed fan and power supply FRUs. Airflow direction of fans and 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. The following example shows mismatch of system airflow and airflow direction in installed fan and power supply as the WWN units should indicate "Non-portside 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
```

2. To reconfigure airflow direction on installed WWN cards, enter **wwnrecover**.

```
sw0:admin> wwnrecover
WWN 1 and/or WWN 2 system airflow direction mismatches with the
installed fan FRU's airflow direction.

        WWN Non-Critical Seeprom Problem Details

WWN 1 system airflow direction mismatches with installed Fan FRU's
airflow direction!!!!
WWN 2 system airflow direction mismatches with installed Fan FRU's
airflow direction!!!!

            Recovery Options

0. Exit

1. Copy Airflow direction from Fan FRU to both WWN cards
```

3. Enter **1** when prompted for a recover option to copy airflow direction from the fan to both WWN cards.

```
Enter Selection > 1
WWN Airflow direction recovery complete.

Please reboot the system.
```

4. 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, refer to "Interpreting WWN card LEDs" on page 78.
2. Enter the **errDump** command. This displays the system error log.

Example

For output examples and additional information on Fabric OS commands, refer to "Using monitoring commands" on page 85 and the *Fabric OS Command Reference*.

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

Chapter 11. Power Supply Assemblies

This chapter provides the following information:
- "AC power supply overview"
- "Precautions specific to power supply assembly" on page 166
- "Power supply assembly fault indicators" on page 166
- "Power supply assembly task guide" on page 167
- "Time and items required" on page 168
- "Removing a power supply" on page 168
- "Installing a power supply" on page 169
- "Verifying power supply operation" on page 170

AC power supply overview

This device supports the following AC power supply assemblies. All power supplies installed in the device must be of the same type and match the airflow of installed fan assemblies.

- Power supply model supporting nonport-side air intake (NPI) provides 1450 W (100-120 VAC) and 2870 W (200-240 VAC). 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) provides 1450 W (100-120 VAC) and 2870 W (200-240 VAC). This assembly has two fans that move the air from the port side to the nonport side of the device.

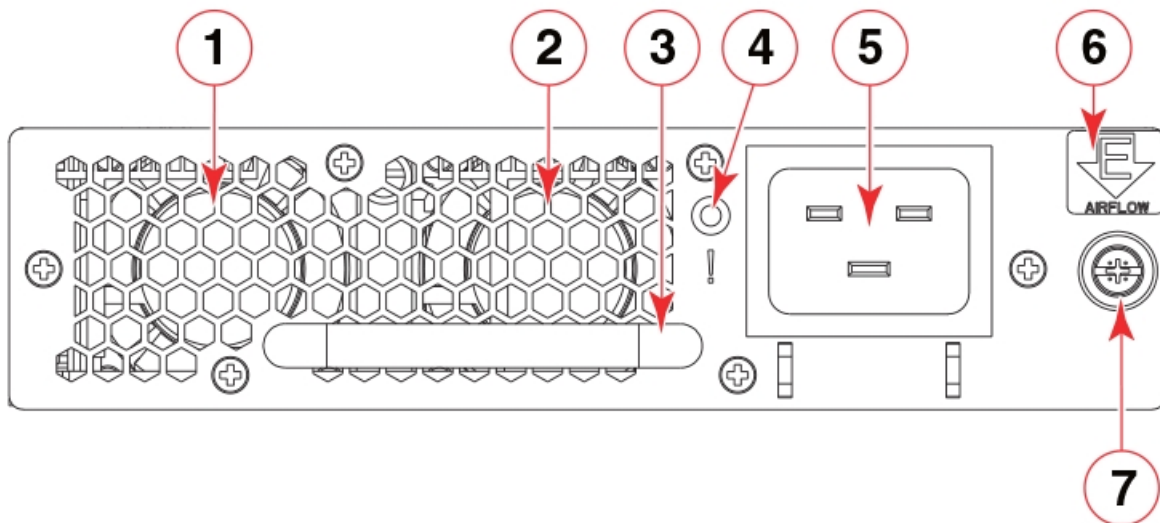The following figure illustrates power supply assembly components.

Figure 45. AC power supply assembly

1. Fan 1
2. Fan 2
3. Handle
4. Status LED
5. AC power cable receptacle

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6. Airflow label

7. Captive screw

The SAN512B-6 Director can have three or four power supplies installed, depending on the quantity ordered. Use of the high-voltage line (200 to 240 VAC) is highly recommended because of better power conversion efficiency. Refer to "Power Supply Requirements" in Appendix B, "Product specifications," on page 235 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. If four power supplies are installed, four primary power connections are required for the SAN512B-6 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 that meet your site and country requirements are available from IBM.

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, LED operation for the power supply will not indicate a fault. If airflow direction for a fan assembly does not match the chassis airflow direction, the fan LED will indicate a fault condition.

You can use external labels as a guide. The power supply and fan assemblies are labeled with a green "E" or orange "I" airflow symbol on the faceplate. The symbol also appears on the top of the FRU. All fans and power supplies in a chassis must have the same label affixed to guarantee airflow direction is consistent.

Figure 46. 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 is called back-to-front airflow or intake airflow. 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 is called front-to-back airflow or exhaust airflow. This symbol should appear on FRUs with part numbers that contain an **NPE**.

Ensure airflow direction of power supply and fan assemblies match airflow direction of the chassis configured on installed WWN cards. If power supply or fan air flow direction does not match, the FRU will fault. Faulty fans can cause increase in temperature.

Airflow direction can be verified by entering the **chassisShow** command. Following is an example from command output indicating mis-matching airflow. WWN units should indicate "Non-portside 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 captive screws securing the fan and power supply assemblies are tightened. If they are not, air pressure inside chassis may unseat these FRUs from chassis connectors.

Power supply assembly numbering

The following figure illustrates the location and number identification of power supply assemblies in the chassis.
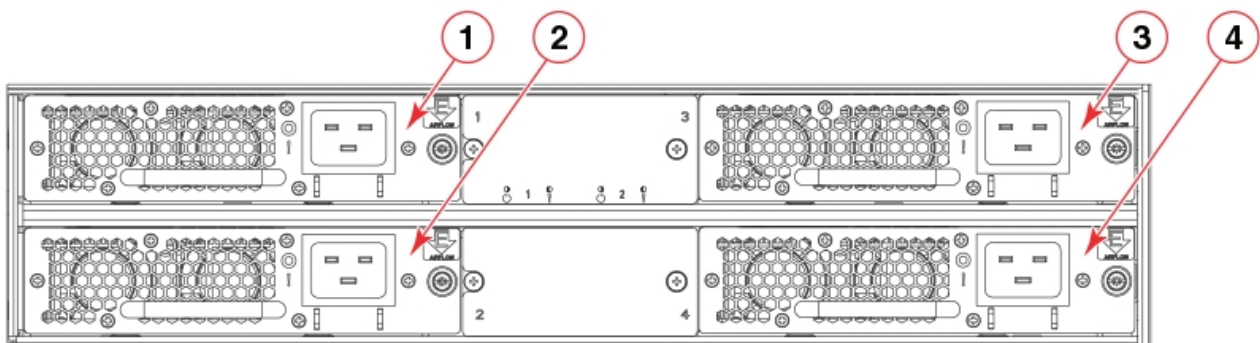

Figure 47. Power supply assembly numbering

1 - Power supply 1

2 - Power supply 2

3 - Power supply 3

HVAC/HVDC power supply overview

The SAN256B-6 device supports 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:

- 1450 W (100-120 VAC)
- 2870 W (200-277 VAC)
- 2870 W (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 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 airflow direction of installed fans.

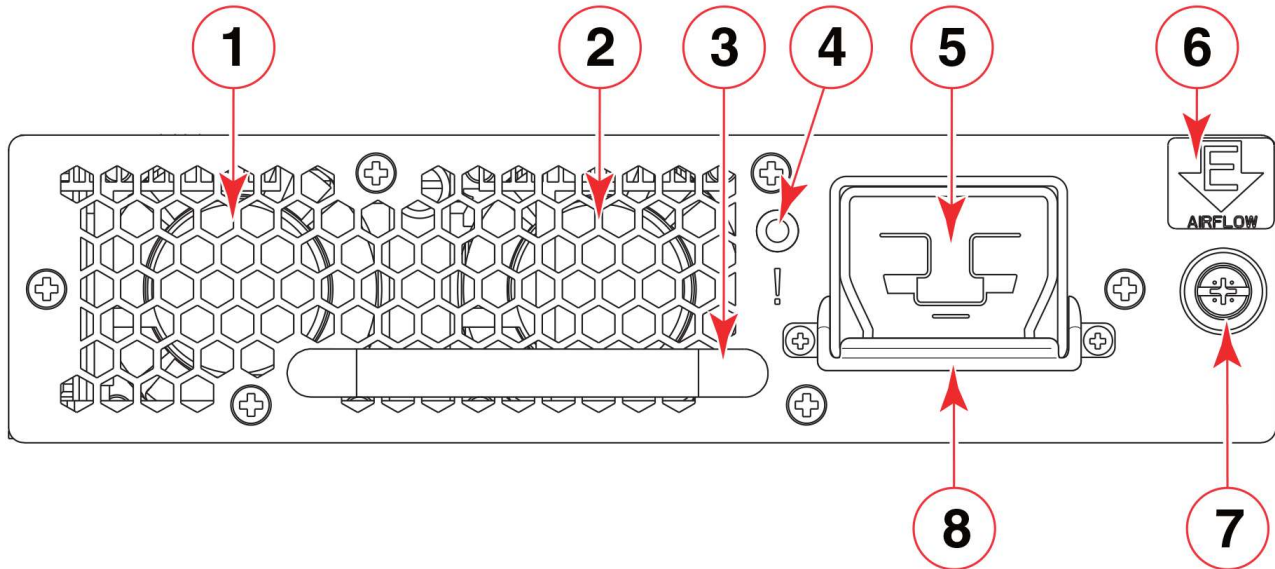The following figure illustrates power supply assembly components.

Figure 48. 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-6 Director has two power supplies installed. Use of the high-voltage line (200 to 277 VAC) is highly recommended because of better power conversion efficiency. Refer to "Power Supply Requirements" in Appendix B, "Product specifications," on page 235 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-6 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. Refer to "Power supply requirements" inAppendix B, "Product specifications," on page 235 for more information about power supply redundancy.

Power cords are available from Brocade. Power cords are 6 m (19.68 ft.) long and contain three colored 14 AWG unterminated wires which are described in the following table:

Table 21. 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 connector on the power supply end and unterminated wires on the other end for attaching to AC or DC power sources. Attach either an AC power plug to these wires that meets your facility and local code requirements or connect wires to appropriate DC power terminal blocks.

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. Refer to "Power Supply Requirements" in Appendix B, "Product specifications," on page 235 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 169 to install the new power supplies. Be sure to follow 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.

Refer to "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 LED does not illuminate, the power supply has no incoming power. Check if power supply is properly seated in backplane connector. Check power source to power cord.
    – If LED is flashing green, the power supply may be faulty.

    For more information on LED operation, refer to "Interpreting power supply LEDs" on page 79.
* Enter **psShow**. If status of power supply displays absent or faulty, check if power supply assembly is seated in chassis. If it is, 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* for more information on the messages in this log.

Refer to"Using monitoring commands" on page 85 and the *Fabric OS Command Reference* for output examples and additional information on Fabric OS commands.

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

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 device is running (hot swap) or must be powered off (cold swap). References are provided to the more detailed removal and installation steps for further information.

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. Refer to "Power Supply Requirements" in Appendix B, "Product specifications," on page 235 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.

Installing additional power supply (hot-install)

If your device is up and running, has empty slots for power supplies, and you want to install additional power supplies, complete the following steps.

1. Remove filler panel from empty power supply assembly slot.
2. Insert the new power supply assembly.
3. Plug power cord into the new power supply assembly from power source.
4. Verify power supply assembly status LED.

Replacing power supply assembly (hot-swap)

If your device is up and running, but a 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-swap. Refer to "Power supply specifications" and "Power supply requirements" in Appendix B, "Product specifications," on page 235 for minimum power supplies required for low and high voltage line operation.

1. Unplug power cable from failed power supply assembly.
2. Remove power supply assembly.
3. Insert new power supply assembly.
4. Plug power cord into new power supply assembly from power source.
5. Verify power supply assembly status LED.

Replace or install power supply assembly (cold-install or cold-swap)

If your device is up and running, but you want to power down the device 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 filler panel from 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 if you can remove a power supply and the leave device operating (hot swap replacement) or must power down the device (cold-swap replacement).

   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. Refer to "Power supply specifications" and "Power supply requirements" in Appendix B, "Product specifications," on page 235 for 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 device 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 device to remove a power supply, enter the **sysShutdown** command. When command output indicates that the device has completed shut-down, remove power cords from all power supply assemblies.
   - If you can leave the device 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.
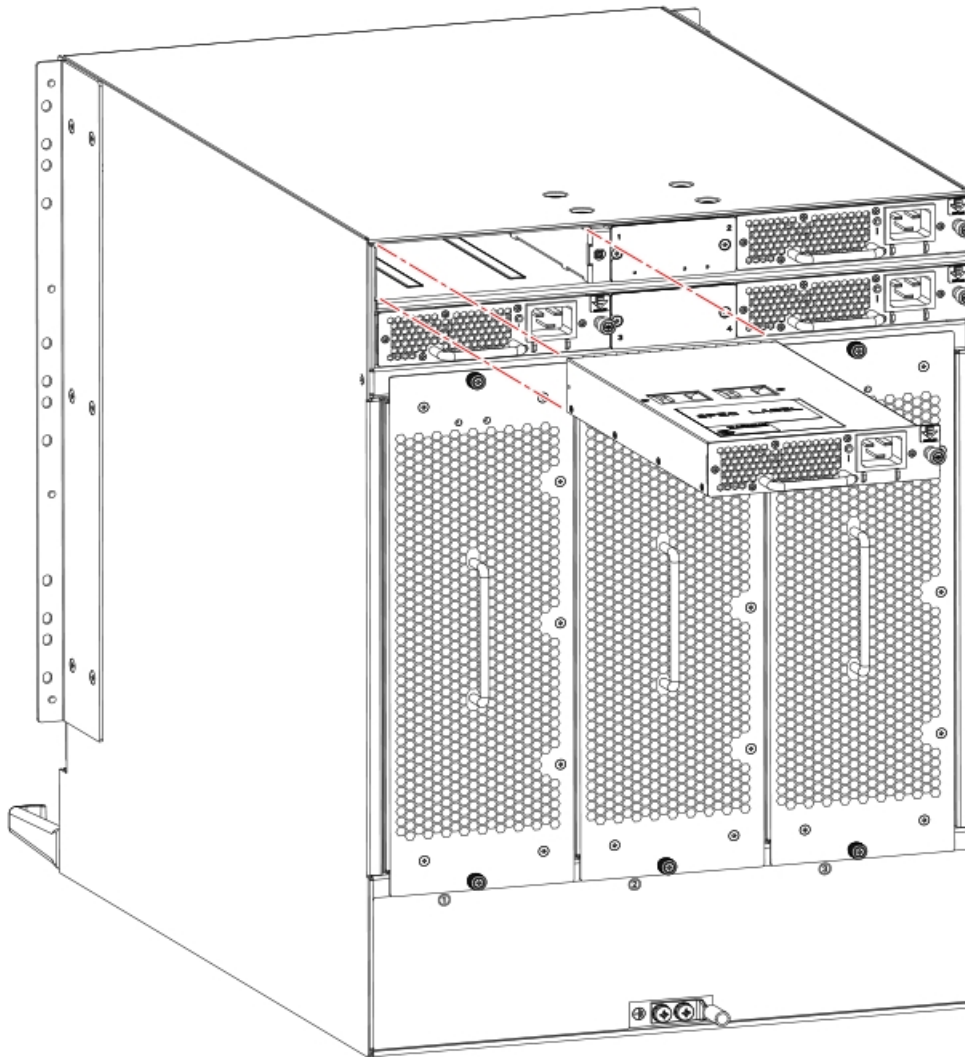

Figure 49. Removing and installing power supply assembly

5. If you are not replacing the power supply and can leave the device operating, insert a filler panel into the slot and tighten 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 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 captive screw, and then tighten with fingers to secure power supply assembly to chassis.

   Note: Make sure that captive screws securing power supply assembly to chassis are tightened. If not, high pressure from fan operation may unseat power supply assembly from chassis connectors.

