QFX3000-G QFabric System Deployment Guide

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The information in this document is current as of the date on the title page.

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Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

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Documentation and Release Notes

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If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

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Supported Platforms

For the features described in this document, the following platforms are supported:

- QFabric System
- QFX3000-G

Using the Examples in This Manual

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   system {
     scripts {
       commit {
         file ex-script.xsl;
       }
     }
   }
   interfaces {
     fxp0 {
       disable;
       unit 0 {
         family inet {
           address 10.0.0.1/24;
         }
       }
     }
   }
   ```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

   ```
   [edit]
   user@host# load merge /var/tmp/ex-script.conf
   load complete
   ```

Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

   For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

   ```
   commit {
     file ex-script-snippet.xsl; }
   ```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

For more information about the **load** command, see the *CLI User Guide*.

Documentation Conventions

Table 1 on page xxvii defines notice icons used in this guide.

Table 1: Notice Icons

Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

Table 2 on page xxvii defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the **configure** command: user@host> **configure**

Table 2: Text and Syntax Conventions *(continued)*

Convention	Description	Examples
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`
Italic text like this	• Introduces or emphasizes important new terms. • Identifies guide names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS CLI User Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Encloses optional keywords or variables.	**stub <default-metric *metric*>;**
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	**broadcast | multicast** **(*string1* | *string2* | *string3*)**
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	**community name members [*community-ids*]**

Indention and braces ({ })	Identifies a level in the configuration hierarchy.	[edit]
		routing-options {
		static {
		route default {
		nexthop *address*;
		retain;
		}
		}
		}

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
GUI Conventions		
Bold text like this	Represents graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.

Table 2: Text and Syntax Conventions *(continued)*

Convention	Description	Examples
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select **Protocols>Ospf**.

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can provide feedback by using either of the following methods:

- Online feedback rating system—On any page at the Juniper Networks Technical Documentation site at http://www.juniper.net/techpubs/index.html, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at http://www.juniper.net/techpubs/feedback/.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or Partner Support Service support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf.
- Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

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For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: http://www.juniper.net/customers/support/
- Search for known bugs: http://www2.juniper.net/kb/
- Find product documentation: http://www.juniper.net/techpubs/
- Find solutions and answer questions using our Knowledge Base: http://kb.juniper.net/

- Download the latest versions of software and review release notes: http://www.juniper.net/customers/csc/software/
- Search technical bulletins for relevant hardware and software notifications: http://kb.juniper.net/InfoCenter/
- Join and participate in the Juniper Networks Community Forum: http://www.juniper.net/company/communities/
- Open a case online in the CSC Case Management tool: http://www.juniper.net/cm/

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: https://tools.juniper.net/SerialNumberEntitlementSearch/

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at http://www.juniper.net/cm/.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see http://www.juniper.net/support/requesting-support.html.

PART 1

Overview

CHAPTER 1

Before You Begin

QFabric System Overview

Supported Platforms QFabric System

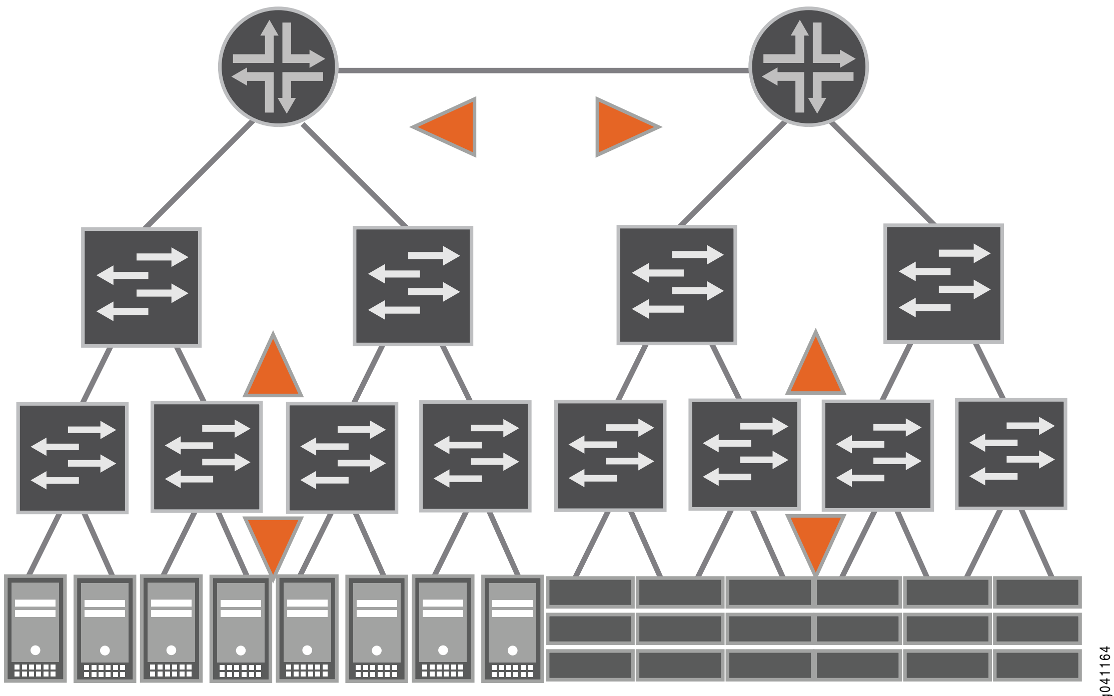
The architecture of legacy data centers contrasts significantly with the revolutionary Juniper Networks data center solution.

This topic covers:

Legacy Data Center Architecture

Service providers and companies that support data centers are familiar with legacy multi-tiered architectures, as seen in Figure 1 on page 4.

Figure 1: Legacy Data Center Architecture



The *access layer* connects servers and other devices to a Layer 2 switch and provides an entry point into the data center. Several access switches are in turn connected to intermediate Layer 2 switches at the *aggregation layer* (sometimes referred to as the *distribution layer*) to consolidate traffic. A *core layer* interconnects the aggregation layer switches. Finally, the core switches are connected to Layer 3 routers in the *routing layer* to send the aggregated data center traffic to other data centers or a wide area network (WAN), receive external traffic destined for the data center, and interconnect different Layer 2 broadcast domains within the data center.

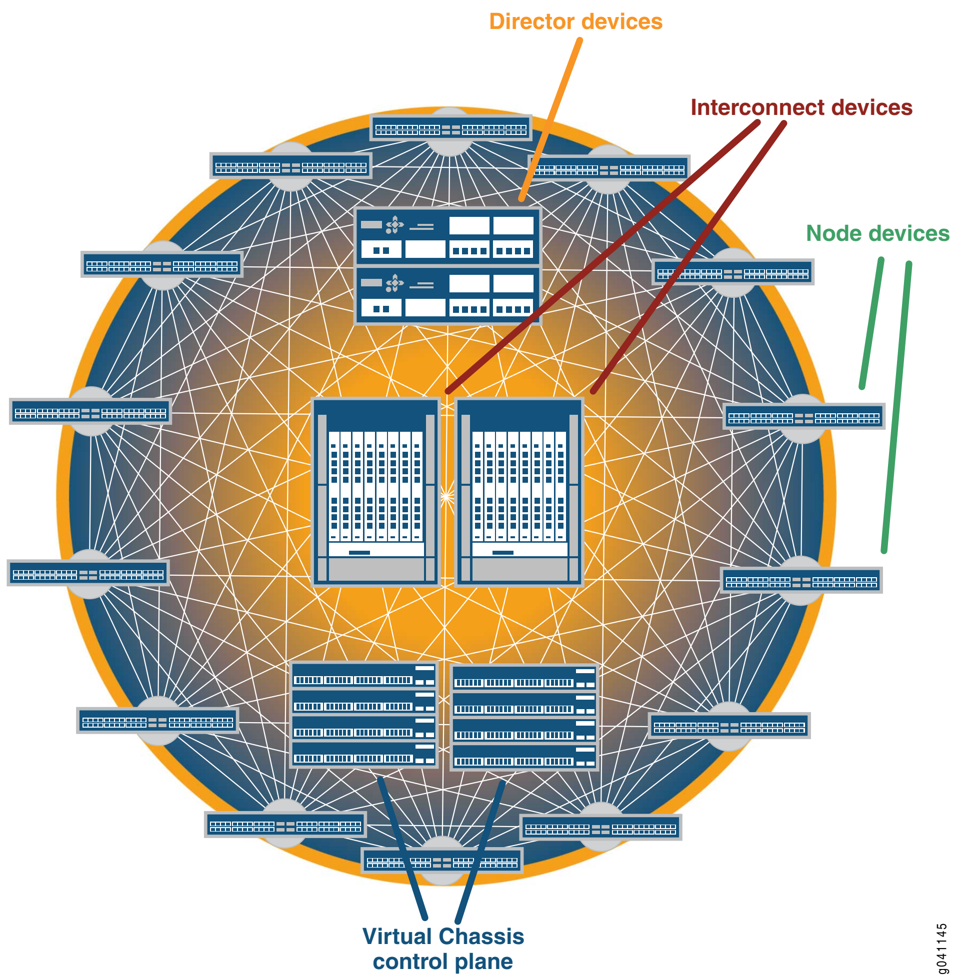
The problems that exist with the multi-tiered data center architecture include:

- **Limited scalability**—The demands for electrical power, cooling, cabling, rack space, and port density increase exponentially as the traditional data center expands, which prohibits growth after minimal thresholds are met.
- **Inefficient resource usage**—Up to 50 percent of switch ports in a legacy data center are used to interconnect different tiers rather than support server and storage connections. In addition, traffic that ideally should move horizontally between servers within a data center often must also be sent vertically up through the tiers to reach a router and down through the tiers to reach the required destination server.
- **Increased latency**—By requiring the devices at each tier level to perform multiple iterations of packet and frame processing, the data plane traffic takes significantly longer to reach its destination than if the sending and receiving devices were directly connected. This processing overhead results in potentially poor performance for time-sensitive applications, such as voice, video, or financial transactions.

QFX Series QFabric System Architecture

In contrast to legacy multi-tiered data center architectures, the Juniper Networks QFX Series QFabric System architecture provides a simplified networking environment that solves the most challenging issues faced by data center operators. A fabric is a set of devices that act in concert to behave as a single switch. It is a highly scalable, distributed, Layer 2 and Layer 3 networking architecture that provides a high-performance, low-latency, and unified interconnect solution for next-generation data centers as seen in Figure 2 on page 5.

Figure 2: QFX Series QFabric System Architecture



A QFabric system collapses the traditional multi-tiered data center model into a single tier where all access layer devices (known in the QFabric system model as *Node devices*) are essentially directly connected to all other access layer devices across a very large scale fabric backplane (known in the QFabric system model as the *Interconnect device*). Such an architecture enables the consolidation of data center endpoints (such as servers, storage devices, memory, appliances, and routers) and provides better scaling and network virtualization capabilities than traditional data centers.

Essentially, a QFabric system can be viewed as a single, nonblocking, low-latency switch that supports thousands of 10-Gigabit Ethernet ports or 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel ports to interconnect servers, storage, and the Internet across a high-speed, high-performance fabric. The entire QFabric system is managed as a single entity through a *Director group*, containing redundant hardware and software components that can be expanded and scaled as the QFabric system grows in size. In addition, the Director group automatically senses when devices are added or removed from the QFabric system and dynamically adjusts the amount of processing resources required to support the system. Such intelligence helps the QFabric system use the minimum amount of power to run the system efficiently, but not waste energy on unused components.

As a result of the QFabric system architecture, data center operators are now realizing the benefits of this next-generation architecture, including:

- **Low latency**—Because of its inherent advantages in this area, the QFabric system provides an excellent foundation for mission-critical applications such as financial transactions and stock trades, as well as time-sensitive applications such as voice and video.
- **Enhanced scalability**—The QFabric system can be managed as a single entity and provides support for thousands of data center devices. As Internet traffic continues to grow exponentially with the increase in high-quality video transmissions and rise in the number of mobile devices used worldwide, the QFabric system can keep pace with the demands for bandwidth, applications, and services offered by the data center.
- **Virtualization-enabled**—The QFabric system was designed to work seamlessly with virtual servers, virtual appliances, and other virtual devices, allowing for even greater scalability, expandability, and rapid deployment of new services than ever before. Migrating to virtual devices also results in significant costs savings, fueled by reduced space requirements, decreased needs for power and cooling, and increased processing capabilities.
- **Simplicity**—Although the QFabric system can scale to hundreds of devices and thousands of ports, you can still manage the QFabric system as a single system.
- **Flexibility**—You can deploy the QFabric system as an entire system or in stages.
- **Convergence**—Because the congestion-free fabric is lossless, all traffic in a QFabric system can be converged onto a single network. As a result, the QFabric system supports Ethernet, Fibre Channel over Ethernet, and native Fibre Channel packets and frames.

Flat, nonblocking, and lossless, the network fabric offered by the QFabric system has the scale and flexibility to meet the needs of small, medium, and large-sized data centers for years to come.

Related Documentation

- Understanding QFabric System Terminology on page 7
- Understanding the QFabric System Hardware Architecture on page 17
- Understanding the QFabric System Software Architecture on page 35

Understanding QFabric System Terminology

Supported Platforms QFabric System

To understand the QFabric system environment and its components, you should become familiar with the terms defined in Table 3 on page 7.

Table 3: QFabric System Terms

Term	Definition
Clos network fabric	Three-stage switching network in which switch elements in the middle stages are connected to all switch elements in the ingress and egress stages. In the case of QFabric system components, the three stages are represented by an ingress chipset, a midplane chipset, and an egress chipset in an Interconnect device (such as a QFX3008-I Interconnect device). In Clos networks, which are well known for their nonblocking properties, a connection can be made from any idle input port to any idle output port, regardless of the traffic load in the rest of the system.
Director device	Hardware component that processes fundamental QFabric system applications and services, such as startup, maintenance, and inter-QFabric system device communication. A set of Director devices with hard drives can be joined to form a *Director group*, which provides redundancy and high availability by way of additional memory and processing power. (See also *Director group*.)
Director group	Set of Director devices that host and load-balance internal processes for the QFabric system. The Director group handles tasks such as QFabric system network topology discovery, Node and Interconnect device configuration, startup, and DNS, DHCP, and NFS services. Operating a Director group is a minimum requirement to manage a QFabric system. The Director group runs the Director software for management applications and runs dual processes in active/standby mode for maximum redundancy and high availability. (See also *Director software* and *Director device*.)
Director software	Software that handles QFabric system administration tasks, such as fabric management and configuration. The Junos OS-based Director software runs on the *Director group*, provides a single, consolidated view of the QFabric system, and enables the main QFabric system administrator to configure, manage, monitor, and troubleshoot QFabric system components from a centralized location. To access the Director software, log in to the default partition. (See also *Director device* and *Director group*.)
fabric control Routing Engine	Virtual Junos OS Routing Engine instance used to control the exchange of routes and flow of data between QFabric system hardware components within a partition. The fabric control Routing Engine runs on the Director group.
fabric manager Routing Engine	Virtual Junos OS Routing Engine instance used to control the initialization and maintenance of QFabric system hardware components belonging to the default partition. The fabric manager Routing Engine runs on the Director group.
infrastructure	QFabric system services processed by the virtual Junos Routing Engines operating within the Director group. These services, such as fabric management and fabric control, support QFabric system functionality and high availability.

Table 3: QFabric System Terms *(continued)*

Term	Definition
Interconnect device	QFabric system component that acts as the primary fabric for data plane traffic traversing the QFabric system between Node devices. Examples of Interconnect devices include the QFX3008-I Interconnect device in a QFX3000-G QFabric system and the QFX3600-I Interconnect device in a QFX3000-M QFabric system. (See also *Node device*.)
Junos Space	Carrier-class network management system for provisioning, monitoring, and diagnosing Juniper Networks routing, switching, security, and data center platforms.
network Node group	Set of one to eight Node devices that connects to an external network.
network Node group Routing Engine	Virtual Junos OS Routing Engine instance that handles routing processes for a network Node group. The network Node group Routing Engine runs on the Director group.
Node device	Routing and switching device that connects to endpoints (such as servers or storage devices) or external network peers, and is connected to the QFabric system through an Interconnect device. You can deploy Node devices similarly to the way a top-of-rack switch is implemented. Examples of Node devices include the QFX3500 Node device, QFX3600 Node device, and QFX5100 Node device. (See also *Interconnect device* and *network Node group*.)
partition	Collection of physical or logical QFabric system hardware components (such as Node devices) that provides fault isolation, separation, and security. In their initial state, all QFabric system components belong to a *default partition*.
QFabric system	Highly scalable, distributed, Layer 2 and Layer 3 networking architecture that provides a high-performance, low-latency, and unified interconnect solution for next-generation data centers. A QFabric system collapses the traditional multi-tier data center model, enables the consolidation of data center endpoints (such as servers, storage devices, memory, appliances, and routers), and provides better scaling and network virtualization capabilities than traditional data centers. Essentially, a QFabric system can be viewed as a single, nonblocking, low-latency switch that supports thousands of 10-Gigabit Ethernet ports or 2-Gbps, 4-Gbps or 8-Gbps Fibre Channel ports to interconnect servers, storage, and the Internet across a high-speed, high-performance fabric. The QFabric system must have sufficient resources and devices allocated to handle the *Director group*, *Node device*, and *Interconnect device* functions and capabilities.

Table 3: QFabric System Terms *(continued)*

Term	Definition
QFabric system control plane	Internal network connection that carries control traffic between QFabric system components. The QFabric system control plane includes management connections between the following QFabric system hardware and software components: • *Node devices*, such as the QFX3500 Node device. • *Interconnect devices*, such as the QFX3008-I Interconnect device. • *Director group* processes, such as management applications, provisioning, and topology discovery. • *Control plane Ethernet switches* to provide interconnections to all QFabric system devices and processes. For example, you can use EX Series EX4200 switches running in Virtual Chassis mode for this purpose. To maintain high availability, the QFabric system control plane uses a different network than the QFabric system data plane, and uses a fabric provisioning protocol and a fabric management protocol to establish and maintain the QFabric system.
QFabric system data plane	Redundant, high-performance, and scalable data plane that carries QFabric system data traffic. The QFabric system data plane includes the following high-speed data connections: • 10-Gigabit Ethernet connections between QFabric system endpoints (such as servers or storage devices) and Node devices. • 40-Gbps quad small form-factor pluggable plus (QSFP+) connections between Node devices and Interconnect devices. • 10-Gigabit Ethernet connections between external networks and a Node device acting as a network Node group. To maintain high availability, the QFabric system data plane is separate from the QFabric system control plane.
QFabric system endpoint	Device connected to a Node device port, such as a server, a storage device, memory, an appliance, a switch, or a router.
QFabric system fabric	Distributed, multistage network that consists of a queuing and scheduling system that is implemented in the Node device, and a distributed cross-connect system that is implemented in Interconnect devices. The QFabric system fabric is part of the QFabric system data plane.
QFX3500 Node device	Node device that connects to either endpoint systems (such as servers and storage devices) or external networks in a QFabric system. It is packaged in an industry-standard 1U, 19-inch rack-mounted enclosure. The QFX3500 Node device provides up to 48 10-Gigabit Ethernet interfaces to connect to the endpoints. Twelve of these 48 interfaces can be configured to support 2-Gbps, 4-Gbps or 8-Gbps Fibre Channel, and 36 of the interfaces can be configured to support Gigabit Ethernet. Also, there are four uplink connections to connect to Interconnect devices in a QFabric system. These uplinks use 40-Gbps quad small form-factor pluggable plus (QSFP+) interfaces. (See also *QFX3500 switch*.)

Table 3: QFabric System Terms *(continued)*

Term	Definition
QFX3500 switch	Standalone data center switch with 10-Gigabit Ethernet access ports and 40-Gbps quad, small form-factor pluggable plus (QSFP+) uplink interfaces. You can (optionally) configure some of the access ports as 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel ports or Gigabit Ethernet ports. The QFX3500 switch can be converted to a QFabric system Node device as part of a complete QFabric system. The switch is packaged in an industry-standard 1U, 19-inch rack-mounted enclosure. (See also *QFX3500 Node device*.)
QFX3600 Node device	Node device that connects to either endpoint systems (such as servers and storage devices) or external networks in a QFabric system. It is packaged in an industry-standard 1U, 19-inch rack-mounted enclosure. The QFX3600 Node device provides 16 40-Gbps QSFP+ ports. By default, 4 ports (labeled **Q0** through **Q3**) are configured for 40-Gbps uplink connections between your Node device and your Interconnect device, and 12 ports (labeled **Q4** through **Q15**) use QSFP+ direct-attach copper (DAC) breakout cables or QSFP+ transceivers with fiber breakout cables to support 48 10-Gigabit Ethernet interfaces for connections to either endpoint systems (such as servers and storage devices) or external networks. Optionally, you can choose to configure the first eight ports (**Q0** through **Q7**) for uplink connections between your Node device and your Interconnect device, and ports **Q2** through **Q15** for 10-Gigabit Ethernet connections to either endpoint systems or external networks. (See also *QFX3600 switch*.)
QFX3600 switch	Standalone data center switch with 16 40-Gbps quad, small form-factor pluggable plus (QSFP+) interfaces. By default, all the 16 ports operate as 40-Gigabit Ethernet ports. Optionally, you can choose to configure the 40-Gbps ports to operate as four 10-Gigabit Ethernet ports. You can use QSFP+ to four SFP+ breakout cables to connect the 10-Gigabit Ethernet ports to other servers, storage, and switches. The QFX3600 switch can be converted to a QFabric system Node device as part of a complete QFabric system. The switch is packaged in an industry-standard 1U, 19-inch rack-mounted enclosure. (See also *QFX3600 Node device*.)
QFX5100 Node device	QFabric system Node device that connects to either endpoint systems (such as servers and storage devices) or external networks. It is packaged in an industry-standard 1U, 19-inch rack-mounted enclosure. The QFX5100-48S Node device by default provides 48 10-Gigabit Ethernet interfaces to connect to the endpoints. There are also six 40-Gbps quad small form-factor pluggable plus (QSFP+) interfaces. By default, the first 4 ports (labeled **fte-0/0/48** through **fte-0/0/51**) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 2 ports (labeled **xle-0/0/52** and **xle-0/0/53**) use QSFP+ direct-attach copper (DAC) breakout cables or QSFP+ transceivers with fiber breakout cables to support 8 10-Gigabit Ethernet interfaces for connections to either endpoint systems (such as servers and storage devices) or external networks. Optionally, you can choose to configure the middle 2 ports (**xle-0/0/50** and **xle-0/0/51**) for additional connections to either endpoint systems or external networks. (See also *QFX3500 Node device* and *QFX3600 Node device*.)

Table 3: QFabric System Terms *(continued)*

Term	Definition
redundant server Node group	Set of two Node devices that connect to servers or storage devices. Link aggregation group (LAG) interfaces can span the Node devices within a redundant server Node group.
rolling upgrade	Method used in the QFabric system to upgrade the software for components in a systematic, low-impact way. A rolling upgrade begins with the Director group, proceeds to the fabric (Interconnect devices), and finishes with the Node groups.
Routing Engine	Juniper Networks-proprietary processing entity that implements QFabric system control plane functions, routing protocols, system management, and user access. Routing Engines can be either physical or virtual entities. The Routing Engine functions in a QFabric system are sometimes handled by Node devices (when connected to endpoints), but mostly implemented by the Director group (to provide support for QFabric system establishment, maintenance, and other tasks).
routing instance	Private collection of routing tables, interfaces, and routing protocol parameters unique to a specific customer. The set of interfaces is contained in the routing tables, and the routing protocol parameters control the information in the routing tables. (See also *virtual private network*.)
server Node group	Set of one or more Node devices that connect to servers or storage devices.
virtual LAN (VLAN)	Unique Layer 2 broadcast domain for a set of ports selected from the components available in a partition. VLANs allow manual segmentation of larger Layer 2 networks and help to restrict access to network resources. To interconnect VLANs, Layer 3 routing is required.
virtual private network (VPN)	Layer 3 routing domain within a partition. VPNs maintain privacy with a tunneling protocol, encryption, and security procedures. In a QFabric system, a Layer 3 VPN is configured as a *routing instance*.

Related Documentation

- QFabric System Overview on page 3
- Understanding the QFabric System Hardware Architecture on page 17
- Understanding the QFabric System Software Architecture on page 35

- *Understanding Fibre Channel Terminology*

Understanding Interfaces on the QFabric System

Supported Platforms QFabric System

This topic describes:

Four-Level Interface Naming Convention

When you configure an interface on the QFabric system, the interface name needs to follow a four-level naming convention that enables you to identify an interface as part of either a Node device or a Node group. Include the name of the network or server Node group at the beginning of the interface name.

The four-level interface naming convention is:
device-name:*type-fpc/pic/port*
where *device-name* is the name of the Node device or Node group. The remainder of the naming convention elements are the same as those in the QFX3500 switch interface naming convention.

An example of a four-level interface name is:
node2:*xe-0/0/2*

QSFP+ Interfaces

The QFX3500 Node device provides four 40-Gbps QSFP+ (quad small form-factor pluggable plus) interfaces (labeled **Q0** through **Q3**) for uplink connections between your Node device and your Interconnect devices.

The QFX3600 Node device provides 16 40-Gbps QSFP+ interfaces. By default, 4 interfaces (labeled **Q0** through **Q3**) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 12 interfaces (labeled **Q4** through **Q15**) use QSFP+ direct-attach copper (DAC) breakout cables or QSFP+ transceivers with fiber breakout cables to support 48 10-Gigabit Ethernet interfaces for connections to either endpoint systems (such as servers and storage devices) or external networks. Optionally, you can choose to configure the first eight interfaces (Q0 through Q7) for uplink connections between your Node device and your Interconnect devices, and interfaces Q2 through Q15 for 10-Gigabit Ethernet or 40-Gigabit Ethernet connections to either endpoint systems or external networks (see "Configuring the Port Type on QFX3600 Node Devices" on page 440). Table 4 on page 12 shows the port mappings for QFX3600 Node devices.

Table 4: QFX3600 Node Device Port Mappings

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
Q0	Not supported on this port	xle-0/1/0	fte-0/1/0
Q1	Not supported on this port	xle-0/1/1	fte-0/1/1

Table 4: QFX3600 Node Device Port Mappings *(continued)*

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
Q2	xe-0/0/8 xe-0/0/9 xe-0/0/10 xe-0/0/11	xle-0/1/2	fte-0/1/2
Q3	xe-0/0/12 xe-0/0/13 xe-0/0/14 xe-0/0/15	xle-0/1/3	fte-0/1/3
Q4	xe-0/0/16 xe-0/0/17 xe-0/0/18 xe-0/0/19	xle-0/1/4	fte-0/1/4
Q5	xe-0/0/20 xe-0/0/21 xe-0/0/22 xe-0/0/23	xle-0/1/5	fte-0/1/5
Q6	xe-0/0/24 xe-0/0/25 xe-0/0/26 xe-0/0/27	xle-0/1/6	fte-0/1/6
Q7	xe-0/0/28 xe-0/0/29 xe-0/0/30 xe-0/0/31	xle-0/1/7	fte-0/1/7
Q8	xe-0/0/32 xe-0/0/33 xe-0/0/34 xe-0/0/35	xle-0/1/8	Not supported on this port

Table 4: QFX3600 Node Device Port Mappings *(continued)*

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
Q9	xe-0/0/36 xe-0/0/37 xe-0/0/38 xe-0/0/39	xle-0/1/9	Not supported on this port
Q10	xe-0/0/40 xe-0/0/41 xe-0/0/42 xe-0/0/43	xle-0/1/10	Not supported on this port
Q11	xe-0/0/44 xe-0/0/45 xe-0/0/46 xe-0/0/47	xle-0/1/11	Not supported on this port
Q12	xe-0/0/48 xe-0/0/49 xe-0/0/50 xe-0/0/51	xle-0/1/12	Not supported on this port
Q13	xe-0/0/52 xe-0/0/53 xe-0/0/54 xe-0/0/55	xle-0/1/13	Not supported on this port
Q14	xe-0/0/56 xe-0/0/57 xe-0/0/58 xe-0/0/59	xle-0/1/14	Not supported on this port
Q15	xe-0/0/60 xe-0/0/61 xe-0/0/62 xe-0/0/63	xle-0/1/15	Not supported on this port

The QFX5100-48S Node device provides 48 10-Gigabit Ethernet interfaces and 6 40-Gbps QSFP+ interfaces. By default, 4 interfaces (labeled **48** through **51**) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 2 interfaces (labeled **52** and **53**) support 40-Gigabit Ethernet connections to either endpoint systems (such as servers and storage devices) or external networks. Optionally, you can choose to configure the middle two interfaces (**50** and **51**) for 40-Gigabit Ethernet connections to either endpoint systems or external networks, and you can choose to configure the last two interfaces (**52** and **53**) for uplink connections between your Node device and your Interconnect devices (see "Configuring the QSFP+ Port Type on QFX5100 Devices" on page 445). Table 5 on page 15 shows the port mappings for QFX5100-48S Node devices.

Table 5: QFX5100-48S Node Device Port Mappings

Port Number	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
48	Not supported on this PIC	fte-0/1/0
49	Not supported on this PIC	fte-0/1/1
50	xle-0/1/2	fte-0/1/2
51	xle-0/1/3	fte-0/1/3
52	xle-0/1/4	fte-0/1/4
53	xle-0/1/5	fte-0/1/5

Link Aggregation

Link aggregation enables you to create link aggregation groups across Node devices within a network Node group or redundant server Node group. You can include up to eight Ethernet interfaces in a LAG. You can have up to 48 LAGs within a redundant server Node group, and 128 LAGs in a network Node group. To configure a LAG, include the **aggregated-devices** statement at the **[edit chassis node-group *node-group-name*]** hierarchy level and the **device-count** statement at the **[edit chassis node-group *node-group-name* aggregated-devices ethernet]** hierarchy level. Additionally, include any aggregated Ethernet options (**minimum-links** and **link-speed**) at the **[edit interfaces *interface-name* aggregated-ether-options]** hierarchy level and the **802.3ad** statement at the **[edit interfaces *interface-name* ether-options]** hierarchy level. To configure the Link Aggregation Control Protocol (LACP), include the **lacp** statement at the **[edit interfaces aggregated-ether-options]** hierarchy level.

Related Documentation

- Configuring the Port Type on QFX3600 Node Devices on page 440
- Configuring the QSFP+ Port Type on QFX5100 Devices on page 445

CHAPTER 2

Hardware Architecture Overview

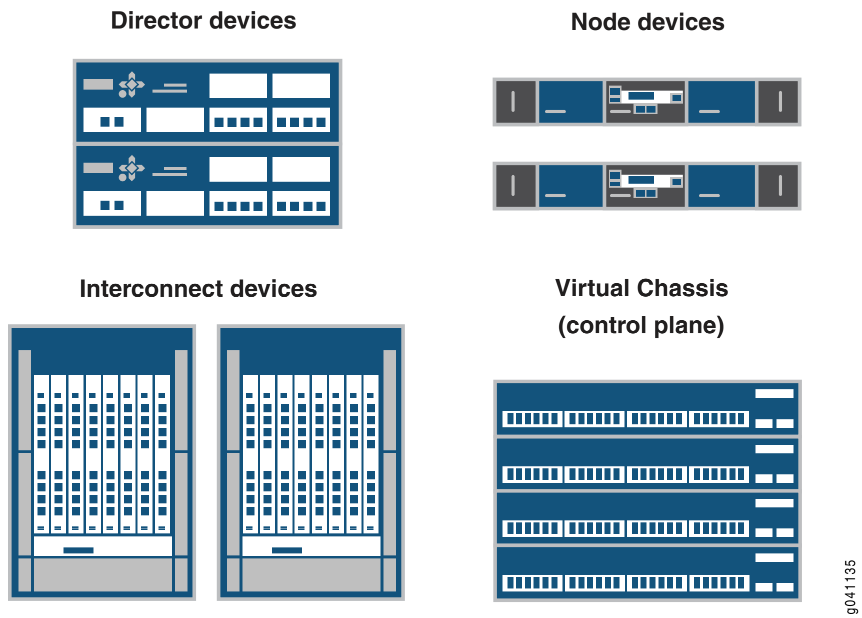
Understanding the QFabric System Hardware Architecture

Supported Platforms QFabric System

QFabric System Hardware Architecture Overview

The QFabric system is a single-layer networking tier that connects servers and storage devices to one another across a high-speed, unified core fabric. You can view the QFabric system as a single, extremely large, nonblocking, high-performance Layer 2 and Layer 3 switching system. The reason you can consider the QFabric system as a single system is that the Director software running on the Director group allows the main QFabric system administrator to access and configure every device and port in the QFabric system from a single location. Although you configure the system as a single entity, the fabric contains four major hardware components. The hardware components can be chassis-based, group-based, or a hybrid of the two. As a result, it is important to understand the four types of generic QFabric system components and their functions, regardless of which hardware environment you decide to implement. A representation of these components is shown in Figure 3 on page 18.

Figure 3: QFabric System Hardware Architecture



The four major QFabric system components include the following:

- **Director group**—The *Director group* is a management platform that establishes, monitors, and maintains all components in the QFabric system. It is a set of Director devices that run the Junos operating system (Junos OS) on top of a CentOS foundation. The Director group handles tasks such as QFabric system network topology discovery, Node and Interconnect device configuration and startup, and Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP), and Network File System (NFS) services. The Director group also runs the software for management applications, hosts and load-balances internal processes for the QFabric system, and starts additional QFabric system processes as requested.
- **Node devices**—A *Node device* is a hardware system located on the ingress of the QFabric system that connects to endpoints (such as servers or storage devices) or external networks, and is connected to the heart of the QFabric system through an Interconnect device. A Node device can be used in a manner similar to how a top-of-rack switch is implemented. By default, Node devices connect to servers or storage devices. However, when you group Node devices together to connect to a network that is external to the QFabric system, the formation is known as a *network Node group*.
- **Interconnect devices**—An *Interconnect device* acts as the primary fabric for data plane traffic traversing the QFabric system between Node devices. To reduce latency to a minimum, the Interconnect device implements multistage Clos switching to provide nonblocking interconnections between any of the Node devices in the system.
- **Control plane network**—The *control plane network* is an out-of-band Gigabit Ethernet management network that connects all QFabric system components. For example, you can use a group of EX4200 Ethernet switches configured as a Virtual Chassis to enable the control plane network. The control plane network connects the Director

group to the management ports of the Node and Interconnect devices. By keeping the control plane network separate from the data plane, the QFabric system can scale to support thousands of servers and storage devices.

The four major QFabric system components can be assembled from a variety of hardware options. Currently supported hardware configurations are shown in Table 6 on page 19.

Table 6: Supported QFabric System Hardware Configurations

QFabric System Configuration	Director Group	Node Device	Interconnect Device	Control Plane Device
QFX3000-G QFabric system	QFX3100 Director group	QFX3500, QFX3600, and QFX5100 Node devices NOTE: There can be a maximum of 128 Node devices in the QFX3000-G QFabric system.	QFX3008-I Interconnect device NOTE: There can be a maximum of four Interconnect devices in the QFX3000-G QFabric system.	Two Virtual Chassis composed of either four EX4200-48T switches each (for a copper-based control plane) or eight EX4200-24F switches each (for a fiber-based control plane)
QFX3000-M QFabric system	QFX3100 Director group NOTE: For a copper-based QFX3000-M QFabric system control plane network, use QFX3100 Director devices with RJ-45 network modules installed. For a fiber-based control plane network, use QFX3100 Director devices with SFP network modules installed.	QFX3500, QFX3600, and QFX5100 Node devices NOTE: • There can be a maximum of 16 Node devices in the QFX3000-M QFabric system. • For a copper-based QFX3000-M QFabric system control plane network, use QFX3500 Node devices with a 1000BASE-T management board installed. For a fiber-based control plane network, use QFX3500 Node devices with an SFP management board installed.	QFX5100-24Q or QFX3600-I Interconnect devices NOTE: There can be a maximum of four Interconnect devices in the QFX3000-M QFabric system.	Two EX4200 Ethernet switches NOTE: For a copper-based QFX3000-M QFabric system control plane network, use EX4200-24T switches with an SFP+ uplink module installed. For a fiber-based control plane network, use EX4200-24F switches with an SFP+ uplink module installed.

To complete the system, external Routing Engines (such as the fabric manager Routing Engines, network Node group Routing Engines, and fabric control Routing Engines) run on the Director group and implement QFabric system control plane functions. The control plane network provides the control plane connections between the Node devices, the Interconnect devices, and the Routing Engines running on the Director group.