5. Connect power to the power supply using steps in "Providing power to the device" on page 39.
6. Verify that the power LED on the power supply displays steady green when power is fully applied.
7. If you are installing additional power supplies to bring the total power supplies up to four, perform one or both of the following tasks to enable sending notifications when one power supply fails.

   Note: A maximum of four power supplies can be installed in the device.
   - For Fabric Watch monitoring, change the switchStatus policy settings to the following:
     ```
     switch.status.policy.PowerSupplies.down = 1
     switch.status.policy.PowerSupplies.marginal = 0
     ```
     For more details on executing the **switchStatusPolicyShow** and **switchStatusPolicySet** commands, refer to the *Fabric OS Command Reference*.
   - For Monitoring and Alerting Policy Suite (MAPS) monitoring, follow procedures to update the active MAPS power supply switchstatus policy settings for four PSU devices in the "Additional MAPS features" section of the *Monitoring and Alerting Policy Suite Administrator's Guide*.

Verifying power supply operation

About this task

Perform the following tasks to verify 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, refer to"Interpreting power supply LEDs" on page 79. Be sure to check all the power supply modules.
2. Check the power supply status by entering the following commands:

   The power supply status displays 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.
   - **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

Refer to "Using monitoring commands" on page 85 and the*Fabric OS Command Reference* for output examples and additional information on Fabric OS commands.

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

Chapter 12. Fan Assemblies

This chapter provides the following information:

- "Fan assembly overview"
- "Precautions specific to fan assemblies" on page 176
- "Fan assembly fault indicators" on page 177
- "Fan assembly task guide" on page 177
- "Time and items required" on page 178
- "Removing a fan assembly" on page 178
- "Installing a fan assembly" on page 179
- "Verifying fan operation" on page 180

Fan assembly overview

Following are important details that you should note about fan assemblies:

- Three fan assemblies are installed in the device, containing two fans each, for a total of six fans.
- The device requires 5 fans out of 6 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 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 device.
  - Fan assembly with nonport-side air exhaust. Fans move air from the port side to the nonport side of the device.
- Fan assemblies can be removed and replaced without special tools.
- The device can continue operation while one fan assembly is replaced if the fan assembly is replaced immediately.

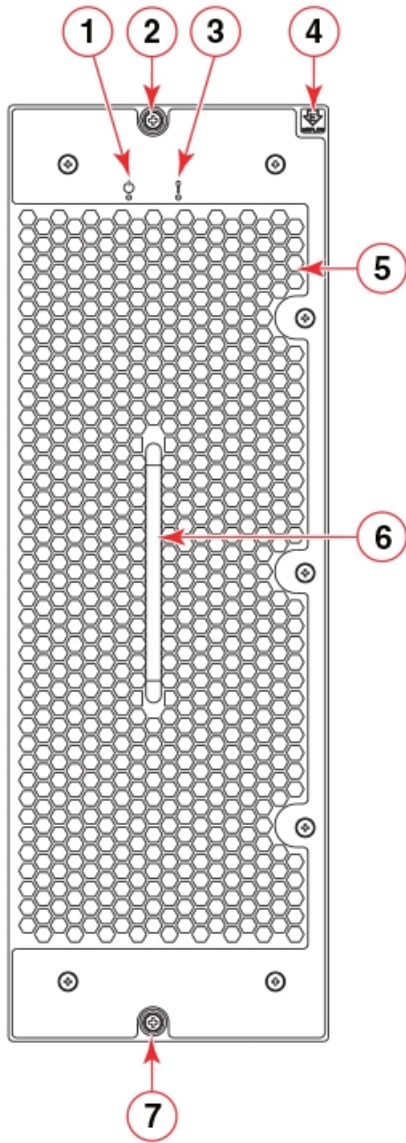The following figure illustrates fan assembly components.

Figure 50. 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, LED operation for the power supply will not indicate a fault. If airflow direction for a fan assembly does not match the chassis airflow direction, the fan LED will indicate a fault condition.

You can use external labels as a guide. The power supply and fan assemblies are labeled with a green "E" or orange "I" airflow symbol on the faceplate. The symbol also appears on the top of the FRU. All fans and power supplies in a chassis must have the same label affixed to guarantee airflow direction is consistent.

Figure 51. 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 is called back-to-front airflow or intake airflow. 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 is called front-to-back airflow or exhaust airflow. This symbol should appear on FRUs with part numbers that contain an **NPE**.

Ensure airflow direction of power supply and fan assemblies match airflow direction of the chassis configured on installed WWN cards. If power supply or fan air flow direction does not match, the FRU will fault. Faulty fans can cause increase in temperature.

Airflow direction can be verified by entering the **chassisShow** command. Following is an example from command output indicating mis-matching airflow. WWN units should indicate "Non-portside 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 captive screws securing the fan and power supply assemblies are tightened. If they are not, air pressure inside 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.
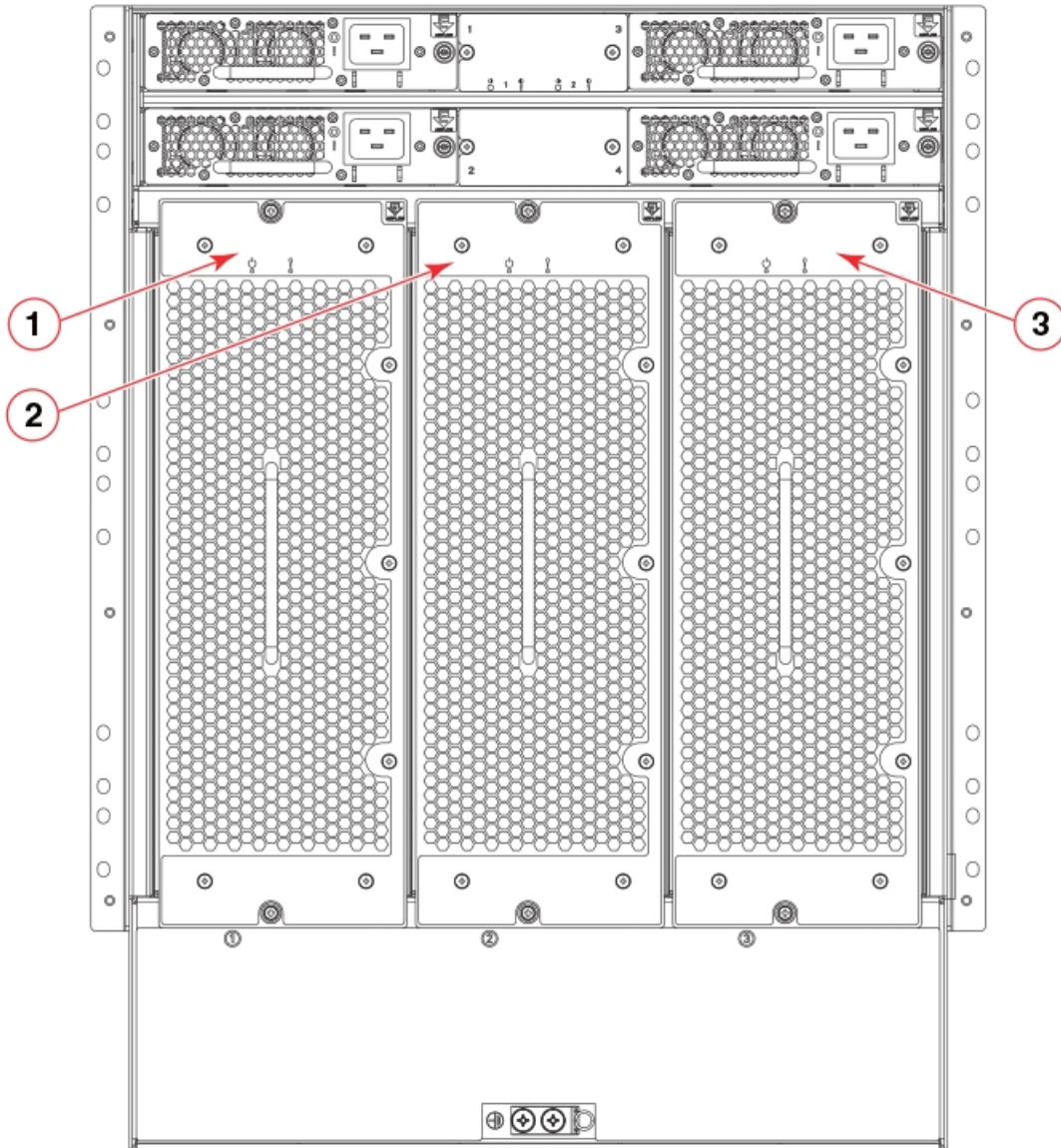

Figure 52. Fan assembly numbering

1 - Fan assembly 1

2 - Fan assembly 2

3 - Fan assembly 3

Precautions specific to fan assemblies

Observe the following precautions when replacing fan assemblies.

Note: Each fan assembly contains two fans for a total of six fans for three installed fan assemblies. The device requires 5 fans out of 6 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 chassis unless a 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 chassis are tightened. If not, high pressure from fan operation may unseat 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 status of fan assembly displays absent or faulty, check if assembly is seated in chassis. If it is, 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, refer to"Interpreting fan assembly LEDs" on page 82.

For output examples and additional information on Fabric OS commands, refer to"Using monitoring commands" on page 85 and the*Fabric OS Command Reference*.

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

Fan assembly task guide

This section contains a guide to more complete, detailed steps in this section for installing or replacing fan assemblies when the device is running (hot swap) or must be powered off (cold swap). References are provided to the more detailed removal and installation steps for further information.

Note: Each fan assembly contains 3 fans for a total of 6 fans for three installed fan assemblies. The device requires 5 fans out of 6 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 chassis unless a 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 chassis are tightened. If not, high pressure from fan operation may unseat fan from chassis connectors.

Replacing fan assembly (hot-swap)

If your device is up and running, but a fan assembly has failed, complete the following steps.

1. Remove fan assembly.
2. Insert new fan assembly into empty slot as soon as possible.
3. Verify that the fan assembly status LED is green.

Replacing fan assembly (cold-swap)

If your device is up and running, but you want to power down the device 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 power cords into all power supply assemblies from power sources to power device on.
6. Verify that 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
- #1 Phillips screwdriver

Removing a fan assembly

About this task

Complete the following steps to remove a fan assembly from the device.

Procedure

1. Before removing a fan assembly, Verify if you can remove a power supply and leave device operating (hot swap replacement), by referring to "Precautions specific to fan assemblies" on page 176.
2. Perform one of the following steps:
   - If you need to power down the device to remove a fan assembly, enter the **sysShutdown** command. When command output indicates the device 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 #1 Phillips screwdriver if tightened.

4. Grasp the handle and pull, sliding the fan assembly from the chassis while supporting the fan assembly from beneath as you remove it.
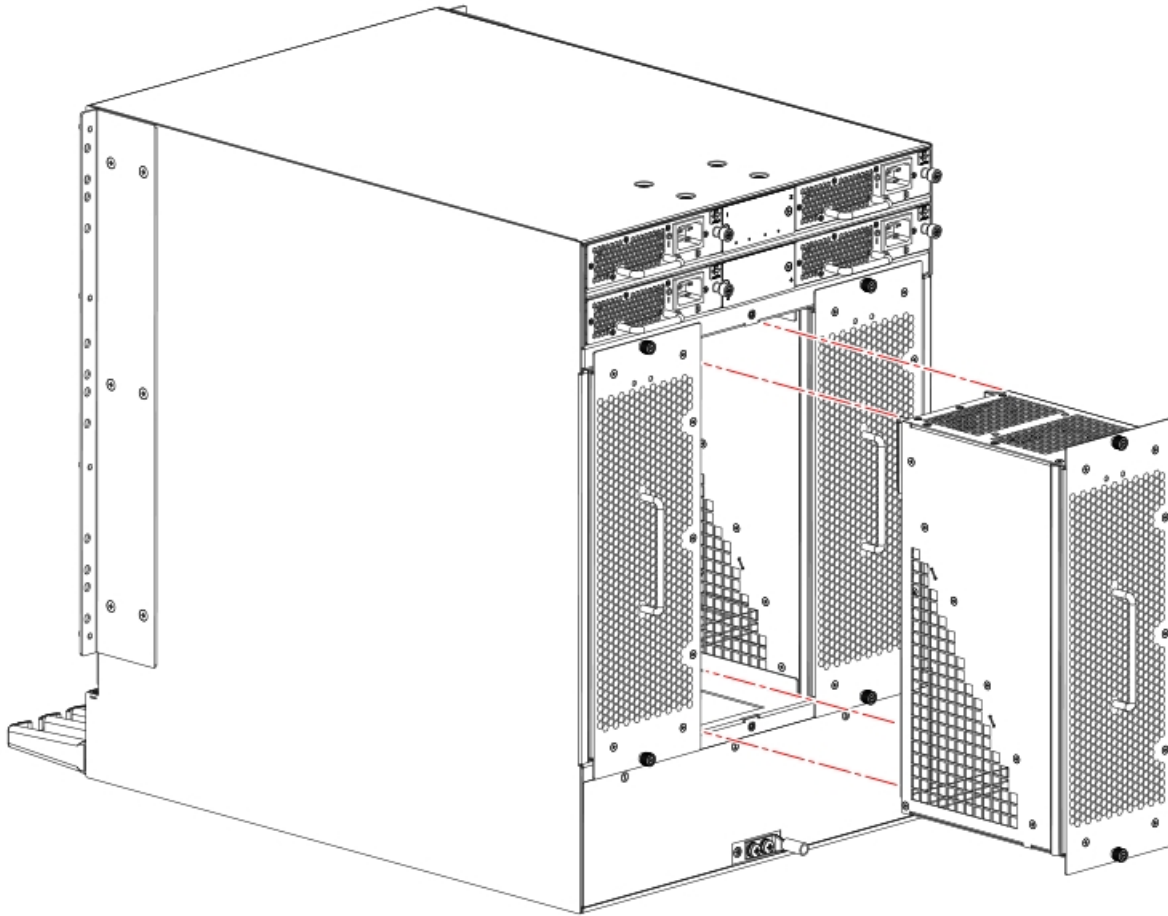

Figure 53. Removing and installing a fan assembly

5. If 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 device.

Procedure

1. Grasp the handle and carefully slide the fan assembly into the device 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 #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.

Verifying fan operation

About this task

Perform the following tasks to verify operation of a fan assembly:

Procedure

1. Check the LED indicators on the fan assemblies. The fan assemblies are located 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, refer to "Interpreting fan assembly LEDs" on page 82.
2. Check the fan assembly status using the following commands:
    *   **fanShow** - Displays the status for each fan assembly as OK, Absent, or Faulty. The RPM of each fan in the assembly is also provided. If a fan assembly displays absent or faulty, contact the device supplier to order replacement parts. Both physically absent or faulty could also be the result of the fan not being properly seated in the chassis slot.
    *   **sensorShow** - Displays current temperature and status of fan and power supply sensors located in the device.
    *   **errShow** - Displays error log messages one at a time.
    *   **errDump** - Displays the entire system error log.

Example

Refer to "Using monitoring commands" on page 85 and the*Fabric OS Command Reference* for output examples and additional information on Fabric OS commands.

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

Chapter 13. Blade Filler Panels

This chapter provides the following information:
- "Blade filler panel removal and replacement"
- "Removing a filler panel"
- "Installing a filler panel" on page 182

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 SAN768B, SAN384B-2, and SAN768B-2 switches are not interchangeable with filler panels for SAN512B-6 switches.

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 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.
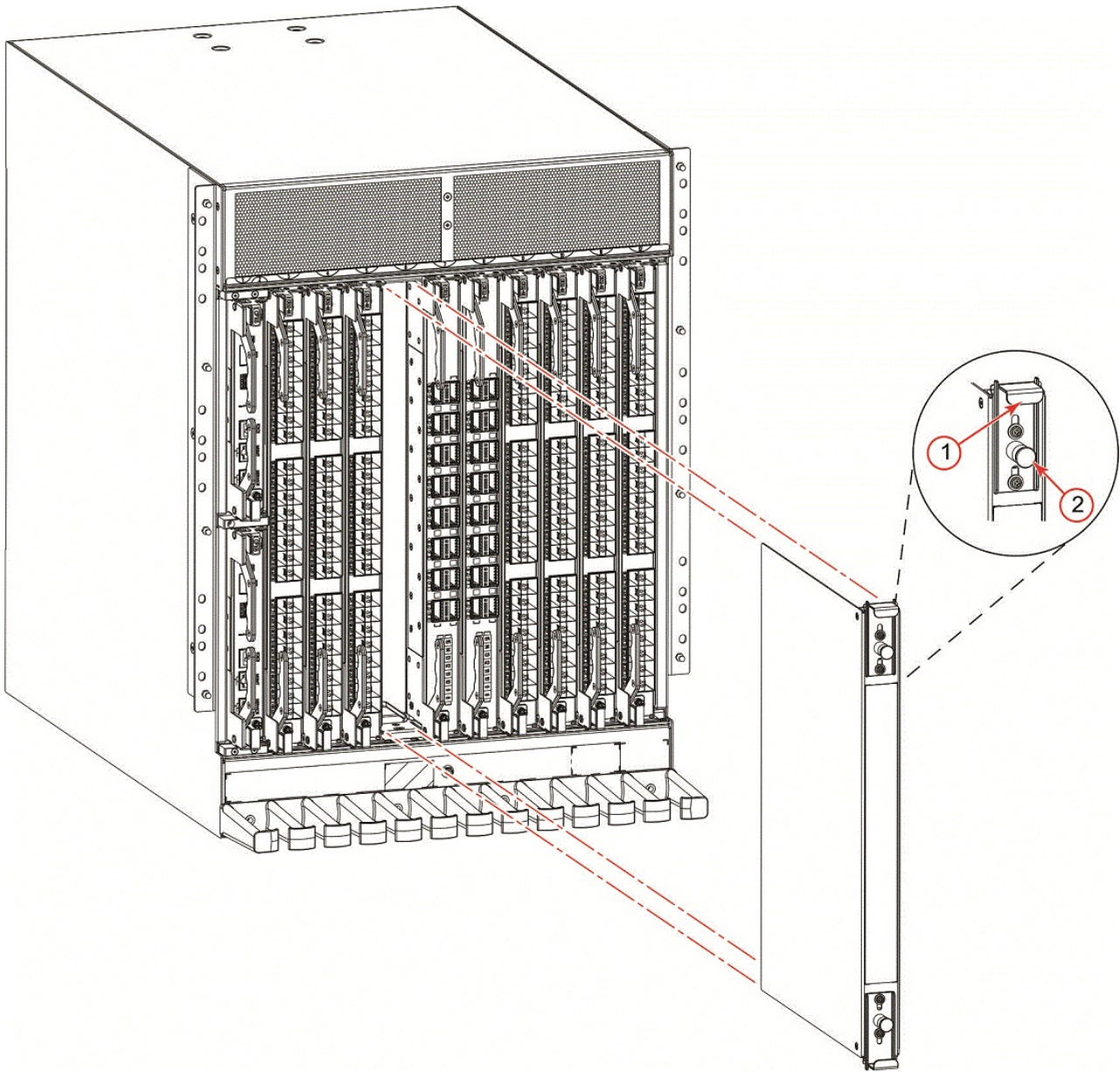
Figure 54. Removing and installing the blade filler panel

1 - Latch pull tab
2 - Latch release

Installing a filler panel

About this task

Complete the following steps to install a filler panel into a blade slot.

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 into the slot.

3. Pull out the spring-loaded latch release at each end of the cover and slide each latch towards the end of the cover. This 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, 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.
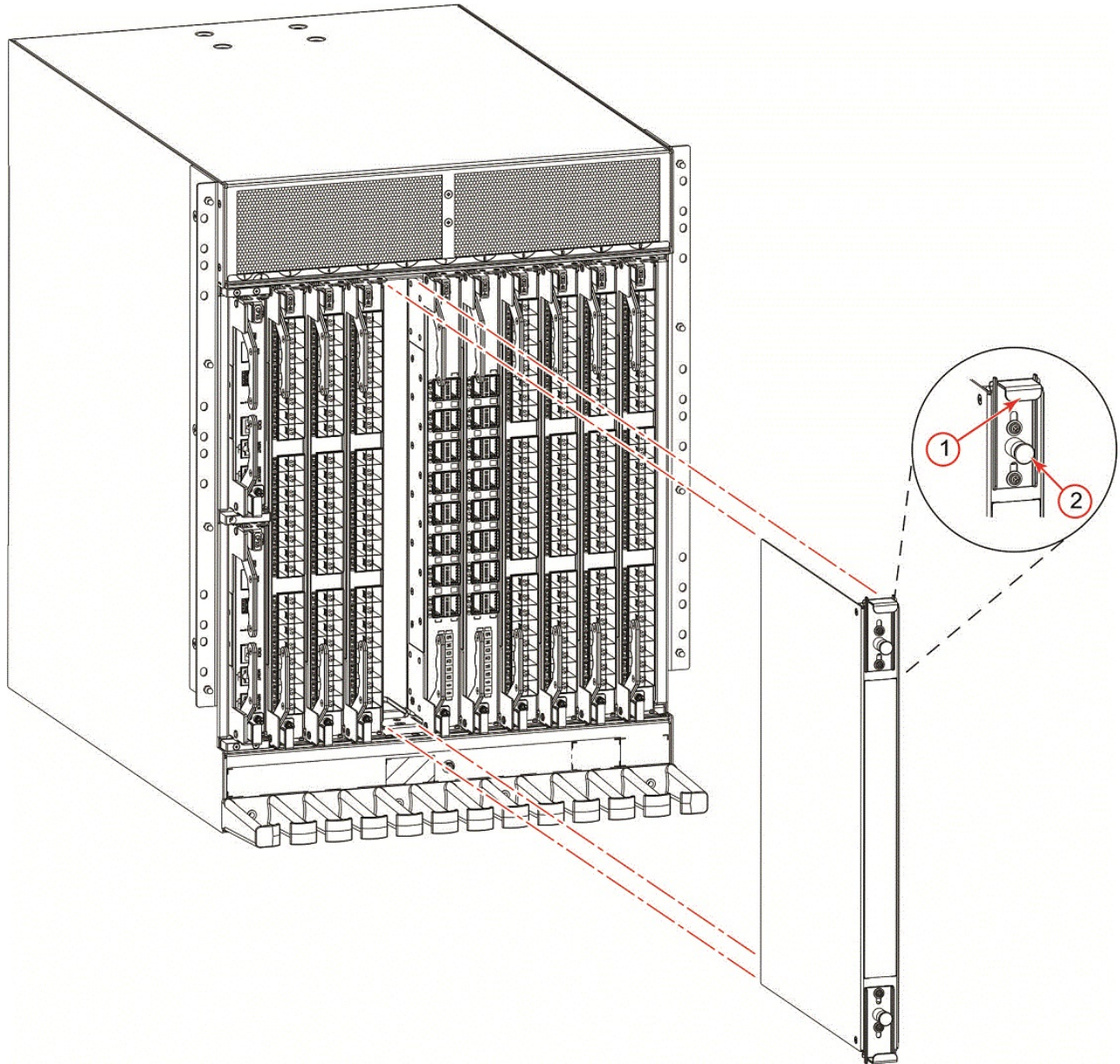

Figure 55. Removing and installing the blade filler panel

4. Reinstall the chassis door. The door must be installed to meet EMI compliance.

Chapter 14. Cable management comb

This chapter provides the following information:
- "Cable management comb overview"
- "Time and items required for removal and installation"
- "Removing cable management comb"
- "Installing cable management comb" on page 186

Cable management comb overview

Use the cable management comb to organize and route cables that are attached to blade ports. The SAN512B-6 can continue to operate while removing or installing the cable management comb.

Time and items required for removal and installation

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

Removing cable management comb

About this task

Complete the following steps to remove the cable management comb.

Procedure

1. Remove the cables from the cable management comb and rearrange the cables around the comb.
2. Unscrew and save the four (4) screws holding the comb to the device. Support the comb to prevent it from falling.
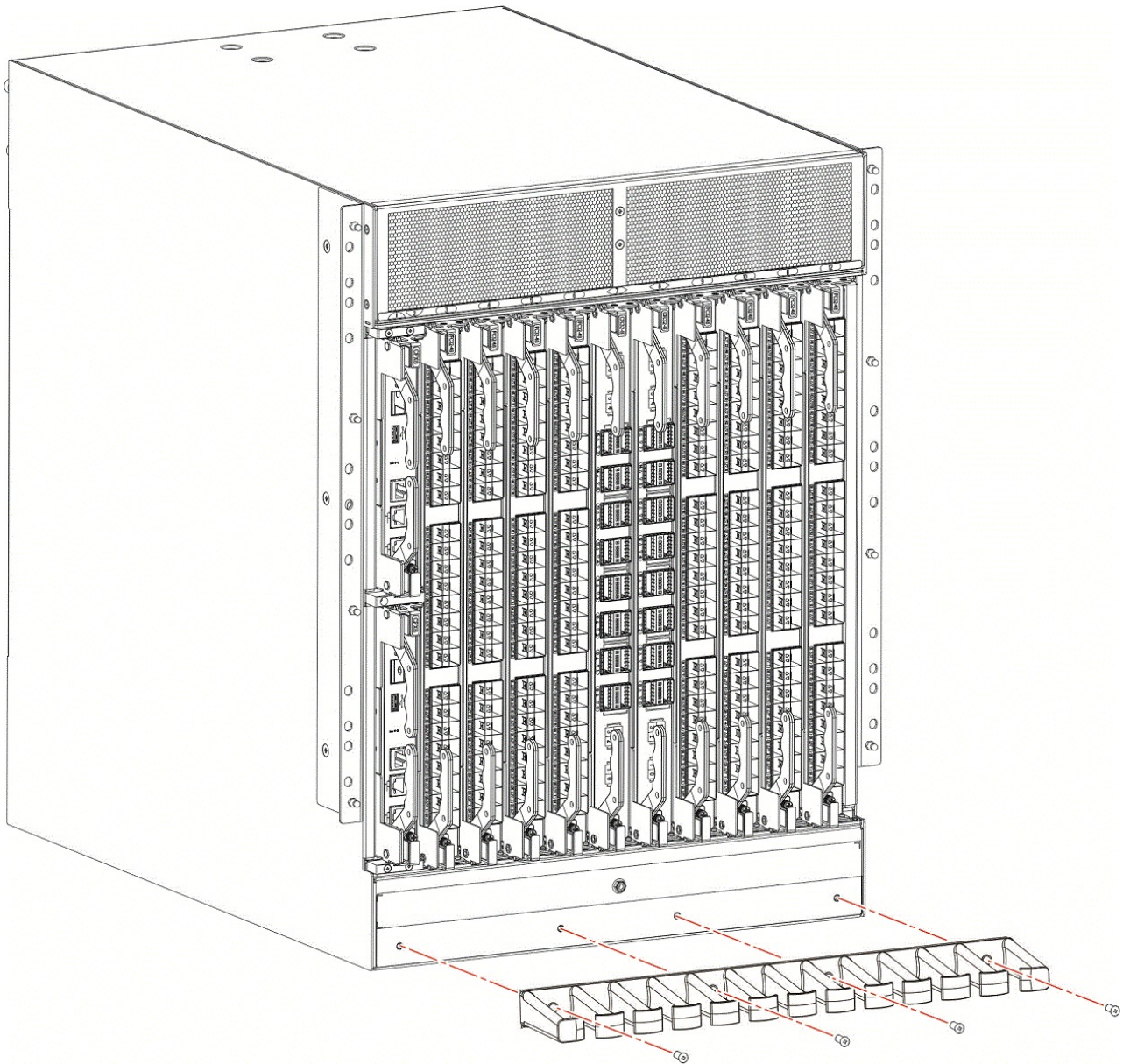3. Remove the cable management comb.

Figure 56. Removing or installing cable management comb

Installing cable management comb

About this task

Complete the following steps to replace the cable management comb.

Procedure

1. Position and tighten the four (4) screws to secure the cable management comb to the chassis.
2. Arrange the cables along the cable management comb.

Chapter 15. Chassis door

This chapter provides the following information:
- "Chassis door overview"
- "Time and items required"
- "Removing a chassis door"
- "Installing a chassis door" on page 188

Chassis door overview

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

The first-time installation procedure for the chassis door takes 15 minutes or longer because you must remove the protective cover and install ball studs to mount the door. Thereafter, removal and reinstallation 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.

Removing a chassis door

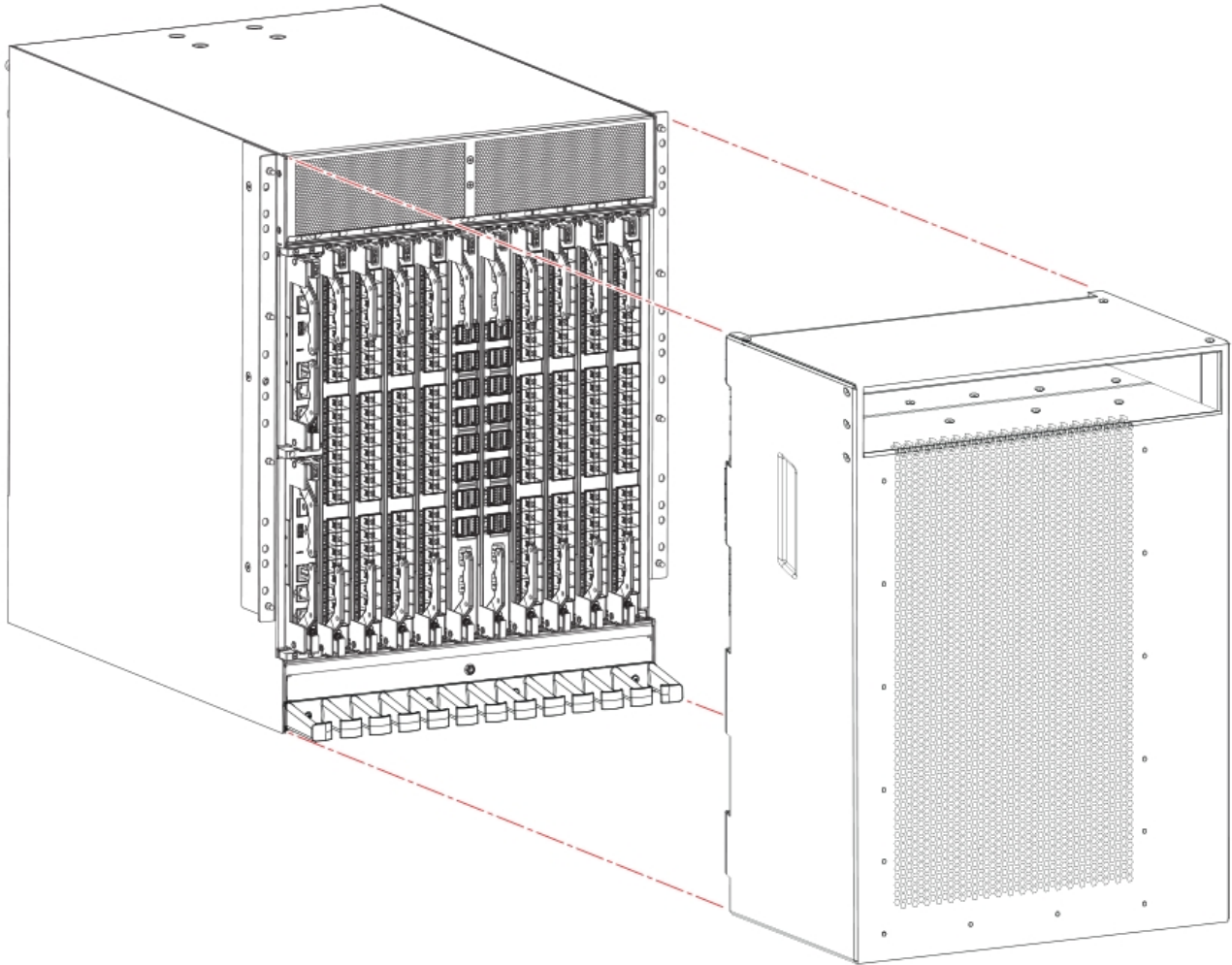Support the door to prevent it from falling. Pull and remove the door. It will pop off the ball studs.

Figure 57. 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.

Before installing the door, use step 1 to remove the protective cover if it is attached over the air vents at the top of the chassis. If the protective cover has been removed, skip to step 2 to install the door.

Procedure

1. Unfasten the protective cover from the chassis mounting bracket by removing the two 6-32 X 3/8 in. panhead Phillips screws securing the cover to the bracket using a Phillips screwdriver. One screw is located above the bracket and one beneath the bracket. You do not need to remove the mounting bracket (1 in following illustration) from the chassis. Save the cover and other parts for future installation.
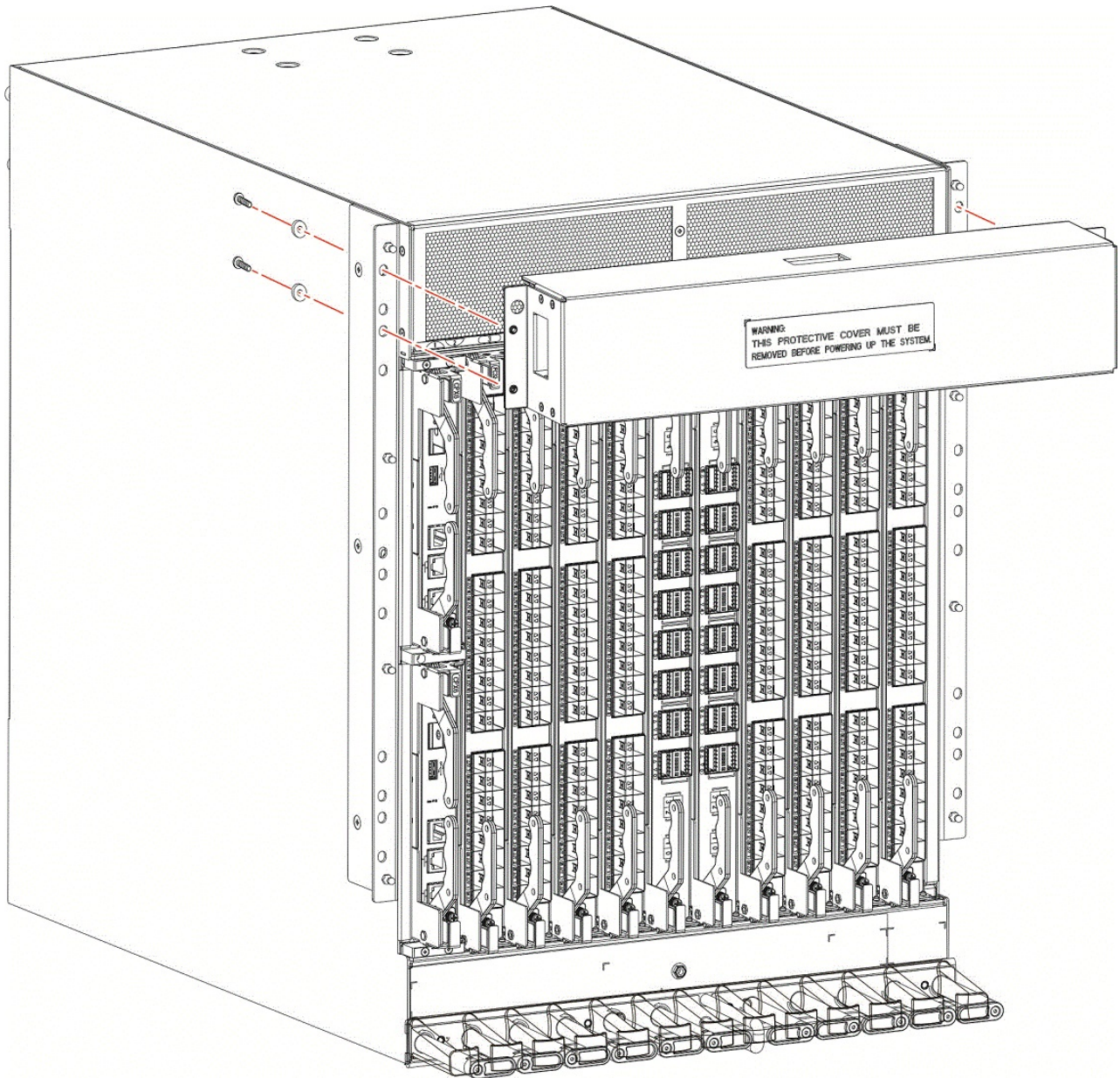
Figure 58. Removing protective cover from SAN512B-6 chassis

2. Align the ball stud attachment holes located vertically on each side of the rear of door with the ball studs on each chassis mounting ear. Push door onto chassis to snap onto the studs.
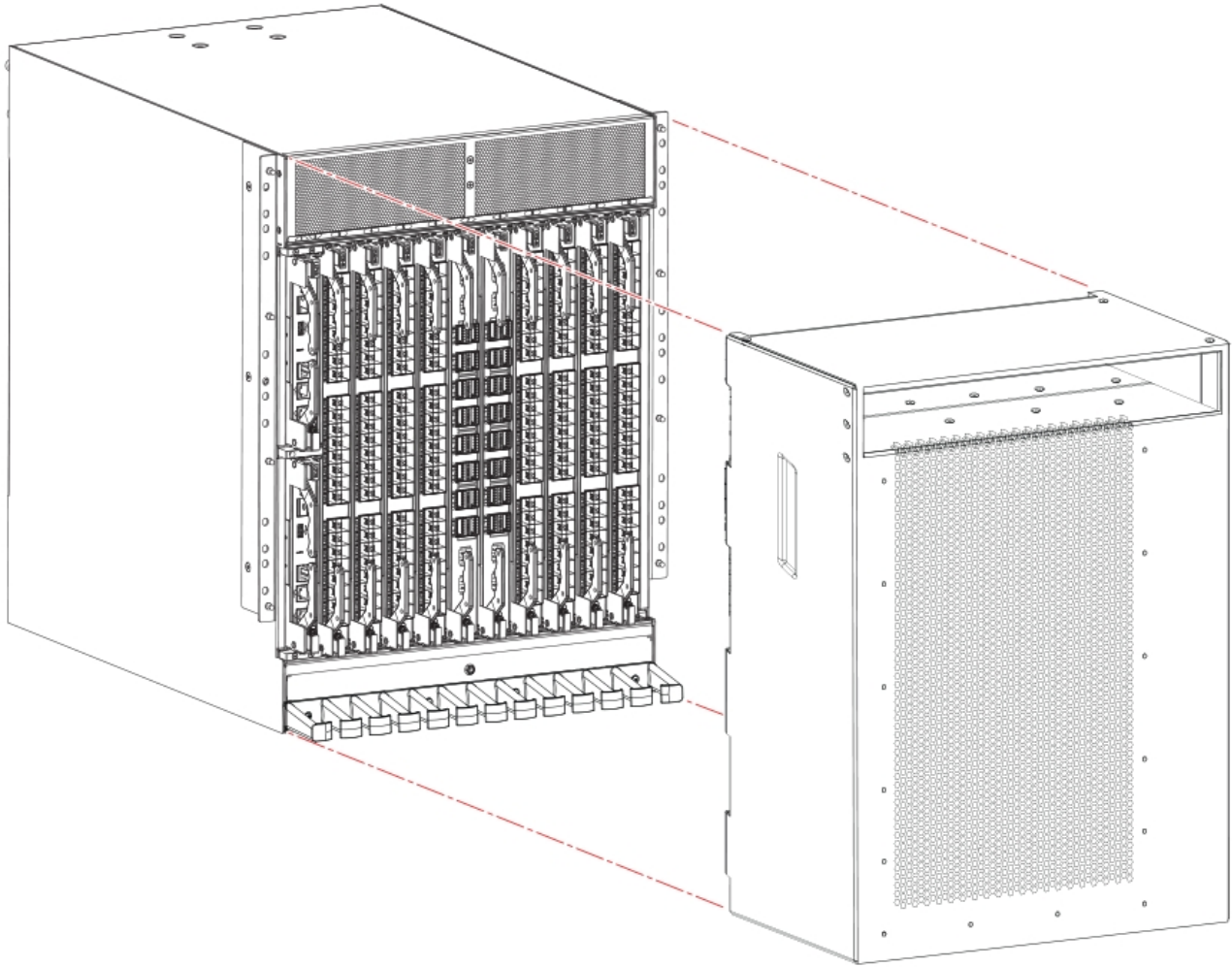
Figure 59. Removal and replacement of the chassis door

Chapter 16. Replacing the Chassis

This chapter provides the following information:
- "Chassis replacement overview"
- "Precautions specific to chassis replacement"
- "Chassis replacement task guide" on page 192
- "Determine need to replace chassis" on page 193
- "Time and items required" on page 194
- "Preparing for replacement" on page 194
- "Removing components from the chassis" on page 203
- "Installing components into the chassis" on page 205
- "Synchronizing airflow direction on WWN cards" on page 206
- "Downloading the configuration" on page 199
- "Verifying correct operation of system" on page 200
- "Reconnecting system to the network and fabric" on page 198
- "Verifying correct configuration of the fabric" on page 202

Chassis replacement overview

Before replacing the chassis, you will need to remove all blades and FRUs, except the WWN cards, from the existing chassis. You will reinstall these in the replacement chassis. Do not remove components without following procedures in this section exactly as you will need to save critical device and SAN information for these components before disconnecting the chassis from the network, fabric, and power to begin removal procedures. After you reinstall components in the new chassis, follow exact procedures to reconnect to the network, fabric and power, and then download firmware if necessary and verify system operation and configuration.

Note: You will not remove WWN cards from the old chassis as new cards are shipped in the replacement chassis.

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 194.

To unpack and transport the new chassis, follow procedures under "Unpacking and transporting the device" on page 19.

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.

18-32 kg (39.7-70.5 lbs)

DANGER

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

18-32 kg (39.7-70.5 lbs)

DANGER

A completely empty chassis weighs approximately 24.49 kg (54.0 lb) and requires a hydraulic or assisted lift to install it.

18-32 kg (39.7-70.5 lbs)

Chassis replacement task guide

About this task

Following are the basic tasks for removing and replacing the chassis with its backplane. Since chassis replacement is a collaborative process between customers and SSRs please review the information provided in "Customer replacement responsibilities" on page 193 and "IBM service replacement responsibilities" on page 203 to gain an understanding of your specific responsibilities for this procedure.

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

1. "Recording critical device and SAN information" on page 195
2. "Powering off the chassis" on page 198
3. "Removing components from the chassis" on page 203

Customer replacement responsibilities

Customer responsibilities for replacing a chassis.

Chassis replacement is a combined effort between the customer and the IBM System Services Representative (SSR). Before the IBM SSR can perform the physical replacement and labeling procedures, you must prepare your environment for chassis replacement by performing the following tasks:

1. "Determine need to replace chassis"
2. "Preparing for replacement" on page 194
3. "Recording critical device and SAN information" on page 195
4. "Powering off the chassis" on page 198

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.

Once you have completed these procedures, the IBM SSR can proceed with the physical replacement of the chassis and components, and labeling procedures. Once the SSR has completed their tasks for replacing the chassis, you will complete the replacement process by performing the following tasks:

1. "Downloading the configuration" on page 199
2. "Verifying correct operation of system" on page 200
3. "Verifying correct configuration of the fabric" on page 202

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.

Determine need to replace chassis

Verify that 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 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 was 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.
- Hydraulic or assisted lift with a minimum raise of 140 cm (55 in.) and a minimum capacity of 158.76 kg (350 lbs)

  DANGER

  > **If a lift tool with a capacity of at least 350 lbs is not available, the director chassis must be depopulated completely before installing it into the rack. Remove the power supplies, fan modules, all of the blades, the cable management comb, and the chassis door (if equipped). Install the empty chassis into the rack following the chassis installation instructions. The weight of the empty chassis is 78.5 lbs (35.6 kg) and must be lifted by minimum 3 people. After securing the chassis to the rack, reinstall the power supplies, fan modules, and the blades and proceed with the installation.**

- A surface on which to place the old chassis, such as a second lift or the pallet originally provided with the old chassis.
- #1 and #2 Phillips screwdriver. Use #1 Phillips screwdriver for removing and installing blades and FRUs in 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 address, WWN, serial numbers, switch ID, 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 195 instructs you to run the following commands and record specific output:
- supportShow
- configUpload - all
- configupload -vf
- ipAddrShow -sw
- chassisShow
- nsShow
- nsAllShow
- switchShow -qsfp
- fabricShow

- licenseShow

Before beginning replacement, you must also properly shut down the device and disconnect from the fabric and power using procedures under "Powering off the chassis" on page 198.

Recording critical device and SAN information:
About this task

Perform the following steps. All commands must be entered from a CLI session (telnet or serial) to the active CP blade unless otherwise indicated.

Procedure

1. Run **supportShow**, which includes most of the information in the following table and more. Be sure to record the location of the .txt files that you create in this procedure that are not called out in the **supportShow** results. For detailed information about Fabric OS commands, refer to the *Fabric OS Command Reference*. Use a checklist to ensure that all required information is recorded.

Table 22. 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 "SANbefor.txt" file	
	Notes regarding **nsshow** output	
	Notes regarding **nsallshow** output	
	Notes regarding **switchshow** output	
	Notes regarding **fabricshow** output	
Output from **chassisshow** command **Important:** The information displayed for Part Num and Serial Num are critical when replacing a chassis. This information allows the replacement chassis to assume the identity of the old chassis.		
Output from **licenseshow** command		
	License keys and other licensing data for licensed products enabled on device.	
Output from **supportshow** command		

Table 22. Critical information checklist (continued)

Checked?	Data	Notes
	Location of "spptshow.txt" file	
	Notes regarding **supportshow** output	
Information about the new chassis		
	New factory serial number	
	New serial number (if available)	

2. Open a telnet session and log into the device as **admin**. The default password is *password*. Enable the logging function on your telnet or serial console connection.

3. Back up the current configuration by entering **configUpload**. 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** 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*.

    ```
    switch:admin> configupload
    Protocol (scp, ftp, sftp, local)  [ftp]: ftp
    Server Name or IP Address [host]: 123.123.123.123
    User Name [user]: Admin24
    Path/Filename [<home dir>/config.txt]: config-switch0.txt
    Section (all|chassis|switch [all]): all
    Password:
    Upload complete
    switch: admin>
    ```

4. 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
    ```

5. Enter **ipAddrShow -sw**, and then copy the command output into the config-miscinfo.txt file.

    ```
    switch:admin> ipaddrshow -sw
    SWITCH
    Ethernet IP Address: 14.25.60.14
    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: 14.25.60.10
    Ethernet Subnetmask: 255.55.0.0
    HostName : cp0
    Gateway Address: 14.25.43.1
    CP1
    Ethernet IP Address: 14.25.50.13
    Ethernet Subnetmask: 255.55.0.0
    HostName : cp1
    ```