QFX3000-G QFabric System Features

A QFX3000-G QFabric system provides the following key features:

- Support for up to 128 Node devices and 4 Interconnect devices, which provides a maximum of 6144 10-Gigabit Ethernet ports.
- Low port-to-port latencies that scale as the system size grows from 48 to 6144 10-Gigabit Ethernet ports.
- Support for up to 384,000 total ingress queues at each Node device to the QFabric system Interconnect backplane.
- Support for Converged Enhanced Ethernet (CEE) traffic.

QFX3000-M QFabric System Features

A QFX3000-M QFabric system provides the following key features:

- Support for up to 16 Node devices and 4 Interconnect devices, which provides a maximum of 768 10-Gigabit Ethernet ports.
- Low port-to-port latencies that scale as the system size grows from 48 to 768 10-Gigabit Ethernet ports.

Related Documentation

- Understanding QFabric System Terminology on page 7
- Understanding the QFabric System Software Architecture on page 35
- Understanding the Director Group on page 20
- Understanding Routing Engines in the QFabric System on page 21
- Understanding Interconnect Devices on page 23
- Understanding Node Devices on page 26
- Understanding Node Groups on page 30
- Understanding Partitions on page 37

Understanding the Director Group

Supported Platforms QFabric System

Because the Director group provides management services for the QFabric system, it is important to understand the components of the cluster and how the Director group supports the needs of the greater fabric.

- Director Group Components on page 20
- Director Group Services on page 21

Director Group Components

When you build a Director group, consider the following elements and concepts.

- **Director device**—A single management device for the QFabric system. Director devices with a hard drive provide full processing services and are used to build the Director group.
- **Director group**—A set of Director devices. The Director group is essential to the QFabric system, which cannot operate properly without it. The Director group shares and load-balances processing tasks for the QFabric system, performs topology discovery, assigns identifiers to QFabric system components, and manages interfabric communication. The primary devices in a Director group are Director devices that contain hard drives. The Director devices run dual processes in active or standby mode for maximum redundancy.

  When you add additional Director devices to the group, the Director group coordinates their activities and distributes processing loads across all available Director devices. The additional Director devices provide the Director group with additional memory and processing power. Supplementing the Director group with extra Director devices allows the group to scale efficiently and serve the needs of the entire QFabric system as it grows.

Director Group Services

The Director group is a management platform that establishes, monitors, and maintains all components in the QFabric system. It is a set of Director devices that run the Junos operating system (Junos OS) on top of a CentOS foundation. The Director group handles tasks such as QFabric system network topology discovery, Node and Interconnect device configuration and startup, and Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP), and Network File System (NFS) services. The Director group also runs the software for management applications, hosts and load-balances internal processes for the QFabric system, maintains configuration and topology databases, and starts additional QFabric system processes as requested.

Another critical role provided by the Director group is the hosting of the virtual Junos Routing Engines. These Routing Engines provide services for the QFabric system to keep it operating smoothly.

Related Documentation

- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411
- Understanding Routing Engines in the QFabric System on page 21
- Understanding the QFabric System Hardware Architecture on page 17

Understanding Routing Engines in the QFabric System

Supported Platforms QFabric System

Routing Engines perform many important processing tasks in the QFabric system. Knowing where the Routing Engines are located and what services they provide enables you to troubleshoot the QFabric system and ensure that it is running the way it should.

This topic covers:

- Hardware-Based Routing Engines on page 22
- Software-Based External Routing Engines on page 22

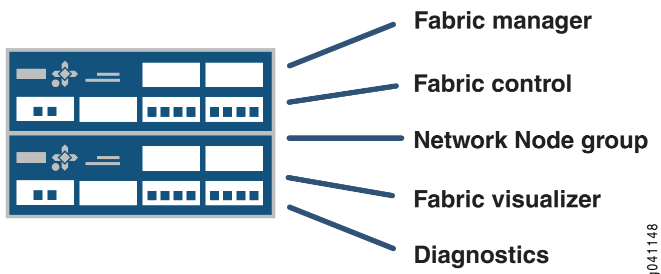
Hardware-Based Routing Engines

A traditional Juniper Networks Routing Engine is a hardware field-replaceable unit that runs routing protocols, builds the routing and switching tables, sends routing information to the Packet Forwarding Engine, and handles several software processes for the device (such as interface control, chassis component monitoring, system management, and user access). Node devices that are part of server Node groups in the QFabric system that connect to servers or storage devices implement Routing Engine functions locally using this traditional hardware method.

Software-Based External Routing Engines

The QFabric system also uses external Routing Engines that run in software on the Director group. In contrast with traditional Routing Engines, the functions and processes provided by software-based Routing Engines are segmented, specialized, and distributed across multiple Routing Engine instances running on the Director group. Such separation provides redundancy for these functions and enables the QFabric system to scale. Figure 4 on page 22 shows the external Routing Engine types.

Figure 4: External Routing Engine Types



These special-purpose external Routing Engine instances running on the Director group provide the following major services for the QFabric system:

- **Fabric manager Routing Engine**—Provides services to all devices in the QFabric system, such as system initialization, topology discovery, internal IP address and ID assignment, and interdevice communication. The fabric manager Routing Engine authenticates Interconnect and Node devices, and maintains a database for system components. A single fabric manager Routing Engine instance is generated to manage the entire QFabric system.
- **Fabric control Routing Engine**—Runs the fabric control protocol to share route information between available devices in a partition. A pair of redundant route

distribution Routing Engine instances is generated for every partition in the QFabric system, and both instances are active.

- **Diagnostic Routing Engine**—Gathers operational information that allows QFabric system administrators to monitor the health of the QFabric system. A single Routing Engine instance is generated for the entire QFabric system.
- **Network Node group Routing Engine**—Provides Routing Engine functionality for groups of Node devices bundled together as a single Layer 3 routing device, which is used to connect to external networks. A pair of redundant Routing Engine instances is generated for every network Node group in the QFabric system.

Related Documentation

- Understanding the Director Group on page 20
- Understanding the QFabric System Control Plane on page 39
- Understanding the QFabric System Hardware Architecture on page 17

Understanding Interconnect Devices

Supported Platforms QFabric System

Interconnect devices in a QFabric system provide a way for the Node devices to connect with one another over a high-speed backplane. By understanding the role of Interconnect devices, you can harness the benefits of low latency, superb scalability, and minimum packet processing offered by a single-tier data center architecture.

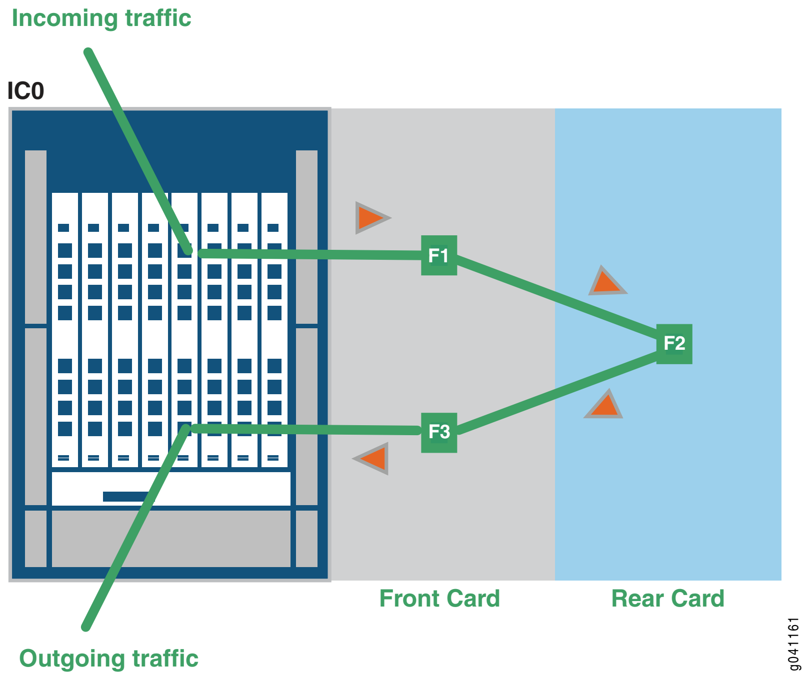
This topic covers:

- Interconnect Device Introduction on page 23
- QFX3008-I Interconnect Devices on page 24
- QFX3600-I Interconnect Devices on page 25

Interconnect Device Introduction

Interconnect devices act as the primary fabric for data plane traffic traversing the QFabric system between Node devices. The main task for the Interconnect devices is to transfer traffic between the Node devices as quickly as possible across a high-speed, available path backplane. To reduce latency to a minimum, larger Interconnect devices (such as the QFX3008-I Interconnect device) implement multistage Clos switching to provide nonblocking connections between any of the Node devices in the system. Figure 5 on page 24 shows an example of how Clos switching works in the QFX3008-I Interconnect device.

Figure 5: Clos Switching for QFX3008-I Interconnect Devices

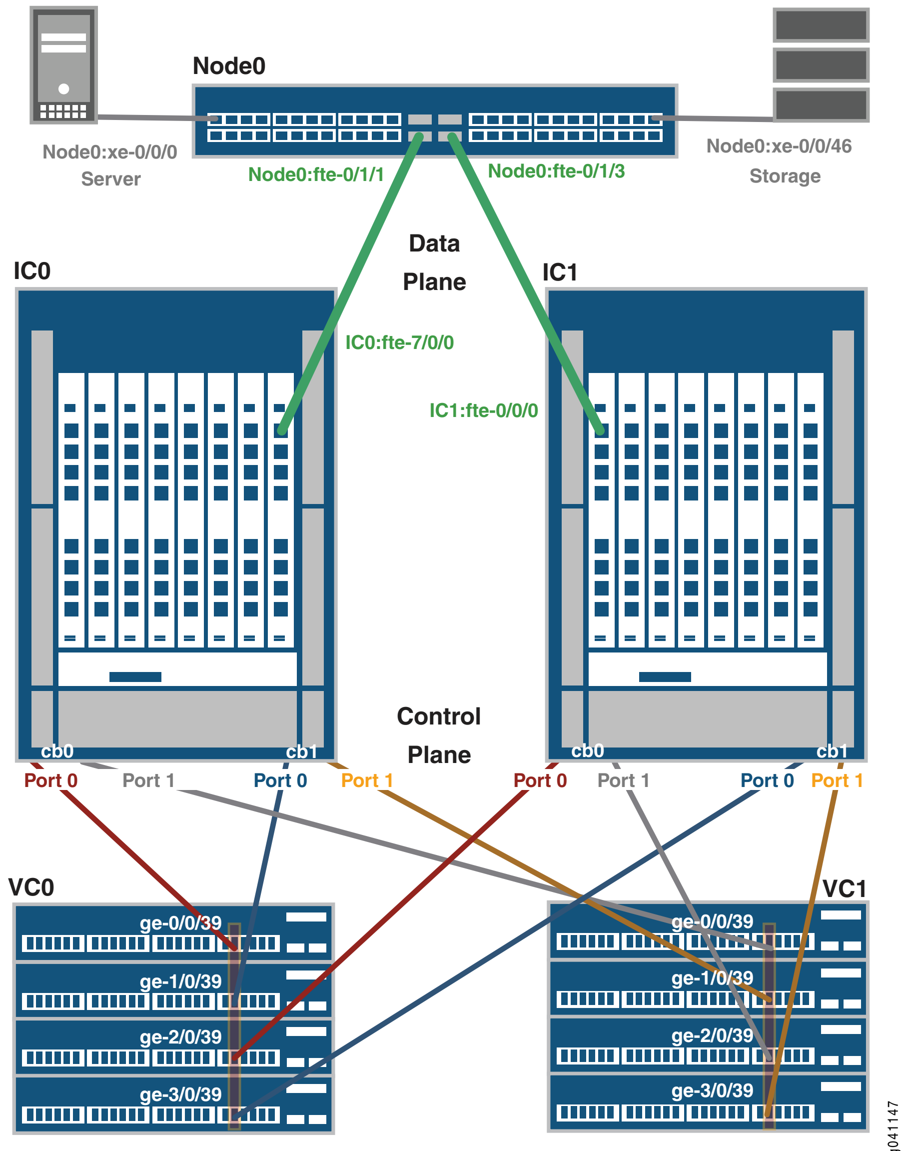


Traffic enters a QSFP+ port from a Node device, and an ingress chipset provides stage F1 processing. For the F2 stage, the frame is sent to a rear card and processed by a midplane chipset. Lastly, an egress chipset on the front card QSFP+ port handles processing tasks for the F3 stage. At each of the three Clos stages, a switching table chooses the best path and determines where to send the frame to reach the next stage. The F1 and F3 stages can be handled by the same front card or different front cards, depending on the best path selected by the fabric. After the frame traverses the Interconnect device backplane, the Interconnect device sends the frame to the egress Node device.

QFX3008-I Interconnect Devices

The QFX3008-I Interconnect device contains eight slots in the front of the chassis. In each slot, you can install a front card containing 16 40-Gbps quad small form-factor pluggable plus (QSFP+) ports. A fully configured system offers a total capacity of 128 QSFP+ connections. These front card ports attach to the high-speed backplane to reach the eight slots in the rear of the chassis, which provide the heavy-duty interconnections for the entire QFX3000-G QFabric system. In addition, four interfaces (two per Control Board) provide Gigabit Ethernet access to the control plane management network. Figure 6 on page 25 shows an example of the data plane and control plane connections for QFX3008-I Interconnect devices.

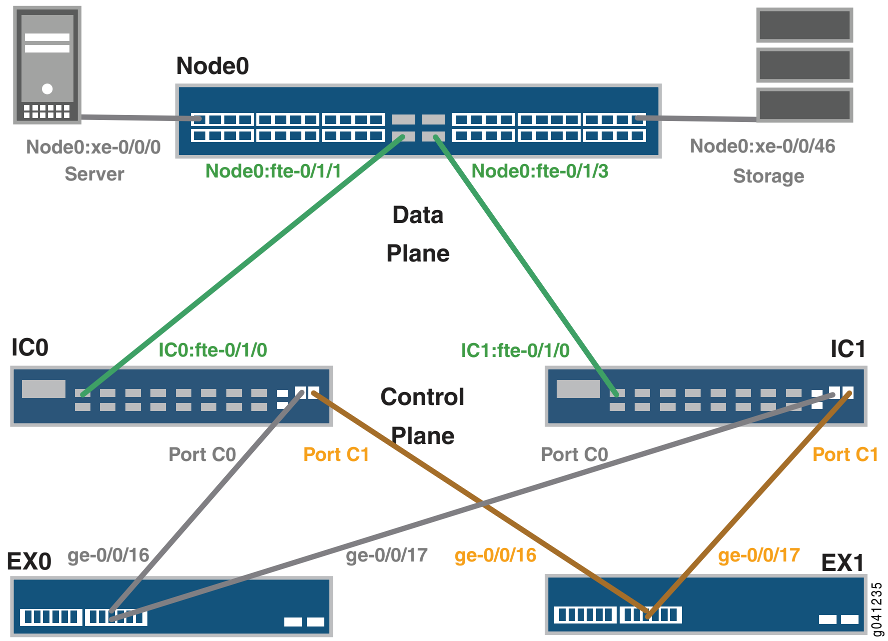
Figure 6: QFX3008-I Data Plane and Control Plane Connections



QFX3600-I Interconnect Devices

The QFX3600-I Interconnect device has 16 40-Gbps quad small form-factor pluggable plus (QSFP+) ports that provide interconnections for the entire QFX3000-M QFabric system. In addition, two management ports provide Gigabit Ethernet access to the control plane management network. Figure 7 on page 26 shows an example of the data plane and control plane connections for a QFX3600-I Interconnect device.

Figure 7: QFX3600-I Data Plane and Control Plane Connections



Related Documentation

- Understanding Node Devices on page 26
- Understanding the QFabric System Data Plane on page 42
- Understanding the QFabric System Control Plane on page 39
- Understanding the QFabric System Hardware Architecture on page 17

Understanding Node Devices

Supported Platforms QFabric System

Node devices in a QFabric system provide a way for servers, storage devices, and external networks to connect to the QFabric system. By understanding the role of Node devices, you can design your QFabric system topology to take advantage of the unique benefits offered by a single-tier data center architecture.

This topic covers:

- Node Device Introduction on page 26
- QFX3500 Node Devices on page 27
- QFX3600 Node Devices on page 28
- QFX5100 Node Devices on page 29

Node Device Introduction

A *Node device* in the QFabric system connects either endpoint systems (such as application servers and storage devices) or external networks to Interconnect devices.

It can be used similarly to the way a top-of-rack switch is implemented in a data center. Node devices provide an access point to the QFabric system, allowing data to flow into and out of the QFabric system. Because all Node devices in the QFabric system connect through a backplane of Interconnect devices, in essence all Node devices are connected to one another. This directly connected design model eliminates multiple tiers of aggregation and core devices and provides minimum latency, maximum scalability, and rapid transport of server-to-server traffic and QFabric system-to-external network traffic.

Sets of Node devices can be bundled together into *Node groups*, in which each group operates as a single virtual entity. Node groups that connect to servers and storage devices are known as *server Node groups*, and Node groups that connect to external networks are known as *network Node groups*.

QFX3500 Node Devices

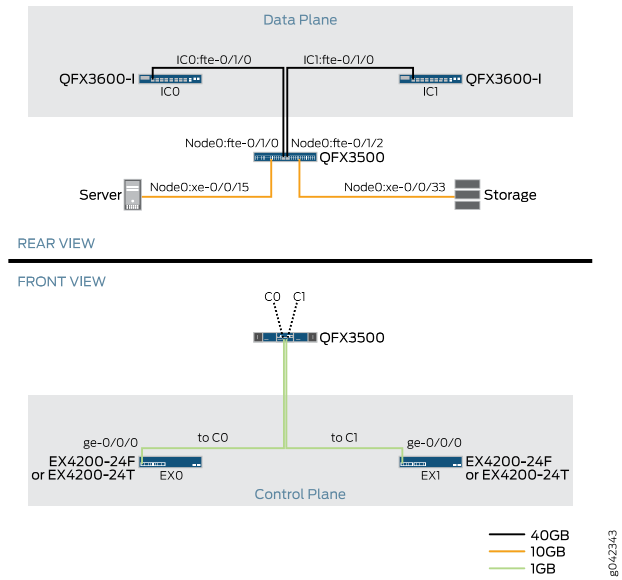
A QFX3500 Node device provides up to 48 10-Gigabit Ethernet interfaces to connect to endpoints or external networks. You can configure 12 of these 48 interfaces to support 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel. You can also configure the remaining 36 interfaces with Gigabit Ethernet.

NOTE: **You can configure interface ports 0 through 47 as 10-Gigabit Ethernet ports, 0 through 5 and 42 through 47 as Fibre Channel over Ethernet ports, and 6 through 41 as Gigabit Ethernet ports. However, you cannot configure any Fibre Channel over Ethernet ports as Gigabit Ethernet ports or vice versa.**

In addition to these server and network interfaces, there are four uplink interfaces to connect the QFX3500 Node device to Interconnect devices in a QFabric system. These uplinks use 40-Gbps quad small form-factor pluggable plus (QSFP+) interfaces.

The control plane requires two management ports on the QFX3500 chassis to connect the Node device to the control plane network. Figure 8 on page 28 shows an example of the data plane and control plane connections for a QFX3500 Node device.

Figure 8: QFX3500 Data Plane and Control Plane Connections

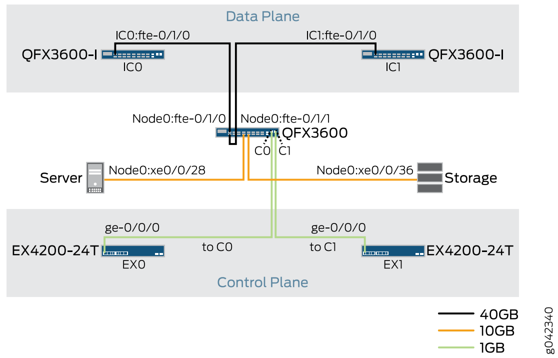


QFX3600 Node Devices

A QFX3600 Node device provides 16 40-Gbps QSFP+ interfaces. By default, 4 interfaces (labeled **Q0** through **Q3**) are configured for 40-Gbps uplink connections between your QFX3600 Node device and your Interconnect device, and 12 interfaces (labeled **Q4** through **Q15**) use QSFP+ direct-attach copper (DAC) breakout cables or QSFP+ transceivers with fiber breakout cables to support 48 10-Gigabit Ethernet interfaces for connections to either endpoint systems or external networks. Optionally, you can choose to configure the first eight interfaces (**Q0** through **Q7**) for uplink connections between your Node device and your Interconnect devices, and interfaces **Q2** through **Q15** for 10-Gigabit Ethernet or 40-Gigabit Ethernet connections to either endpoint systems or external networks.

The control plane requires two management ports on the QFX3600 chassis to connect the Node device to the control plane network. Figure 9 on page 29 shows an example of the data plane and control plane connections for a QFX3600 Node device.

Figure 9: QFX3600 Data Plane and Control Plane Connections



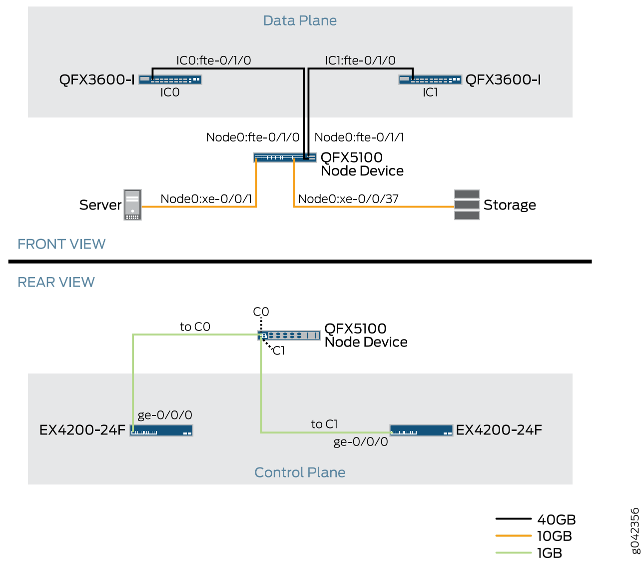
QFX5100 Node Devices

A QFX5100 Node device works as part of a QFabric system. A QFX5100-48S Node device provides 48 10-Gigabit Ethernet interfaces to connect to endpoints or external networks and 6 40-Gbps QSFP+ interfaces. By default, 4 of the QSFP+ interfaces (labeled **fte-0/0/48** through **fte-0/0/51**) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 2 QSFP+ interfaces (labeled **xle-0/0/52** and **xle-0/0/53**) provide 40-Gigabit Ethernet connections to either endpoint systems (such as servers and storage devices) or external networks. Optionally, you can choose to configure the middle two interfaces (**xle-0/0/50** and **xle-0/0/51**) for 40-Gigabit Ethernet connections to either endpoint systems or external networks, and you can choose to configure the last two interfaces (**fte-0/0/52** and **fte-0/0/53**) for uplink connections between your Node device and your Interconnect devices.

The control plane requires two management ports on the QFX5100 chassis to connect the Node device to the control plane network.

Figure 10 on page 30 shows an example of the data plane and control plane connections for a QFX5100 Node device.

Figure 10: QFX5100 Data Plane and Control Plane Connections



Related Documentation

- Converting the Device Mode for a QFabric System Component on page 329
- Configuring Aliases for the QFabric System on page 430
- Configuring Node Groups for the QFabric System on page 447
- Configuring the Port Type on QFX3600 Node Devices on page 440
- Understanding Node Groups on page 30
- Understanding Interconnect Devices on page 23
- Understanding the QFabric System Data Plane on page 42
- Understanding the QFabric System Control Plane on page 39
- Understanding the QFabric System Hardware Architecture on page 17

Understanding Node Groups

Supported Platforms QFabric System

Node groups help you combine multiple Node devices into a single virtual entity within the QFabric system to enable redundancy and scalability at the edge of the data center.

This topic covers:

- Network Node Groups on page 31
- Server Node Groups on page 31

Network Node Groups

A set of one or more Node devices that connect to an external network is called a *network Node group*. The network Node group also relies on two external Routing Engines running on the Director group. These redundant *network Node group Routing Engines* run the routing protocols required to support the connections from the network Node group to external networks.

When configured, the Node devices within a network Node group and the network Node group Routing Engines work together in tandem as a single entity. By default, network Node group Routing Engines are part of the **NW-NG-0** network Node group but no Node devices are included in the group. As a result, you must configure Node devices to be part of a network Node group.

In a QFabric system deployment that requires connectivity to external networks, you can modify the automatically generated network Node group by including its preset name **NW-NG-0** in the Node group configuration. Within a network Node group, you can include a minimum of one Node device up to a maximum of eight Node devices. By adding more Node devices to the group, you provide enhanced scalability and redundancy for your network Node group.

NOTE: **The QFabric system creates a single NW-NG-0 network Node group for the default partition. You cannot configure a second network Node group inside the default partition. The remaining Node devices within the default partition are reserved to connect to servers, storage, or other endpoints internal to the QFabric system. These Node devices either can be retained in the automatically generated server Node groups or can be configured as part of a redundant server Node group.**

Server Node Groups

A *server Node group* is a set of one or more Node devices that connect to servers or storage devices. Unlike Node devices that are part of a network Node group and rely on an external Routing Engine, a Node device within a server Node group connects directly to endpoints and implements the Routing Engine functions locally, using the local CPU built into the Node device itself.

There are two different server Node group types:

- **Autogenerated server Node group**—By default, each Node device is placed in its own self-named Node group to connect to servers and storage. No configuration is necessary, but the QFabric system provides no redundancy for this type of Node group.
- **Redundant server Node group**—You can override the default, autogenerated server Node group assignment by manually configuring a *redundant server Node group* that contains a maximum of two Node devices. You can use a redundant server Node group to provide multihoming services to servers and storage, as well as configure aggregated LAG connections that span the two Node devices.

NOTE: The Node devices in a redundant server Node group must be of the same type, either two QFX3500 Node devices, two QFX3600 Node devices, or two QFX5100 Node devices. You cannot mix and match different Node device models in the same redundant server Node group.

Related Documentation

- Configuring Node Groups for the QFabric System on page 447
- Understanding Node Devices on page 26
- Understanding Routing Engines in the QFabric System on page 21
- Understanding the QFabric System Hardware Architecture on page 17

Understanding Port Oversubscription on Node Devices

Supported Platforms QFabric System

Each Node device in a QFabric system can have a different port oversubscription configuration. For example, you can have a Node device with 3:1 port oversubscription, another with 6:1 oversubscription, and yet another with 1:1 oversubscription.

The port oversubscription ratio on a Node device is based on the total amount of bandwidth from the server-facing connections and the total number of uplink connections. To determine your oversubscription ratio, multiply the number of server ports by the server-port speed, multiply the number of uplink ports by the uplink-port speed, and divide the total server-facing bandwidth by the total uplink-facing bandwidth. For example, If you use 32 10-Gigabit Ethernet server ports (320 gigabits) and 8 40-Gigabit Ethernet uplink ports (320 gigabits) on a QFX3600 Node device, you can configure 1:1 port oversubscription by connecting the eight uplink ports (labeled Q0 through Q7) from the Node device to the Interconnect devices and splitting the remaining 8 40-Gigabit Ethernet ports into 32 10-Gigabit Ethernet server ports.

Table 7 on page 32 shows the oversubscription ratio for ports on QFX3500 Node devices based on the number of Interconnect devices and the number of connections from each Node device to each Interconnect device.

Table 7: Oversubscription Ratio on QFX3500 Node Devices

Number of Interconnect Devices	Number of Connections from Each Node Device to Each Interconnect Device	Oversubscription Ratio on Node Device
2	1	6:1
2	2	3:1
4	1	3:1

Table 8 on page 33 shows the oversubscription ratio for ports on QFX3600 Node devices based on the number of Interconnect devices and the number of connections from each Node device to each Interconnect device.

Table 8: Oversubscription Ratio on QFX3600 Node Devices

Number of Interconnect Devices	Number of Connections from Each Node Device to Each Interconnect Device	Oversubscription Ratio on Node Device
2	1	6:1
2	2	3:1
2	4	1:1
4	1	3:1
4	2	1:1

Table 9 on page 33 shows the oversubscription ratio for ports on QFX5100 Node devices based on the number of Interconnect devices and the number of connections from each Node device to each Interconnect device.

Table 9: Oversubscription Ratio on QFX5100 Node Devices

Number of Interconnect Devices	Number of Connections from Each Node Device to Each Interconnect Device	Oversubscription Ratio on Node Device
2	1	8:1
2	2	3.5:1
2	3	2:1
4	1	3.5:1

Related Documentation

- Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 321
- Connecting a QFX3600 Node Device to a QFX3008-I Interconnect Device on page 319
- Connecting a QFX5100 Node Device to a QFX3008-I Interconnect Device on page 322

- *Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device*
- *Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device*
- *Connecting a QFX5100 Node Device to a QFX3600-I Interconnect Device*

CHAPTER 3

Software Architecture Overview

Understanding the QFabric System Software Architecture

Supported Platforms QFabric System

The software architecture for the QFabric system environment has been designed to provide a high-speed, low-latency, nonblocking fabric for data center traffic. This topic explores how the software architecture for a QFabric system supports these goals.

Key components of the QFabric system software architecture include:

- A single administrative view of all QFabric system components provides unified management, configuration, monitoring, and troubleshooting of the QFabric system. This view is provided by the QFX Series Director software running on the Director group. A primary administrator can access the unified view through the default partition.
- A fabric control protocol enables rapid transport of data traffic between QFabric system components. This unique feature of the software architecture distributes route information for each device within the QFabric system, and removes the need to run spanning-tree protocols inside the QFabric system network.
- A fabric management protocol provides rapid transport of control traffic between QFabric system components. This protocol helps identify and initialize QFabric system resources, supports device redundancy, and supports management communication throughout the QFabric system.
- A control plane network that is separate from the data plane network provides high availability for the QFabric system.

The software also provides access to relevant features in the Junos operating system (Junos OS) that support QFabric system functionality. Support is available for most switching features available on EX Series Ethernet switches and many routing features available on M Series, MX Series, and T Series routing platforms.

Related Documentation

- Understanding QFabric System Terminology on page 7
- Understanding the QFabric System Hardware Architecture on page 17
- Understanding the Director Software on page 36
- Understanding Partitions on page 37
- Understanding the QFabric System Control Plane on page 39
- Understanding the QFabric System Data Plane on page 42

Understanding the Director Software

Supported Platforms QFabric System

The Director software provides a single view into the QFabric system so that it can be managed as a single entity. This topic explains how the Director software interacts with the components of the QFabric system to maintain operations from a central location.

Because the QFabric system consists of multiple Director, Node, and Interconnect devices, the architects of the QFabric system determined that it would be useful to manage the entire system as a single logical entity. As a result, the Director software handles administration tasks for the entire QFabric system, such as fabric management and configuration. The Director software runs on the *Director group*, provides a single consolidated view of the QFabric system, and enables the main QFabric system administrator to configure, manage, monitor, and troubleshoot QFabric system components from a centralized location. In the Junos operating system (Junos OS) command-line interface (CLI), you can access the Director software by logging in to the default partition.

The Director software handles the following major tasks for the QFabric system:

- Provides command-line interface (CLI) access to all QFabric system components that you have permission to manage or view.
- Evaluates configuration statements and operational mode commands for their scope and sends requests to the applicable Director, Node, and Interconnect devices. (This operation is sometimes referred to as *scattering*.)
- Consolidates responses from Director, Node, and Interconnect devices, and displays output from the devices in a unified, centralized manner. (This operation is sometimes referred to as *gathering*.)
- Coordinates configuration and operational efforts with a database housed in the Director group to store and retrieve configurations, software images, event logs, and system log messages.
- Facilitates control plane communication between the Node devices, the Routing Engine services running on the Director group, and the Interconnect devices.
- Runs parallel processes on the Director group devices to provide high availability for the QFabric system.

- Coordinates interactions with QFabric system components to provide load balancing of processing tasks across the Director group devices.
- Manages user access and privileges.
- Enables you to configure, manage, monitor, and troubleshoot QFabric system components that are assigned to you.
- Gathers QFabric system inventory and topology details.
- Offers a way to manage Director group devices, including the ability to add and delete Director devices in the group, set and switch mastership in the Director group, and monitor Director group status.
- Provides a centralized way to coordinate software upgrades for QFabric system components.

The Director software provides a backbone of functionality that supports the entire QFabric system. It is an essential component of the QFabric system that enables you to implement the system in a logical and efficient way.

Related Documentation

- Gaining Access to the QFabric System Through the Default Partition on page 421
- Understanding the Director Group on page 20
- Understanding the QFabric System Software Architecture on page 35

Understanding Partitions

Supported Platforms QFabric System

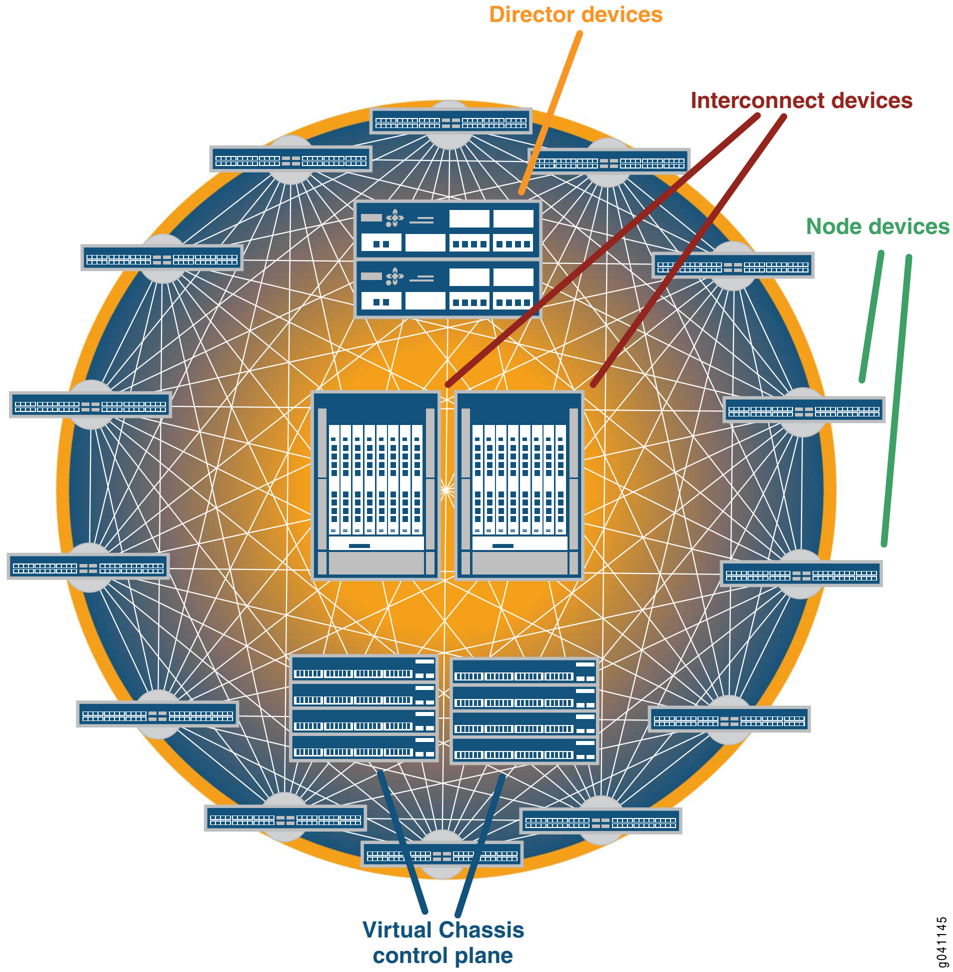
Partitions provide a way to allocate specified virtual and physical resources within your QFabric system. This topic covers:

- QFabric System Default Partition on page 37

QFabric System Default Partition

By default, all equipment and virtual resources in the QFabric system belong to the *default partition*. As a result, the QFabric system in its initial state has a single broadcast domain that is administered by a single main administrator. Figure 11 on page 38 shows a topology with the default settings—a single collection that contains all the devices in the QFabric system.

Figure 11: QFabric System Topology - Default Partition



NOTE: The initial release of the QFabric system supports a single default partition. All equipment and resources belong to the default partition.

A partition provides the following functions:

- Fault isolation and separation from other partitions at the control plane level.
- A separate configuration domain for the Node devices within the partition.
- A Layer 2 domain in which MAC learning takes place, and members of the same VLAN can communicate with each other. To provide network connectivity between partitions, you need to enable Layer 3 routing by way of a routed VLAN interface (RVI).

Related Documentation

- Gaining Access to the QFabric System Through the Default Partition on page 421
- Understanding the QFabric System Software Architecture on page 35
- Understanding the QFabric System Hardware Architecture on page 17

Understanding the QFabric System Control Plane

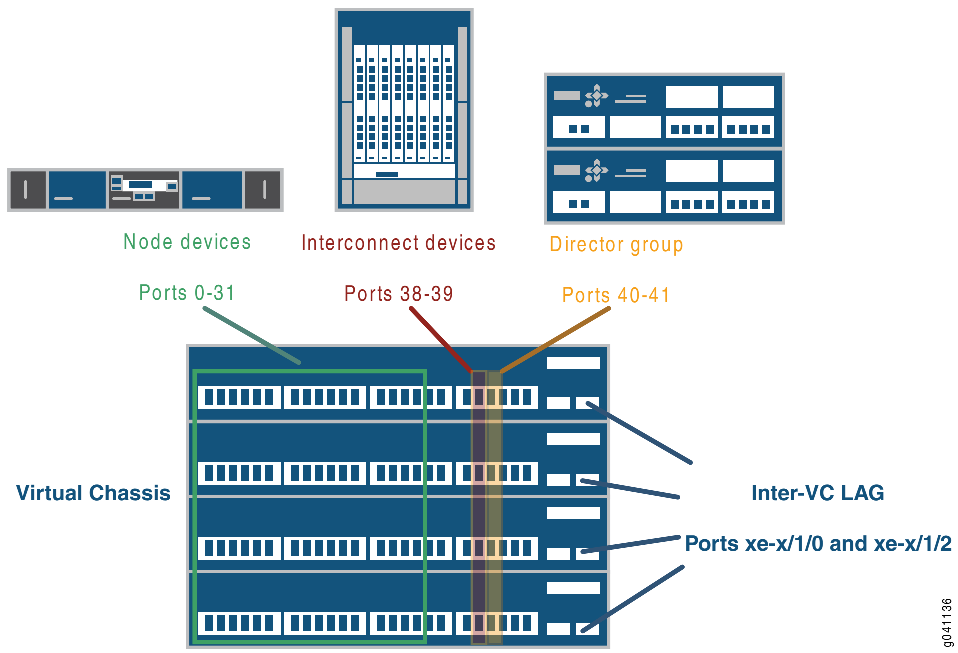
Supported Platforms QFabric System

The control plane in the QFabric system transports management traffic between QFabric system components to facilitate system operations, configuration, and maintenance. This topic covers:

Control Plane Elements

Control traffic within a QFabric system is carried across a redundant, scalable, out-of-band, Ethernet switching network called the *control plane* network. To maintain high availability, the QFabric system control plane is separated from the QFabric system data plane. Figure 12 on page 40 shows a diagram of the QFabric system devices that compose the control plane network.

Figure 12: QFabric System Control Plane Network



The control plane consists of the following elements:

- **Control plane switches**—Provide connectivity to the management interfaces of all QFabric system components in the control plane network, including the Node devices, the Interconnect devices, and the Director group. When you interconnect all QFabric system devices to the control plane switches, the Director group can manage the entire system. Depending on the size and scale of your QFabric system, the control plane switches might be standalone switches or might be groups of switches bundled into a Virtual Chassis (See the Example topics in the Related Documentation section of this topic to learn more about the control plane switch configuration required for your QFabric system.)

  For example, the control plane switch for the QFX3000-G QFabric system requires two Virtual Chassis containing four EX4200 switch members each. The two Virtual Chassis connect to each other across a 10-Gigabit Ethernet LAG link to provide maximum resiliency for the QFabric system control plane.

- **Connections between the management interfaces of the Node devices and the control plane switches**—Enable control plane connectivity from the Node devices to the rest of the QFabric system. You must connect two management interfaces from each Node device to the control plane switches. Connect each interface to a different control plane switch to provide system resiliency.

- **Connections between the management interfaces of the Interconnect devices and the control plane switches**—Enable control plane connectivity from the Interconnect devices to the rest of the QFabric system. You must connect the interfaces in each Interconnect device to the control plane switches. Connect each interface to a different control plane switch to provide system resiliency.

  For example, on QFX3008-I Interconnect devices, there are two Control Boards and two interfaces per Control Board, for a total of four connections per Interconnect device. To provide system resiliency, connect one interface from each Control Board to the first Virtual Chassis, and connect the second interface from each Control Board to the second Virtual Chassis.

- **Connections between the network module interfaces of the Director group and the control plane switches**—Enable control plane connectivity from the Director group to the rest of the QFabric system. You must connect some interfaces from the first network module in a Director device to one control plane switch, and connect some interfaces from the second network module in a Director device to the second control plane switch. Also, you must connect the ports from the first network module to the primary control plane switch for each Director device (which may vary depending on the configuration of your Director group).

  For the most current guidance on the QFabric control plane configuration and cabling recommendations, see:

  - Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane on page 336
  - Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System on page 378
  - *Example: Configuring EX4200 Switches for the QFX3000-M QFabric System Control Plane*

- **Routing Engines**—Although they are automatically provisioned, specialized Routing Engines implement services such as default QFabric system infrastructure, device management, route sharing, and diagnostics to support the QFabric system. Routing Engines for control plane functions are virtual entities that run on the Director group.

- **Fabric management protocol**—A link-state protocol runs on the control plane network to identify and initialize QFabric system resources, support device redundancy, and support management communication throughout the QFabric system. The protocol is enabled by default.

Control Plane Services

The QFabric system control plane provides the infrastructure to support the following services for the QFabric system:

- System initialization
- Topology discovery

- Internal IP address and unique ID assignment
- Route information sharing
- Configuration delivery to Node devices
- Interdevice communication between Node devices, Interconnect devices, and the Director group

Many of these services are provided by the external Routing Engines that run in software on the Director group.

Related Documentation

- Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane on page 336
- Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System on page 378
- *Example: Configuring EX4200 Switches for the QFX3000-M QFabric System Control Plane*
- Understanding the QFabric System Data Plane on page 42
- Understanding Routing Engines in the QFabric System on page 21
- Understanding the QFabric System Hardware Architecture on page 17

Understanding the QFabric System Data Plane

Supported Platforms QFabric System

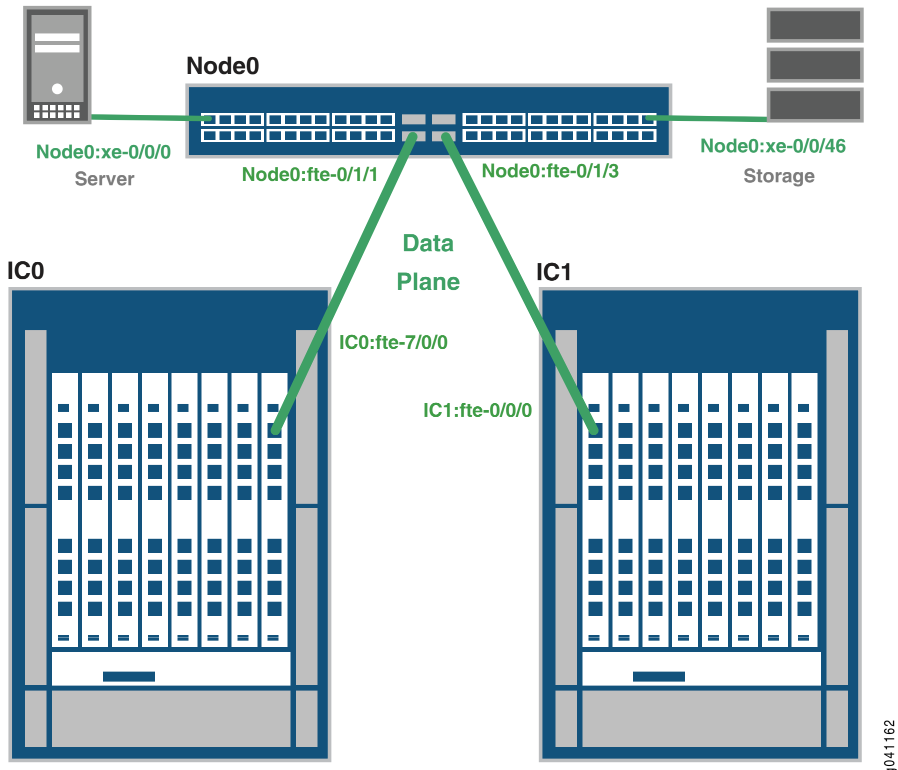
The data plane in the QFabric system transfers application traffic between QFabric system components rapidly and efficiently. This topic covers:

- Data Plane Components on page 42
- QFabric System Fabric on page 43

Data Plane Components