```
Gateway Address: 14.25.43.1
Backplane IP address of CP0 : 14.11.0.6
Backplane IP address of CP1 : 14.11.0.7
switch:admin>switch:admin>
```

6. 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.

   For example output from the **chassisShow** command, refer to "switchShow" on page 99.

7. Create a SAN "profile" by entering and recording the information provided by the following commands:

   - **nsShow**
   - **nsAllShow**
   - **switchShow -qsfp**
   - **fabricShow**

   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>
```

8. Enter **licenseShow**, and then copy the command output into a text file named "licenseshow.txt."

```
switch:admin> licenseshow
S9bddb9SQbTAceeC:
Fabric license
eezeRRySff0fSe:
Remote Switch license
bzbzRcbcSc0c0SY:
Remote Fabric license
dSeR9RcSeeTfSAq:
Extended Fabric license
RyeSzRScycTzfT09:
Entry Fabric license
RyeSzRScycazfT0G:
Trunking license
RyeSzRScycS0fT09:
4 Domain Fabric license
```

9. 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 file provides a backup of all the information that might be required by Technical Support. The information can be used after the device is restored to the fabric to verify that no unintentional changes have occurred to the fabric.

```
switch:admin> supportshow
version: 8.0.1
<output truncated>
switch:admin>
```

10. Record the cable connections between the chassis and the target device and ports.

11. Run **supportSave** on the active CP blade. The information recorded can be very important in case you have difficulties during the replacement process.

Powering off the chassis:
About this task

Complete the following steps to power off and shut down the chassis.

Procedure

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 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 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.**

What to do next

Work with your IBM SSR to continue with the physical replacement of the chassis and components, and labeling procedures, then proceed with "Downloading the configuration" on page 199.

Reconnecting 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.
   a. Insert the appropriate Ethernet cables into each Ethernet port.
   b. Connect the other ends to an appropriate Ethernet LAN, if not already connected.

Note: The device can be accessed by remote connection using any of the available management tools, such as Telnet or Web Tools. Ensure that the device is not modified using other connections during the rest of this procedure.

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 Administrator's 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.

What to do next

Allow the customer to "Downloading the configuration" and "Verifying correct operation of system" on page 200 and then proceed with "Reconnecting system to the network and fabric" on page 198.

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*.

Complete the following steps to download the configuration.

Procedure

1. Log in to the device as **admin**.

   ```
   switch:admin> configdownload
   Protocol (scp, ftp, sftp, local) [ftp]: ftp
   Server Name or IP Address [host]: 123.123.123.123
   User Name [user]: Admin24
   Path/Filename [<home dir>/config.txt]: config-switch.txt
   Section (all|chassis|switch [all]): all
   ```

CAUTION:
This command is used to download a back-up configuration for a specific switch. If you use a file from a different switch, its configuration settings will override current switch settings. Downloading a configuration file that was uploaded from a different type of switch, can cause this switch to fail.

Reboot the system for the configuration to take effect.
```
configDownload operation may take several minutes to complete for large files.
Do you want to continue [y/n]: y
Password:
```

Note: If you are using the Virtual Fabric feature, you must run **configdownload -vf** *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.

Verifying correct operation of system
About this task

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

Procedure

1. Log in to the device as **admin**.
```
switch:admin> login
login: admin
password: xxxxxxxx
switch:admin>
```

2. Enter the **chassisShow** command to verify that airflow direction set on WWN cards matches airflow direction for fans in fan and power supply assemblies installed in device. Airflow direction of fans and 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. The following example shows mismatch of system airflow and airflow direction in installed fan and 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 system airflow direction and airflow direction of fan in power supply or fan assembly refer to "Configuring airflow direction on WWN cards" on page 157 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).

```
switch: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      178   FC32-48       ENABLED
  5     AP BLADE      186   SX6           ENABLED
  6     SW BLADE      178   FC32-48       ENABLED
  7     CORE BLADE    176   CR32-8        ENABLED
  8     CORE BLADE    176   CR32-8        ENABLED
  9     SW BLADE      178   FC32-48       ENABLED
 10     AP BLADE      186   SX6           ENABLED
 11     SW BLADE      178   FC32-48       ENABLED
 12     SW BLADE      178   FC32-48       ENABLED
switch:admin>
```

4. Verify that the device is functioning correctly by entering **switchShow** or **switchStatusShow**.

This **switchShow** command displays the device and port status information.

```
switch15:admin> switchshow
switchshow>       switchshow
switchName:       sw15
switchType:       166.0
switchState:      Online
switchMode:       Native
switchRole:       Subordinate
switchDomain:     1
switchId:         fffc01
switchWwn:        10:00:00:23:f8:f2:15:82
zoning:           ON (MPR4k)
switchBeacon:     OFF
FC Router:        OFF
FC Router BB Fabric ID: 128
Address Mode:     0
Fabric Name:      BB1
HIF Mode:         OFF
Index Slot Port Address Media Speed  State   Proto
=======================================================
  0    3    0   010000   id    32G   Online  FC  F-Port 20:00:00:27:f8:f3:15:80
  1    3    1   010100   id    32G   Online  FC  F-Port 20:01:00:27:f8:f3:15:80
  2    3    2   010200   id    32G   Online  FC  F-Port 20:02:00:27:f8:f3:15:80
  3    3    3   010300   id    32G   Online  FC  F-Port 20:03:00:27:f8:f3:15:80
  4    3    4   010400   id    32G   Online  FC  F-Port 20:04:00:27:f8:f3:15:80
  5    3    5   010500   id    32G   Online  FC  F-Port 20:05:00:27:f8:f3:15:80
  6    3    6   010600   id    32G   Online  FC  F-Port 20:06:00:27:f8:f3:15:80
(output truncated)
```

5. Verify that all the IP address information is correct by entering **ipAddrShow** 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

Copying the command outputs from this section into a file is recommended. You must be logged in with Admin privileges.

Procedure

1. Create an "after" SAN profile by entering the following commands and copying the output to a text file named SANafter.txt:

   - **nsShow**

   - **nsAllShow**

   - **switchShow**

   - **fabricShow**

   - **lscfg --show** (if using the Virtual Fabric feature)