Data traffic within a QFabric system is carried across a redundant, high-performance, and scalable *data plane*. To maintain high availability, the QFabric system data plane is separated physically from the QFabric system control plane and uses a different network. Figure 13 on page 43 shows an example diagram of the QFabric system data plane network.

Figure 13: QFabric System Data Plane Network



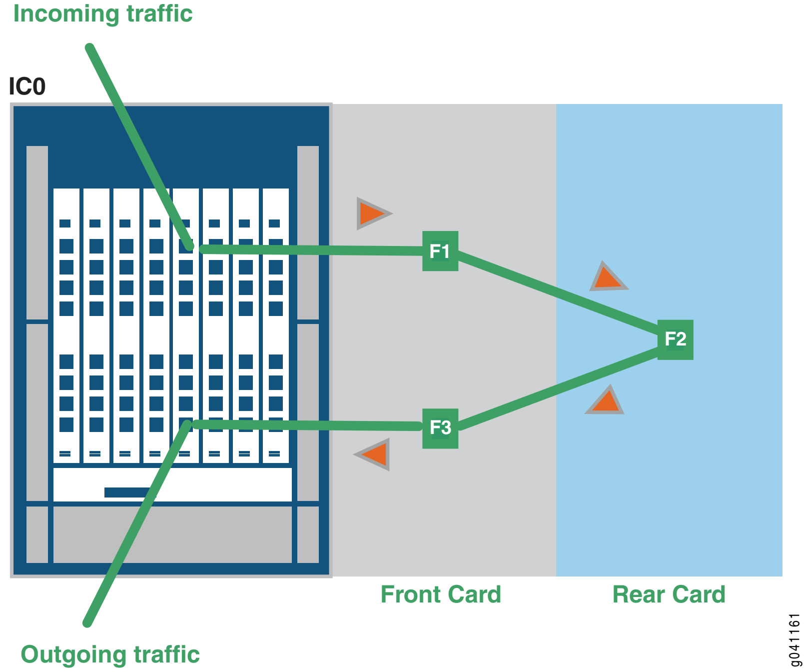
The QFabric system data plane includes the following high-speed data connections and elements:

- 10-Gigabit Ethernet or 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel connections between QFabric system endpoints (such as servers or storage devices) and the Node devices.
- 40-Gbps quad, small form-factor pluggable plus (QSFP+) connections between the Node devices and the Interconnect devices.
- 10-Gigabit Ethernet connections between external networks and the Node devices contained in the network Node group.
- A fabric control protocol, used to distribute route information to all devices connected to the QFabric system data plane.

QFabric System Fabric

Unlike traditional data centers that employ a multi-tiered hierarchy of switches, a QFabric system contains a single tier of Node devices connected to one another across a backplane of Interconnect devices. The QFabric system fabric is a distributed, multistage network that consists of a fabric queuing and scheduling system implemented in the Node devices, and a distributed cross-connect system implemented in the Interconnect devices. The cross-connect system for the QFX3008-I Interconnect device is shown as an example in Figure 14 on page 44.

Figure 14: QFX3008-I Interconnect Device Cross-Connect System



The design of the cross-connect system provides multistage Clos switching, which results in nonblocking paths for data traffic and any-to-any connectivity for the Node devices. Because all Node devices are connected through the Interconnect device, the QFabric system offers very low port-to-port latencies. In addition, dynamic load balancing and low-latency packet flows provide for scaling the port count and bandwidth capacity of a QFabric system.

Related Documentation

- Understanding the QFabric System Control Plane on page 39
- Understanding the QFabric System Hardware Architecture on page 17

CHAPTER 4

Software Features

QFX Series Software Features

Supported Platforms QFabric System, QFX Series standalone switches

For information about the software features supported with Junos OS 13.2X51, see

- Feature Explorer: Junos OS 13.2X51-D25
- Feature Explorer: Junos OS 13.2X51-D20
- Feature Explorer: Junos OS 13.2X51-D10

Related Documentation

- *QFX3000-G QFabric System Hardware Documentation*
- *QFX3000-M QFabric System Hardware Documentation*
- *QFX3500 Device Hardware Documentation*
- *QFX3600 Device Hardware Documentation*

Understanding Software Upgrade on the QFabric System

Supported Platforms QFabric System

The QFabric system software package contains software for the QFabric system infrastructure and for all of the different component devices in the QFabric system: Director group, Interconnect devices, and Node devices.

Operational Software Commands

The **request system software download** CLI command enables you to download the software package to various locations: for example, USB device, remote server, or FTP site.

The following CLI commands enable you to install the software for the Director group, Interconnect devices, Node devices, and the QFabric system infrastructure. You may need to specify the **reboot** option depending on which devices or QFabric infrastructure you are installing the software. The **reboot** option works differently depending on whether you install the software on the QFabric system infrastructure or on a particular device in the QFabric system.

- **request system software add component all**

  This command installs software for the Director group, fabric control Routing Engine, fabric manager Routing Engine, Interconnect devices, and network and server Node groups.

- **request system software add component director-group**

  This command installs software for the Director group and the default partition, which is where you access the QFabric system CLI.

- **request system software add component fabric**

  This command installs the software for the fabric control Routing Engines and the Interconnect devices.

- **request system software add component *node-group-name***

  This command installs software for a server Node group or a network Node group.

Additionally, you can back up your current QFabric configuration file and installation-specific parameters using the **request system software configuration-backup** command. We recommend that you save this file to an external location, like an FTP site or USB device, but you can save it locally.

Operational Reboot Commands

The following commands enable you to reboot the entire QFabric system, various Node devices, or the QFabric system infrastructure:

- **request system reboot all**

  This command reboots the Director group, fabric control Routing Engines, fabric manager Routing Engine, Interconnect devices, and network and server Node groups.

- **request system reboot director-group**

  This command reboots the Director group and the default partition, which is where you access the QFabric system CLI.

- **request system reboot fabric**

  This command reboots the fabric control Routing Engines and the Interconnect devices.

- **request system reboot node-group**

  This command reboots a server Node group or a network node group.

Related Documentation

- Upgrading Software on a QFabric System on page 528

Understanding Nonstop Software Upgrade for QFabric Systems

Supported Platforms QFabric System

The framework that underlies a nonstop software upgrade in a QFabric system enables you to upgrade the system in a step-by-step manner and minimize the impact to the continuous operation of the system. This topic explains how a nonstop software upgrade works in a QFabric system, the steps that are involved, and the procedures that you need to implement to experience the benefits of this style of software upgrade.

Nonstop software upgrade enables some QFabric system components to continue operating while similar components in the system are being upgraded. In general, the QFabric system upgrades redundant components in stages so that some components remain operational and continue forwarding traffic while their equivalent counterparts upgrade to a new version of software.

TIP: Use the following guidelines to decide when to implement a nonstop software upgrade:

Before you perform a nonstop software upgrade, contact JTAC to perform a pre-upgrade health check on the QFabric system.

TIP: Before you perform a nonstop software upgrade, contact JTAC to perform a pre-upgrade health check on the QFabric system.

- If you need to upgrade all components of the system in the shortest amount of time (approximately one hour) and you do not need to retain the forwarding resiliency of the data plane, issue the **request system software add component all** command to perform a standard software upgrade. All components of the QFabric system upgrade simultaneously and expediently, but this type of upgrade does not provide resiliency or switchover capabilities.
- If you need to minimize service impact, preserve the forwarding operations of the data plane during the upgrade, and are willing to take the extra time required for component switchovers (in many cases, several hours), issue the three nonstop software upgrade commands (**request system software nonstop-upgrade (director-group | fabric | node-group)** described in this topic in the correct order.

NOTE:

- Before you begin a nonstop software upgrade, issue the **request system software download** command to copy the software to the QFabric system.
- Each of the 3 nonstop software upgrade steps must be considered parts of the whole process. You must complete all 3 steps of a nonstop software upgrade in the correct order to ensure the proper operation of the QFabric system.
- Open two SSH sessions to the QFabric CLI. Use one session to monitor the upgrade itself and use a second session to verify that the QFabric system components respond to operational mode commands as expected. For more information on verification of the upgrade, see "Verifying Nonstop Software Upgrade for QFabric Systems" on page 508.
- Issue the **show fabric administration inventory** command to verify that all upgraded components are operational at the end of a step before beginning the next step.
- Once you start the nonstop software upgrade process, we strongly recommend that you complete all 3 steps within 12 hours.

The three steps to a successful nonstop software upgrade must be performed in the following order:

- Director group—The first step upgrades the Director devices, the fabric manager Routing Engine, and the diagnostic Routing Engine. To perform the first step, issue the **request system software nonstop-upgrade director-group** command. The key actions that occur during a Director group upgrade are:

1. Connecting to the QFabric system by way of an SSH connection. This action establishes a load-balanced CLI session on one of the Director devices in the Director group.
2. The QFabric system downloads and installs the new software in both Director devices.
3. The Director device hosting the CLI session becomes the master for all QFabric system processes running on the Director group, such as the fabric manager and network Node group Routing Engines.
4. The QFabric system installs the new software for the backup fabric manager Routing Engine on the backup Director device.
5. The backup Director device reboots to activate the new software.
6. The master Director device begins a 15 minute sequence that includes a temporary suspension of QFabric services and a QFabric database transfer. You cannot issue operational mode commands in the QFabric CLI during this period.
7. The QFabric system installs the new software for the fabric manager and diagnostic Routing Engines on the Director group master.
8. The QFabric system switches mastership of all QFabric processes from the master Director device to the backup Director device.
9. The master Director device reboots to activate the new software.
10. The CLI session terminates, and logging back in to the QFabric system with a new SSH connection establishes the session on the new master Director device (the original backup).
11. The previous master Director device resumes operation as a backup and the associated processes (such as the fabric manager and network Node group Routing Engines) become backup as well. The fabric control Routing Engine associated with this Director device returns to active status.

NOTE: After the Director group nonstop software upgrade completes, any Interconnect device or Node device that reboots will automatically download the new software, install it, and reboot again. As a result, try not to restart any QFabric system devices before you complete the rest of the nonstop software upgrade steps.

TIP:

- To enable BGP and OSPF to continue operating on the network Node group during a Director group nonstop service upgrade, we recommend that you configure graceful restart for these routing protocols. For more information on graceful restart, see "Configuring Graceful Restart for QFabric Systems" on page 453.
- Wait 15 minutes after the second Director device returns to service and hosts Routing Engine processes before proceeding to step 2—the fabric

upgrade. You can verify the operational status of both Director devices by issuing the **show fabric administration inventory director-group status** command. Also, issue the **show fabric administration inventory infrastructure** command to verify when the Routing Engine processes become load balanced (typically, there will be three to four Routing Engines running on each Director device).

- Fabric—The second step upgrades the Interconnect devices and the fabric control Routing Engines. To perform the second step, issue the **request system software nonstop-upgrade fabric** command. The key actions that occur during a fabric upgrade are:

  1. The QFabric system downloads, validates, and installs the new software in all Interconnect devices and fabric control Routing Engines (FC-0 and FC-1).
  2. One fabric control Routing Engine reboots and comes back online.
  3. The other fabric control Routing Engine reboots and comes back online.
  4. The first Interconnect device reboots, comes back online, and resumes the forwarding of traffic.
  5. Subsequent Interconnect devices reboot one at a time, come back online, and return to service.

NOTE:
- If the software does not load properly on any one of the fabric components, all components revert back to the original software version.
- If one of the components in a fabric upgrade does not reboot successfully, issue the **request system reboot fabric** command to reattempt the rebooting process for this fabric component and activate the new software.

- Node group—The third and final step upgrades Node groups. You can choose to upgrade a network Node group, a redundant server Node group, or individual server Node groups. You can upgrade the Node groups one at a time or in groups (known as upgrade groups). However, you must upgrade all Node groups in your QFabric system before you can complete the nonstop software upgrade process. To perform the third step, issue the **request system software nonstop-upgrade node-group** command.

  The key actions that occur during a network Node group upgrade are:

  1. The QFabric system copies the new software to each Node device one at a time.
  2. The QFabric system validates and then installs the new software in all Node devices simultaneously.
  3. The system copies the software to the network Node group Routing Engines.
  4. The QFabric system validates and then installs the software in the network Node group Routing Engines one at a time -- first the backup, then the master.

5. The backup network Node group Routing Engine reboots and comes back online.
6. The supporting Node devices reboot and come back online one at a time.

NOTE: To reduce the total upgrade duration, configure an upgrade group. All Node devices within the upgrade group reboot at the same time.

7. The master network Node group Routing Engine relinquishes mastership to the backup, reboots, and comes back online.

The key actions that occur during a redundant server Node group upgrade are:

1. The QFabric system copies the new software to the backup Node device, then the master Node device.
2. The QFabric system validates and then installs the new software on the backup Node device, then the master Node device.
3. The backup Node device reboots, comes back online, and becomes the master Node device.
4. The previous master Node device reboots and comes back online as a backup Node device.

NOTE: For redundant server Node groups, both Node devices must be online before the upgrade will proceed. If one of the devices is no longer available, remove the Node device from the Node group configuration before you issue the nonstop software upgrade command.

The key actions that occur during a server Node group upgrade for a Node group that contains one member are:

1. The Node device downloads the software package and validates the software.
2. The Node device installs the software and reboots.

NOTE: Because there is no redundancy for Node groups containing a single Node device, traffic loss occurs when the device reboots during the upgrade.

Related Documentation

- *Nonstop Software Upgrade Checklist for QFabric Systems*
- Performing a Nonstop Software Upgrade on the QFabric System on page 503
- Verifying Nonstop Software Upgrade for QFabric Systems on page 508
- **request system software nonstop-upgrade on page 559**
- *request system software add*
- Configuring Graceful Restart for QFabric Systems on page 453

Understanding Statements and Commands on the QFabric System

Supported Platforms QFabric System

Chassis Statements

The following chassis statements enable you to configure various options for your Interconnect devices, Node groups (network and server), and Node devices:

- **interconnect-device**
- **node-group**
- **node-device**

Chassis Commands

The Junos OS CLI contains additions to the existing chassis commands. These additions reflect new options as a result of adding the **interconnect-device**, **node-group**, and **node-device** chassis statements at the **[edit chassis]** hierarchy level.

The following chassis commands enable you to monitor and configure the QFabric system hardware and software options at various hierarchy levels:

- **clear chassis display message**
- **request chassis beacon**
- **request chassis cb** (QFX3000-G QFabric systems only)
- **request chassis fabric** (QFX3000-G QFabric systems only)
- **request chassis fpc**
- **request chassis routing-engine master**
- **set chassis aggregated-devices**
- **set chassis alarm**
- **set chassis container-devices**
- **set chassis craft-lockout**
- **set chassis display**
- **set chassis fpc**
- **set chassis routing-engine**
- **show chassis alarms**
- **show chassis beacon**
- **show chassis environment**

- **show chassis fan** (QFX3000-G QFabric systems only)
- **show chassis fabric**
- **show chassis firmware**
- **show chassis fpc**
- **show chassis hardware**
- **show chassis lcd**
- **show chassis led**
- **show chassis location**
- **show chassis mac-addresses**
- **show chassis nonstop-upgrade**
- **show chassis pic**
- **show chassis routing-engine**
- **show chassis temperature-thresholds**
- **show chassis zones**

Related Documentation

- QFabric System Initial and Default Configuration Information on page 327
- Understanding User and Access Management Features on the QFabric System on page 58
- Generating the MAC Address Range for a QFabric System on page 410
- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411

Understanding NTP on the QFabric System

Supported Platforms QFabric System

Network Time Protocol (NTP) enables you to synchronize the time across the network. This is especially helpful for correlating log events and replicating databases and file systems. The QFabric system synchronizes time with servers that are external to the system and operates in client mode only.

To configure NTP, include the **server address** and **authentication-key** statements at the **[edit system ntp]** hierarchy level.

Related Documentation

- *NTP Time Server and Time Services Overview (QFabric System)*
- *Synchronizing and Coordinating Time Distribution Using NTP*
- *Configuring NTP Authentication Keys (QFabric System)*
- *Configuring the NTP Time Server and Time Services (QFabric System)*
- *Configuring the Router or Switch to Listen for Broadcast Messages Using NTP*
- *Configuring the Router or Switch to Listen for Multicast Messages Using NTP*

- *Example: Configuring NTP*
- *Example: Configuring NTP as a Single Time Source for Router and Switch Clock Synchronization*

Understanding Network Management Implementation on the QFabric System

Supported Platforms QFabric System

This topic describes network management features on the QFabric system that are implemented differently than on other devices running Junos OS.

The following network management features are supported on the QFabric system:

- **System log messages**—The QFabric system monitors events that occur on its component devices, distributes system log messages about those events to all external system log message servers (hosts) that are configured, and archives the messages. Component devices include Node devices, Interconnect devices, Director devices, and the Virtual Chassis. You configure system log messages at the **[edit system syslog]** hierarchy level. Use the **show log *filename*** operational mode command to view messages.
- **Simple Network Management Protocol (SNMP) Version 1 (v1) and v2c**—SNMP monitors network devices from a central location. The SNMP implementation on the QFabric system supports the basic SNMP architecture of Junos OS with some limitations, including a reduced set of MIB objects, read-only access for SNMP communities, and limited support for SNMP requests. You configure SNMP at the **[edit snmp]** hierarchy level. Only the **show snmp statistics** operational mode command is supported, but you can issue SNMP requests using external SNMP client applications.
- **Advanced Insight Solutions (AIS)**—AIS provides tools and processes to automate the delivery of support services for the QFabric system. AIS components include Advanced Insight Scripts (AI-Scripts) and Advanced Insight Manager (AIM). You install AI-Scripts using the **request system scripts add** operational mode command. However, the **jais-activate-scripts.slax** file used during installation is preconfigured for the QFabric system and cannot be changed.

Related Documentation

- *Advanced Insight Scripts (AI-Scripts) Release Notes*
- *Understanding Device and Network Management Features*
- *Overview of Junos OS System Log Messages*
- Understanding the Implementation of SNMP on the QFabric System on page 54
- *SNMP MIBs Support*

Understanding the Implementation of SNMP on the QFabric System

Supported Platforms QFabric System

SNMP monitors network devices from a central location. The QFabric system supports the basic SNMP architecture of Junos OS, but its implementation of SNMP differs from that of other devices running Junos OS. This topic provides an overview of the SNMP implementation on the QFabric system.

As in other SNMP systems, the SNMP manager resides on the network management system (NMS) of the network to which the QFabric system belongs. The SNMP agent resides in the QFabric Director software and is responsible for receiving and distributing all traps as well as responding to all the queries of the SNMP manager. For example, traps that are generated by a Node device are sent to the SNMP agent in the Director software, which in turn processes and sends them to the target IP addresses that are defined in the SNMP configuration.

NOTE: In its SNMP implementation, the QFabric system acts as an SNMP proxy server, and requires more time to process SNMP requests than a typical Junos OS device does. The default timeout setting on most SNMP client applications is 3 seconds, which is not enough time for the QFabric system to respond to SNMP requests, so the results of your **mibwalk** command may be incomplete. For this reason, we recommend that you change the SNMP timeout setting to 5 seconds or longer for the QFabric system to complete the responses to your requests.

Support for SNMP on the QFabric system includes:

- Support for the SNMP Version 1 (v1) and v2.

  NOTE: Only SNMPv2 traps are supported on the QFabric system.

- Support for the following standard MIBs:
  - RFC 1155, *Structure and Identification of Management Information for TCP/IP-based Internets*
  - RFC 1157, *A Simple Network Management Protocol (SNMP)*
  - RFC 1212, *Concise MIB Definitions*
  - RFC 1213, *Management Information Base for Network Management of TCP/IP-Based Internets: MIB-II* (partial support, including the system group and interfaces group)
  - RFC 1215, *A Convention for Defining Traps for use with the SNMP*
  - RFC 1901, *Introduction to Community-based SNMPv2*
  - RFC 1905, *Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)*
  - RFC 1907, *Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2)*
  - RFC 2011, *SNMPv2 Management Information Base for the Internet Protocol Using SMIv2*

- RFC 2012, *SNMPv2 Management Information Base for the Transmission Control Protocol Using SMIv2*
- RFC 2013, *SNMPv2 Management Information Base for the User Datagram Protocol Using SMIv2*
- RFC 2233, *The Interfaces Group MIB Using SMIv2*
- RFC 2571, *An Architecture for Describing SNMP Management Frameworks* (read-only access) (excluding SNMPv3)
- RFC 2572, *Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)* (read-only access) (excluding SNMPv3)
- RFC 2576, *Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework* (excluding SNMPv3)
- RFC 2578, *Structure of Management Information Version 2 (SMIv2)*
- RFC 2579, *Textual Conventions for SMIv2*
- RFC 2580, *Conformance Statements for SMIv2*
- RFC 2665, *Definitions of Managed Objects for the Ethernet-like Interface Types*
- RFC 2863, *The Interfaces Group MIB*
- RFC 3410, *Introduction and Applicability Statements for Internet Standard Management Framework* (excluding SNMPv3)
- RFC 3411, *An Architecture for Describing Simple Network Management Protocol (SNMP) Management Framework* (excluding SNMPv3)
- RFC 3412, *Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)* (excluding SNMPv3)
- RFC 3413, *Simple Network Management Protocol (SNMP) Applications* (excluding SNMPv3)
- RFC 3416, *Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)*
- RFC 3417, *Transport Mappings for the Simple Network Management Protocol (SNMP)*
- RFC 3418, *Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)*
- RFC 3584, *Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework* (excluding SNMPv3)
- RFC 4188, *Definitions of Managed Objects for Bridges*
- RFC 4293, *Management Information Base for the Internet Protocol (IP)*
- RFC 4363b, *Q-Bridge VLAN MIB*

- Support for the following Juniper Networks enterprise-specific MIBs:
  - Chassis MIB (mib-jnx-chassis.txt)
  - Class-of-Service MIB (mib-jnx-cos.txt)

  - Configuration Management MIB (mib-jnx-cfgmgmt.txt)
  - Fabric Chassis MIB (mib-jnx-fabric-chassis.txt)
  - Interface MIB Extensions (mib-jnx-if-extensions.txt)
  - Power Supply Unit MIB (mib-jnx-power-supply-unit.txt)
  - QFabric MIB (mib-jnx-qf-smi.txt)
  - Utility MIB (mib-jnx-util.txt)

- Support for operational mode commands—Limited to the **show snmp statistics** command. You may issue other SNMP requests, including **get**, **get next**, and **walk** requests, by using external SNMP client applications.

Related Documentation

- *SNMP MIBs Support*
- *SNMP Traps Support*

Understanding the Implementation of System Log Messages on the QFabric System

Supported Platforms QFabric System

This topic provides an overview of system log (syslog) messages as implemented on the QFabric system.

The QFabric system monitors events that occur on its component devices and distributes system log messages about those events to all external system log message servers (hosts) that are configured. Component devices may include Node devices, Interconnect devices, Director devices, and the Virtual Chassis. Messages are stored for viewing only in the QFabric system database. To view the messages, issue the **show log** command.

You configure system log messages by using the **host** and **file** statements at the **[edit system syslog]** hierarchy level. Use the **show log *filename*** operational mode command to view the messages.

NOTE: On the QFabric system, a syslog file named **messages** with a size of 100 MB is configured by default. If you do not configure a filename, you can use the default filename **messages** with the **show log *filename*** command.

All messages with a severity level of **notice** or higher are logged. Messages with a facility level of **interactive-commands** on Node devices are not logged.

The QFabric system supports the following system log message features:

- The **file *filename*** and **host *hostname*** statements at the **[edit system syslog]** hierarchy level are supported. Other statements at that hierarchy level are not supported.
- You can specify the maximum amount of data that is displayed when you issue the **show log *filename*** command by configuring the **file *filename* archive *maximum-file-size*** statement.

- You can specify that one or more system log message servers receive messages, which are sent to each server that is configured.
- If you configured an alias for a device or interface, the alias is displayed in the message for the device or interface.
- The level of detail that is included in a message depends on the facility and severity levels that are configured. Messages include the highest level of detail available for the configured facility and severity levels.
- The unit of time is is measured and displayed in seconds, and not milliseconds. If you attempt to configure the **time-format** option in milliseconds, the log output displays **000**.

Starting in Junos OS Release 13.1, the QFabric system supports these additional syslog features:

- You can filter the output of the **show log *filename*** operational mode command by device type and device ID or device alias when you specify the ***device-type*** **(*device-id* | *device-alias*)** optional parameters. Device types include **director-device**, **infrastructure-device**, **interconnect-device**, and **node-device**.
- You can specify the syslog structured data output format when you configure the **structured-data** statement at the **[edit system syslog file *filename*]** and **[edit system syslog host *hostname*]** hierarchy levels.

NOTE: Information displayed in the structured data output for system logs originating from the Director software may not be complete.

- You can filter the types of logs that the Director group collects from a component device when you configure the **filter all *facility severity*** or **filter all match "*regular-expression*"** statements at the **[edit system syslog]** hierarchy level.

Unsupported syslog features include:

- File access to syslog messages
- Monitoring of syslog messages

Related Documentation

- *Example: Configuring System Log Messages*
- syslog (QFabric System) on page 498

Understanding User and Access Management Features on the QFabric System

Supported Platforms QFabric System

The QFabric system supports the following user and access management features:

- User authentication
- RADIUS

- Link Layer Discovery Protocol (LLDP)
- SSH
- TACACS+
- Access privilege management

The specific functionality, features, options, syntax, and hierarchy levels of some of the user and access management commands and configuration statements implemented on the QFabric system may differ somewhat from the same commands and configuration statements on standard Junos OS. See the configuration statement or command topic in the documentation set for additional information, and use the help (**?**) command-line function to display specific information as needed.

Some user and access management features are not yet fully supported in the full QFabric architecture, although full support is planned for future releases. The user and access management features currently unsupported on the QFabric system include:

- Full RADIUS server support, including RADIUS accounting
- **accounting-options** configuration statement hierarchy
- **tacplus-options** configuration statement

Understanding QFabric System Login Classes

Supported Platforms QFabric System

In some cases (such as device-level troubleshooting), it is useful to log in to individual QFabric system components so you can view and manage issues on a per-device basis. This topic explains the login classes that provide individual component access within a QFabric system.

NOTE: Under normal operating conditions, you should manage the QFabric system as a single entity by using the QFabric system default partition command-line interface (CLI). The default partition CLI provides you with the ability to configure and monitor your entire QFabric system from a central location and should be used as the primary way to manage the system.

The QFabric system offers three special preset login classes that provide different levels of access to individual components within a QFabric system:

- **qfabric-admin**—Provides the ability to log in to individual QFabric system components and manage them. This class is equivalent to setting the following permissions: **access**, **admin**, **clear**, **firewall**, **interface**, **maintenance**, **network**, **reset**, **routing**, **secret**, **security**, **snmp**, **system**, **trace**, and **view**. The *qfabric-admin* class also enables you issue all operational mode commands except **configure**. To provide QFabric system component-level login and management privileges, include the **qfabric-admin** statement at the **[edit system login user *username* authentication remote-debug-permission]** hierarchy level.

- **qfabric-operator**—Provides the privilege to log in to individual QFabric system components and view component operations and configurations. This class is equivalent to setting the following permissions: **trace** and **view**. The *qfabric-operator* class also enables you issue the **monitor** and **show log messages** operational mode commands. To provide limited QFabric system component-level access, include the **qfabric-operator** statement at the **[edit system login user *username* authentication remote-debug-permission]** hierarchy level.
- **qfabric-user**—Prevents access to individual QFabric system components. This class is the default setting for all QFabric system users and is equivalent to the preset Junos OS class of **unauthorized**. To prevent a user from accessing individual QFabric system components, include the **qfabric-user** statement at the **[edit system login user *username* authentication remote-debug-permission]** hierarchy level.

When you perform the initial setup for the Director group, you must specify a username and password for QFabric components. Once configured, this information is stored in the QFabric system and mapped to the QFabric system login classes. Such mapping allows users with the proper login class (**qfabric-admin** or **qfabric-operator**) to log in automatically to a component without being prompted for the username and password.

After you assign the **qfabric-admin** or **qfabric-operator** class to a user, the user can log in to an individual QFabric system component by issuing the **request component login *component-name*** command. You can access Node devices, Interconnect devices, and virtual Junos Routing Engines (diagnostics, fabric control, and fabric manager) one at a time when you issue this command. To leave the CLI prompt of a component and return to the QFabric system default partition CLI, issue the **exit** command from the component's operational mode CLI prompt.

Related Documentation

- Example: Configuring QFabric System Login Classes on page 422
- **remote-debug-permission on page 494**
- **request component login on page 542**

- *Junos OS Login Classes Overview*

Understanding Interfaces on the QFabric System

Supported Platforms QFabric System

This topic describes:

Four-Level Interface Naming Convention

When you configure an interface on the QFabric system, the interface name needs to follow a four-level naming convention that enables you to identify an interface as part of either a Node device or a Node group. Include the name of the network or server Node group at the beginning of the interface name.

The four-level interface naming convention is:
device-name:type-fpc/pic/port
where *device-name* is the name of the Node device or Node group. The remainder of the naming convention elements are the same as those in the QFX3500 switch interface naming convention.

An example of a four-level interface name is:
node2:xe-0/0/2

QSFP+ Interfaces

The QFX3500 Node device provides four 40-Gbps QSFP+ (quad small form-factor pluggable plus) interfaces (labeled **Q0** through **Q3**) for uplink connections between your Node device and your Interconnect devices.

The QFX3600 Node device provides 16 40-Gbps QSFP+ interfaces. By default, 4 interfaces (labeled **Q0** through **Q3**) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 12 interfaces (labeled **Q4** through **Q15**) use QSFP+ direct-attach copper (DAC) breakout cables or QSFP+ transceivers with fiber breakout cables to support 48 10-Gigabit Ethernet interfaces for connections to either endpoint systems (such as servers and storage devices) or external networks. Optionally, you can choose to configure the first eight interfaces (Q0 through Q7) for uplink connections between your Node device and your Interconnect devices, and interfaces Q2 through Q15 for 10-Gigabit Ethernet or 40-Gigabit Ethernet connections to either endpoint systems or external networks (see "Configuring the Port Type on QFX3600 Node Devices" on page 440). Table 4 on page 12 shows the port mappings for QFX3600 Node devices.

Table 10: QFX3600 Node Device Port Mappings

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
Q0	Not supported on this port	xle-0/1/0	fte-0/1/0
Q1	Not supported on this port	xle-0/1/1	fte-0/1/1
Q2	xe-0/0/8 xe-0/0/9 xe-0/0/10 xe-0/0/11	xle-0/1/2	fte-0/1/2

Table 10: QFX3600 Node Device Port Mappings *(continued)*

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
Q3	xe-0/0/12 xe-0/0/13 xe-0/0/14 xe-0/0/15	xle-0/1/3	fte-0/1/3
Q4	xe-0/0/16 xe-0/0/17 xe-0/0/18 xe-0/0/19	xle-0/1/4	fte-0/1/4
Q5	xe-0/0/20 xe-0/0/21 xe-0/0/22 xe-0/0/23	xle-0/1/5	fte-0/1/5
Q6	xe-0/0/24 xe-0/0/25 xe-0/0/26 xe-0/0/27	xle-0/1/6	fte-0/1/6
Q7	xe-0/0/28 xe-0/0/29 xe-0/0/30 xe-0/0/31	xle-0/1/7	fte-0/1/7
Q8	xe-0/0/32 xe-0/0/33 xe-0/0/34 xe-0/0/35	xle-0/1/8	Not supported on this port
Q9	xe-0/0/36 xe-0/0/37 xe-0/0/38 xe-0/0/39	xle-0/1/9	Not supported on this port

Table 10: QFX3600 Node Device Port Mappings *(continued)*

Port Number	10-Gigabit Ethernet Interfaces (On PIC 0)	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
Q10	xe-0/0/40 xe-0/0/41 xe-0/0/42 xe-0/0/43	xle-0/1/10	Not supported on this port
Q11	xe-0/0/44 xe-0/0/45 xe-0/0/46 xe-0/0/47	xle-0/1/11	Not supported on this port
Q12	xe-0/0/48 xe-0/0/49 xe-0/0/50 xe-0/0/51	xle-0/1/12	Not supported on this port
Q13	xe-0/0/52 xe-0/0/53 xe-0/0/54 xe-0/0/55	xle-0/1/13	Not supported on this port
Q14	xe-0/0/56 xe-0/0/57 xe-0/0/58 xe-0/0/59	xle-0/1/14	Not supported on this port
Q15	xe-0/0/60 xe-0/0/61 xe-0/0/62 xe-0/0/63	xle-0/1/15	Not supported on this port

The QFX5100-48S Node device provides 48 10-Gigabit Ethernet interfaces and 6 40-Gbps QSFP+ interfaces. By default, 4 interfaces (labeled **48** through **51**) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 2 interfaces (labeled **52** and **53**) support 40-Gigabit Ethernet connections to either endpoint systems (such as servers and storage devices) or external networks. Optionally, you can choose to configure the middle two interfaces (**50** and **51**) for 40-Gigabit Ethernet connections to either endpoint systems or external networks, and you can choose to configure the last two interfaces (**52** and **53**) for uplink connections between your Node device and your Interconnect devices (see "Configuring the QSFP+ Port Type on QFX5100 Devices" on page 445). Table 5 on page 15 shows the port mappings for QFX5100-48S Node devices.

Table 11: QFX5100-48S Node Device Port Mappings

Port Number	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
48	Not supported on this PIC	fte-0/1/0
49	Not supported on this PIC	fte-0/1/1
50	xle-0/1/2	fte-0/1/2
51	xle-0/1/3	fte-0/1/3
52	xle-0/1/4	fte-0/1/4
53	xle-0/1/5	fte-0/1/5

Link Aggregation

Link aggregation enables you to create link aggregation groups across Node devices within a network Node group or redundant server Node group. You can include up to eight Ethernet interfaces in a LAG. You can have up to 48 LAGs within a redundant server Node group, and 128 LAGs in a network Node group. To configure a LAG, include the **aggregated-devices** statement at the **[edit chassis node-group *node-group-name*]** hierarchy level and the **device-count** statement at the **[edit chassis node-group *node-group-name* aggregated-devices ethernet]** hierarchy level. Additionally, include any aggregated Ethernet options (**minimum-links** and **link-speed**) at the **[edit interfaces *interface-name* aggregated-ether-options]** hierarchy level and the **802.3ad** statement at the **[edit interfaces *interface-name* ether-options]** hierarchy level. To configure the Link Aggregation Control Protocol (LACP), include the **lacp** statement at the **[edit interfaces aggregated-ether-options]** hierarchy level.

Related Documentation

- Configuring the Port Type on QFX3600 Node Devices on page 440
- Configuring the QSFP+ Port Type on QFX5100 Devices on page 445

Understanding Layer 3 Features on the QFabric System

Supported Platforms QFabric System

The QFabric system supports the following Layer 3 features:

- Static routes, which enable you to manually configure and enter routes directly into the routing table.

- Routed VLAN Interfaces, which are a special type of Layer 3 virtual interface that enable you to forward packets between VLANs without using a router to connect the VLANs. Using this approach to connect VLANs reduces complexity and avoids the costs associated with purchasing, installing, managing, powering, and cooling another device.
- Routing protocols for routing traffic. The following routing protocols are supported on QFabric systems:
  - Border Gateway Protocol (BGP), which is an exterior gateway protocol (EGP) for routing traffic between autonomous systems (ASs).
  - Open Shortest Path First (OSPF) protocol, which is an interior gateway protocol (IGP) for routing traffic within an autonomous system (AS). QFabric systems support OSPFv1 and OSPFv2.

NOTE:
- When you configure routing protocols on the QFabric system, you must use interfaces from the Node devices assigned to the network Node group. If you try to configure routing protocols on interfaces from the Node devices assigned to server Node groups, the configuration commit operation fails.
- You can configure routing protocols by including statements at the **[edit protocols]** hierarchy level. If you want to isolate customer traffic on your network, you can configure virtual router routing instances at the **[edit routing-instances]** hierarchy level, and configure routing protocols for each virtual router routing instance by including statements at the **[edit routing-instances *routing-instance-name* protocols]** hierarchy level.

Related Documentation
- *Understanding Virtual Router Routing Instances*

Understanding Security Features on the QFabric System

Supported Platforms QFabric System

The QFabric system supports the following security features:

- Firewall filters provide rules that define whether to accept or discard packets that are transiting an interface. If a packet is accepted, you can configure additional actions to perform on the packet, such as class-of-service (CoS) marking (grouping similar types of traffic together and treating each type of traffic as a class with its own level of service priority) and traffic policing (controlling the maximum rate of traffic sent or received).
- Policing (rate-limiting) traffic allows you to control the maximum rate of traffic sent or received on an interface and to provide multiple priority levels or classes of service. You use policers to apply limits to traffic flow and set consequences for packets that exceed these limits—usually applying a higher loss priority—so that if packets encounter downstream congestion, they can be discarded first. Policers apply only to unicast packets.

- MAC limiting protects against flooding of the Ethernet switching table (also known as the MAC forwarding table or Layer 2 forwarding table). You enable this feature on Layer 2 interfaces (ports). MAC limiting sets a limit on the number of MAC addresses that can be learned on a single Layer 2 access interface or on all the Layer 2 access interfaces on the switch. Junos OS provides two MAC limiting methods:
  - Maximum number of MAC addresses—You configure the maximum number of dynamic MAC addresses allowed per interface. When the limit is exceeded, incoming packets with new MAC addresses can be ignored, dropped, or logged. You can also specify that the interface be shut down or temporarily disabled.
  - Allowed MAC—You configure specific “allowed” MAC addresses for the access interface. Any MAC address that is not in the list of configured addresses is not learned, and the switch logs an appropriate message. Allowed MAC binds MAC addresses to a VLAN so that the address does not get registered outside the VLAN. If an allowed MAC setting conflicts with a dynamic MAC setting, the allowed MAC setting takes precedence.
- Storm control causes a switch to monitor traffic levels and take a specified action when a specified traffic level—called the storm control level—is exceeded, thus preventing packets from proliferating and degrading service. You can configure switches to drop broadcast and unknown unicast packets, shut down interfaces, or temporarily disable interfaces when the storm control level is exceeded.

Related Documentation

- *Overview of Policers*
- *Overview of Firewall Filters*
- *Understanding MAC Limiting and MAC Move Limiting for Port Security*
- *Understanding Storm Control*

Understanding Port Mirroring

Supported Platforms EX4600, QFabric System, QFX Series standalone switches

Port Mirroring Overview

Port mirroring copies packets entering or exiting a port or entering a VLAN and sends the copies to a local interface for local monitoring or to a VLAN for remote monitoring. Use port mirroring to send traffic to applications that analyze traffic for purposes such as monitoring compliance, enforcing policies, detecting intrusions, monitoring and predicting traffic patterns, correlating events, and so on.

Port mirroring is needed for traffic analysis on a switch because a switch normally sends packets only to the port to which the destination device is connected. You configure port mirroring on the switch to send copies of unicast traffic to a local interface or a VLAN and run an analyzer application on a device connected to the interface or VLAN. You configure port mirroring by using the **analyzer** statement.

Keep performance in mind when configuring port mirroring. For example, If you mirror traffic from multiple ports, the mirrored traffic may exceed the capacity of the output interface. We recommend that you limit the amount of copied traffic by selecting specific interfaces instead of using the **all** keyword. You can also limit the amount of mirrored traffic by using a firewall filter to send specific traffic to a port mirroring instance. Mirroring only the necessary packets reduces the possibility of a performance impact.

You can use port mirroring to copy any of the following:

- All packets entering or exiting an interface (in any combination)—For example, you can send copies of the packets entering some interfaces and the packets exiting other interfaces to the same local interface or VLAN. If you configure port mirroring to copy packets exiting an interface, traffic that originates on that switch or Node device (in a QFabric system) is not copied when it egresses. Only switched traffic is copied on egress. (See the limitation on egress mirroring below.)
- All packets entering a VLAN—You cannot use port mirroring to copy packets exiting a VLAN.
- Firewall-filtered sample—Sample of packets entering a port or VLAN. Configure a firewall filter to select certain packets for mirroring.

NOTE: **Firewall filters are not supported on egress ports; therefore, you cannot specify policy-based sampling of packets exiting an interface.**

Port Mirroring Instance Types

To configure port mirroring, you configure an instance of one of the following types:

- Analyzer instance: You must specify the input and output for the instance. This instance type is useful for ensuring that all traffic transiting an interface or VLAN is mirrored and sent to the analyzer device.
- Port-mirroring instance: You do not specify an input for this instance type. Instead, you, create a firewall filter that specifies the required traffic and directs it to the mirror. This instance type is useful for controlling which types of traffic should be mirrored. When you use a port-mirroring instance, you can direct traffic to it in the following ways:
  - Specify the name of the port-mirroring instance in the firewall filter using the **port-mirror-instance** ***instance-name*** firewall action. You should use this approach if there are multiple port-mirroring instances defined.
  - Configure the filter to send the mirrored packets to the output interface defined in the instance using the **port-mirror** firewall action. You can use this approach if there is only one port-mirroring instance defined.

Port-Mirroring Terminology

Table 12 on page 68 lists the terms used in the documentation about port mirroring and provides definitions.

Table 12: Port Mirroring Terms and Definitions

Term	Description
Analyzer instance	Port-mirroring configuration that includes a name, source interfaces or source VLAN, and a destination for mirrored packets (either a local access interface or a VLAN).
Port mirroring instance	A port-mirroring configuration that does not specify an input.. A firewall filter must be used to send traffic to the port mirror. Use the action **port-mirror-instance** ***instance-name*** in the firewall filter configuration to send packets to the port mirror.
Output interface (also known as monitor interface)	Access interface to which packet copies are sent and to which a device running an analyzer application is connected. The following limitations apply to an output interface: • Cannot also be a source port. • Cannot be used for switching. • Cannot be an aggregated Ethernet interface (LAG). • Does not participate in Layer 2 protocols, such as Spanning Tree Protocol (STP). • Loses any existing VLAN associations when you configure it as an analyzer output interface. If the capacity of the output interface is insufficient to handle the traffic from the source ports, overflow packets are dropped.
Output VLAN (also known as monitor or analyzer VLAN)	VLAN to which copies are sent and to which a device running an analyzer application is connected. The analyzer VLAN can span multiple switches. The following limitations apply to an output VLAN: • Cannot be a private VLAN or VLAN range. • Cannot be shared by multiple **analyzer** statements. • An output VLAN interface cannot be a member of any other VLAN. • An output VLAN interface cannot be an aggregated Ethernet interface (LAG). • On the source (monitored) switch, only one interface can be a member of the analyzer VLAN.
Input interface (also known as mirrored or monitored interface)	Interface that provides traffic to be mirrored. This traffic can be entering or exiting the interface. (Ingress or egress traffic can be mirrored.) An input interface cannot also be an output interface for an analyzer.
Monitoring station	Computer running an analyzer application.
Local port mirroring	Port-mirroring configuration in which the mirrored packets are sent to an interface on the same switch.
Remote port mirroring	Flooding mirrored packets to an analyzer VLAN that you create to receive mirror traffic or sending the mirrored packets to a remote IP address. (You cannot send mirrored packets to a remote IP address on a QFabric system.)

Table 12: Port Mirroring Terms and Definitions *(continued)*

Policy-based mirroring	Mirroring of packets that match the match a firewall filter term. The action **analyzer** ***analyzer-name*** is used in the firewall filter to send the packets to the analyzer.

Port Mirroring and STP

The behavior of STP in a port-mirroring configuration depends on the version of Junos OS you are using:

- Junos OS 13.2X50, Junos OS 13.2X51-D25 or earlier, Junos OS 13.2X52: If you enable STP, port mirroring might not work because STP might block the mirrored packets.
- Junos OS 13.2X51-D30, Junos OS 14.1X53: STP is disabled for mirrored traffic. You must ensure that your topology prevents loops for this traffic.

Port Mirroring Constraints and Limitations

Supported Platforms EX4600, QFabric System, QFX Series standalone switches

- Local and Remote Port Mirroring on page 69
- Remote Port Mirroring Only on page 71

Local and Remote Port Mirroring

The following constraints and limitations apply to local and remote port mirroring:

- You can create a total of four port-mirroring configurations.
- You can create a total of four port-mirroring configurations on each Node group in a QFabric system, subject to the following constraints:
  - As many as four of the configurations can be for local port mirroring.
  - As many as three of the configurations can be for remote port mirroring.
- Regardless of whether you are configuring a standalone switch or a Node group, the following limits apply:
  - There can be no more than two configurations that mirror ingress traffic. (If you configure a firewall filter to send traffic to a port mirror—that is, you use the **analyzer** action modifier in a filter term—this counts as an ingress mirroring configuration for switch or Node group on which the filter is applied.)
  - There can be no more than two configurations that mirror egress traffic.

NOTE: On QFabric systems, there is no system-wide limit on the total number of mirror sessions.

- You can configure no more than one type of output in one port-mirroring configuration. That is, you can use no more than one of the following to complete a **set analyzer** ***name*** **output** statement:

  - **interface**
  - **ip-address**
  - **vlan**

- If you configure Junos OS to mirror egress packets, do not configure more than 2000 VLANs on a standalone switch or QFabric system. If you do so, some VLAN packets might contain incorrect VLAN IDs. This applies to any VLAN packets—not only the mirrored copies.
- The **ratio** and **loss-priority** options are not supported.
- Packets with physical layer errors are filtered out and are not sent to the output port or VLAN.
- If you use sFlow monitoring to sample traffic, it does not sample the mirror copies when they exit from the output interface.
- You cannot mirror packets exiting or entering the following ports:
  - Dedicated Virtual Chassis interfaces
  - Management interfaces (me0 or vme0)
  - Fibre Channel interfaces
  - Routed VLAN interfaces
- An aggregated Ethernet interface cannot be an output interface if the input is a VLAN or if traffic is sent to the analyzer by a firewall filter.
- Do not include an 802.1Q subinterface that has a unit number other than 0 in a port mirroring configuration. Port mirroring does not work with subinterfaces if their unit number is not 0. (You configure 802.1Q subinterfaces using the **vlan-tagging** statement.)
- When packet copies are sent out the output interface, they are not modified for any changes that are normally applied on egress, such as CoS rewriting.
- An interface can be the input interface for only one mirroring configuration. Do not use the same interface as the input interface for multiple mirroring configurations.
- CPU-generated packets (such as ARP, ICMP, BPDU, and LACP packets) cannot be mirrored on egress.
- VLAN-based mirroring is not supported for STP traffic.
- (QFabric systems only) If you configure a QFabric analyzer to mirror egress traffic and the input and output interfaces are on different Node devices, the mirrored copies have incorrect VLAN IDs. This limitation does not apply if you configure a QFabric analyzer to mirror egress traffic and the input and output interfaces are on the *same* Node device. In this case the mirrored copies have the correct VLAN IDs (as long as you do not configure more than 2000 VLANs on the QFabric system).

Remote Port Mirroring Only

The following constraints and limitations apply to remote port mirroring:

- If you configure an output IP address, the address cannot be in the same subnetwork as any of the switch's management interfaces.
- If you create virtual routing instances and also create an analyzer configuration that includes an output IP address, the output address belongs to the default virtual routing instance (inet.0 routing table).
- An output VLAN cannot be a private VLAN or VLAN range.
- An output VLAN cannot be shared by multiple **analyzer** statements.
- An output VLAN interface cannot be a member of any other VLAN.
- An output VLAN interface cannot be an aggregated Ethernet interface.
- On the source (monitored) switch, only one interface can be a member of the analyzer VLAN.

Related Documentation

- *Configuring Port Mirroring*
- *Example: Configuring Port Mirroring for Local Analysis*
- *Example: Configuring Port Mirroring for Remote Analysis*
- *Example: Configuring Port Mirroring for Local Analysis*
- *Example: Configuring Port Mirroring for Remote Analysis*
- *Troubleshooting Port Mirroring*

Understanding Fibre Channel Fabrics on the QFabric System

Supported Platforms QFabric System

A Fibre Channel (FC) fabric on a QFabric system is a construct that you configure on a QFX3500 Node device when the Node device is in FCoE-FC gateway mode. The FC fabric on a QFabric Node device is not the same as an FC fabric on a storage area network (SAN). The FC fabric on a QFabric Node device is local to that particular node device. We call the FC fabric on a QFabric Node device a *local FC fabric* to differentiate it from an FC fabric on the SAN.

NOTE: The QFX3600 Node device does not support FC or FCoE features.

A local FC fabric does not span Node devices and does not span the fabric Interconnect device. Local FC fabrics are entirely contained on a single Node device. A local FC fabric creates associations that connect FCoE devices that have converged network adapters (CNAs) on the Ethernet network to an FC switch or FCoE forwarder (FCF) on the FC network. A local FC fabric consists of:

- A unique fabric name.
- A unique fabric ID.
- One or more FCoE VLAN interfaces that include one or more 10-Gigabit Ethernet interfaces connected to FCoE devices. The FCoE VLANs transport traffic between the FCoE servers and the FCoE-FC gateway. Each FCoE VLAN must carry only FCoE traffic. You cannot mix FCoE traffic and standard Ethernet traffic on the same VLAN.

  The 10-Gigabit Ethernet interfaces that connect to FCoE devices must include a native VLAN to transport FIP traffic because FIP VLAN discovery and notification frames are exchanged as untagged packets.

  Each FCoE VLAN interface can present multiple VF_Port interfaces to the FCoE network.
- One or more native FC interfaces. The native FC interfaces transport traffic between the gateway and the FC switch or FCF.

TIP: **If the network does not use a dual-rail architecture for redundancy, configure more than one native FC interface for each local FC fabric to create redundant connections between the FCoE devices and the FC network. If one physical link goes down, any sessions it carried can log in again and connect to the FC network on a different interface.**

All of the FC and FCoE traffic that belongs to a local FC fabric on a Node device must enter and exit that Node device. This means that the FC switch or FCF and the FCoE devices in the Ethernet network must be connected to the same Node device. The interfaces that connect to the FC switch and the interfaces that connect to the FCoE devices must be included in the local FC fabric. You cannot configure a local FC fabric that spans more than one Node device.

Traffic flows from FC and FCoE devices that are not in the same local FC fabric remain separate and cannot communicate with each other through the FCoE-FC gateway.

NOTE: **The QFabric system enforces commit checks to ensure that local FC fabrics and FCoE VLANs on FCoE-FC gateways do not span more than one Node device.**

Related Documentation

- *Overview of Fibre Channel*
- *Understanding an FCoE-FC Gateway*
- *Understanding FCoE-FC Gateway Functions*
- *Understanding Interfaces on an FCoE-FC Gateway*

Understanding CoS Fabric Forwarding Class Sets

Supported Platforms QFabric System

Fabric forwarding class sets (fabric fc-sets) are similar to the fc-sets (priority groups) you configure on Node devices. The major differences are:

1. Fabric fc-sets group traffic for transport across the QFX3008-I or QFX3600-I Interconnect device (the fabric). Node device fc-sets group traffic on a Node device for transport across that Node device.
2. Fabric fc-sets are global. They apply to the entire fabric. Node device fc-sets apply only to the Node device on which they are configured.
3. You can configure class of service (CoS) scheduling for Node device fc-sets, but you cannot configure CoS for fabric fc-sets.
4. Fabric fc-sets map to Interconnect device fabric output queues statically—you cannot configure the mapping of fabric fc-sets to fabric output queues. All traffic in a fabric fc-set maps to the same output queue.

   Node device fc-sets include forwarding classes that map to Node device output queues, and you can configure the mapping of forwarding classes to output queues (or you can use the default mapping). Because output queues are mapped to forwarding classes, different classes of traffic in a Node device fc-set can be mapped to different output queues.

Node device fc-sets consist of forwarding classes containing traffic that requires similar CoS treatment. (Forwarding classes are default forwarding classes or user-defined forwarding classes.) You can configure CoS for each fc-set to determine how the traffic of its forwarding classes is scheduled on a Node device.

When traffic exits a Node device interface and enters an Interconnect device fabric interface, the Interconnect device uses the same forwarding classes to group traffic. The forwarding classes are mapped to global fabric fc-sets for transport across the fabric. Like fc-sets on a Node device, fabric fc-sets also contain traffic that requires similar CoS treatment. Unlike fc-sets on a Node device, you cannot configure CoS on fabric fc-sets.

Fabric fc-sets reside on the Interconnect device and are global to the QFabric system. Fabric fc-sets apply to all traffic that traverses the fabric. The mapping of forwarding classes to fabric fc-sets is global and applies to all forwarding classes with traffic that traverses the fabric from all connected Node devices. You can change the mapping of forwarding classes to fabric fc-sets. All mapping changes you make are global. For example, if you change the fabric fc-set to forwarding class mapping of the default best-effort forwarding class, then every Node device's best-effort forwarding class traffic that traverses the fabric is mapped to that fabric fc-set.

This topic describes:

- Default Fabric Forwarding Class Sets on page 74
- Fabric Forwarding Class Set Configuration and Implementation on page 77
- Fabric Forwarding Class Set Scheduling (CoS) on page 79
- Support for Flow Control and Lossless Transport Across the Fabric on page 81

Default Fabric Forwarding Class Sets

Interconnect devices have 12 default fabric fc-sets, including five visible default fabric fc-sets, four for unicast traffic and one for multidestination (multicast, broadcast, and destination lookup failure) traffic.

There are also seven hidden default fabric fc-sets. There are three hidden default fabric fc-sets for multidestination traffic that you can use if you want to map different multidestination forwarding classes to different multidestination fabric fc-sets. There are four hidden default fabric fc-sets for lossless traffic that you can use to map different lossless forwarding classes (priorities) to different lossless fabric fc-sets. Table 13 on page 74 shows the default fabric fc-sets:

Table 13: Default Fabric Forwarding Class Sets

Fabric Forwarding Class Set Name	Characteristics
fabric_fcset_be	Transports best-effort unicast traffic across the fabric.
fabric_fcset_strict_high	Transports unicast traffic that has been configured with **strict-high** priority and in the **network-control** forwarding class across the fabric. This fabric fc-set receives as much bandwidth across the fabric as it needs to service the traffic in the group up to the entire fabric interface bandwidth. For this reason, exercise caution when mapping traffic to this fabric fc-set to avoid starving other traffic.
fabric_fcset_noloss1	Transports unicast traffic in the default **fcoe** forwarding class across the fabric.
fabric_fcset_noloss2	Transports unicast traffic in the default **no-loss** forwarding class across the fabric.
fabric_fcset_noloss3	(Hidden) No traffic is assigned by default to this fabric fc-set. Unless traffic is mapped to this fabric fc-set, this fabric fc-set remains hidden. This fabric fc-set is valid only for lossless forwarding classes.
fabric_fcset_noloss4	(Hidden) No traffic is assigned by default to this fabric fc-set. Unless traffic is mapped to this fabric fc-set, this fabric fc-set remains hidden. This fabric fc-set is valid only for lossless forwarding classes.
fabric_fcset_noloss5	(Hidden) No traffic is assigned by default to this fabric fc-set. Unless traffic is mapped to this fabric fc-set, this fabric fc-set remains hidden. This fabric fc-set is valid only for lossless forwarding classes.

Table 13: Default Fabric Forwarding Class Sets *(continued)*

Fabric Forwarding Class Set Name	Characteristics
fabric_fcset_noloss6	(Hidden) No traffic is assigned by default to this fabric fc-set. Unless traffic is mapped to this fabric fc-set, this fabric fc-set remains hidden. This fabric fc-set is valid only for lossless forwarding classes.
fabric_fcset_multicast1	Transports multidestination traffic in the **mcast** forwarding class across the fabric. This fabric fc-set is valid only for multidestination forwarding classes.
fabric_fcset_multicast2	(Hidden) No traffic is assigned by default to this fabric fc-set. Unless traffic is mapped to this fabric fc-set, this fabric fc-set remains hidden. This fabric fc-set is valid only for multidestination forwarding classes.
fabric_fcset_multicast3	(Hidden) No traffic is assigned by default to this fabric fc-set. Unless traffic is mapped to this fabric fc-set, this fabric fc-set remains hidden. This fabric fc-set is valid only for multidestination forwarding classes.
fabric_fcset_multicast4	(Hidden) No traffic is assigned by default to this fabric fc-set. Unless traffic is mapped to this fabric fc-set, this fabric fc-set remains hidden. This fabric fc-set is valid only for multidestination forwarding classes.

The five default forwarding classes (**best-effort**, **fcoe**, **no-loss**, **network-control**, and **mcast**) are mapped to the fabric fc-sets by default as shown in Table 14 on page 75.

Table 14: Default Forwarding Class to Fabric Forwarding Class Set Mapping

Forwarding Class	Fabric Forwarding Class Set	Fabric Output Queue	Maximum MTU Supported for Lossless Operation
best-effort	fabric_fcset_be	0	NA
network-control	fabric_fcset_strict_high	7	NA
fcoe	fabric_fcset_noloss1	1	9K
no-loss	fabric_fcset_noloss2	2	9K
mcast	fabric_fcset_multicast1	8	NA
No forwarding classes are mapped by default to this hidden fabric fc-set.	fabric_fcset_noloss3	3	9k

Table 14: Default Forwarding Class to Fabric Forwarding Class Set Mapping *(continued)*

Forwarding Class	Fabric Forwarding Class Set	Fabric Output Queue	Maximum MTU Supported for Lossless Operation
No forwarding classes are mapped by default to this hidden fabric fc-set.	fabric_fcset_noloss4	4	9k
No forwarding classes are mapped by default to this hidden fabric fc-set.	fabric_fcset_noloss5	5	9k
No forwarding classes are mapped by default to this hidden fabric fc-set.	fabric_fcset_noloss6	6	9k
No forwarding classes are mapped by default to this hidden fabric fc-set.	fabric_fcset_multicast2	9	NA
No forwarding classes are mapped by default to this hidden fabric fc-set.	fabric_fcset_multicast3	10	NA
No forwarding classes are mapped by default to this hidden fabric fc-set.	fabric_fcset_multicast4	11	NA

The maximum fiber cable length between the QFabric system Node device and the QFabric system Interconnect device is 150 meters.

TIP: If you explicitly configure lossless forwarding classes, we recommend that you map each user-configured lossless forwarding class to an unused fabric fc-set (fabric_fcset_noloss3 through fabric_fcset_noloss6) on a one-to-one basis: one lossless forwarding class mapped to one lossless fabric fc-set.

The reason for one-to-one mapping is to avoid fate sharing of lossless flows. Because each fabric fc-set is mapped statically to an output queue, when you map more than one forwarding class to a fabric fc-set, all of the traffic in all of the forwarding classes that belong to the fabric fc-set uses the same output queue. If that output queue becomes congested due to congestion caused by one of the flows, the other flows are also affected. (They share fate because the flow that congests the output queue affects flows that are not experiencing congestion.)

However, it is important to understand that fabric_fcset_noloss1 and fabric_fcset_noloss2 have a scheduling weight of 35, while the other fabric fc-sets have a scheduling weight of 1. The scheduling weights mean that fabric_fcset_noloss1 and fabric_fcset_noloss2 receive most of the bandwidth available to lossless fabric fc-sets if the amount of traffic on fabric_fcset_noloss1 and fabric_fcset_noloss2 requires the bandwidth.

If you believe that the traffic on fabric_fcset_noloss1 and fabric_fcset_noloss2 will consume most of that bandwidth, then you should place all lossless traffic on fabric_fcset_noloss1 and fabric_fcset_noloss2. If you believe that the traffic on fabric_fcset_noloss1 and fabric_fcset_noloss2 will <emphasis>not</emphasis> consume most of that bandwidth, then you can map lossless forwarding classes in a one-to-one manner to lossless fabric fc-sets to avoid fate sharing.

If you want to map different multidestination forwarding classes to different multidestination fabric fc-sets, use one or more of the hidden multidestination fabric fc-sets.

NOTE: The global mapping of forwarding classes to fabric fc-sets is independent of the mapping of forwarding classes to Node device fc-sets. Global mapping of forwarding classes to fabric fc-sets occurs only on the Interconnect device. The Node device mapping of forwarding classes to fc-sets does not affect the global mapping of forwarding classes to fabric fc-sets on the Interconnect device, and vice versa.

When you define new forwarding classes on a Node device, you explicitly map those forwarding classes to Node device fc-sets. However, new (user-created) forwarding classes are mapped by default to fabric fc-sets. (You can override the default mapping if you want to configure the forwarding class to fabric fc-set mapping explicitly, as described in the next section.)

By default:

- All best-effort traffic forwarding classes that you create are mapped to the **fabric_fcset_be** fabric fc-set.
- All lossless traffic forwarding classes that you create are mapped to the **fabric_fcset_noloss1** or **fabric_fcset_noloss2** fabric fc-set.
- All multidestination traffic forwarding classes that you create are mapped to the **fabric_fcset_multicast1** fabric fc-set.
- All **strict-high** priority traffic and **network-control** forwarding classes that you create are mapped to the **fabric_fcset_strict_high** fabric fc-set.

Fabric Forwarding Class Set Configuration and Implementation

You can map forwarding classes to fabric fc-sets, but no other attributes of fabric fc-sets are user-configurable, including CoS. This section describes:

- Mapping Forwarding Classes to Fabric Forwarding Class Sets on page 78
- Fabric Forwarding Class Set Implementation on page 78

Mapping Forwarding Classes to Fabric Forwarding Class Sets

If you do not want to use the default mapping of forwarding classes to fabric fc-sets, you can map forwarding classes to fabric fc-sets the same way as you map forwarding classes to Node device fc-sets. To do this, use exactly the same statement that you use to map forwarding classes to fc-sets, but instead of specifying a Node device fc-set name, specify a fabric fc-set name.

NOTE: The global mapping of forwarding classes to fabric fc-sets does not affect the mapping of forwarding classes to Node device fc-sets. The global forwarding class mapping to fabric fc-sets pertains to the traffic only when it enters, traverses, and exits the fabric. The forwarding class mapping to fc-sets on a Node device is valid within that Node device.

Mapping forwarding classes to fabric fc-sets does not affect the scheduling configuration of the forwarding classes or fc-sets on Node devices. Fabric fc-set scheduling (which is not user-configurable) pertains to traffic only when it enters, traverses, and exits the Interconnect device fabric.

If you change the mapping of a forwarding class to a fabric fc-set, the new mapping is global and applies to all traffic in that forwarding class, regardless of which Node device forwards the traffic to the Interconnect device.

- To assign one or more forwarding classes to a fabric fc-set:

  ```
  [edit class-of-service]
  user@switch# set forwarding-class-sets fabric-forwarding-class-set-name class forwarding-class-name
  ```

  For example, to map a user-defined forwarding class named **best-effort-2** to the fabric fc-set **fabric_fcset_be**:

  ```
  [edit class-of-service]
  user@switch# set forwarding-class-sets fabric_fcset_be class best-effort-2
  ```

NOTE: Because fabric fc-set configuration is global, in this example all forwarding classes with the name **best-effort-2** on all of the Node devices attached to the fabric use the **fabric_fcset_be** fabric fc-set to transport traffic across the fabric.

Fabric Forwarding Class Set Implementation

The following rules apply to fabric fc-sets:

- You cannot create new fabric fc-sets. Only the twelve default fabric fc-sets are available.
- You cannot delete a default fabric fc-set.
- You cannot attach a fabric fc-set to a Node device interface. Fabric fc-sets are used only on the Interconnect device fabric, not on Node devices.

- You can map only multidestination forwarding classes to multidestination fabric fc-sets.
- You cannot map multidestination forwarding classes to unicast fabric fc-sets.
- You cannot map unicast forwarding classes to multidestination fabric fc-sets.
- You cannot configure CoS for fabric fc-sets. (However, default CoS scheduling properties are applied to traffic on the fabric, and the fabric interfaces use link layer flow control (LLFC) for flow control.)

Fabric Forwarding Class Set Scheduling (CoS)

Although fabric fc-set CoS is not user-configurable, CoS is applied to traffic on the fabric. (In addition, fabric interfaces use LLFC to ensure lossless transport for lossless traffic flows.) This section describes how the fabric applies CoS scheduling to traffic:

Class Groups for Fabric Forwarding Class Sets

To transport traffic across the fabric, the QFabric system organizes the fabric fc-sets into three classes called *class groups*. The three class groups are:

- **Strict-high priority**—All traffic in the fabric fc-set **fabric_fcset_strict_high**. This class group includes the traffic in **strict-high** priority and **network-control** forwarding classes and in any forwarding classes you create on a Node device that consist of **strict-high** priority or **network-control** forwarding class traffic.
- **Unicast**—All traffic in the fabric fc-sets **fabric_fcset_be**, **fabric_fcset_noloss1**, and **fabric_fcset_noloss2**. This class group includes the traffic in the **best-effort**, **fcoe**, and **no-loss** forwarding classes and in any forwarding classes you create on a Node device that consist of best-effort or lossless traffic. If you use any of the hidden no loss fabric fc-sets (**fabric_fcset_noloss3**, **fabric_fcset_noloss4**, **fabric_fcset_noloss5**, or **fabric_fcset_noloss6**), that traffic is part of this class group.
- **Multidestination**—All traffic in the fabric fc-set **fabric_fcset_multicast1**. This class group includes the traffic in the **mcast** forwarding class and in any forwarding classes you create on a Node device that consist of multidestination traffic. If you use any of the hidden multidestination fabric fc-sets (**fabric_fcset_multicast2**, **fabric_fcset_multicast3**, or **fabric_fcset_multicast4**), that traffic is also classified as part of this class group.

Class Group Scheduling

You cannot configure CoS for class groups or for fabric fc-sets (that is, you cannot attach a traffic control profile to a fabric fc-set—you attach traffic control profiles to Node device fc-sets to apply scheduling to the traffic that belongs to the Node device fc-set). By default, the fabric uses weighted round-robin (WRR) scheduling in which each class group receives a portion of the total available fabric bandwidth based on its type of traffic, as shown in Table 15 on page 80:

Table 15: Class Group Scheduling Properties and Membership

Class Group	Fabric fc-sets	Forwarding Classes (Default Mapping)	Class Group Scheduling Properties (Weight)
Strict-high priority	**fabric_fcset_strict_high**	• All **strict-high** priority forwarding classes • **network-control**	Traffic in the strict-high priority class group is served first. This class group receives all of the bandwidth it needs to empty its queues and therefore can starve other types of traffic during periods of high-volume strict-high priority traffic. Plan carefully and use caution when determining how much traffic to configure as strict-high priority traffic.
Unicast	• **fabric_fcset_be** • **fabric_fcset_noloss1** • **fabric_fcset_noloss2** Includes the hidden lossless fabric fc-sets if used: • **fabric_fcset_noloss3** • **fabric_fcset_noloss4** • **fabric_fcset_noloss5** • **fabric_fcset_noloss6**	• **best-effort** • **fcoe** • **no-loss** NOTE: No forwarding classes are mapped to the hidden lossless fabric_fcsets by default.	Traffic in the unicast class group receives an 80% weight in the WRR calculations. After the strict-high priority class group has been served, the unicast class group receives 80% of the remaining fabric bandwidth. (If more bandwidth is available, the unicast class group can use more bandwidth.)
Multidestination	**fabric_fcset_multicast1** Includes the hidden multidestination fabric fc-sets if used: • **fabric_fcset_multicast2** • **fabric_fcset_multicast3** • **fabric_fcset_multicast4**	• **mcast** NOTE: No forwarding classes are mapped to the hidden multidestination fabric_fcsets by default.	Traffic in the multidestination class group receives a 20% weight in the WRR calculations. After the strict-high priority class group has been served, the multidestination class group receives 20% of the remaining fabric bandwidth. (If more bandwidth is available, the multidestination class group can use more bandwidth.)

The fabric fc-sets within each class group are weighted equally and receive bandwidth using round-robin scheduling. For example:

- If the unicast class group has three member fabric fc-sets, **fabric_fcset_be**, **fabric_fcset_noloss1**, and **fabric_fcset_noloss2**, then each of the three fabric fc-sets receives one-third of the bandwidth available to the unicast class group.
- If the multidestination class group has one member fc-set, **fabric_fcset_multicast1**, then that fc-set receives all of the bandwidth available to the multidestination class group.
- If the multidestination class group has two member fc-sets, **fabric_fcset_multicast1** and **fabric_fcset_multicast2**, then each of the two fabric fc-sets receives one-half of the bandwidth available to the multidestination class group.

QFabric System CoS

When traffic enters and exits the same Node device, CoS works the same as it works on a standalone switch.

However, when traffic enters a Node device, crosses the Interconnect device, and then exits a different Node device, CoS is applied differently:

1. Traffic entering the ingress Node device receives the CoS configured at the Node ingress (packet classification, congestion notification profile for PFC).
2. When traffic goes from the ingress Node device to the Interconnect device, the fabric fc-set CoS is applied as described in the discussion of fabric forwarding class set scheduling.
3. When traffic goes from the Interconnect device to the egress Node device, the egress Node device applies CoS at the egress port (egress queue scheduling, WRED, IEEE 802.1p or DSCP code-point rewrite).

Support for Flow Control and Lossless Transport Across the Fabric

The Interconnect device incorporates flow control mechanisms to support lossless transport during periods of congestion on the fabric. To support the priority-based flow control (PFC) feature on the Node devices, the fabric interfaces use LLFC to support lossless transport for up to six IEEE 802.1p priorities when the following two configuration constraints are met:

1. The IEEE 802.1p priority used for the traffic that requires lossless transport is mapped to a lossless forwarding class on the Node devices.
2. The lossless forwarding class must be mapped to a lossless fabric fc-set on the Interconnect device (**fabric_fcset_noloss1**, **fabric_fcset_noloss2**, **fabric_fcset_noloss3**, **fabric_fcset_noloss4**, **fabric_fcset_noloss5**, or **fabric_fcset_noloss6**).

When traffic meets the two configuration constraints, the fabric propagates the back pressure from the egress Node device across the fabric to the ingress Node device during periods of congestion. However, to achieve end-to-end lossless transport across the switch, you must also configure a congestion notification profile to enable PFC on the Node device ingress ports.

For all other combinations of IEEE 802.1p priority to forwarding class mapping and all other combinations of forwarding class to fabric fc-set mapping, the congestion control mechanism is normal packet drop. For example:

- **Case 1**—If the IEEE 802.1p priority **5** is mapped to the lossless **fcoe** forwarding class, and the **fcoe** forwarding class is mapped to the **fabric_fcset_noloss1** fabric fc-set, then the congestion control mechanism is PFC.
- **Case 2**—If the IEEE 802.1p priority **5** is mapped to the lossless **fcoe** forwarding class, and the **fcoe** forwarding class is mapped to the **fabric_fcset_be** fabric fc-set, then the congestion control mechanism is packet drop.

- **Case 3**—If the IEEE 802.1p priority **5** is mapped to the lossless **no-loss** forwarding class, and the **no-loss** forwarding class is mapped to the **fabric_fcset_noloss2** fabric fc-set, then the congestion control mechanism is PFC.
- **Case 4**—If the IEEE 802.1p priority **5** is mapped to the lossless **no-loss** forwarding class, and the **no-loss** forwarding class is mapped to the **fabric_fcset_be** fabric fc-set, then the congestion control mechanism is packet drop.
- **Case 5**—If the IEEE 802.1p priority **5** is mapped to the **best-effort** forwarding class, and the **best-effort** forwarding class is mapped to the **fabric_fcset_be** fabric fc-set, then the congestion control mechanism is packet drop.
- **Case 6**—If the IEEE 802.1p priority **5** is mapped to the **best-effort** forwarding class, and the **best-effort** forwarding class is mapped to the **fabric_fcset_noloss1** fabric fc-set, then the congestion control mechanism is packet drop.

NOTE: Lossless transport across the fabric also must meet the following two conditions:

1. The maximum cable length between the Node device and the Interconnect device is a 150 meters of fiber cable.
2. The maximum frame size is 9216 bytes.

If the MTU is 9216 KB, in some cases the QFabric system supports only five lossless forwarding classes instead of six lossless forwarding classes because of headroom buffer limitations.

The number of IEEE 802.1p priorities (forwarding classes) the QFabric system can support for lossless transport across the Interconnect device fabric depends on several factors:

- Approximate fiber cable length—The longer the fiber cable that connects Node device fabric (FTE) ports to the Interconnect device fabric ports, the more data the connected ports need to buffer when a pause is asserted. (The longer the fiber cable, the more frames are traversing the cable when a pause is asserted. Each port must be able to store all of the “in transit” frames in the buffer to preserve lossless behavior and avoid dropping frames.)
- MTU size—The larger the maximum frame sizes the buffer must hold, the fewer frames the buffer can hold. The larger the MTU size, the more buffer space each frame consumes.
- Total number of Node device fabric ports connected to the Interconnect device—The higher the number of connected fabric ports, the more headroom buffer space the Node device needs on those fabric ports to support the lossless flows that traverse the Interconnect device. Because more buffer space is used on the Node device fabric ports, less buffer space is available for the Node device access ports, and a lower total number of lossless flows are supported.

The QFabric system supports six lossless priorities (forwarding classes) under most conditions. The priority group headroom that remains after allocating headroom to lossless flows is sufficient to support best-effort and multidestination traffic.

Table 16 on page 83 shows how many lossless priorities the QFabric system supports under different conditions (fiber cable lengths and MTUs) in cases when the QFabric system supports fewer than six lossless priorities. The number of lossless priorities is the same regardless of how many Node device FTE ports are connected to the Interconnect device. However, the higher the number of FTE ports connected to the Interconnect device, the lower the number of total lossless flows supported. In all cases that are not shown in Table 16 on page 83, the QFabric system supports six lossless priorities.

NOTE: The system does not perform a configuration commit check that compares available system resources with the number of lossless forwarding classes configured. If you commit a configuration with more lossless forwarding classes than the system resources can support, frames in lossless forwarding classes might be dropped.

Table 16: Lossless Priority (Forwarding Class) Support for Node Devices When Fewer than Six Lossless Priorities Are Supported

MTU in Bytes	Fiber Cable Length in Meters (Approximate)	Maximum Number of Lossless Priorities (Forwarding Classes) on the Node Device
9216 (9K)	100	5
9216 (9K)	150	5

NOTE: The total number of lossless flows decreases as resource consumption increases. For a Node device, the higher the number of FTE ports connected to the Interconnect device, the larger the MTU, and the longer the fiber cable length, the fewer total lossless flows the QFabric system can support.

Viewing Fabric Forwarding Class Set Information

You can display information about fabric fc-sets using the same CLI command you use to display information about Node device fc-sets:

```
user@switch> show class-of-service forwarding-class-set
Forwarding class set: fabric_fcset_be, Type: fabric-type, Forwarding class set
index: 1
  Forwarding class                       Index
  best-effort                              0

Forwarding class set: fabric_fcset_mcast1, Type: fabric-type, Forwarding class
set index: 5
  Forwarding class                       Index
  mcast                                    8
```



```
Forwarding class set: fabric_fcset_mcast2, Type: fabric-type, Forwarding class
set index: 6

Forwarding class set: fabric_fcset_mcast3, Type: fabric-type, Forwarding class
set index: 7

Forwarding class set: fabric_fcset_mcast4, Type: fabric-type, Forwarding class
set index: 8

Forwarding class set: fabric_fcset_noloss1, Type: fabric-type, Forwarding class
set index: 2
  Forwarding class                       Index
  fcoe                                     1

Forwarding class set: fabric_fcset_noloss2, Type: fabric-type, Forwarding class
set index: 3
  Forwarding class                       Index
  no-loss                                  2

Forwarding class set: fabric_fcset_noloss3, Type: fabric-type, Forwarding class
set index: 9

Forwarding class set: fabric_fcset_noloss4, Type: fabric-type, Forwarding class
set index: 10

Forwarding class set: fabric_fcset_noloss5, Type: fabric-type, Forwarding class
set index: 11

Forwarding class set: fabric_fcset_noloss6, Type: fabric-type, Forwarding class
set index: 12

Forwarding class set: fabric_fcset_strict_high, Type: fabric-type, Forwarding
class set index: 4
  Forwarding class                       Index
  network-control                          3
```

Table 17 on page 84 describes the meaning of the **show class-of-service forwarding-class-set** output fields when you display fabric fc-set information.

Table 17: show class-of-service forwarding-class-set Command Output Fields

Field Name	Field Description
Forwarding class set	Name of the fabric forwarding class set.
Type	Type of forwarding class set: • Fabric-type—Fabric fc-set • Normal-type—Node device fc-set
Forwarding class set index	Index of this forwarding class set.
Forwarding class	Name of a forwarding class.
Index	Index of the forwarding class.

Summary of Fabric Forwarding Class Set and Node Device Forwarding Class Set Differences

Table 18 on page 85 summarizes the differences between fabric fc-sets and Node device fc-sets:

Table 18: Summary of Differences Between Fabric fc-sets and Node Device fc-sets

Characteristic	Fabric fc-set	Node device fc-set
Location	QFX3008-I or QFX3600-I Interconnect device (the fabric).	QFabric system Node device.
Global or Node-device specific	Global, valid for the entire fabric.	Local to the Node device on which the fc-set is configured.
Ability to create (define) a new fc-set	No. Use the 12 default fabric fc-sets provided.	Yes.
Ability to configure CoS	Default CoS settings only. CoS is not user-configurable.	User-configurable using traffic control profiles.
Ability to map forwarding classes to an fc-set	Yes. Mapping is global and applies to all forwarding classes across Interconnect device fabric (traffic from all connected Node devices).	Yes. Mapping is local to a Node device and applies only to the forwarding classes on the Node device.

Related Documentation

- *Understanding CoS Forwarding Class Sets (Priority Groups)*
- *Understanding CoS Scheduling on QFabric System Node Device Fabric (fte) Ports*
- *Understanding Default CoS Scheduling on QFabric System Interconnect Devices (Junos OS Release 13.1 and Later Releases)*
- *Defining CoS Forwarding Class Sets*
- *Example: Configuring Forwarding Class Sets*
- *show class-of-service forwarding-class-set*

CHAPTER 5

Licenses

Junos OS Feature Licenses

Supported Platforms ACX Series, EX Series, J Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, SRX Series, T Series

Some Junos OS software features require a license to activate the feature. To enable a licensed feature, you need to purchase, install, manage, and verify a license key that corresponds to each licensed feature. To conform to Junos OS feature licensing requirements, you must purchase one license per feature per device. The presence of the appropriate software license key on your device determines whether you are eligible to configure and use the licensed feature.

To speed deployment of licensed features, Junos OS software implements an honor-based licensing structure and provides you with a 30-day grace period to use a licensed feature without a license key installed. The grace period begins when you configure the feature and your device uses the licensed feature for the first time, but not necessarily when you install the license. After the grace period expires, the system generates system log messages saying that the feature requires a license. To clear the error message and use the licensed feature properly, you must install and verify the required license.

For information about how to purchase software licenses, contact your Juniper Networks sales representative.

Related Documentation

- *License Enforcement*
- Junos OS Feature License Keys on page 89
- *Software Feature Licenses*
- Verifying Junos OS License Installation on page 464

Software Features That Require Licenses on the QFX Series

Supported Platforms QFabric System, QFX Series standalone switches

NOTE: If you try to configure a feature that is not licensed, you will receive syslog messages saying that you are using a feature that is licensable and that you do not possess a license for the feature. If you try to commit configuration changes for a feature that is not licensed, you will receive a commit warning saying that you have exceeded the allowed license limit for the feature.

NOTE: There is no separate license for Virtual Chassis like there is for Virtual Chassis Fabric.

Table 19 on page 88 lists the licenses you can purchase for each QFX Series software feature.

For information about how to purchase a software license, contact your Juniper Networks sales representative.

Table 19: Junos OS Feature Licenses and Model Numbers for QFX Series Devices

Licensed Software Feature	Supported Devices	Number of Licenses Required	Model Number
QFX Series advanced feature license for Border Gateway Protocol (BGP), Intermediate System-to-Intermediate System (IS-IS), Multi-protocol Label Switching (MPLS), and Virtual Extensible Local Area Network (VXLAN), and Open vSwitch Database (OVSDB)	QFX3500, QFX3600, QFX5100-48S, and QFX5100-48T switches	One per switch, two per Virtual Chassis, and two per Virtual Chassis Fabric	QFX-JSL-EDGE-ADV1
QFX Series advanced feature license for Border Gateway Protocol (BGP), Intermediate System-to-Intermediate System (IS-IS), Multi-protocol Label Switching (MPLS), and Virtual Extensible Local Area Network (VXLAN) and Open vSwitch Database (OVSDB)	QFX5100-24Q and QFX5100-96S switches	One per switch, two per Virtual Chassis, and two per Virtual Chassis Fabric	QFX5100-HDNSE-LIC
QFX Series advanced feature license for Border Gateway Protocol (BGP)	QFX3100 Director device	One per Node device in a network Node group	QFX-JSL-DRCTR-ADV1
QFX Series advanced feature license for Fibre Channel	QFX3500 switch	One per switch on which fibre channel ports are configured	QFX-JSL-EDGE-FC

Table 19: Junos OS Feature Licenses and Model Numbers for QFX Series Devices *(continued)*

Licensed Software Feature	Supported Devices	Number of Licenses Required	Model Number
QFX Series advanced feature license for Fibre Channel	QFX3100 Director device	One per QFX3500 Node device on which fibre channel ports are configured	QFX-JSL-DRCTR-FC
QFX Series advanced feature license for Fibre Channel - Capacity 16	QFX3100 Director device	One for up to 16 QFX3500 Node devices on which fibre channel ports are configured	QFX-JSL-DRCTR-FC-C16
QFX Series feature license for enabling fabric mode	QFX3500 and QFX3600 device	One per device	QFX3000-JSL-EDGE-FAB
QFX Series feature license for base software for QFX3000-G QFabric system	QFX3100 Director device	One per QFX3000-G QFabric system	QFX3008-JSL-DRCTR-FAB
QFX Series feature license for base software for QFX3000-M QFabric system	QFX3100 Director device	One per QFX3000-M QFabric system	QFX3000M-JSL-DRCTR-FAB
Virtual Chassis Fabric (VCF)	All member devices in a Virtual Chassis Fabric (VCF)	Two per Virtual Chassis Fabric (VCF)	QFX-VCF-LIC

Related Documentation

- Junos OS Feature Licenses on page 87
- Junos OS Feature License Keys on page 89
- *Generating License Keys*
- Generating the License Keys for a QFabric System on page 459
- Adding New Licenses (CLI Procedure) on page 461
- Deleting a License (CLI Procedure) on page 462
- Saving License Keys on page 463
- Verifying Junos OS License Installation on page 464

Junos OS Feature License Keys

Supported Platforms EX Series, J Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, SRX Series, T Series

Some Junos OS software features require a license to be activated. To enable each licensed feature, you must purchase, install, manage, and verify a license key that corresponds to the licensed feature.

Release-Tied License Keys and Upgrade Licenses on MX Series Routers

The Junos OS licensing infrastructure currently associates a license feature with attributes such as date, platform, and validity. In addition to these attributes, for MX Series routers running Junos OS Release 12.2 and later, a licensed feature can be associated with a release number at the time of generating the license key. This type of release-tied license key is used to validate a particular licensed feature while attempting a software upgrade. The upgrade process aborts if the release number in the license key is earlier than the Junos OS release number to which the system is being upgraded.

Additionally, an upgrade license key can be generated for a release-tied licensed feature. An upgrade license key is used for carrying forward a capacity license to the upgrade release. Although an upgrade license might be an acceptable license on the current release, it does not add to the existing capacity limit. The capacity added in the upgrade license key is valid for the upgrade software release only.

The release number embedded in the license key indicates the maximum release number up to which Junos OS can be upgraded.

As an example, assume that your system is running Junos OS Release 12.2 and is using the **scale-subscriber** licensed feature with a later release-tied upgrade license key installed. If you request a software upgrade to the later release of Junos OS, the software upgrade operation fails and the following error message is displayed:

```
mgd: error: No valid upgrade license found for feature 'scale-subscriber'.
Aborting Software upgrade.
Validation failed
```

In this example, to successfully upgrade to the later release of Junos OS, the release number included in the upgrade license key should be greater than or equal to the later release number. Also, you can perform software upgrades up to the previous release without any additional license keys to retain the existing scale limit.

NOTE:

When you install a release-tied license, the following apply:

- You can purchase an upgrade capacity license only if a base capacity license for the same scale-tier has already been generated or purchased.
- You cannot install an upgrade license if the capacity does not match any of the existing base capacity licenses on the system.
- The license installation fails when you install a lower release number license key on a higher software release number.
- A release-tied license can be installed on a Junos OS release number that is lower than or equal to the release number included in the license key. For example, a 12.2 license key is valid on Junos OS Release 12.1.
- An upgrade license is valid only on the target release number specified in the license key, but can be installed on an earlier Junos OS release. For example, a 4 K scale-tier upgrade license for Junos OS Release 12.2 can be installed on an earlier release, and the installed count of licenses remains unaltered.
- Release-tied licenses of the previous release are not deleted on upgrading Junos OS to a newer release version.

Licensable Ports on MX5, MX10, and MX40 Routers

Starting with Junos OS Release 12.2, license keys are available to enhance the port capacity on MX5, MX10, and MX40 routers up to the port capacity of an MX80 router. The MX5, MX10, and MX40 routers are derived from the modular MX80 chassis with similar slot and port assignments, and provide all functionality available on an MX80 router, but at a lower capacity. Restricting port capacity is achieved by making a set of MIC slots and ports licensable. MICs without a license are locked, and are unlocked or made usable by installing appropriate upgrade licenses.

The base capacity of a router is identified by the Ideeprom assembly ID (I2C ID), which defines the board type. However, the Junos OS licensing infrastructure allows the use of restricted ports without a license for a grace period of 30 days. After the grace period expires, the router reverts back to the base capacity if no upgrade license is purchased and installed for the locked ports. The I2C ID along with an upgrade license determine the final capacity of an MX5, MX10, or MX40 router.

The MX5, MX10, MX40, and MX80 routers support the following types of MICs:

- A built-in 10-Gigabit Ethernet MIC with four 10-Gigabit Ethernet ports
- Two front-pluggable MICs

A feature ID is assigned to every license upgrade for enhancing port capacity. Table 20 on page 92 displays the chassis types and their associated port capacity, I2C ID, base capacity, feature ID, feature name, and the final capacity after a license upgrade.

Table 20: Upgrade Licenses for Enhancing Port Capacity

Chassis Type	Port Capacity	I2C ID	Base Capacity	Feature ID and Feature Name	Upgrade Capacity
MX5	20G	0x556	Slot 1 • 1/MIC0	f1—MX5 to MX10 upgrade	Slot 1 and 2 • 1/MIC0 • 1/MIC1
MX10	40G	0x555	Slot 1 and 2 • 1/MIC0 • 1/MIC1	f2—MX10 to MX40 upgrade	Slot 2 and first 2 ports on Slot 0 • 1/MIC1 • First 2 ports on 0/MIC0
MX40	60G	0x554	Slot 1, SLot 2 and first 2 ports on Slot 0 • 1/MIC0 • 1/MIC1 • First 2 ports on 0/MIC0	f3—MX40 to MX80 upgrade	Slot 2 and all ports on Slot 0 • 1/MIC1 • All 4 ports on 0/MIC0

When installing an upgrade license for enhancing port capacity on MX5, MX10 and MX40 routers, consider the following:

- To upgrade an MX5 router to MX80 router capacity, licenses for all three features (f1, f2, f3) must be installed. All three features can be provided in a single license key.
- To upgrade an MX10 router to MX40 router capacity, installing a license key with f2 feature is sufficient.
- Non-applicable feature IDs in a license key reject the upgrade license. For example:
  - An f1 feature ID on an MX10 upgrade license key rejects the license.
  - Feature IDs f1 and f2 on an MX40 upgrade license key reject the entire license.

Related Documentation

- Junos OS Feature Licenses on page 87
- *License Enforcement*
- *Software Feature Licenses*
- Verifying Junos OS License Installation on page 464

PART 2

Installation

CHAPTER 6

Before You Begin

QFX3000-G QFabric System Installation Overview

Supported Platforms QFX3000-G

A QFX3000-G QFabric system is formed by interconnecting QFX3500, QFX3600, and QFX5100 Node devices, QFX3008-I Interconnect devices, and QFX3100 Director devices. Two Virtual Chassis, composed of four EX4200 switches each, are used to interconnect the control plane and management network. For more information about the role of each device in the QFX3000-G QFabric system see "Understanding QFX3000-G QFabric System Hardware Configurations" on page 97.

Before you begin to install the QFX3000-G QFabric system:

- Read *General Safety Guidelines and Warnings*, with particular attention to *Chassis Lifting Guidelines for a QFX3008-I Interconnect Device*.
- Review "Planning a QFX3000-G QFabric System Deployment" on page 99 and the topics it references. The installation should not begin until you have completed the site preparation checklists for each device type:

- *Site Preparation Checklist for a QFX3100 Director Device*
- *Site Preparation Checklist for a QFX3008-I Interconnect Device*
- *Site Preparation Checklist for a QFX5100 Device*
- *Site Preparation Checklist for a QFX3600 or QFX3600-I Device*
- *Site Preparation Checklist for a QFX3500 Device*
- *Site Preparation Checklist for EX4200 Switches*

To install a QFX3000-G QFabric system:

1. Install all the devices in their permanent location, connect the devices to earth ground, and connect power to the devices. See:
   - Installing and Connecting a QFX3100 Director Device on page 173
   - Installing and Connecting a QFX3008-I Interconnect Device on page 185
   - Installing and Connecting a QFX5100 Device on page 257
   - Installing and Connecting a QFX3600 or QFX3600-I Device on page 223
   - Installing and Connecting a QFX3500 Device on page 241
   - *Installing and Connecting an EX4200 Switch*
2. Ensure that each Node device is set to Node device mode. By default, the devices work as standalone switches. You perform this step using the console (**CON**) port on each Node device. Leave the Node devices powered on. See "Converting the Device Mode for a QFabric System Component" on page 329.
3. Cable two Virtual Chassis of four EX4200 switches each. See *Understanding Virtual Chassis Hardware Configuration on an EX4200 Switch* and *Virtual Chassis Cabling Configuration Examples for EX4200 Switches*.
4. Interconnect the two Virtual Chassis using the 10-Gigabit Ethernet SFP+ uplink ports. These ports will later be configured in a LAG. See "Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy" on page 275.
5. Interconnect the two QFX3100 Director devices for control plane redundancy. See "Connecting QFX3100 Director Devices in a Director Group" on page 278.
6. Connect each QFX Series device to each Virtual Chassis for control plane interconnection. See:
   - Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 280
   - Connecting a QFX3008-I Interconnect Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 283
   - Connecting a QFX5100 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 291

- Connecting a QFX3600 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 286
- Connecting a QFX3500 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 288

7. Connect each Node device to each QFX3008-I Interconnect Device for data plane interconnection. See:
   - Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 321
   - Connecting a QFX3600 Node Device to a QFX3008-I Interconnect Device on page 319
   - Connecting a QFX5100 Node Device to a QFX3008-I Interconnect Device on page 322
8. Configure each Virtual Chassis using the recommended configuration described in "Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane" on page 336. Leave the Virtual Chassis powered on.
9. Power on each QFX3008-I Interconnect device. See "Powering On a QFX3008-I Interconnect Device" on page 221.
10. Power on the QFX3100 Director devices and complete the initial configuration for the QFX3000-G QFabric system described in "Performing the QFabric System Initial Setup on a QFX3100 Director Group" on page 411.

Related Documentation

- QFabric System Initial and Default Configuration Information on page 327

Understanding QFX3000-G QFabric System Hardware Configurations

Supported Platforms QFX3000-G

The QFX3000-G QFabric system is made up of multiple hardware components:

- EX4200 switches—Eight EX4200 switches are required for a QFX3000-G QFabric system. The EX4200 switches are divided into two Virtual Chassis configurations with four switches each.
  - Up to 192 Gigabit Ethernet RJ-45 ports on each Virtual Chassis provide control plane and management network interconnection.
  - Four 10-Gigabit Ethernet uplink ports on each Virtual Chassis interconnect the two Virtual Chassis configurations.
- QFX3100 Director devices—Two QFX3100 Director devices are required for a QFX3000-G QFabric system. Together, the two Director devices are called a *Director group*.
  - Six Gigabit Ethernet RJ-45 or six small-form factor pluggable (SFP) ports on each QFX3100 Director device provide connection to the control plane and management network through the Virtual Chassis.
  - Two Gigabit Ethernet RJ-45 or two SFP ports on each QFX3100 Director device interconnect two Director devices in a Director group.

  - One Gigabit Ethernet RJ-45 management port on each QFX3100 Director device provides connection to the management network through your out-of-band manageFment network.

- QFX3500 , QFX3600, and QFX5100 Node devices—Up to 128 Node devices can be connected to the QFX3000-G QFabric system.

  - NOTE: Up to eight Node devices can be configured as a *network Node group* to connect to external networks. See “Understanding Node Groups” on page 30.

  - Four 40-Gbps quad small form-factor pluggable plus (QSFP+) uplink ports on each QFX3500 or QFX5100 Node device connect to the data plane network through the QFX3008-I Interconnect devices.

  - Two to eight 40-Gbps QSFP+ uplink ports on each QFX3600 or QFX5100 Node device connect to the data plane network through the QFX3008-I Interconnect devices.

    NOTE: On QFX3600 the four QSFP+ ports (Q0 through Q3 are configured as uplink ports by default.

  - Two Gigabit Ethernet RJ-45 or two SFP ports on each Node device provide connection to the control plane and management network through the Virtual Chassis.

    NOTE: All models of the QFX5100 have at least one RJ-45 port C0 and an SFP cage (C1). Some QFX5100 SKUs an additional SFP cage. The SFP cages can be configured for either 1 GbE copper or fiber SFP transceivers. For details on the number of management ports on QFX5100 SKUs, see *QFX5100 Device Models*.

- QFX3008-I Interconnect devices—Two QFX3008-I Interconnect devices are required for a QFX3000-G QFabric system. Up to four QFX3008-I Interconnect devices can be used in a QFX3000-G QFabric sysem.

  - Up to 128 40-Gbps QSFP+ ports on each QFX3008-I Interconnect device connect the QFX3500 and QFX3600 Node devices to the data plane network across fiber-optic cables and a high-speed backplane.

  - Up to eight Gigabit Ethernet SFP+ interfaces (four per Control Board) connect each QFX3008-I Interconnect device to the control plane and management network through the Virtual Chassis.

Related Documentation

- QFX3000-G QFabric System Installation Overview on page 95

Planning a QFX3000-G QFabric System Deployment

Supported Platforms QFX3000-G

A QFX3000-G QFabric system is formed by interconnecting QFX3500, QFX3600, or QFX5100 Node devices, QFX3008-I Interconnect devices, and QFX3100 Director devices. Two Virtual Chassis, composed of four EX4200 switches each, are used to interconnect the control plane and management network.

Before installing a QFabric system, you must consider the following factors:

- The number of devices in the QFabric system and location—You can interconnect up to 128 Node devices and 4 QFX3008-I Interconnect Devices; each QFabric system must have 2 QFX3100 Director devices operating in a Director group.
  - The number of Node devices you require depends on the following factors:
    - The number of access ports you need for connections to either endpoint systems (such as servers and storage devices) or external networks.
    - The oversubscription ratio you need on the access ports.
    - The number of access ports supported on each Node device based on that oversubscription ratio.

  Table 21 on page 99 shows the number of 10-Gigabit Ethernet access ports supported on Node devices based on the oversubscription ratio you need on the access ports.

Table 21: Number of 10-Gigabit Ethernet Access Ports Supported on Node Devices Based on Oversubscription Ratio

Oversubscription Ratio on Access Ports	Number of 10-Gigabit Ethernet Access Ports Supported on a QFX3500 Node Device	Number of 10-Gigabit Ethernet Access Ports Supported on a QFX3600 Node Device	Number of 10-Gigabit Ethernet Access Ports Supported on a QFX5100-48S Node Device
1:1 (no oversubscription)	1:1 oversubscription is not supported	32	1:1 oversubscription is not supported
3:1	48	48	48 NOTE: Channelization of the downlink 40-Gigabit Ethernet (xle) interfaces is not supported.
3.5:1	3.5:1 oversubscription is not supported	3.5:1 oversubscription is not supported	54
6:1	48	48	54

To calculate the required number of Node devices (N_n) for your QFabric system, divide the number of access ports you need for connections to either endpoint systems or external networks (N_p) by the number of access ports supported on each Node device (N_a) based on the required oversubscription ratio, and round up the resulting value. For example, if you need 300 10-Gigabit Ethernet access ports at 3:1 oversubscription, and your Node device supports 48 10-Gigabit Ethernet access ports at 3:1 oversubscription, you require 7 Node devices as shown below:

$N_n = N_p/N_a$

$N_n = 300/48$

$N_n = 6.25$ (rounded up to 7)

- The number of Interconnect devices you require depends on the number of Node devices and the oversubscription ratio required on the access ports of the Node devices. See Table 22 on page 100 to determine the number of Interconnect devices you require. For example, if you plan to install 60 Node devices and require 3:1 oversubscription ratio on the Node devices, you must install 2 Interconnect devices.

Table 22: Maximum Number of Node Devices Supported Based on Oversubscription Ratio and Number of Interconnect Devices

Oversubscription Ratio	QFX Series Switch Models	Number of QFX3008-I Interconnect Devices	Maximum Number of Node Devices
1:1	• QFX3600	2	32
		4	64
3:1	• QFX3500 • QFX3600	2	64
		4	128
3.5:1	• QFX5100-48S	2	64
		4	128
6:1	• QFX3500 • QFX3600	2	128

For information about the size and strength of racks for the devices, see the following topics:

- *Rack Requirements for a QFX3100 Director Device*
- *Rack Requirements for a QFX3008-I Interconnect Device*
- *Rack Requirements for a QFX5100 Device*
- *Rack Requirements for a QFX3600 or QFX3600-I Device*
- *Rack Requirements for a QFX3500 Device*
- *Rack Requirements for EX4200 Switches*

For the dimensions and weights of the devices, see the following topics:

- *Chassis Physical Specifications for a QFX3100 Director Device*
- *Chassis Physical Specifications for a QFX3008-I Interconnect Device*
- *Chassis Physical Specifications for a QFX5100 Device*
- *Chassis Physical Specifications for QFX3600 and QFX3600-I Devices*
- *Chassis Physical Specifications for a QFX3500 Chassis*
- *Chassis Physical Specifications for EX4200 Switches*

- Cabling requirements for the control plane and management network—The control plane and management network are interconnected using standard 1000BASE-T Ethernet over copper wiring. Each network segment can be a maximum length of 100 m (328 ft). See "Cable Specifications for Copper-Based Control Plane Connections for the QFabric System" on page 154.

- Cabling requirements for the data plane—The data plane is interconnected using standard 40GBASE-SR Ethernet QSFP+ optical transceivers over fiber-optic wiring. If you use OM3 optical fiber, each network segment can be a maximum of 100 m (328 ft). If you use OM4 optical fiber, each network segment can be a maximum of 150 m (492 ft). However, keep in mind that each network segment in the control plane and management network is limited to a maximum length of 100 m (328 ft). See "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125.

  The data plane cabling requirements depend on the number of connections required from each Node device to Interconnect devices based on the oversubscription ratio you need on the access ports of the Node device. Table 23 on page 101 shows the number of connections required from each Node device to Interconnect devices based on the oversubscription ratio you need on the Node device.

Table 23: Number of Connections Required Between Node and Interconnect Devices Based on Oversubscription Ratio

Oversubscription Ratio	QFX Series Switch Model	Number of Connections from Each Node Device to Interconnect Devices
1:1	QFX3600	8
3:1	QFX3500 QFX3600	4
3.5:1	QFX5100-48S	4
6:1	QFX3500 QFX3600	2

- Power supply—You must plan the installation site to meet the power requirements of all the devices in the QFX3000 QFabric system. For information on power requirements and configuration options for each device, see the following topics:

- AC Power Specifications for a QFX3100 Director Device on page 157
- AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 159
- AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 160
- AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 160
- AC Power Specifications for a QFX3600 or QFX3600-I Device on page 165
- AC Power Specifications for a QFX3500 Device on page 166
- AC Power Specifications for a QFX5100 Device on page 167
- *Power Specifications for EX4200 Switches*

- For more information about the site preparation requirements for each device, see the following topics:
  - *Site Preparation Checklist for a QFX3100 Director Device*
  - *Site Preparation Checklist for a QFX3008-I Interconnect Device*
  - *Site Preparation Checklist for a QFX3600 or QFX3600-I Device*
  - *Site Preparation Checklist for a QFX3500 Device*
  - *Site Preparation Checklist for a QFX5100 Device*
  - *Site Preparation Checklist for EX4200 Switches*

Related Documentation

- QFX3000-G QFabric System Installation Overview on page 95
- Understanding QFX3000-G QFabric System Hardware Configurations on page 97
- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3100 Director Device*
- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device*
- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX5100 Device*
- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3600 or QFX3600-I Device*
- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device*
- *Clearance Requirements for Airflow and Hardware Maintenance for EX4200 Switches*

General Site Guidelines

Supported Platforms EX Series, QFabric System, QFX Series standalone switches

This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

Efficient device operation requires proper site planning and maintenance and proper layout of the equipment, rack or cabinet (if used), and wiring closet.

To plan and create an acceptable operating environment for your device and prevent environmentally caused equipment failures:

- Keep the area around the chassis free from dust and conductive material, such as metal flakes.
- Follow prescribed airflow guidelines to ensure that the cooling system functions properly and that exhaust from other equipment does not blow into the intake vents of the device.
- Follow the prescribed electrostatic discharge (ESD) prevention procedures to prevent damaging the equipment. Static discharge can cause components to fail completely or intermittently over time.
- Install the device in a secure area, so that only authorized personnel can access the device.

Related Documentation

- *Prevention of Electrostatic Discharge Damage*
- *Environmental Requirements and Specifications for EX Series Switches*
- Environmental Requirements and Specifications for a QFX3100 Director Device on page 105
- Environmental Requirements and Specifications for a QFX3008-I Interconnect Device on page 106
- Environmental Requirements and Specifications for a QFX3500 Device on page 107
- Environmental Requirements and Specifications for QFX3600 and QFX3600-I Devices on page 108
- Environmental Requirements and Specifications for a QFX5100 Device on page 109

Site Electrical Wiring Guidelines

Supported Platforms EX Series, QFabric System, QFX Series standalone switches

This topic applies to hardware devices in the EX Series product family, which includes switches, the EX Series Redundant Power System (RPS), and the XRE200 External Routing Engine.

This topic also applies to hardware devices in the QFX Series.

Table 24 on page 104 describes the factors you must consider while planning the electrical wiring at your site.

WARNING: It is particularly important to provide a properly grounded and shielded environment and to use electrical surge-suppression devices.

Table 24: Site Electrical Wiring Guidelines

Site Wiring Factor	Guidelines
Signaling limitations	If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding: • Improperly installed wires cause radio frequency interference (RFI). • Damage from lightning strikes occurs when wires exceed recommended distances or pass between buildings. • Electromagnetic pulses (EMPs) caused by lightning damage unshielded conductors and electronic devices.
Radio frequency interference	To reduce or eliminate radio frequency interference (RFI) from your site wiring, do the following: • Use a twisted-pair cable with a good distribution of grounding conductors. • If you must exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.
Electromagnetic compatibility	If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice. Some of the problems caused by strong sources of electromagnetic interference (EMI) are: • Destruction of the signal drivers and receivers in the switch • Electrical hazards as a result of power surges conducted over the lines into the equipment

Related Documentation

- *General Safety Guidelines and Warnings*
- *General Electrical Safety Guidelines and Warnings*
- *Prevention of Electrostatic Discharge Damage*
- *Power Supply in EX2200 Switches*
- *Power Supply in EX3200 Switches*
- *Power Supply in EX3300 Switches*
- *Power Supply in EX4200 Switches*
- *AC Power Supply in EX4300 Switches*
- *DC Power Supply in EX4300 Switches*
- *AC Power Supply in EX4500 Switches*
- *DC Power Supply in EX4500 Switches*

- *AC Power Supply in EX4550 Switches*
- *DC Power Supply in EX4550 Switches*
- *AC Power Supply in an EX4600 Switch*
- *DC Power Supply in an EX4600 Switch*
- *AC Power Supplies in an EX6200 Switch*
- *DC Power Supply in an EX6200 Switch*
- *AC Power Supply in an EX8200 Switch*
- *DC Power Supply in an EX8200 Switch*
- *AC Power Supply in an EX9204 Switch*
- *DC Power Supply in an EX9204 Switch*
- *AC Power Supply in an EX9208 Switch*
- *DC Power Supply in an EX9208 Switch*
- *AC Power Supply in an EX9214 Switch*
- *DC Power Supply in an EX9214 Switch*
- *Power Supply in an EX Series Redundant Power System*
- *AC Power Supply in a QFX3100 Director Device*
- *AC Power Supply in a QFX3008-I Interconnect Device*
- *Wiring Tray in a QFX3008-I Interconnect Device*
- *AC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *DC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *AC Power Supply for a QFX5100 Device*
- *DC Power Supply in a QFX5100 Device*

Environmental Requirements and Specifications for a QFX3100 Director Device

Supported Platforms QFabric System

The device must be installed in a rack or cabinet housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the device cooling system.
- Maintain ambient airflow for normal device operation. If the airflow is blocked or restricted, or if the intake air is too warm, the device might overheat, leading to the device temperature monitor shutting down the device to protect the hardware components.

Table 25 on page 106 provides the required environmental conditions for normal device operation.

Table 25: QFX3100 Director Device Environmental Tolerances

Description	Tolerance
Altitude	No performance degradation to 10,000 feet (3048 meters)
Relative humidity	Normal operation ensured in relative humidity range of 5% through 85%, noncondensing
Temperature	• Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C) • Short-term operation ensured in temperature range of 23° F through 131° F (–5° C through 55° C) NOTE: As defined in NEBS GR-63-CORE, Issue 3, short-term events can be up to 96 hours in duration but not more than 15 days per year. • Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C)

NOTE: Install QFX Series devices only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

Related Documentation

- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3100 Director Device*
- Installing and Connecting a QFX3100 Director Device on page 173

Environmental Requirements and Specifications for a QFX3008-I Interconnect Device

Supported Platforms QFX3000-G

The QFX3008-I Interconnect device chassis must be installed in a rack or cabinet housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the device cooling system.
- Maintain ambient airflow for normal device operation. If the airflow is blocked or restricted, or if the intake air is too warm, the device might overheat, leading to the device temperature monitor shutting down the device to protect the hardware components.

Table 26 on page 107 provides the required environmental conditions for normal device operation.

Table 26: QFX3008-I Interconnect Device Environmental Tolerances

Description	Tolerance
Altitude	No performance degradation to 10,000 feet (3048 meters)
Relative humidity	Normal operation ensured in relative humidity range of 5% through 85%, noncondensing
Temperature	• Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C) • Short-term operation ensured in temperature range of 23° F through 122° F (–5° C through 50° C) NOTE: As defined in NEBS GR-63-CORE, Issue 3, short-term events can be up to 96 hours in duration but not more than 15 days per year. • Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C)
Seismic	Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 3.

NOTE: Install QFX Series devices only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

Related Documentation

- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device*
- Installing and Connecting a QFX3008-I Interconnect Device on page 185

Environmental Requirements and Specifications for a QFX3500 Device

Supported Platforms QFabric System, QFX3500

The device must be installed in a rack or cabinet housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the device cooling system.
- Maintain ambient airflow for normal device operation. If the airflow is blocked or restricted, or if the intake air is too warm, the device might overheat, leading to the device temperature monitor shutting down the device to protect the hardware components.

Table 27 on page 108 provides the required environmental conditions for normal device operation.

Table 27: QFX3500 Device Environmental Tolerances

Description	Tolerance
Altitude	No performance degradation to 10,000 feet (3048 meters)
Relative humidity	Normal operation ensured in relative humidity range of 5% through 85%, noncondensing
Temperature	• Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C) • Short-term operation ensured in temperature range of 23° F through 131° F (–5° C through 55° C) NOTE: As defined in NEBS GR-63-CORE, Issue 3, short-term events can be up to 96 hours in duration but not more than 15 days per year. • Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C)
Seismic	Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 3.

NOTE: Install QFX Series devices only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

Related Documentation

- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device*
- Installing and Connecting a QFX3500 Device on page 241

Environmental Requirements and Specifications for QFX3600 and QFX3600-I Devices

Supported Platforms QFabric System, QFX3600

The QFX3600 and QFX3600-I devices must be installed in a rack or cabinet housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the device cooling system.
- Maintain ambient airflow for normal device operation. If the airflow is blocked or restricted, or if the intake air is too warm, the device might overheat, leading to the device temperature monitor shutting down the device to protect the hardware components.

Table 28 on page 109 provides the required environmental conditions for normal device operation.

Table 28: QFX3600 and QFX3600-I Device Environmental Tolerances

Description	Tolerance
Altitude	No performance degradation to 10,000 feet (3048 meters)
Relative humidity	Normal operation ensured in relative humidity range of 5% through 85%, noncondensing
Temperature	• Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C) • Short-term operation ensured in temperature range of 23° F through 131° F (–5° C through 55° C) NOTE: As defined in NEBS GR-63-CORE, Issue 3, short-term events can be up to 96 hours in duration but not more than 15 days per year. • Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C)
Seismic	Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 3.

NOTE: Install QFX Series devices only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

Related Documentation

- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3600 or QFX3600-I Device*
- Installing and Connecting a QFX3600 or QFX3600-I Device on page 223

Environmental Requirements and Specifications for a QFX5100 Device

Supported Platforms QFabric System, QFX5100

The switch must be installed in a rack or cabinet. It must be housed in a dry, clean, well-ventilated, and temperature-controlled environment.

Follow these environmental guidelines:

- The site must be as dust-free as possible, because dust can clog air intake vents and filters, reducing the efficiency of the switch cooling system.
- Maintain ambient airflow for normal switch operation. If the airflow is blocked or restricted, or if the intake air is too warm, the switch might overheat, leading to the switch temperature monitor shutting down the device to protect the hardware components.

Table 29 on page 110 provides the required environmental conditions for normal switch operation.

Table 29: QFX5100 Switch Environmental Tolerances

Description	Tolerance