   ```
   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. Resolve any issues or unintentional changes to the device or fabric:

- If there are any mechanical problems, try reseating the associated component.
- If the configuration information is not correct for the device, modify as required.
- If other issues exist, contact your support provider.

IBM service replacement responsibilities

IBM SSR responsibilities for chassis replacement.

IBM System Services Representatives (SSR) are responsible for the physical replacement and labeling of the chassis. The SSR performs the following tasks during the replacement:

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.

1. "Disconnecting the cables"
2. "Removing components from the chassis"
3. "Installing the replacement chassis" on page 204
4. "Installing components into the chassis" on page 205
5. "Reconnecting system to the network and fabric" on page 198

Disconnecting the cables

About this task

Procedure

1. Power off the chassis by removing the power cords from the power supplies and the power outlets.
2. Remove the chassis door.
3. Label the cables connected to all blades and record the connections. Per connection, identify the slot and port, the device connected, and the slot or port on the connected device.
4. Disconnect the cables from the transceivers in 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.
5. 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 chassis ground (if the device is plugged in) or a bench ground.

Note: You do not need to remove WWN cards from the chassis as new WWN cards are shipped with the replacement 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.

Procedure

1. Remove the chassis door ("Removing a chassis door" on page 187) if not already removed.
2. Remove the cable management comb ("Removing cable management comb" on page 185).
3. Remove the port, extension, blades or filler panels ("Removing a blade" on page 111 and "Removing a filler panel" on page 181).
4. Remove the core routing blades ("Removing a core routing blade" on page 124).
5. Remove the control processor blades ("Removing a blade" on page 135).
6. Remove the power supply assemblies or filler panels ("Removing a power supply" on page 168).
7. Remove the fan assemblies ("Removing a fan assembly" on page 178).

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 24.49 kg (54.0 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 to 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 accessory kit, rack mount kits, and 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 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 "Items shipped" on page 15.

h. Save foam packing material and 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 chassis ground (if the device is plugged in) or a bench ground.

DANGER

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

Procedure

1. Record the chassis serial number, SKU, and WWN printed on the chassis label. This label is located on the upper portion of the chassis to the left of the fan assemblies on the nonport side. You may need this information to transfer licenses to the new chassis.

2. Replace the fan assemblies ("Installing a fan assembly" on page 179).

3. Replace the power supplies or filler panels ("Installing a power supply" on page 169).

4. Replace the control processor (CP) blades ("Replacing a CP blade" on page 134).

5. Replace the core routing (CR) blades ("Installing a blade" on page 142).

6. Replace the port and extension blades or filler panels ("Installing a blade" on page 114 and "Installing a filler panel" on page 182).

7. Replace the cable management comb ("Installing cable management comb" on page 186).

8. Replace the chassis door. The door is required to meet EMI compliance. Refer to "Installing a chassis door" on page 188.

9. Plug in power cords from power source into all installed power supplies to power on device. Refer to ("Providing power to the device" on page 39).

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.

10. Verify that the device is powered on and POST is complete (all power LED indicators on the blades should be a steady green).

11. Verify that all components are functioning correctly by checking their LEDs. If the LEDs do not indicate correct operation, try reinstalling the corresponding component.

12. Perform the following procedures in order to complete this installation:

    a. "Downloading the configuration" on page 199

    b. "Verifying correct operation of system" on page 200

    c. "Reconnecting system to the network and fabric" on page 198

    d. "Verifying correct configuration of the fabric" on page 202

    e. "Synchronizing airflow direction on WWN cards"

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 airflow direction set on new WWN cards shipped with replacement chassis.

You can check airflow direction for fans in fan and power supply assemblies installed in device with airflow direction set on WWN cards by entering the `chassisShow` command. Airflow direction of fans and 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 system airflow direction and airflow direction of fan in power supply or fan assemblies refer, to "Configuring airflow direction on WWN cards" on page 157 for instructions on configuring correct airflow direction on WWN cards.

Note: Changing chassis airflow allows you to synchronize established chassis airflow direction from installed fan and power supply assemblies with airflow direction configured on WWN cards. This procedure may need to be used after replacing WWN cards. This procedure must be performed when replacing the 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.

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 60 and remove the BR1225 battery from the holder.
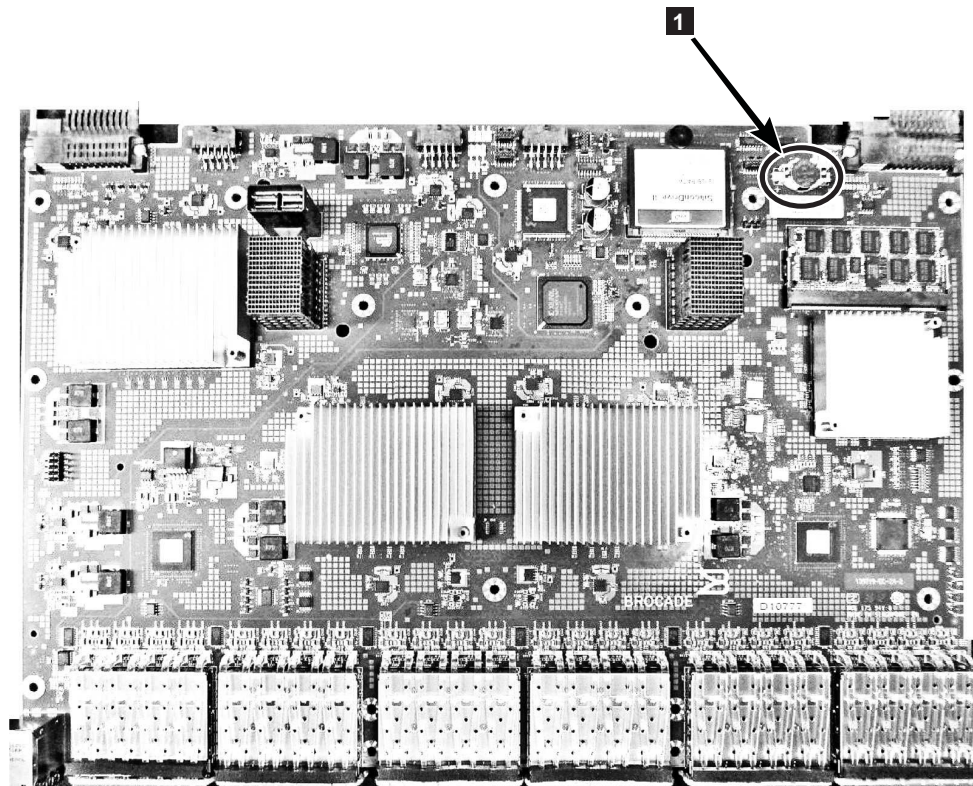
Figure 60. Location of battery holder

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. SAN rack

This topic describes how to install and service the SAN rack. A number of different machine type 8961 and 2499 b-type models of directors can be installed in this SAN rack, including products that are no longer marketed by IBM. These products include the following:

- 8961 SAN director models
  - F04 (SAN256B-6)
  - F08 (SAN512B-6)
- 2499 SAN director models
  - 416 (SAN384B-2)
  - 816 (SAN786B-2)

For specific installation and service information for these IBM Storage Networking SAN products, refer to their respective installation and service guides.

Throughout this document, the IBM TotalStorage IBM SAN rack is referred to as the *rack*. The IBM Storage Networking SAN512B-6, 256B-6, and IBM System Networking SAN768B-2 and 384B-2 are referred to as *directors*. The term *devices* refers generically to directors or other products.

Installing the IBM SAN rack

This section contains the procedures to install a IBM SAN rack (hereafter referred to as the *rack*) and prepare it for use.

The installation steps are as follows:
- "Step 1. Position the rack" on page 210
- "Step 2. Level the rack" on page 210
- "Step 3. Attach the stabilizers" on page 211
- "Step 4. Attach the rack to a concrete floor" on page 212
- "Step 5. Attach the rack to a concrete floor beneath a raised floor" on page 214
- "Step 6. Attach the mounting plates" on page 217
- "Step 7. Attach the front door" on page 217
- "Step 8. Check the customer's ac power source" on page 218
- "Step 9. Check the intelligent power distribution units" on page 219
- "Step 10. Connect switch and device cables" on page 221
- "Step 11. Power on the rack" on page 221

Attention: Refer to "Safety and environmental notices" on page xiii for safety information and notices before starting any installation or service procedures.

Step 1. Position the rack

DANGER

> **Heavy Equipment - Personal injury or equipment damage may result if mishandled (D006)**

> 500 lbs. (> 227 kg.)

Attention: An IBM service support representative must install the rack. Professional movers/riggers must transport the rack to within the installation room. The IBM authorized service provider will only perform minimal frame repositioning within the computer room, as needed, to perform required service actions. Refer to "Danger notices" on page xv for more information.

Perform the following steps to position the rack:

1. Remove all packing and tape from the rack.
2. Position the rack according to the customer floor plan.
3. Lock each caster wheel by tightening the screw on the caster. See Figure 61.

Locking Screw

SJ000654
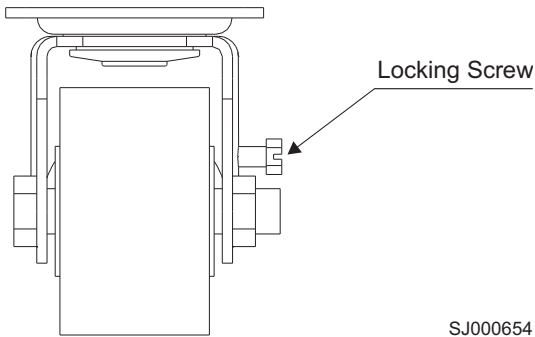
Figure 61. Caster wheel

Use the following conditions to determine the next step:

- If you are not attaching the rack to the floor, go to "Step 2. Level the rack."
- If you are bolting the rack to a concrete floor, go to "Step 4. Attach the rack to a concrete floor" on page 212.
- If you are bolting the rack to a concrete floor beneath a raised floor, go to "Step 5. Attach the rack to a concrete floor beneath a raised floor" on page 214.

Step 2. Level the rack

Perform the following steps to adjust the leveling feet:

1. Loosen the jam nut on each leveling foot by turning the nut counterclockwise, away from the bottom of the rack. See Figure 62 on page 211.
2. Rotate each leveling foot downward until it contacts the surface on which the rack is placed.
3. Adjust the leveling feet downward as needed until the rack is level. When the rack is level, tighten the jam nuts against the base by turning the nut clockwise, toward the bottom of the rack.

Rear of Cabinet

Jam Nut

Leveling Screw

Front of Cabinet

SJ000655
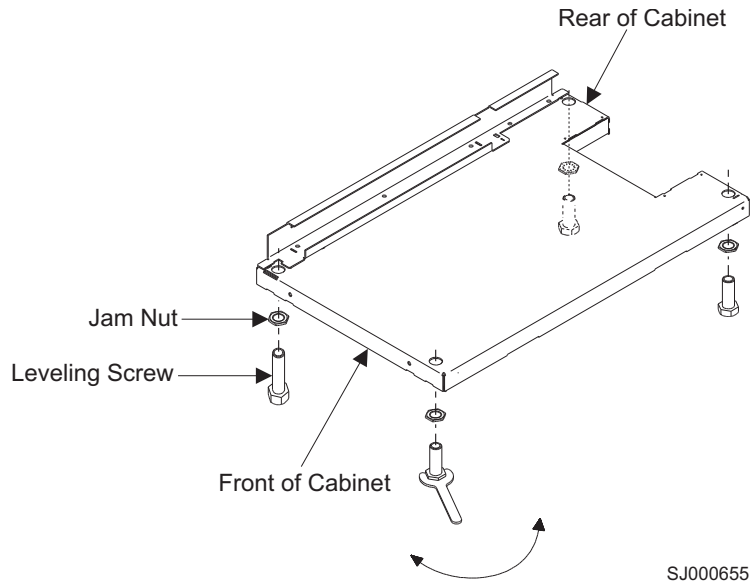
Figure 62. Adjusting the leveling feet

Step 3. Attach the stabilizers

DANGER

You must firmly attach the stabilizers to the bottom front and bottom rear of the rack to prevent the rack from turning over when the switches are pulled out of the rack. (R001)

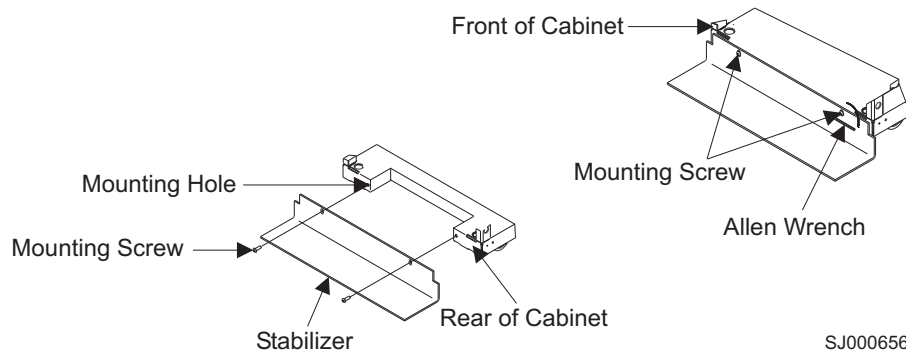1. Align the slots in the stabilizer with the mounting holes at the bottom front of the rack. See Figure 63.

Front of Cabinet

Mounting Screw

Allen Wrench

Mounting Hole

Mounting Screw

Rear of Cabinet

Stabilizer

SJ000656

Figure 63. Stabilizers

2. Install the two mounting screws.
3. Ensure that the base of the stabilizer rests firmly on the floor. Use the Allen wrench that is supplied with the rack to alternately tighten the mounting screws until they are tight.

Step 4. Attach the rack to a concrete floor

Perform the following steps to attach the rack-mounting plates directly to a concrete floor. Refer to Figure 64 while you perform the steps.
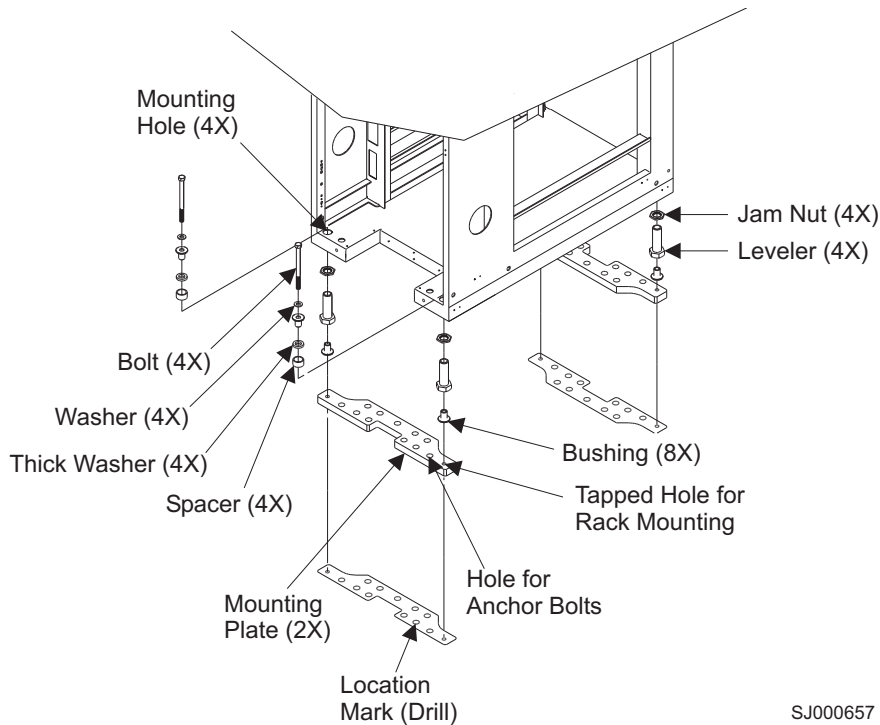
Figure 64. Attaching the rack to a concrete floor

1. Ensure that the rack is in the correct location.
2. In this rack, temporarily install the bushings to help position the rack-mounting plates.
3. Ensure that the bushing is in the leveling foot. Position the two rack-mounting plates in the approximate mounting location under the rack. If necessary, raise the leveling feet for clearance.
4. Place a bushing on a rack-mounting bolt. Insert the bolt and bushing through the leveling foot and bushing and out the bottom bushing.
5. Insert the four rack-mounting bolts through the leveling feet and bushings and out the bottom of the rack.
6. Position the rack-mounting plates under the four rack-mounting bolts. Center the rack-mounting bolts directly over the tapped holes.
7. Turn the rack-mounting bolts 3–4 rotations into the tapped holes.
8. Mark the floor around the edges of both rack-mounting plates.
9. Mark the rack-mounting plate bolt-down holes that are accessible through the opening in the rear of the rack.
10. Remove the rack-mounting bolts and bushings.
11. Remove the rack-mounting plates.
12. Loosen the locking screws on the casters. Move the rack so that the rack is clear of the locator marks for the rack-mounting plates.

13. Position the rack-mounting plates within the marked areas.
14. Mark the floor at the center of each hole in the rack-mounting plates (including the tapped holes).
15. Remove the two rack-mounting plates from the marked locations.
16. At the marked location of the tapped rack-mounting bolt holes, drill four holes approximately 5 cm (2 in.). This allows clearance for the ends of the four rack-mounting bolts. The ends of the rack-mounting bolts protrude past the thickness of the mounting plate.

    Note: You must use a minimum of two anchor bolts for each rack-mounting plate to attach it to the concrete floor. Because some of the holes in the rack-mounting plates might align with the concrete reinforcement rods that are below the surface of the concrete, some of the rack-mounting plate holes might not be suitable.

17. For each rack-mounting plate, select at least two suitable holes. Select holes as close to the threaded holes as possible. Be sure that the holes you select at the rear of the rack are accessible. Drill the selected holes (two for each rack-mounting plate).
18. Position the front rack-mounting plate within the marked area.
19. Using anchor bolts, attach the front rack-mounting plate to the concrete floor.

    Note: Do not use the four plastic isolator bushings.
20. Position the rack over the front rack-mounting plate.
21. Position the rear rack-mounting plate within the marked area.
22. Using anchor bolts, attach the rear rack-mounting plate to the concrete floor.
23. Insert each of the rack-mounting bolts through a flat washer, a thick washer, and through a leveling foot.
24. Align the four rack-mounting bolts with the four tapped holes in the two rack-mounting plates and turn the bolts 3–4 rotations.
25. Tighten the locking screw on each caster.
26. Adjust the leveling screw downward, as needed, until the rack is level. See Figure 65 on page 214. When the rack is level, tighten the jam nuts against the base by turning the jam nut clockwise, toward the bottom of the rack. Torque the four bolts to 54–67 nm (40–50 ft-lbs).
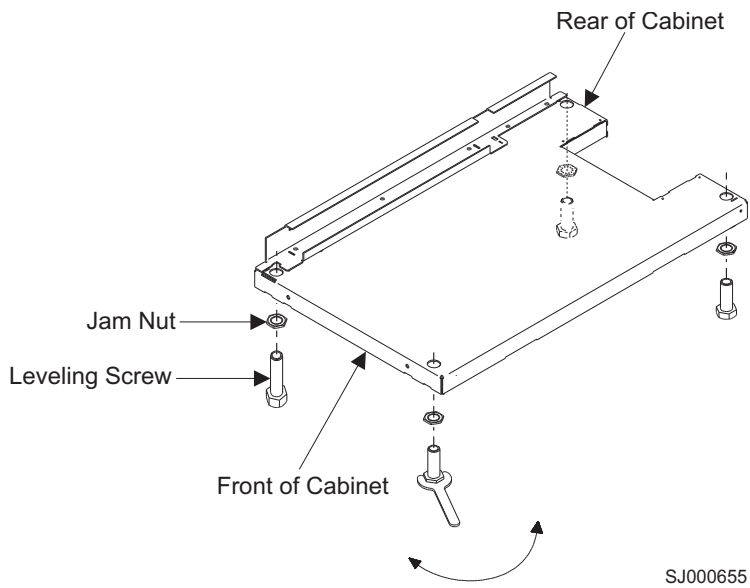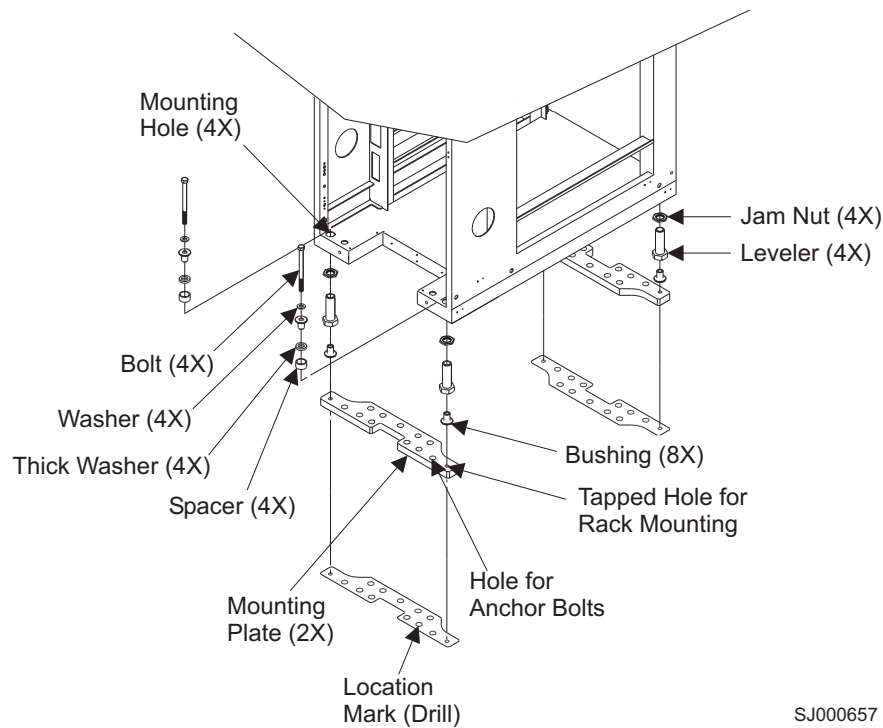
Figure 65. Leveling the rack

27. After you bolt down the rack, go to "Step 7. Attach the front door" on page 217.

Step 5. Attach the rack to a concrete floor beneath a raised floor

Perform the following steps to attach the rack-mounting plates to the concrete floor beneath a raised floor.

Refer to Figure 66 on page 215 while you perform the steps.

Mounting Hole (4X)

Jam Nut (4X)

Leveler (4X)

Bolt (4X)

Washer (4X)

Thick Washer (4X)

Spacer (4X)

Bushing (8X)

Tapped Hole for Rack Mounting

Hole for Anchor Bolts

Mounting Plate (2X)

Location Mark (Drill)

SJ000657

Figure 66. Attaching the rack to a raised floor

1. Ensure that the rack is in the correct location.
2. In this rack, temporarily install the bushings to help position the rack-mounting plates.
3. Ensure that the bushing is in the leveling foot. Position the two rack-mounting plates in the approximate mounting locations under the rack. If necessary, raise the leveling feet for clearance.
4. Place a bushing on a rack-mounting bolt. Insert the bolt and bushing through the leveling foot and bushing, and out of the bottom bushing.
5. Insert the four rack-mounting bolts through the leveling feet and bushings, and out the bottom of the rack.
6. Position the rack-mounting plates under the four rack-mounting bolts. Center the rack-mounting bolts directly over the tapped holes.
7. Turn the rack-mounting bolts 3–4 rotations into the tapped holes.
8. Mark the raised-floor panel around the edges of both rack-mounting plates.
9. Mark the rack-mounting plate bolt-down holes that are accessible through the opening in the rear of the rack.
10. Remove the rack-mounting bolts and bushings.
11. Remove the rack-mounting plates.
12. Loosen the locking screws on the casters. Move the rack so that it is clear of the locator marks for the rack-mounting plates.
13. Position the rack-mounting plates within the marked areas.
14. Mark the raised-floor panel at the center of each hole in the rack-mounting plates (including the tapped holes).
15. Remove the two rack-mounting plates from the marked locations.
16. Transfer the locations of the holes from the raised-floor panel to the concrete floor directly beneath. Mark the holes on the concrete floor.

Note: You must use a minimum of two anchor bolts for each rack-mounting plate to attach it to the concrete floor. Because some of the holes in the rack-mounting plates might align with concrete reinforcement rods below the surface of the concrete, some of the rack-mounting plate holes might not be suitable.

17. For each rack-mounting plate, select at least two suitable holes. Select holes as close to the threaded holes as possible. Be sure that the holes you select at the rear of the rack are accessible. Drill the selected holes (two for each rack-mounting plate) in the concrete floor.

18. Drill pass-through holes in the raised-floor panel at the location of the four rack-mounting bolts.

19. Position the front rack-mounting plate within the marked area.

20. Using anchor bolts, attach the front rack-mounting plate to the concrete floor. Do not use the four plastic isolator bushings.

21. Position the rack on the raised-floor panel over the front rack-mounting plate.

22. Position the rear rack-mounting plate within the marked area.

23. Using anchor bolts, attach the rear rack-mounting plate to the concrete floor.

24. Insert each of the rack-mounting bolts through a flat washer, a plastic isolator bushing, a thick washer, and through a leveling foot.

25. Align the four rack-mounting bolts with the four tapped holes in the two mounting plates and turn the bolts 3–4 rotations.

26. Tighten the locking screw on each caster.

27. Adjust the leveling feet downward, as needed, until the rack is level. See Figure 67. When the rack is level, tighten the jam nuts against the base by turning the jam nut clockwise (toward the bottom of the rack). Torque the four bolts to 54–67 nm (40–50 ft-lbs).

Rear of Cabinet

Jam Nut

Leveling Screw

Front of Cabinet

SJ000655
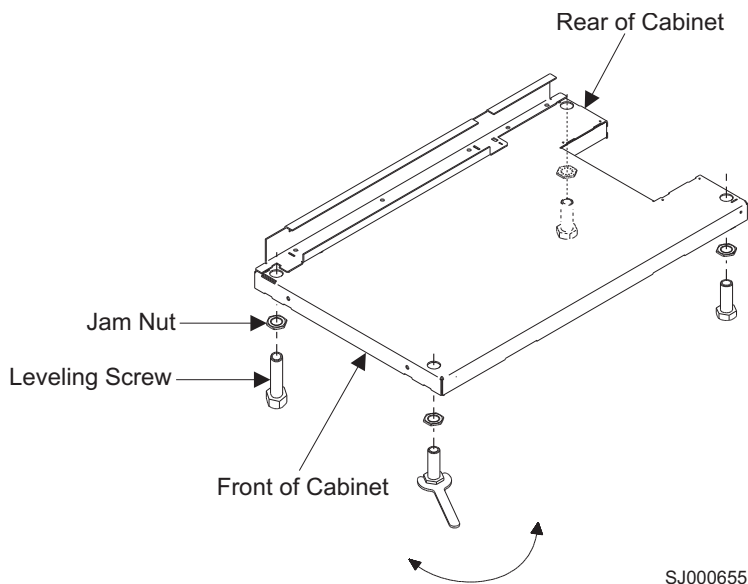
Figure 67. Leveling the rack

28. If the rack does not have a front door, install the top, left, and right trim panels.

29. After you bolt down the rack, go to "Step 7. Attach the front door."

Step 6. Attach the mounting plates

Note: You attach the front and rear mounting plates through the same mounting holes that you use to mount the stabilizers. Therefore, you must bolt down the rack rather than use the stabilizers. Install the mounting plates *only* if you bolted the rack to the floor.

The mounting plates are part of the Earthquake Mounting Kit, feature code 6080.

Align the holes on the mounting plate with the holes on the front of the rack. Use the Allen wrench that is supplied with the rack to install the mounting plate screws (stabilizer mounting screws). Repeat this procedure for the mounting plate on the rear of the rack. See Figure 68.
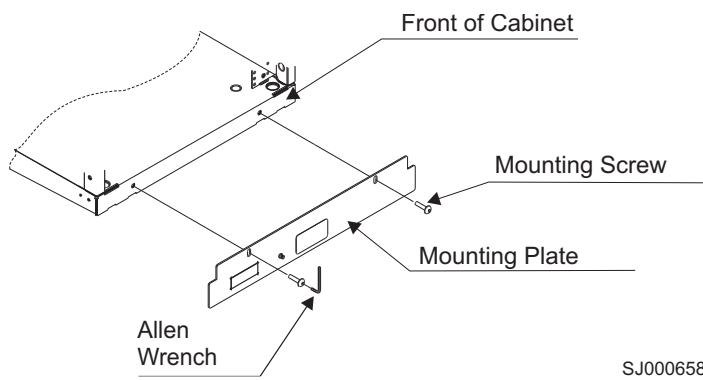
Figure 68. Attaching the mounting plate

Step 7. Attach the front door

If necessary, perform the following steps to attach the front door. Refer to Figure 69 on page 218 while you perform the steps.

Latch Mounting Screws

Latch

Door Removed for Clarity

Hinge Mounting Screws
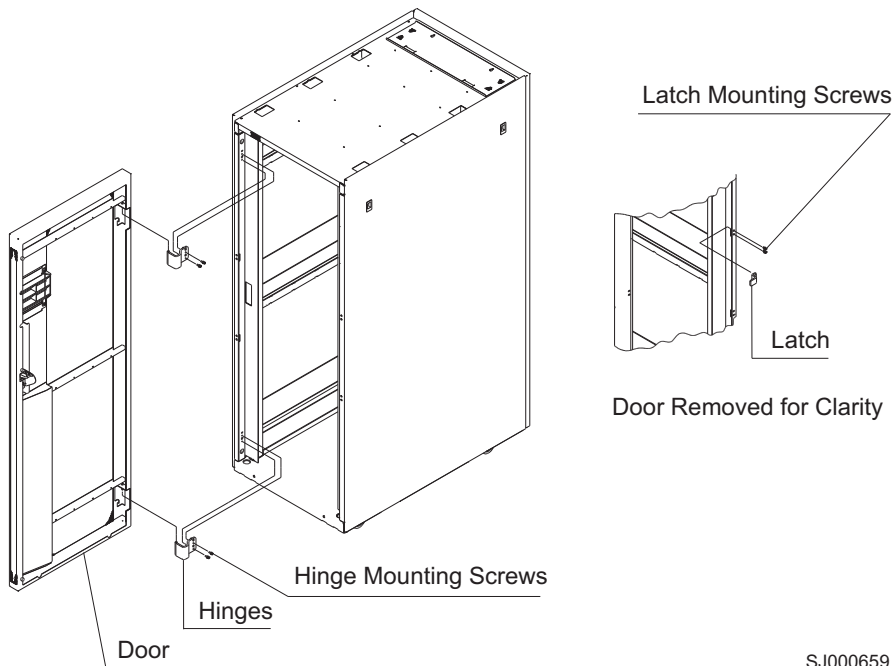
Hinges

Door

SJ000659

Figure 69. Attaching the front door

1. Install the hinges.
2. Install the latch.
3. Align the lower hinge pin on the front door with the hinge. Partially insert the pin into the hinge.
4. Align the upper hinge pin with the hinge. Lower the door into position.
5. Adjust the latch so that the door is latched securely.

Step 8. Check the customer's ac power source

Before you plug the power cord into the ac power source, perform the following checks on the customer's ac power source.

DANGER

If the receptacle has a metal shell, do not touch the shell until you have completed the voltage and grounding checks. Improper wiring or grounding could place dangerous voltage on the metal shell. If any of the conditions are not as described, STOP. Ensure the improper voltage or impedance conditions are corrected before proceeding. (D003)

CAUTION:
Ensure the building power circuit breakers are turned off *BEFORE* **you connect the power cord(s) to the building power. (C023)**

1. Have the customer turn off the branch circuit breaker for the ac power outlet into which the power cord will plug. Attach a "Do Not Operate" tag (S229–0237) to the circuit breaker switch.

Note: All measurements are made with the receptacle face plate in the normal installed position.

2. Some receptacles are enclosed in metal housings. For this type of receptacle, perform the following steps:

   a. Check for less than 1 volt from the receptacle case to any grounded metal structure, such as a raised-floor metal structure, water pipe, building steel, or similar structure.

   b. Check for less than 1 volt from the receptacle ground pin to a grounded point in the building.

   Note: If the receptacle case or face plate is painted, be sure that the probe tip penetrates the paint and makes good electrical contact with the metal.

   c. Check the resistance from the ground pin of the receptacle to the receptacle case. Check the resistance from the ground pin to the building ground. The readings should be less than 0.1 ohm, which indicates the presence of a continuous grounding conductor.

3. If any of the three checks that you made in step ins008#mtlhsng are not correct, ask the customer to:

   • Remove the power from the branch circuit.

   • Make the wiring corrections.

   Recheck the receptacle.

   Note: Do not use a digital multimeter to measure grounding resistance in the following steps.

4. Check for infinite resistance between the ground pin of the receptacle and each of the phase pins. This check is for a wiring short to ground or a wiring reversal.

5. Check for infinite resistance between the phase pins. This check is for a wiring short.

CAUTION:
If the reading is other than infinity, do not proceed! Have the customer make the necessary wiring corrections before you continue. Do not turn on the branch circuit breaker until you satisfactorily complete all the previous steps. (Refer to danger notices D004, D005 in "Safety and environmental notices" on page xiii for more specific information.)

6. Have the customer turn on the branch circuit breaker. Measure for the appropriate voltages between phases. If no voltage is present on the receptacle case or the ground pin, the receptacle is safe to touch.

7. With an appropriate meter, verify that the voltage at the ac outlet is correct.

8. Verify that the grounding impedance is correct by using the ECOS 1020, 1023, B7106, C7106, or an appropriately approved ground impedance tester.

Step 9. Check the intelligent power distribution units

The SAN rack can contain up to four intelligent power distribution units (iPDUs). The iPDUs contains ac outlets to provide power to the directors. Two iPDUs (PN 00FW787) are factory-installed along the left and right sides of the rack in the lower cutouts. These iPDUs provide power for the directors. You can install two

additional iPDUs along the sides of the rack in the upper cutouts to provide power for any additional directors you choose to install. These iPDUs must be installed in pairs.

The input ac power is not switched, so each outlet has a separate circuit breaker to protect against excessive current. When the power cords are plugged into the iPDU outlets, resistance should be less than 0.1 ohm between input ground and either switch or rack frames.

For instructions on how to remove and install the iPDUs:
- See "Installing additional iPDUs" for an initial installation of the iPDUs.
- See "Side-mounted iPDUs" on page 223 for instructions for removing and replacing the side-mounted iPDUs.

Installing additional iPDUs

The rear of the rack contains cutouts for additional iPDUs. The cutouts for the iPDUs are located on the upper right side and the upper left side of the rack (see **1** in Figure 71 on page 223 and **2** in Figure 73 on page 232).

Complete the following steps to install the two additional iPDUs into the rack:
1. Install the four nut clips (PN 178837) in the top right iPDU cutout.
2. Insert the iPDU (PN 00FW787) into the top right cutout.
3. Insert the four screws (PN 17P8838) into the iPDU and tighten.
4. Install the four nut clips (PN 178837) in the top left iPDU cutout.
5. Insert the iPDU (PN 00FW787) into the top left cutout.
6. Insert the four screws (PN 17P8838) into the iPDU and tighten.

Attention: The iPDUs for directors (PN 00FW787) have a maximum total current capacity of 24 amps. Ensure that attached devices do not exceed this capacity.

Figure 70 on page 221 shows how the power cords should be looped inside the rack. Be sure that the cords do not loop below the lower rack brace.
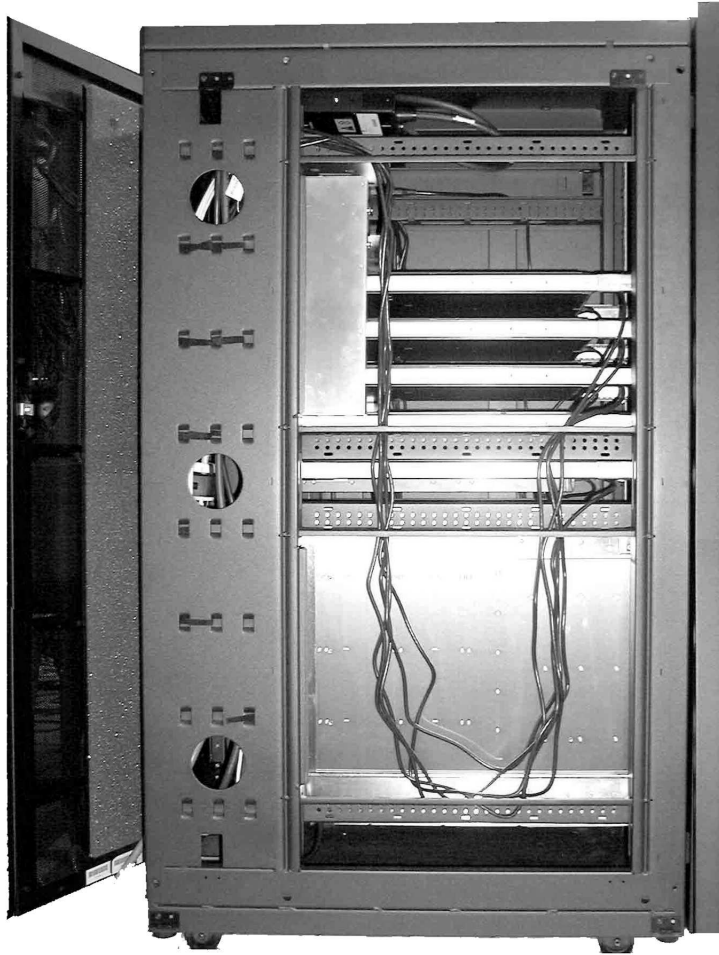
SJ002016

Figure 70. Power cord cabling (rack side view)

> **Attention:** To ensure proper air circulation and cooling, filler panels (see "Blank fillers" on page 228) must be installed in all blank spaces in the rack.

Step 10. Connect switch and device cables

The factory configures the rack and installs all of the director power cables.

The factory does not install switches or routers. These products should be installed only by qualified personnel.

If you need to install device cables, follow the installation instructions provided with the component that you are installing.

Step 11. Power on the rack

Perform the following steps to power on the rack:

1. Plug all power cords into the outlets on the power distribution units (iPDUs).
2. Plug the power cord of each iPDU into the customer's ac power outlets. Use only the cords supplied with the rack and iPDUs.

⚠️ **CAUTION:**
This product is equipped with a 3-wire (two conductors and ground) power cable and plug. Use this power cable with a properly grounded electrical outlet to avoid electrical shock. (C018)

> **Note:** See "Power cables" on page 230 for information about the power cords that are available for the rack.

3. Follow the power-on procedures for the switches and directors installed in the rack. See the specific installation and service guides for each installed switch.
4. Close the front door of the rack.

Service procedures

The service procedures described in this chapter are for the cabinet and associated hardware only. Service procedures for the individual products mounted in the cabinet are described in their respective installation and service guides. This chapter contains the following sections:

- "Director power-off procedure"
- "Removing and replacing the iPDUs" on page 223
- "Removing and replacing the front or rear rack door" on page 224
- "Relocating the rack" on page 225

Attention: Refer to "Safety and environmental notices" on page xiii before performing any service procedures in this chapter.

Attention: To ensure proper air circulation and cooling, filler panels (see "Blank fillers" on page 228) must be installed in all blank spaces in the cabinet. If you remove any devices, fill the blank spaces with filler panels.

Director power-off procedure

Use the following procedure to power-off a director before attempting to remove or replace any rack components. For more specific instructions to power off a particular device, refer to the installation and service guide for that particular product.

Attention: Removing power to a mounted director or other device has an adverse effect on the customer's systems and networks if they are not properly prepared. Inform the customer before you power off any product.

1. Open the rear door of the rack. Check the power cabling from the device that is attached to the iPDU that you are servicing. Most devices have dual power cords, which are plugged into iPDUs with independent ac sources.
2. Before you power off the director, make sure that the customer has removed, dismounted, or taken the devices off line from their systems.
3. Turn off the ac power switches (circuit breakers) of the devices connected to the iPDU you are servicing.
4. Unplug the power cord from the customer's ac power outlet(s).
5. Unplug all power cords from the iPDU you are servicing.

Removing and replacing the iPDUs

For all racks with serial numbers ending in an alphabetic character, iPDUs for the directors and other devices are mounted only in the side cutouts. See "Side-mounted iPDUs" for instructions on removing and replacing side-mounted iPDUs.

Figure 71 shows the SAN rack with the factory installed iPDUs (**2**). Each iPDU has six receptacles (see Figure 74 on page 233.
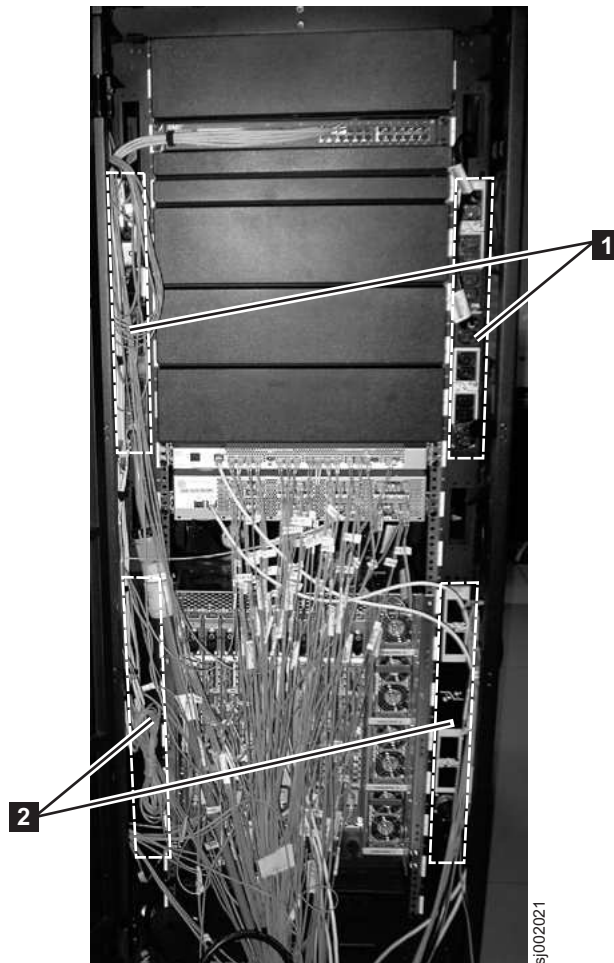

Figure 71. SAN rack with iPDU locations

Item	Description	Part number
2	iPDU for director attachment	(PN00FW787)

Note: This illustration is for locating the positions of the iPDUs only. The director door and cable management trays are not installed, and the cables are not sufficiently organized. Refer to the appropriate director installation and service guides for information on cable management.

Side-mounted iPDUs

iPDUs are located in the lower cutouts in the left and right sides of the rack.

Removing the side-mounted iPDU: Complete the following steps to remove the side-mounted iPDU from the rack:

1. Follow the steps in "Director power-off procedure" on page 222.
2. Turn off power and disconnect the ac power distribution bus from the customer's ac power outlet. Record the locations of the director ac power cables that are plugged into the iPDU.
3. Unplug the director ac power cables from the iPDU.
4. Remove the four screws from the iPDU. Set aside for later use.
5. With one hand under the iPDU to support it, remove the iPDU from the rack.
6. Set the iPDU aside. Follow the return instructions that accompany the replacement iPDU.

Replacing the side-mounted iPDU: Complete the following steps to replace the side-mounted director iPDU:

1. Insert the new iPDU (PN 00FW787) into the cutout until the iPDU mounting tabs are against the nut clips.
2. Insert the four screws through the iPDU mounting tabs and into the nut clips. Tighten each screw.
3. Reattach the iPDU power cable to the iPDU and to the power source.
4. Reconnect any director power cables that you disconnected from the iPDU, using the locations you noted during the removal process.
5. Follow the steps in "Step 11. Power on the rack" on page 221.

Removing and replacing the front or rear rack door

Use this procedure to remove and replace the front or rear rack doors.

Removing the rack door

Perform the following steps to remove the front or rear door:

1. Open the door of the rack.
2. Remove the door by lifting it up and out.
3. Remove the hinge bracket (if necessary) by removing the hinge mounting screws that attach the bracket to the rack. See Figure 72 on page 225.
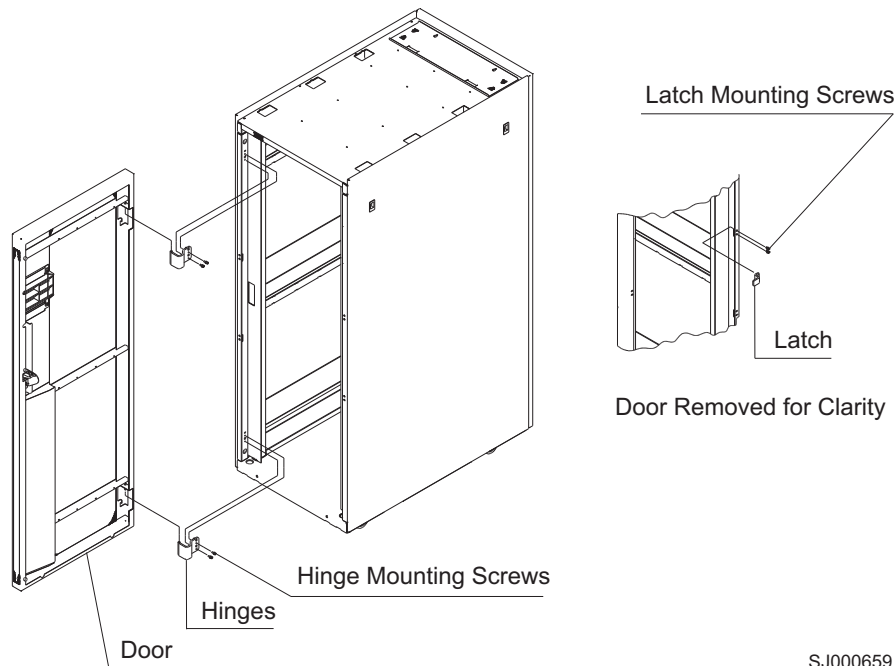
Figure 72. Removing the rack door

Replacing the rack door: Perform the following steps to replace the front or rear door:

1. Align the door with the hinge pin.
2. Install the bottom hinge pin (the longest pin) first.
3. Install the top hinge pin (the shortest pin) second.

Relocating the rack

DANGER

Heavy Equipment - Personal injury or equipment damage may result if mishandled (D006)

Attention: Refer to "Danger notices" on page xv for safety information regarding moving the rack. Professional movers/riggers may be required.

CAUTION:
Refer to "Rack safety" on page xx (R001, R002) for weight balance and loading safety notices before moving loaded racks or racks.

Perform the following steps to relocate the rack:

1. Turn off all power to the rack and the devices installed.
2. Disconnect all power and all device cables.
3. Unbolt the rack from the floor or remove the stabilizers.
4. Raise all the leveling feet.

5. Unlock each caster wheel by loosening the screw on the caster.

6. Move the rack to the new position.

7. Reposition the rack. Go to "Step 1. Position the rack" on page 210.

Parts information

This chapter contains detailed drawings, FRU part numbers, and part descriptions for a IBM SAN rack. For parts information specific to individual devices installed in the rack, see the installation and service guides for those products.

Rack door and side panels
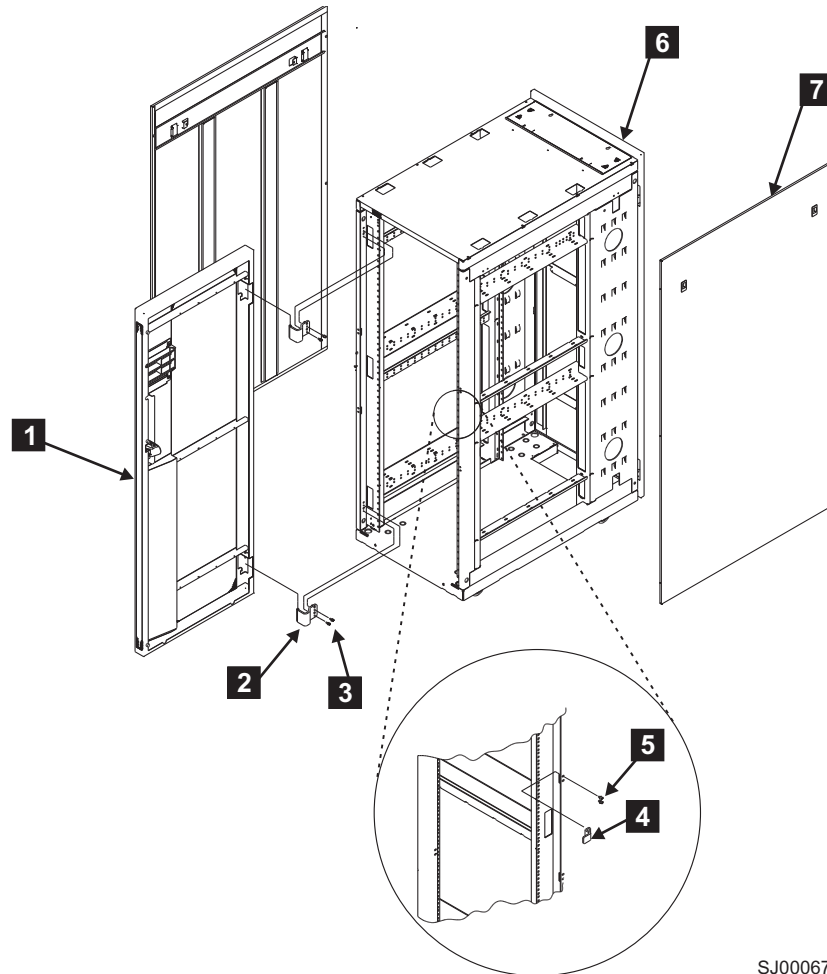
SJ000670

Index number	FRU part number	Units per assembly	Description
1	18P2120	1	Front door
2	31L7547	2	Hinge, front door
3	31L8594	4	Screw, front hinge
4	31L7545	1	Latch, front door
5	31L7540	2	Screw, front door latch
6	11P0724	1	Rear door (black)
7	05N6478	2	Side panel (black)

Earthquake brace
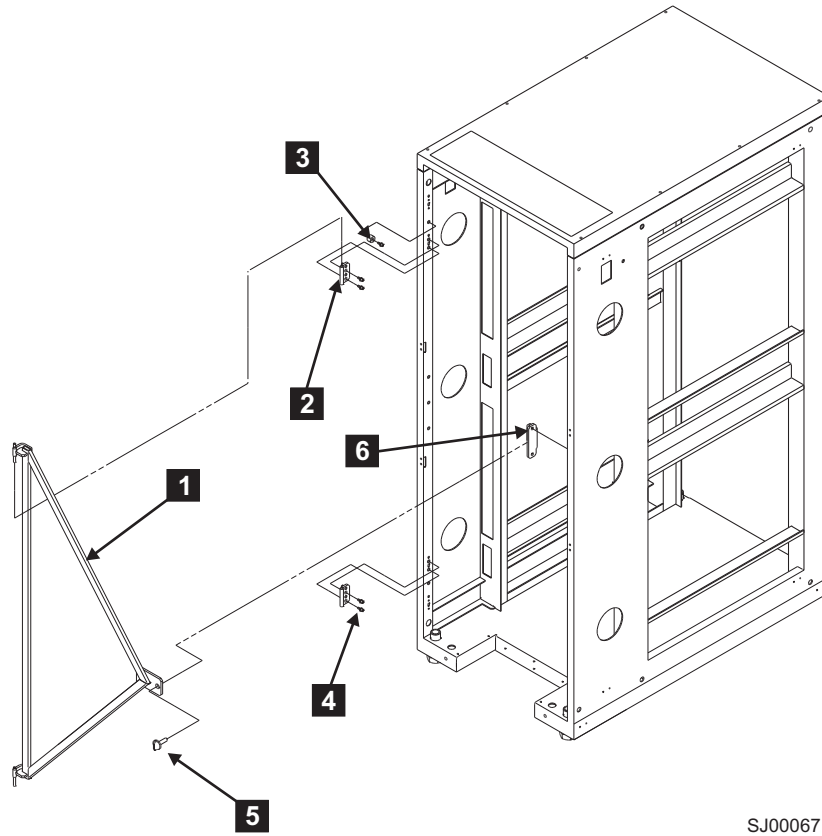
SJ000671

Index number	FRU part number	Units per assembly	Description
	41V0488	1	Earthquake brace kit
1	Reference only	1	Bracket
2	Reference only	2	Hinge
3	Reference only	1	Spacer
4	Reference only	7	Screw
5	Reference only	1	Bolt
6	Reference only	1	Latch plate

Blank fillers

SJ000672
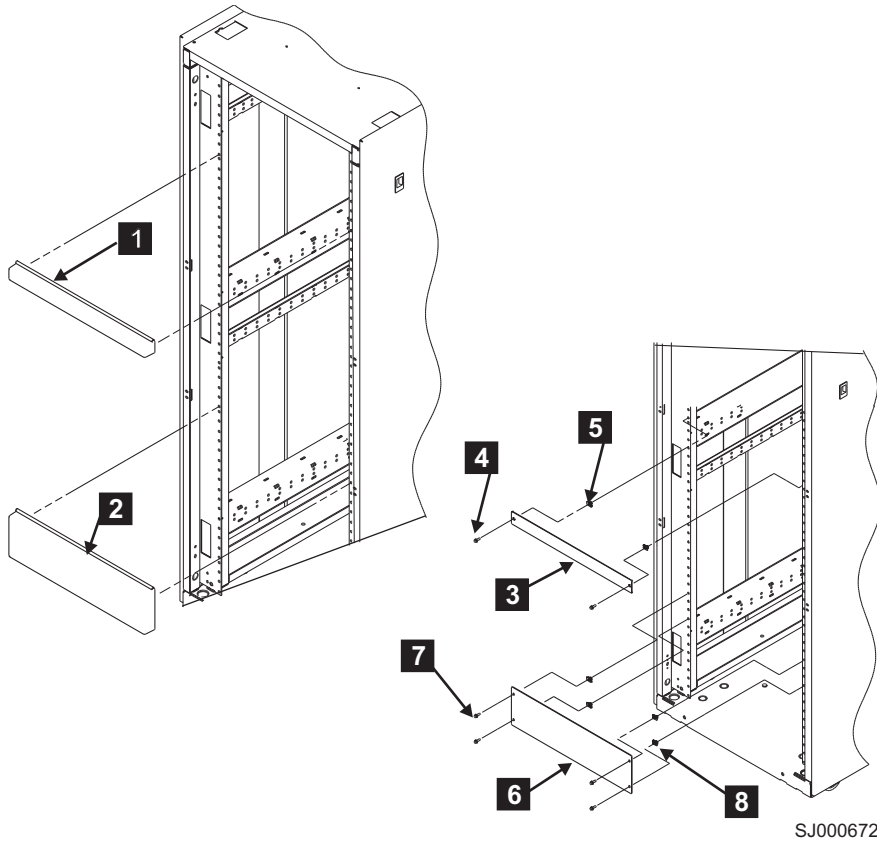
Index number	FRU part number	Units per assembly	Description
1	97H9754	As needed	1U (black) filler snap
2	97H9755	As needed	3U (black) filler snap
3	Reference only	1	Panel (1U kit)
4	Reference only	2	M5 X 14 Hex screw (1U kit)
5	Reference only	2	M5 nut clip (1U kit)
6	Reference only	1	Panel (3U kit)
7	Reference only	4	M5 X 14 hex screw (3U kit)
8	Reference only	4	M5 nut clip (3U kit)

Stabilizers
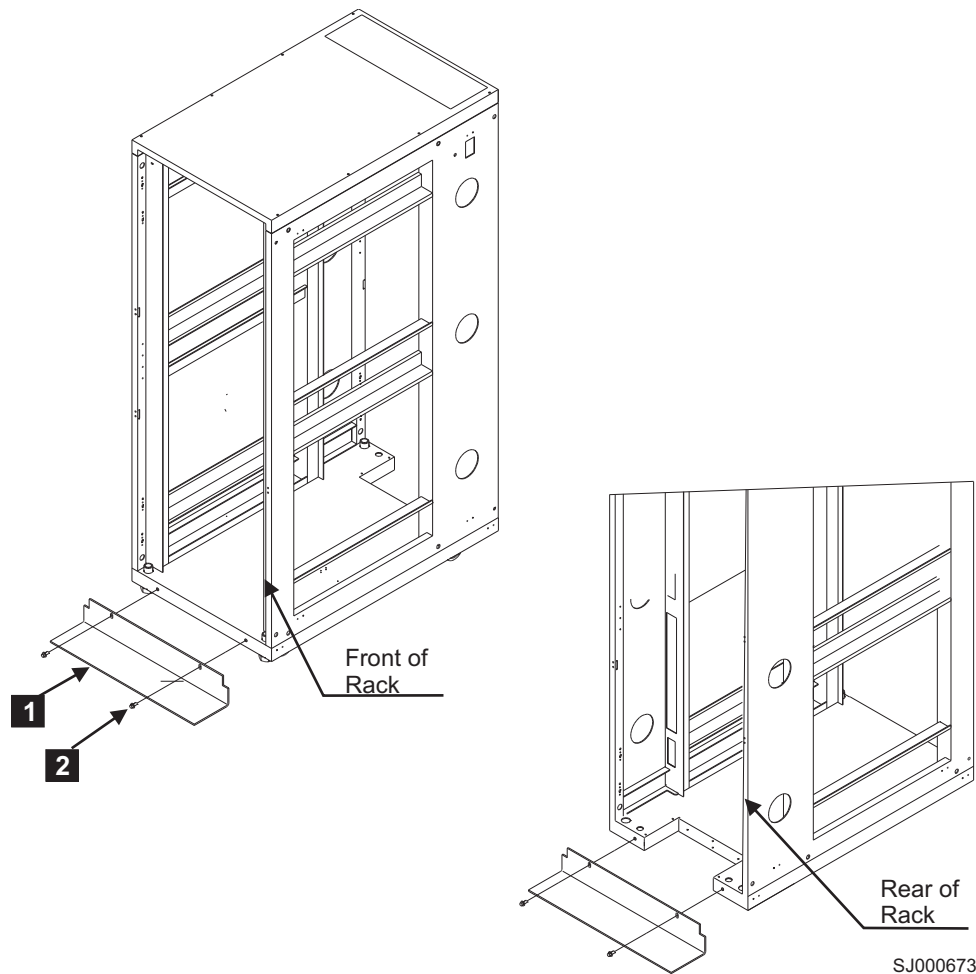
SJ000673

Index number	FRU part number	Units per assembly	Description
	31L8305	1	Stabilizer kit (black)
1	Reference only	2	Bracket
2	Reference only	4	M8 X 25 screw, button head socket

Leveling feet
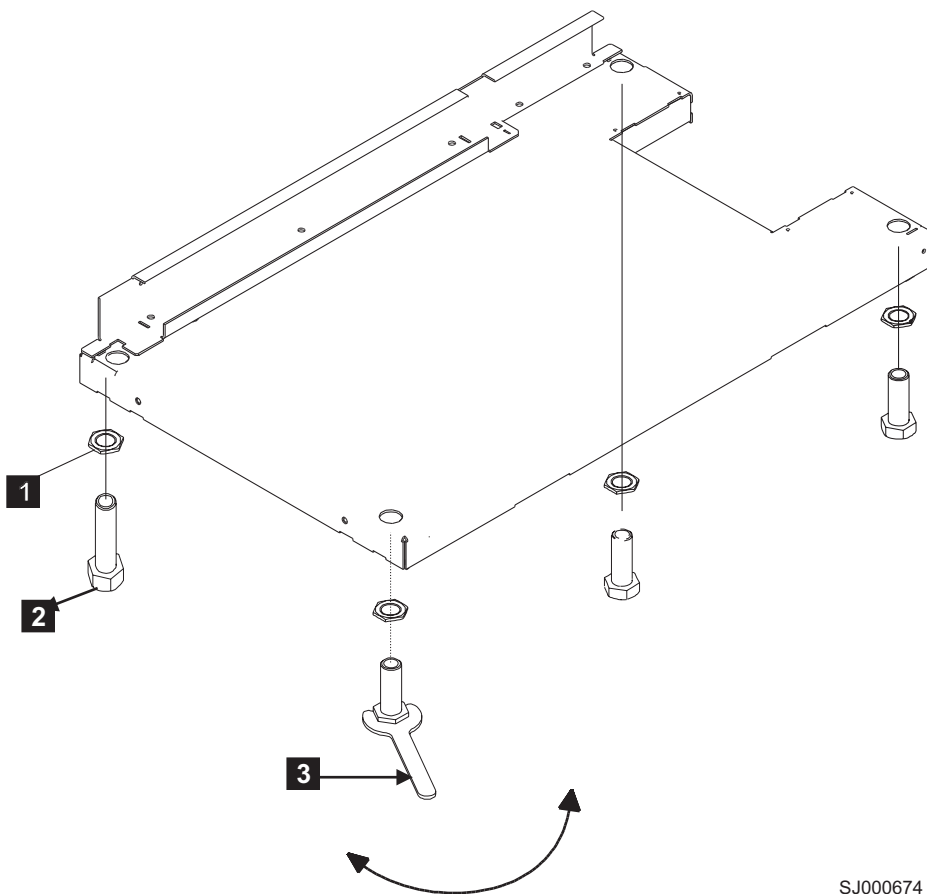
SJ000674

Index number	FRU part number	Units per assembly	Description
1	Reference only	4	Jam nut
2	Reference only	4	Leveller
3	31L8313	1	Wrench

Power cables
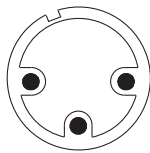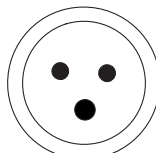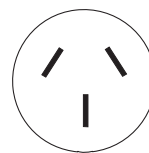
1   2   3   4

sj002018

Table 23. Power cables for side-mount iPDUs

Index number	FRU part number	Nomenclature	Country or region supported
1	39M5416	NEMA L6-30P	U.S., Canada, Argentina, Bahamas, Bangladesh, Barbados, Bermuda, Bolivia, Brunei, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Hong Kong, India, Indonesia, Jamaica, Japan, Macao, Malaysia, Mexico, Myanmar, Netherlands, Antilles, Panama, Peoples Republic of China, Peru, Philippines, Singapore, Sri Lanka, Suriname, Taiwan, Trinidad, Uruguay, Venezuela
2	39M5419		Australia / New Zealand
3	39M5414	IEC 309	Bahrain, Belgium, Botswana, Brazil, Egypt, Ethiopia, France, Germany, Ghana, Greece, Iceland, Iraq, Ireland, Italy, Kenya, Jordan, Kuwait, Lebanon, Malawi, Nigeria, Norway, Oman, Qatar, Saudi Arabia, Spain, Sudan, Tanzania, Uganda, United Arab Emirates, United Kingdom, Zaire, Zambia, Zimbabwe
4	39M5420		Korea

Rack parts list

Table 24 lists the items that are supplied with the 14U director chassis mount kit.

Table 24. Items supplied with the 14U director chassis mount kit

Item No.	Description	Quantity
1	Left mount shelf bracket	1
2	Right mount shelf bracket	1
3	Left upper mount bracket assembly, containing:	1
3a	Left upper mount bracket (flat)	1
3b	Left upper mount bracket (L-shaped)	1
3c	Screw	2
4	Right upper mount bracket assembly, containing:	1
4a	Right upper mount bracket (flat)	1
4b	Right upper mount bracket (L-shaped)	1
4c	Screw	2
5	10-32 x 5/16-in. Phillips flathead screw	8
6	10-32 x 5/8 in. Phillips panhead screw with washer	4
7	10-32 clip nut (package of 20; only four are required)	20
8	1/4-20 x 1/2 in. Phillips panhead screws, with lock washer	16
Discard the following		
9	10-32 retainer nuts	4
10	1/4-20 x 1/2 in. Phillips panhead screws with glue	16
11	0.375 in. square washers	16

Table 24. Items supplied with the 14U director chassis mount kit (continued)

Item No.	Description	Quantity
12	8-32 x 5/16 in. Phillips flathead screws	8

Intelligent power distribution units
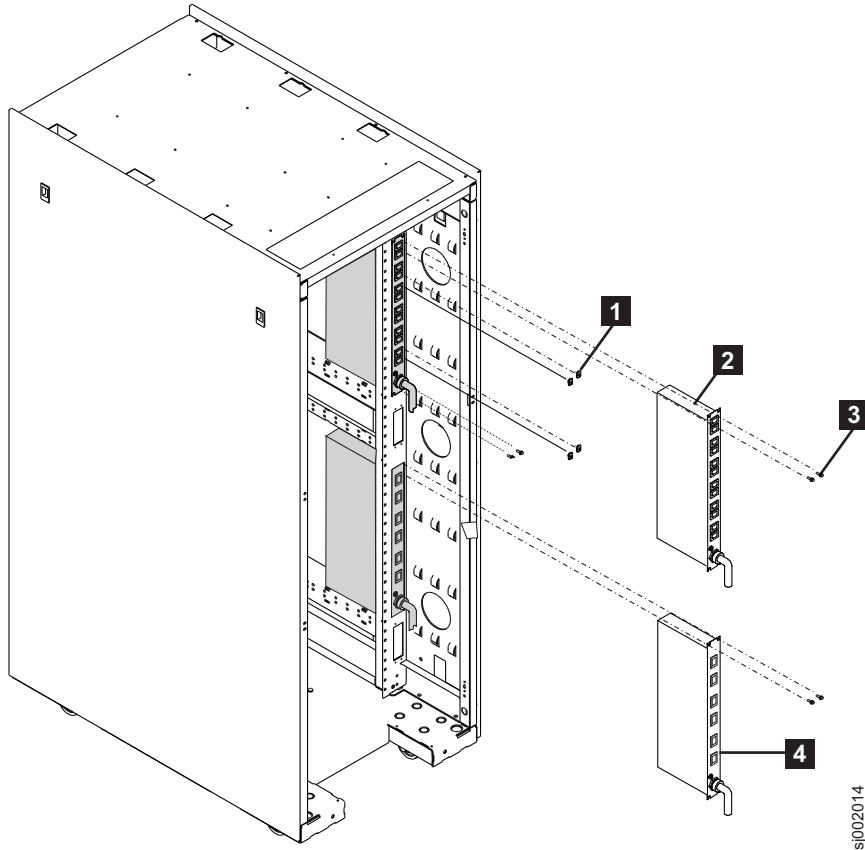
Figure 73. iPDU locations

Index number	Units per assembly	Description
1	4	Nut clip
2	1	iPDU (PN 00FW787)
3	4	Screw
4	1	iPDU (PN 00FW787)

iPDU for director attachment:

Figure 74. iPDU (PN 00FW787) for director attachment

SAN rack specifications

The physical dimension specifications for the SAN rack are listed in Table 25. An example weight with two M12 directors installed is also included. (The M12 is heavier than either the M14 or M48, fully populated.) The total weight of a rack with directors installed will depend upon which directors are installed. For the specifications of individual directors, see the respective installation and service guides.

Table 25. IBM SAN rack specifications

Dimension	Value
Height	1785 mm (70.3 in.)
Depth	• With rear door installed: 1042 mm (41 in.) • With rear and front door installed: 1098 mm (43.3 in.)
Width	• With side panels installed: 650 mm (25.6 in.) • Without side panel installed: 623 mm (24.5 in.)
EIA units	36 EIA units
Weight	rack 535 lbs rack with two 8961 Model F08 directors: 535 lbs + 2 x 321.5

Note: The maximum supported configuration for a SAN rack is two directors.

Appendix B. Product specifications

This appendix provides the specifications for the switch.

- "System specifications"
- "Fibre channel" on page 238
- "LEDs" on page 238
- "Weight and physical dimensions" on page 239
- "Environmental requirements" on page 241\
- "Power supply requirements" on page 241
- "Fibre Channel data transmission ranges" on page 246
- "Data port specifications (Fibre Channel)" on page 247
- "Serial port specifications (pinout RJ-45)" on page 247
- "Memory specifications (per CP blade)" on page 248
- "Regulatory compliance (EMC)" on page 248

System specifications

System component	Description
Enclosure	SAN256B-6 - 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 two-post rack. SAN512B-6, 12 blade slots, 14U rack-mountable chassis; 27–31 in. and 22 in. rail kits for four-post rack; mid-mount kit for two-post rack.
Control processor	Redundant (active/standby) control processor blades
Scalability	Full fabric architecture: a maximum of 239 switches
Performance	- 4-Gbps line speed, full duplex - 8-Gbps line speed, full duplex - 10-Gbps line speed, full duplex - 16-Gbps line speed, full duplex - 32-Gbps line speed, full duplex Autosensing of 4-, 8-,16-, and 32-Gbps port speeds depending on SFPs used. Speed matching between 4-, 8-,16-, and 32-Gbps port speeds. 10-Gbps port speeds with dedicated SFPs.

System component	Description
ICL trunking	Can configure the following maximum QSFPs per trunk depending on blade type connecting:
	• Up to four 4x32 Gbps QSFP ports in a trunk group can form a 512 Gbps trunk between two CR32-4 blades. For trunks containing four or fewer QSFP ports, ports in trunk must be located in the same port group on each blade.
	• Up to four 4x32 Gbps QSFP ports in a trunk group can form a 512-Gbps trunk between a CR32-4 and CR32-8 blade. For trunks containing four or fewer QSFP ports, ports in trunk must be located in the same port group on each blade.
	• Up to four 4x16 Gbps QSFP ports in a trunk group can form a 256-Gbps trunk between a CR32-X (CR32-8 or CR32-4) blade and CR16-X blade (Gen 5 CR blade).
	Four 32 Gbps ports in a QSFP form a 128-Gbps link.
	A minimum of two QSFP connections are required for a trunk.
Slot bandwidth	1,536 Gbps (data rate)
Local switching bandwidth	1.5 Tbps for FC32-48: 48 ports × 32 Gbps (data rate)
Chassis bandwidth	SAN256B-6 : 8 Tbps per chassis (192 ports with 32 Gbps data rate plus 16 4x32 Gbps ICLs)
	SAN512B-6 : 16 Tbps per chassis (384 ports with32 Gbps data rate plus 32 4x32 Gbps ICLs)
ISL trunking	Can use up to 8 ports in a trunk group to form a 256-Gbps trunk.
UltraScale ICL bandwidth	SAN256B-6 : 2 Tbps; 16 UltraScale ICL ports provide the equivalent of 64 32-Gbps ports. Each UltraScale ICL port provides 128-Gbps bandwidth over a QSFP (32 Gbps x 4) link.
	SAN512B-6 : 4 Tbps; 32 UltraScale ICL ports provide the equivalent of 128 32-Gbps ports. Each UltraScale ICL port provides 128 Gbps bandwidth over a QSFP (32 Gbps x 4) line.
	Both models: Frame-based trunking is enabled between four UltraScale ICLs. DPS distributes exchanges across all frame trunks.
Power inlet	C20; power from non-port side.
Power supplies	SAN256B-6 : Up to two modular, hot-swappable AC power supplies providing 1450 W (100-120 VAC) and 2870 W (200-240 VAC).
	SAN512B-6 : Up to four modular, hot-swappable AC power supplies providing 1450 W (100-120 VAC) and 2870 W (200-240 VAC). **Note:** Refer to "Power Supply Requirements" section of this Technical Specification for details on minimum power supplies required for operation and redundancy.
Cooling	SAN256B-6 : 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.
	SAN512B-6 : Three fan assemblies, nonport-side exhaust or intake, for 2+1 redundancy. Each assembly contains 2 fans for total of 6. System requires 5 out of 6 functioning fans for operation. One fan assembly can be hot-swapped, but must be replaced immediately.

System component	Description
System architecture	Nonblocking shared memory
System processors	FreeScale P4080 (8 core), 1.5 GHz
Aggregate bandwidth	SAN256B-6 : 8 Tbps when populated with 192x32 Gbps ports and using 16 ICL ports at 128 Gbps (including 2 Tbps of ICL bandwidth) SAN512B-6 : 16 Tbps when populated with 384x32 Gbps and using 32 ICL ports at 128 Gbps (including 4 Tbps of ICL bandwidth)
Switch latency	FC32-48 blade: <900ns (including FEC) any port to any port local switching and 2.7 µsec blade to blade (including FEC) at 32-Gbps, cut-through routing. SX6 blade - FC to FC: <900ns (including FEC) and 2.7 µsec any port to any port at 32 Gbps, cut-through routing.
Maximum frame size	112-byte payload
Frame buffers	15000 per CR32 core routing blade ASIC
Port types	FC32-48 port blade: 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
Media types	FC32-48 port blade: supports hot-pluggable 32 Gbps SWL/LWL SFP28, 16 Gbps SWL/LWL/ELWL SFP+, 10 Gbps SWL/LWL SFP SX6 extension blade: supports hot-pluggable 32 Gbps SWL/LWL SFP28, 16 Gbps SWL/LWL/ELWL SFP+, 10 Gbps SWL/LWL SFP, 1 GbE copper SFP, 1GbE 1000Base-SX/LX/CWDM SFP, 10 GbE SR/LR SFP+; 10 GbE Tunable DWDM 80km SFP+, and 40 GbE SR4/LR4/ER4 QSFP. Core routing blade CR32-4 and CR32-8: support -branded, hot-pluggable 4x32 Gbps SWL QSFP, 4x16 Gbps SWL QSFP, 4x16 Gbps 2km LWL QSFP for ICL connections
USB	One USB port per control processor for firmware download, support save, and configuration upload or download
Fabric services	Advanced Performance Monitoring; Adaptive Networking (Ingress Rate Limiting, Traffic Isolation, QoS); BB credit recovery; Advanced Zoning (default zoning, port/WWN zoning, broadcast zoning); Dynamic Path Selection (DPS); Extended Fabrics; Fabric Vision; FDMI; FICON CUP; Frame Redirection; FSPF; Integrated 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; Flow Vison; Virtual Fabrics (Logical Switch, Logical Fabric); target-driven zoning; peer zoning

System component	Description
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)
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-6 : Up to 192 32-Gbps ports, universal (F_Port, E_Port, EX_Port, M_Port, D_Port, FICON) SAN512B-6 : Up to 384 32-Gbps ports, universal (E_Port, F_Port, EX_Port, M_Port, D_Port, FICON)
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-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 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.

System component	Description
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) status LED displaying four different LED states based on fan operation.
Power supply status	Unicolor (green) power status LED displaying eight different LED states based on power supply operation.

Other

System component	Description
Serial Cable	RS-232 serial cable
RJ-45 to DB9 adaptor	RS-232 cable has an adapter at one end that can be removed to provide an RJ-45 style connector. For serial port.
RJ-45 connector	For 10/100/1000 Ethernet management port and 10 Gbps Ethernet port on control processor (CP) blades. Note that the 10 Gbps port is reserved for future use.

Weight and physical dimensions

Model	Height	Width	Depth	Weight (empty)	Weight (fully loaded)
SAN512B-6	61.23 cm 24.11 inches	43.74 cm 17.23 inches	61.05 cm 24.04 inches	35.61 kg 78.5 lb	145.83 kg 321.5 lb Weight includes all blades and four power supplies.
SAN512B-6 with door	61.23 cm 24.11 inches	43.74 cm 17.23 inches	72.96 cm 28.72 inches		

Model	Height	Width	Depth	Weight (empty)	Weight (fully loaded)
SAN256B-6	34.45 cm 13.56 inches	43.74 cm 17.23 inches	61.04 cm 24.04 inches	24.49 kg 54 lb	68.95 kg 152.0 lb Weight includes all blades and two power supplies.
SAN256B-6 with Airflow Diverter and Port Side Exhaust Kit	40.00 cm 15.75 inches	43.74 cm 17.22 inches	61.29 cm 24.09 inches		
SAN256B-6 with door	34.45 cm 13.56 inches	43.74 cm 17.23 inches	73.20 cm 28.82 inches		

Blade	Description	Length	Depth	Height	Weight
CPX6 blade	Control processor blade	20.55 cm 8.09 inches	34.46 cm 13.57 inches	3.28 cm 1.29 inches	1.93 cm 4.25 lb
CR32-4 blade (without media)	Core routing blade for SAN256B-6	42.06 cm 16.56 inches	34.13 cm 13.44 inches	3.63 cm 1.43 inches	3.92 kg 8.65 lb
CR32-8 blade (without media)	Core routing blade for SAN512B-6	42.06 cm 16.56 inches	34.13 cm 13.44 inches	3.63 cm 1.43 inches	4.87 kg 10.75 lb
FC32-48 port blade (without media)	48-port port blade supporting 4/8/10/16/32 Gbps	42.06 cm 16.56 inches	34.13 cm 13.44 inches	3.63 cm 1.43 inches	4.35 kg 9.6 lb
SX6 extension blade (without media)	Enables FC extension functionality over existing IP infrastructure. Has 16 FC ports supporting 8/10/16/32 Gbps, 16 GbE ports supporting 1 or 10 Gbps, and two GbE ports supporting 40 Gbps.	42.06 cm 16.56 inches	34.13 cm 13.44 inches	3.63 cm 1.43 inches	5.22 kg 11.5 lb

Environmental requirements

Condition	Operational	Non-operational (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 (non-condensing)	5% to 93% at 40°C (104°F) with maximum gradient of 10% per hour	10% to 93% at 70°C (158°F)
Altitude (above sea level	0 to 3000 m (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 @ 0.0005Grms; 200-500Hz @ -5db/Oct. Scale 0.05 Grms	Random Vibration is 3-10Hz @ +5db/Oct; 10-200Hz @ 0.0065Grms; 200-500Hz @ -5db/Oct. Scale 1.12 Grms
Air flow	SAN512B-6 Maximum: 1711 cmh (1007 cfm) SAN512B-6 Nominal: ~985 cmh (~580 cfm) SAN256B-6 Maximum: 953 cmh (561 cfm) SAN256B-6 Nominal: ~ 486 cmh (~286 cfm)	N/A
Heat dissipation	SAN256B-6 - refer to Watts and Btu/hr values under VAC inputs in Typical, Idle, and Maximum Power Consumption tables. SAN512B-6- refer to Watts and Btu/hr values under VAC inputs in Typical, Idle, and Maximum Power Consumption tables.	N/A
Operating noise	SAN256B-6: 64.2 dB SAN512B-6: 68.2 dB	N/A

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 the AC input voltage level. N is minimum number of power supplies to operate configuration, N+N doubles power supplies for full AC input and DC output redundancy, and N+1 adds additional power supply for DC output redundancy in case of 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 representative.

Model name	Configured ports	AC connection	Minimum power supplies for operation	Number of power supplies (redundancy)
SAN256B-6	Any combination of 32 Gbps ports, Extension blades, and QSFP ICLs	100–120 VAC (low line)	2	Not supported
		200–240 VAC (high line)	1	2 (N+N)
SAN512B-6	144 32 Gbps ports and QSFP ICLs	100–120 VAC (low line)	2	3 (N+1)
		100–120 VAC (low line)	2	4 (N+N)
		200–240 VAC (high line)	1	2 (N+N)
SAN512B-6	384 32 Gbps ports and QSFP ICLs	100–120 VAC (low line)	3	Not supported
		200–240 VAC (high line)	2	3 (N+1)
		200–240 VAC (high line)	2	4 (N+N)
SAN512B-6	Any combination of 32 Gbps ports, Extension blades, and QSFP ICLs	100–120 VAC (low line)	3	Not supported
		200–240 VAC (high line)	2	3 (N+1)
		200–240 VAC (high line)	2	4 (N+N)

Power supply specifications (per PSU)

Power supply model	Maximum output power rating (DC)	Input voltage	Input line frequency	Maximum input current	Input line protection	Maximum inrush current
XBR-X6-RACNPIPSU-W 0104 XBR-X6-RACNPEPSU-0104	1450/2870	1450 W Output 100–120 V (nominal) 90–132 V (range) 2870 W Output 200–240 V (nominal) 180–264 V (range)	50–60 Hz (nominal)	15 A	Line & Neutral Fused	35 A peak for <10 ms at cold or warm start 25 A peak for cycles 10ms -150ms Less than fuse rating for >150ms

Power consumption (typical configuration)

The typical power consumption configuration features fans at nominal speed and the FC32-48 port blade configured with optics operating at 50% line rate and random packets (does not include the power draw for the SX6 extension blade).

Model name	@100 VAC input	@200 VAC input	@-48 VDC input	Minimum number of power supplies	Notes
SAN256B-6	1407 W 4802 BTU/hr	1376 W 4696 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.	SAN256B-6 fully loaded: 2 CP blades, 2 CR blades, 4 FC32-48 port blades, 2 fan assemblies
SAN512B-6	2647 W 9034 BTU/hr	2589 W 8836 BTU/hr	Not supported	3 power supplies for AC low line (100–120 VAC) 2 power supplies for AC high line (200–240 VAC) Two power supplies provide system power, but 3 or 4 must be installed to provide power efficiency and redundancy.	SAN512B-6 fully loaded: 2 CP blades, 2 CR blades, 8 FC32-48 blades, 3 fan assemblies

Power consumption (idle configuration)

No optics or connections, ports disabled, and system completed boot up, fans at low speed.

Model name	@100 VAC input	@200 VAC input	@-48 VDC input	Minimum number of power supplies	Notes
SAN256B-6	840 W 2867 BTU/hr	822 W 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) Device ships with 2 power supplies. One provides system power, but both must be installed to provide power efficiency and redundancy.	SAN256B-6 fully loaded: 2 CP blades, 2 CR blades, 4 FC32-48 port blades, 2 fan assemblies
SAN512B-6	1515 W 5171 BTU/hr	1481 W 5055 BTU/hr	Not supported	3 power supplies for AC low line (100–120 VAC) 2 power supplies for AC high line (200–240 VAC) Device ships with 3 or 4 power supplies. Two provide system power, but 3 or 4 must be installed to provide power efficiency and redundancy.	SAN512B-6 fully loaded: 2 CP blades, 2 CR blades, 8 FC32-48 blades, 3 fan assemblies

Power consumption (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, smallest packet is 64-bytes, 40°C (104°F) ambient temperature, and maximum power for all supported optics. Does not include the power draw for the SX6 extension blade.

Model name	@100 VAC input	@200 VAC input	@-48 VDC input	Minimum number of power supplies	Notes
SAN256B-6	2438 W 8322 BTU/hr	2385 W 8139 BTU/hr	N/A	2 for AC low line (100–120 VAC) 1 for AC high line (200–240 VAC) Device ships with 2 power supplies. One provides system power, but both must be installed to provide power efficiency and redundancy.	SAN256B-6 fully loaded: 2 CP blades, 2 CR blades, 4 FC32-48 port blades, 2 fan assemblies
SAN512B-6	4339 W 14810 BTU/hr	4244 W 14485 BTU/hr	N/A	3 for AC low line (100–120 VAC) 2 for AC high line (200–240 VAC) Device ships with 3 or 4 power supplies. Two provide system power, but 3 or 4 must be installed to provide power efficiency and redundancy	SAN512B-6 fully loaded: 2 CP blades, 2 CR blades, 8 FC32-48 blades, 3 fan assemblies

Power consumption (modules)

For blades in the following table:
- Idle: blade enabled, chips initialized, no optics, ports disabled.
- Nominal: blade enabled, optics in 50% of ports, passing line rate.

- Maximum: blade enabled, optics installed, traffic, full–line rate, 64-byte smallest packet, 40°C (104°F) ambient temperature, maximum power for all supported optics.

Module name	Module description	Power consumption
CPX6	Control Processor Blade	Idle = 38 W Typical = 45 W Maximum = 50 W
CR32-4	Core Routing Blade for SAN256B-6	Idle = 95 W Typical = 160 W Maximum = 244 W
CR32-8	Core Routing Blade for SAN512B-6	Idle = 180 W Typical = 342 W Maximum = 450 W
SX6	Extension Blade	Idle = 300 W Typical = 340 W Maximum = 420 W
FC32-48	48 x 32 Gbps Port Blade	Idle = 95 W Typical = 160 W Maximum = 245 W
WWN card	World Wide Name card	Idle = 1 W Typical = 1 W Maximum = 1 W
Fan assembly	Fan assembly contains two fans	Idle = 50 W Nominal = 100 W Maximum = 300 W

Fibre Channel data transmission ranges

Port speed (Gbps)	Cable size (microns)	Short wavelength (SWL)	Long wavelength (LWL)	Extended long wavelength (ELWL)
4	50	150 m (492 ft) (OM2) 380 m (1,264 ft) (OM3) 400 m (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

Port speed (Gbps)	Cable size (microns)	Short wavelength (SWL)	Long wavelength (LWL)	Extended long wavelength (ELWL)
8	50	50 m (164 ft) (OM2) 150 m (492 ft) (OM3) 190 m (623 ft) (OM4)	N/A	N/A
	62.5	21 m (68 ft)	N/A	N/A
	9	N/A	10 km (6.2 miles)	N/A
10	50	82 m (269 ft) (OM2) 300 m (984 ft) (OM3) 550 m (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	35 m (115 ft) (OM2) 100 m (328 ft) (OM3) 125 m (410 ft) (OM4)	N/A	N/A
	62.5	15 m (49 ft)	N/A	N/A
	9	N/A	10 km (6.2 miles)	N/A
32	50	10 m (32.8 ft) (OM2) 70 m (230 ft) (OM3) 100 m (328 ft) (OM4)	N/A	N/A
	62.5	10 m (32.8 ft)	N/A	N/A
	9	100 m (328 ft)	10 km (6.2 miles)	N/A

Data port specifications (Fibre Channel)

Name	Number of ports	Description
SAN256B-6	192	32 Gbps (E, F, D, M, and EX) Fibre Channel ports using four 48-port 32 Gbps Fibre Channel port blades.
SAN512B-6	384	32 Gbps (E, F, D, M, and EX) Fibre Channel ports using four 48-port 32 Gbps Fibre Channel port blades.

Serial port specifications (pinout RJ-45)

Pin	Signal	Description
1	Not supported	NA
2	Not supported	NA
3	UART1_RXD	Transmit data
4	GND	Logic ground
5	GND	Logic ground

Pin	Signal	Description
6	UART1_TXD	Receive data
7	Not supported	NA
8	Not supported	NA

Serial port specifications (protocol)

Parameter	Value
Baud	9600
Data bits	8
Parity	None
Flow control	None **Note:** Flow control 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)

- FCC Part 15, Subpart B (Class A)
- EN 55022 (CE mark) (Class A)
- EN 55024 (CE mark) (Immunity) for Information Technology Equipment
- ICES-003 (Canada) (Class A)
- AS/NZ 55022 (Australia) (Class A)
- VCCI (Japan) (Class A)
- EN 61000-3-2
- EN 61000-3-3
- EN 61000-6-1

Regulatory compliance (safety)

- CAN/CSA-C22.2 No. 60950/UL 60950
- EN 60825 Safety of Laser Products
- EN 60950/IEC 60950 Safety of Information Technology Equipment

Regulatory compliance (environmental)

- 2014/35/EU and 2014/30/EU
- 2011/65/EU - Restriction of the use of certain hazardous substance in electrical and electronic equipment (EU RoHS).
- 2012/19/EU - Waste electrical and electronic equipment (EU WEEE).
- 94/62/EC - packaging and packaging waste (EU).
- 2006/66/EC - batteries and accumulators and waste batteries and accumulators (EU battery directive).

- 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).
- Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 - U.S. Conflict Minerals.
- 30/2011/TT-BCT - Vietnam circular.
- 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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European community contact:

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Email: halloibm@de.ibm.com

Germany Electromagnetic Compatibility Directive

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