Altitude	No performance degradation to 6,562 feet (2000 meters)
Relative humidity	Normal operation ensured in relative humidity range of 5% through 90%, noncondensing • Short-term operation ensured in relative humidity range of 5% through 93%, noncondensing NOTE: As defined in NEBS GR-63-CORE, Issue 3, short-term events can be up to 96 hours in duration but not more than 15 days per year.
Temperature	• Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C) NOTE: Customers with QFX5100-48T switches should ensure the room temperature does not exceed a 2° C increase or decrease per minute. • Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C)
Seismic	Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 3.

NOTE: Install QFX Series devices only in restricted areas, such as dedicated equipment rooms and equipment closets, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

Related Documentation

- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX5100 Device*
- Installing and Connecting a QFX5100 Device on page 257

CHAPTER 7

Ports and Connectors

Interface Support for the QFX3600 Device

Supported Platforms QFabric System, QFX3600

The QFX3600 device provides 16 QSFP+ ports, which support QSFP+ transceivers and QSFP+ DAC or DAC breakout cables.

On a QFX3600 Node device in a QFabric system, four ports (labeled **Q0** through **Q3**) operate as 40-Gbps data uplink (**fte**) ports for uplink connections between your QFX3600 Node device and your Interconnect device. Twelve ports (labeled **Q4** through **Q15**) operate in 10-Gigabit Ethernet (**xe**) mode to support 48 10-Gigabit Ethernet interfaces for connections to either endpoint systems or external networks. Optionally, you can choose to configure ports **Q0** through **Q7** to operate as 40-Gbps data uplink (**fte**) ports, and ports **Q2** through **Q15** to operate in 10-Gigabit Ethernet (**xe**) or 40-Gigabit Ethernet (**xle**) mode. See "Configuring the Port Type on QFX3600 Node Devices" on page 440 for more information.

On a QFX3600 standalone switch, ports **Q0** through **Q15** operate as 40-Gigabit Ethernet (**xle**) ports. Optionally, you can choose to configure ports **Q0** through **Q15** to operate as 10-Gigabit Ethernet (**xe**) ports. See *Configuring the Port Type on QFX3600 Standalone Switches* for more information.

NOTE: On a QFX3600 standalone switch, you can either configure up to 63 or 64 10-Gigabit Ethernet ports on ports Q0 through Q15, depending on the Junos OS release running on the switch. See the Channelizing Interfaces topic for your specific Junos OS release for further details.

You can use SFP transceivers to connect the QFX3600 device to a management network, or the control plane and management network of a QFabric system. The 1000BASE-SX Gigabit Ethernet SFP module (QFX-SFP-1GE-SX) is supported in the SFP management ports labeled **C0S** and **C1S**. The QFX3600 device also has two 1000BASE-T RJ-45 management ports (labeled **C0** and **C1**), which can be used to connect the QFX3600 device to a management network, or the control plane and management network of a QFabric system.

Table 30 on page 112 lists the supported transceivers and the software release in which they were first supported.

Table 30: Supported Transceivers for the QFX3600 Device

Description	QFX3600 Device as Standalone Switch	QFX3600 Node Device in a QFX3000-M QFabric System	QFX3600 Node Device in a QFX3000-G QFabric System
40GBASE-SR4 QSFP+ module (QFX-QSFP-40GE-SR4)	Junos OS 12.2X50-D20 NOTE: The QFX-QSFP-40GE-SR4 cannot be used to channelize ports into multiple 10-Gigabit Ethernet interfaces. Use the QFX-QSFP-40GE-ESR4 module with a breakout cable to distribute the interfaces to up to four 10GBASE-SR SFP+ transceivers.	Junos OS 12.2X50-D10 to interconnect a Node device and Interconnect device	Junos OS 12.2X50-D10 to interconnect a Node device and Interconnect device
40GBASE-SR4 QSFP+ module (QFX-QSFP-40GE-ESR4)	Junos OS 12.2X50-D40 NOTE: If you are configuring a port as multiple 10-Gigabit Ethernet interfaces, you can use a fiber breakout cable to distribute the interfaces to up to four 10GBASE-SR SFP+ transceivers.	Junos OS 12.2X50-D40 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device	Junos OS 12.2X50-D40 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device

Table 31 on page 113 describes the supported DAC and DAC breakout cables and the software release in which they were first supported.

NOTE: The QSFP+ DAC cables consist of a cable assembly terminated with QSFP+ transceivers on either end. If you use the QSFP+ DAC cable as the data plane connection between a QFX3600-I Interconnect device and a QFX3600 or QFX3500 Node device, the interface is automatically configured to operate at 40 Gbps. If you use the QSFP+ DAC cable to interconnect a QFX3600 Node device with another device, the interface is automatically configured to operate as four 10-Gigabit Ethernet interfaces over one cable.

NOTE: You can use DAC and DAC breakout cables purchased from a third party. These cables should meet the specifications described in "Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series" on page 145 and "Interface Specifications for QSFP+ DAC Cables for the QFX Series" on page 149

Table 31: Supported DAC and DAC Breakout Cables for the QFX3600 Device

Description	QFX3600 Device as Standalone Switch	QFX3600 Node Device in a QFX3000-M QFabric System	QFX3600 Node Device in a QFX3000-G QFabric System
10-Gigabit Ethernet QSFP+ to four SFP+ passive DAC breakout cables, 1-meter (QFX-QSFP-DACBO-1M)	Junos OS 12.2X50-D20	Junos OS 12.2X50-D10	Junos OS 12.2X50-D10
10-Gigabit Ethernet QSFP+ to four SFP+ passive DAC breakout cables, 3-meter (QFX-QSFP-DACBO-3M)	Junos OS 12.2X50-D20	Junos OS 12.2X50-D10	Junos OS 12.2X50-D10
10-Gigabit Ethernet QSFP+ to four SFP+ active DAC breakout cables, 5-meter (JNP-QSFP-DACBO-5MA)	Junos OS 13.2X51-D15 for configuration as four 10-Gigabit Ethernet interfaces over a single cable.	Junos 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.	Junos 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.
10-Gigabit Ethernet QSFP+ to four SFP+ active DAC breakout cables, 7-meter (JNP-QSFP-DACBO-7MA)	Junos OS 13.2X51-D15 for configuration as four 10-Gigabit Ethernet interfaces over a single cable.	Junos 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.	Junos 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.
10-Gigabit Ethernet QSFP+ to four SFP+ passive DAC breakout cables, 10-meter (JNP-QSFP-DACBO-10M)	Junos OS 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces over a single cable.	Junos 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.	Junos 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.

Table 31: Supported DAC and DAC Breakout Cables for the QFX3600 Device *(continued)*

Description	QFX3600 Device as Standalone Switch	QFX3600 Node Device in a QFX3000-M QFabric System	QFX3600 Node Device in a QFX3000-G QFabric System
40-Gbps QSFP+ passive DAC cable, 1-meter (QFX-QSFP-DAC-1M)	• Junos OS 12.2X50-D20 for configuration as four 10-Gigabit Ethernet interfaces over a single cable • Junos OS 12.3X50-D10 for configuration as a 40-Gigabit Ethernet interface.	Junos OS 12.2X50-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.	Junos OS 12.2X50-D10 for configuration as four 10-Gigabit Ethernet interfaces NOTE: The QFX-QSFP-DAC-1M cable cannot be used to interconnect a Node device and Interconnect device.
40-Gbps QSFP+ passive DAC cable, 3-meter (QFX-QSFP-DAC-3M)	• Junos OS 12.2X50-D20 for configuration as four 10-Gigabit Ethernet interfaces over a single cable • Junos OS 12.3X50-D10 for configuration as a 40-Gigabit Ethernet interface.	Junos OS 12.2X50-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.	Junos OS 12.2X50-D10 for configuration as four 10-Gigabit Ethernet interfaces NOTE: The QFX-QSFP-DAC-3M cable cannot be used to interconnect a Node device and Interconnect device.
10-Gigabit Ethernet passive DAC cable, 5-meter (QFX-SFP-DAC-5M)	Junos OS 11.1R1 for configuration as four 10-Gigabit Ethernet interfaces over a single cable	Junos OS 12.2X50-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.	Junos OS 11.3X30.6 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.
40-Gbps QSFP+ active DAC cable, 5-meter (QFX-QSFP-DAC-5MA)	• Junos OS 13.2X51-D15 for configuration as four 10-Gigabit Ethernet interfaces over a single cable • Junos OS 13.2X51-D15 for configuration as a 40-Gigabit Ethernet interface.	Junos OS 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.	Junos OS 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.
40-Gbps QSFP+ active DAC cable, 7-meter (QFX-QSFP-DAC-7MA)	• Junos OS 13.2X51-D15 for configuration as four 10-Gigabit Ethernet interfaces over a single cable • Junos OS 13.2X51-D15 for configuration as a 40-Gigabit Ethernet interface.	Junos OS 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.	Junos OS 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.

Table 31: Supported DAC and DAC Breakout Cables for the QFX3600 Device *(continued)*

Description	QFX3600 Device as Standalone Switch	QFX3600 Node Device in a QFX3000-M QFabric System	QFX3600 Node Device in a QFX3000-G QFabric System
40-Gbps QSFP+ active DAC cable, 10-meter (QFX-QSFP-DAC-10MA)	• Junos OS 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces over a single cable • Junos OS 13.2X52-D10 for configuration as a 40-Gigabit Ethernet interface.	Junos OS 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.	Junos OS 13.2X52-D10 for configuration as four 10-Gigabit Ethernet interfaces or to interconnect a Node device and Interconnect device.

Related Documentation

- Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 125
- Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 145
- Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 149

Interface Support for the QFX3500 Device

Supported Platforms QFabric System, QFX3500

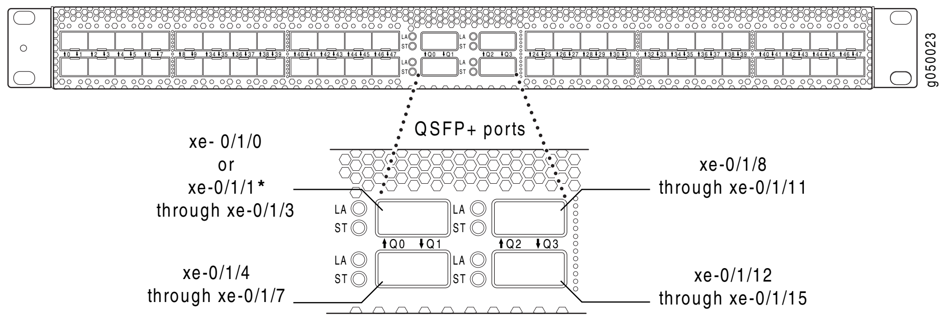
The 48 small form-factor pluggable plus (SFP+) access ports in the QFX3500 device support SFP and SFP+ transceivers, as well as SFP+ direct-attach copper (DAC) cables.

The four quad small form-factor pluggable plus (QSFP+) uplink ports in the QFX3500 device support QSFP+ transceivers, as well as QSFP+ DAC and DAC breakout cables. When the QFX3500 device is operating as a standalone switch, each QSFP+ port can be configured to operate as 10-Gigabit Ethernet interfaces or a single 40-Gigabit Ethernet interface. By default, the uplink ports on a standalone switch are configured as 10-Gigabit Ethernet interfaces.

NOTE: Ports Q1 through Q3 support four of the 10-Gigabit Ethernet interfaces. Together, the three QSFP+ ports provide up to 12 10-Gigabit Ethernet interfaces. Port Q0 also supports 10-Gigabit Ethernet interfaces, but the number of interfaces supported depends on the release of Junos OS running on the switch. Some Junos OS releases support three 10-Gigabit Ethernet interfaces, others support four. See the topic on Channelizing Interface for your specific release.

Figure 15 on page 116 shows the uplink ports and lists the interfaces created on each port when they are configured as 10-Gigabit Ethernet interfaces.

Figure 15: QSFP+ Uplink Port Locations



*Port availability is release dependent.
See the topic on Channelizing Interfaces for your Junos Release.

If your QFX3500 device has an SFP management board instead of the 1000BASE-T RJ-45 management board, you can use the SFP transceivers to connect the QFX3500 device to a management network, or the control plane and management network of a QFabric system. The 1000BASE-SX Gigabit Ethernet SFP module (QFX-SFP-1GE-SX) is supported in the SFP management ports in the following software releases:

- Junos OS 12.1X49-D1 or later for the QFX3500 device as a standalone switch
- Junos OS 12.2X50-D10 or later for the QFX3500 Node device in a QFabric system

Table 32 on page 116 lists the supported transceivers and the software release in which they were first supported.

Table 32: Supported Transceivers for the QFX3500 Device

Description	QFX3500 Device as Standalone Switch	QFX3500 Node Device in a QFX3000-M QFabric System	QFX3500 Node Device in a QFX3000-G QFabric System
1000BASE-T Gigabit Ethernet SFP module (QFX-SFP-1GE-T)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
1000BASE-SX Gigabit Ethernet SFP module (QFX-SFP-1GE-SX)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
1000BASE-LX Gigabit Ethernet SFP module (QFX-SFP-1GE-LX)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
2GFC, 4GFC, and 8GFC (Short-Wavelength) Fibre Channel SFP+ module (QFX-SFP-8GFC-SW)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
10GBASE-SR SFP+ module (QFX-SFP-10GE-USR)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
10GBASE-SR SFP+ module (QFX-SFP-10GE-SR)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6

Table 32: Supported Transceivers for the QFX3500 Device *(continued)*

Description	QFX3500 Device as Standalone Switch	QFX3500 Node Device in a QFX3000-M QFabric System	QFX3500 Node Device in a QFX3000-G QFabric System
10GBASE-LR SFP+ module (QFX-SFP-10GE-LR)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
10GBASE-ER SFP+ module (QFX-SFP-10GE-ER)	Junos OS 11.3R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
40GBASE-SR4 QSFP+ module (QFX-QSFP-40GE-SR4) Also available in packs of 4 transceivers, JNP-40G-SR4-4pack.	Junos OS 12.2X50-D20 for configuration as a 40-Gigabit Ethernet interface NOTE: The QFX-QSP-40GE-SR4 cannot be used to channelize ports into multiple 10-Gigabit Ethernet interfaces. Use the QFX-QSFP-40GE-ESR4 module with a breakout cable to distribute the interfaces to up to four 10GBASE-SR SFP+ transceivers.	Junos OS 12.2X50-D10 NOTE: Supported only for data plane interconnection between QFX3500 Node device and QFX3600-I Interconnect device.	Junos OS 11.3X30.6 NOTE: Supported only for data plane interconnection between QFX3500 Node device and QFX3008-I Interconnect device.
40GBASE-SR4 QSFP+ module (QFX-QSFP-40GE-ESR4)	Junos OS 12.2X50.D40 NOTE: If you are configuring a port as multiple 10-Gigabit Ethernet interfaces, you can use a fiber breakout cable to distribute the interfaces to up to four 10GBASE-SR SFP+ transceivers.	Junos OS 12.2X50-D40 NOTE: Supported only for data plane interconnection between QFX3500 Node device and QFX3600-I Interconnect device.	Junos OS 12.2X50-D40 NOTE: Supported only for data plane interconnection between QFX3500 Node device and QFX3008-I Interconnect device.

Table 33 on page 118 describes the supported DAC and DAC breakout cables and the software release in which they were first supported.

NOTE: You can use DAC and DAC breakout cables purchased from a third party. These cables should meet the specifications described in "Interface Specifications for SFP+ DAC Cables for the QFX Series" on page 139, "Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series" on page 145, and "Interface Specifications for QSFP+ DAC Cables for the QFX Series" on page 149

Table 33: Supported DAC and DAC Breakout Cables for the QFX3500 Device

Description	QFX3500 Device as Standalone Switch	QFX3500 Node Device in a QFX3000-M QFabric System	QFX3500 Node Device in a QFX3000-G QFabric System
10-Gigabit Ethernet passive DAC cable, 1-meter (QFX-SFP-DAC-1M)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
10-Gigabit Ethernet passive DAC cable, 3-meter (QFX-SFP-DAC-3M)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
10-Gigabit Ethernet passive DAC cable, 5-meter (QFX-SFP-DAC-5M)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
10-Gigabit Ethernet active DAC cable, 1-meter (QFX-SFP-DAC-1MA)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
10-Gigabit Ethernet active DAC cable, 3-meter (QFX-SFP-DAC-3MA)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
10-Gigabit Ethernet active DAC cable, 5-meter (QFX-SFP-DAC-5MA)	Junos OS 11.1R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
10-Gigabit Ethernet active DAC cable, 7-meter (QFX-SFP-DAC-7MA)	Junos OS 11.3R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
10-Gigabit Ethernet active DAC cable, 10-meter (QFX-SFP-DAC-10MA)	Junos OS 11.3R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
40-Gbps QSFP+ passive DAC cable, 1-meter (QFX-QSFP-DAC-1M)	• Junos OS 12.2X50-D10 for configuration as four 10-Gigabit Ethernet interfaces over a single cable • Junos OS 12.3X50-D10 for configuration as a 40-Gigabit Ethernet interface	Junos OS 12.2X50-D10 NOTE: Supported only for data plane interconnection between QFX3500 Node device and QFX3600-I Interconnect device.	Not supported
40-Gbps QSFP+ passive DAC cable, 3-meter (QFX-QSFP-DAC-3M)	• Junos OS 12.2X50-D10 for configuration as four 10-Gigabit Ethernet interfaces over a single cable • Junos OS 12.3X50-D10 for configuration as a 40-Gigabit Ethernet interface	Junos OS 12.2X50-D10 NOTE: Supported only for data plane interconnection between QFX3500 Node device and QFX3600-I Interconnect device.	Not supported

Table 33: Supported DAC and DAC Breakout Cables for the QFX3500 Device *(continued)*

Description	QFX3500 Device as Standalone Switch	QFX3500 Node Device in a QFX3000-M QFabric System	QFX3500 Node Device in a QFX3000-G QFabric System
40-Gbps QSFP+ passive DAC cable, 5-meter (QFX-QSFP-DAC-5M)	• Junos OS 12.2X50-D10 for configuration as four 10-Gigabit Ethernet interfaces over a single cable • Junos OS 12.3X50-D10 for configuration as a 40-Gigabit Ethernet interface	Junos OS 12.2X50-D10 NOTE: Supported only for data plane interconnection between QFX3500 Node device and QFX3600-I Interconnect device.	Not supported
40-Gbps QSFP+ active DAC cable, 5-meter (JNP-QSFP-DAC-5MA)	Junos OS 13.2X51-D20	Not supported	Not supported
40-Gbps QSFP+ active DAC cable, 7-meter (JNP-QSFP-DAC-7MA)	Junos OS 13.2X51-D20	Not supported	Not supported
40-Gbps QSFP+ active DAC cable, 10-meter (JNP-QSFP-DAC-10MA)	Junos OS 13.2X51-D20	Not supported	Not supported
40-Gigabit Ethernet QSFP+ to four SFP+ passive DAC breakout cables, 1-meter (QFX-QSFP-DACBO-1M)	Junos OS 11.2R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
40-Gigabit Ethernet QSFP+ to four SFP+ passive DAC breakout cables, 3-meter (QFX-QSFP-DACBO-3M)	Junos OS 11.2R1	Junos OS 12.2X50-D10	Junos OS 11.3X30.6
40-Gigabit Ethernet QSFP+ to four SFP+ active DAC breakout cables, 5-meter (QFX-QSFP-DACBO-5MA)	Junos OS 12.2X50-D20	Junos OS 12.2X50-D20	Junos OS 12.2X50-D20
40-Gigabit Ethernet QSFP+ to four SFP+ active DAC breakout cables, 7-meter (JNP-QSFP-DACBO-7MA)	Junos OS 13.2X51-D15	Junos OS 13.2X52-D10	Junos OS 13.2X52-D10
40-Gbps QSFP+ passive DAC breakout cable, 10-meter (JNP-QSFP-DACBO-10M)	Junos OS 13.2X51-D20	Junos OS 13.2X52-D10	Junos OS 13.2X52-D10

Related Documentation

- Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 125
- Interface Specifications for SFP+ DAC Cables for the QFX Series on page 139
- Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 145
- Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 149

Interface Support for the QFX5100 Device

Supported Platforms QFabric System, QFX5100

All product SKUs of the QFX5100 supply four quad small form-factor pluggable plus (QSFP+) ports for use as uplinks, as access ports, or as Virtual Chassis ports (VCPs). These 40 GbE ports support QSFP+ transceivers, QSFP+ direct-attach copper (DAC) cables, and DAC breakout cables (DACBO). The QFX5100-48S has 6 QSFP+ ports; the QFX5100-96S has 8 QSFP+ ports; the QFX5100-24Q has 24 built-in QSFP+ ports that can all be used as uplinks. The You can also add two QFX-EM-4Q expansion modules to the QFX5100-24Q for additional QSFP+ uplink ports. Each QSFP+ port on a QFX5100-24Q can be configured to operate as 10-Gigabit Ethernet interface by using a breakout cable or as a single 40-Gigabit Ethernet interface. See "Configuring the QSFP+ Port Type on QFX5100 Devices" on page 445 for more information.

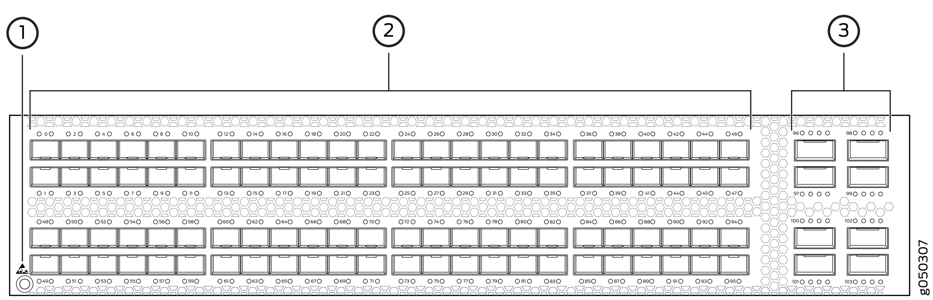
On all QFX5100 product SKUs, the ports are enabled by default and the default config adds the ports to the default VLAN.

Downlink ports are product SKU-specific:

- *QFX5100-96S*—has 96 small form-factor pluggable plus (SFP+) ports that support SFP and SFP+ transceivers, as well as DAC cables.
- *QFX5100-48S*—has 48 SFP+ ports that support SFP and SFP+ transceivers, as well as DAC cables.
- *QFX5100-48T*—has 6 QSFP+ uplink ports.
- *QFX5100-24Q*—has 24 QSFP+ access ports that can be configured to operate as 10-Gigabit Ethernet interfaces or as a single 40-Gigabit Ethernet interface.

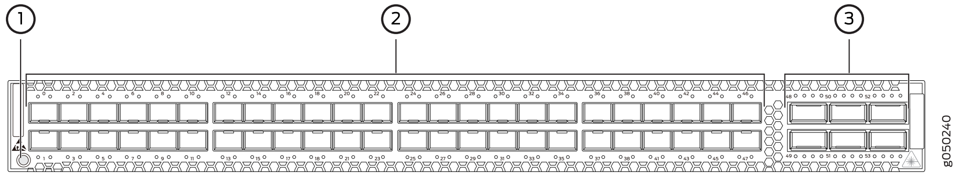
Figure 16 on page 120 shows the location of SFP+ and QSFP+ ports for the QFX5100-96S, Figure 17 on page 121 shows these ports for the QFX5100-48S,Figure 18 on page 121 shows the RJ45 and QSFP+ ports for the QFX5100-48T, and Figure 19 on page 121 shows the location of QSFP+ ports for the QFX5100-24Q.

Figure 16: Port Panel QFX5100-96S



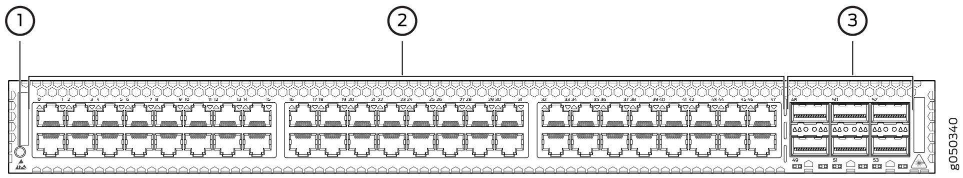
1— Electrostatic discharge (ESD) terminal	3—QSFP+ uplink ports (8)
2—SFP+ access ports (96)	

Figure 17: Port Panel QFX5100-48S



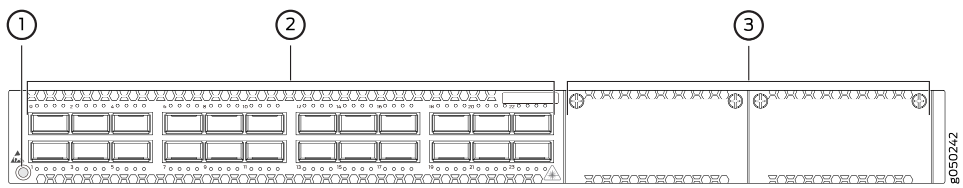
1—Electrostatic discharge (ESD) terminal	3—QSFP+ uplink ports (6)
2—SFP+ access ports (48)	

Figure 18: Port Panel QFX5100-48T



1—Electrostatic discharge (ESD) terminal	3—QSFP+ uplink ports (6)
2—RJ45 access ports (48)	

Figure 19: Port Panel QFX5100-24Q



1—Electrostatic discharge (ESD) terminal	3—Expansion module bays with cover panels (2)
2—QSFP+ access or uplink ports (24)	

Table 34 on page 121 lists the optical transceivers supported on QFX5100 switches.

CAUTION: You can use SFP and QSFP+ transceivers purchased from a third party at your own risk. If there is a problem with the transceiver, support will not be provided.

Table 34: Supported Optical Transceivers for the QFX5100 Switch

Part Number	Description	Maximum Distance Supported
QFX-SFP-1GE-T	SFP module 1000BASE-T Gigabit Ethernet . Also available in packs of eight transceivers, (JNP-1G-T–8PACK)	100 m transmission on Category 5 cable
QFX-SFP-1GE-SX	SFP module 1000BASE-SX Gigabit Ethernet Also available in packs of eight transceivers, (JNP-1G-SX-8PACK)	8 nm for up to 550 m transmission on multimode fiber (MMF) cable

Table 34: Supported Optical Transceivers for the QFX5100 Switch *(continued)*

Part Number	Description	Maximum Distance Supported
QFX-SFP-1GE-LX	SFP module 1000BASE-LX Gigabit Ethernet	1310 nm for up to 10 km transmission on single-mode fiber (SMF) cable
QFX-SFP-10GE-USR NOTE: Not available for the QFX5100-48T	SFP+ module 10-Gigabit Ethernet Ultra Short Reach (USR)	850 nm for up to 10 m on OM1 grade fiber; 20 m on OM2 grade fiber; 100 m on OM3 grade fiber
QFX-SFP-10GE-SR NOTE: Not available for the QFX5100-48T	SFP+ module 10GBASE-SR, 10-Gigabit Ethernet Also available in packs of eight transceivers, (JNP-10G-SR-8PACK)	850 nm for up to 300 m transmission on MMF cable
QFX-SFP-10GE-LR NOTE: Not available for the QFX5100-48T	SFP+ module 10GBASE-LR, 10-Gigabit Ethernet	1310 nm for up to 10 km transmission on MMF cable
QFX-SFP-10GE-ER NOTE: Not available for the QFX5100-48T	SFP+ module 10GBASE-ER, 10-Gigabit Ethernet	1550 nm for up to 40 km transmission on SMF cable
EX-SFP-10GE-ZR NOTE: Not available for the QFX5100-48T	SFP+ module 10GBASE-ZR, 10-Gigabit Ethernet	1550 nm for up to 80 km transmission on SMF cable
QFX-QSFP-40G-SR4	QSFP+ module 40GBASE-SR4, 40-Gigabit Ethernet	850 nm for up to 150 m transmission on MMF cable
QFX-QSFP-40G-ESR4 NOTE: Not available for the QFX5100-48T	QSFP+ module 40GBASE-eSR4, 40-Gigabit Ethernet	850 nm for up to 150 m transmission on MMF cable NOTE: If you are configuring a port as multiple 10-Gigabit Ethernet interfaces, you can use a fiber breakout cable to distribute the interfaces to up to four 10GBASE-SR SFP+ transceivers.
JNP-QSFP-4X10GE-IR	QSFP+ parallel single mode module 40-Gigabit Ethernet pluggable	1310 nm for up to 1.4 km on SMF
JNP-QSFP-40GE-IR4	QSFP+ module 40GBASE-ILR4, 40-Gigabit Ethernet pluggable	1310 nm for up to 2 km on SMF
JNP-QSFP-40G-LR4	QSFP+ module 40GBASE-LR4, 40-Gigabit Ethernet pluggable	1310 nm for up to 10 km on SMF
JNP-QSFP-40G-LX4 Also available in packs of 4 transceivers, JNP-40G-LX4-4PACK.	QSFP+ module 40GBASE-LX4, 40-Gigabit Ethernet pluggable	1310 nm for up to 150 m transmission on OM4 duplex MMF

Table 35 on page 123 describes the supported DAC and DAC breakout cables.

CAUTION: You can use DAC and DAC breakout cables purchased from a third party at your own risk. If there is a problem with the cable, support will not be provided. If you choose to use a third-party cable, it should meet the specifications described in "Interface Specifications for SFP+ DAC Cables for the QFX Series" on page 139, "Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series" on page 145, and "Interface Specifications for QSFP+ DAC Cables for the QFX Series" on page 149.

Table 35: Supported DAC and DAC Breakout Cables for the QFX5100 Switch

Part Number	Description	Active/Passive	Length
QFX-SFP-DAC-1M NOTE: Not available for the QFX5100-48T	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Passive	1 meter
QFX-SFP-DAC-3M NOTE: Not available for the QFX5100-48T	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Passive	3 meters
QFX-SFP-DAC-5M NOTE: Not available for the QFX5100-48T	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Passive	5 meters
QFX-SFP-DAC-1MA NOTE: Not available for the QFX5100-48T	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Active	1 meter
QFX-SFP-DAC-3MA NOTE: Not available for the QFX5100-48T	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Active	3 meters
QFX-SFP-DAC-5MA NOTE: Not available for the QFX5100-48T	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Active	5 meters
QFX-SFP-DAC-7MA NOTE: Not available for the QFX5100-48T	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Active	7 meters
QFX-SFP-DAC-10MA NOTE: Not available for the QFX5100-48T	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Active	10 meters

Table 35: Supported DAC and DAC Breakout Cables for the QFX5100 Switch *(continued)*

Part Number	Description	Active/Passive	Length
QFX-QSFP-DAC-1M	QSFP+ 40-Gigabit Ethernet, programmable ID, cable assembly, 30 AWG	Passive	1 meter
QFX-QSFP-DAC-3M	QSFP+ 40-Gigabit Ethernet, programmable ID, cable assembly, 30 AWG	Passive	3 meters
JNP-QSFP-DAC-5M	QSFP+ 40-Gigabit Ethernet DAC assembly, programmable ID, cable assembly, 26 AWG	Passive	5 meters
JNP-QSFP-DAC-5MA NOTE: Not available for the QFX5100-48T	QSFP+ 40-Gigabit Ethernet DAC assembly, programmable ID, cable assembly, 26 AWG	Active	5 meters
JNP-QSFP-DAC-7MA NOTE: Not available for the QFX5100-48T	QSFP+ 40-Gigabit Ethernet DAC assembly, programmable ID, cable assembly, 30 AWG	Active	7 meters
JNP-QSFP-DAC-10MA NOTE: Not available for the QFX5100-48T	QSFP+ 40-Gigabit Ethernet DAC assembly, programmable ID, cable assembly, 28 AWG	Active	10 meters
QFX-QSFP-DACBO-1M NOTE: Not available for the QFX5100-48T	QSFP+ to SFP+ 10-Gigabit Ethernet DACBO cable assembly, 30 AWG	Passive	1 meter
QFX-QSFP-DACBO-3M NOTE: Not available for the QFX5100-48T	QSFP+ to SFP+ 10-Gigabit Ethernet DACBO assembly, 30 AWG	Passive	3 meters
QFX-QSFP-DACBO-5MA NOTE: Not available for the QFX5100-48T	QSFP+ to SFP+ 10-Gigabit Ethernet DACBO assembly, 30 AWG	Active	5 meters
QFX-QSFP-DACBO-7MA NOTE: Not available for the QFX5100-48T	QSFP+ to SFP+ 10-Gigabit Ethernet DACBO assembly, 30 AWG	Active	7 meters
QFX-QSFP-DACBO-10M NOTE: Not available for the QFX5100-48T	QSFP+ to SFP+ 10-Gigabit Ethernet DACBO assembly, 28 AWG	Passive	10 meters

Related Documentation

- Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 125

- Interface Specifications for SFP+ DAC Cables for the QFX Series on page 139
- Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 145
- Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 149

Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series

Supported Platforms QFabric System, QFX Series standalone switches

This topic describes the specifications for the SFP, SFP+, and QSFP+ transceivers used in QFX Series devices.

NOTE: This topic does not describe which devices support these transceivers. For information about which transceivers are supported on QFX Series devices, see the following topics:

- Interface Support for the QFX3600 Device on page 111
- Interface Support for the QFX3500 Device on page 115
- Interface Support for the QFX5100 Device on page 120

The optical transceivers installed in QFX Series devices support digital optical monitoring (DOM): you can view the diagnostic details for these transceivers by issuing the operational mode CLI command **show interfaces diagnostics optics**. The command does not give any output for copper transceivers or transceivers not purchased from Juniper Networks.

The three tables in this topic describe the optical interface support over single-mode fiber-optic (SMF) and multimode fiber-optic (MMF) cables and copper interface support over four-pair, Category 5 shielded twisted-pair cables:

- Table 36 on page 126—Copper interface support and optical interface support for Gigabit Ethernet SFP transceivers.
- Table 37 on page 129—Optical interface support for 10-Gigabit Ethernet SFP+ transceivers.
- Table 38 on page 134—Optical interface support for 40-Gigabit Ethernet QSFP+ transceivers.

NOTE: If you are using the QFX-QSFP-40G-ESR4 transceiver in an access port and have configured the port to operate as multiple 10-Gigabit Ethernet interfaces, you can use a fiber breakout cable to distribute the interfaces to up to four 10GBASE-SR SFP+ transceivers. Juniper Networks does not sell fiber breakout cables.

Table 36: Copper Interface Support and Optical Interface Support for Gigabit Ethernet SFP Transceivers for the QFX Series

Ethernet Standard	Specifications	
1000BASE-T	Product SKU number	QFX-SFP-1GE-T
	Rate	1000 Mbps
	Connector type	RJ-45
	Fiber count	–
	Transmitter wavelength	–
	Minimum launch power	–
	Maximum launch power	–
	Minimum receiver sensitivity	–
	Maximum input power	–
	DOM support	Not available
	Fiber type	–
	Core/cladding size	–
	Modal bandwidth	–
	Distance	100 m (328 ft)

Table 36: Copper Interface Support and Optical Interface Support for Gigabit Ethernet SFP Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications				
1000BASE-SX	Product SKU number	QFX-SFP-1GE-SX			
	Rate	1000 Mbps			
	Connector type	LC			
	Fiber count	Dual			
	Transmitter wavelength	850 nm			
	Minimum launch power	–9.5 dBm			
	Maximum launch power	–3 dBm			
	Minimum receiver sensitivity	–21 dBm			
	Maximum input power	0 dBm			
	DOM support	Available			
	Fiber type	MMF	MMF	MMF	MMF
	Core/cladding size	62.5/125 µm	62.5/125 µm	50/125 µm	50/125 µm
	Fiber grade	FDDI	OM1	–	OM2
	Modal bandwidth	160 MHz/km	200 MHz/km	400 MHz/km	500 MHz/km
	Distance	220 m (721 ft)	275 m (902 ft)	500 m (1640 ft)	550 m (1804 ft)

Table 36: Copper Interface Support and Optical Interface Support for Gigabit Ethernet SFP Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications	
1000BASE-LX	Product SKU number	QFX-SFP-1GE-LX
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1310 nm
	Minimum launch power	–9.5 dBm
	Maximum launch power	–3 dBm
	Minimum receiver sensitivity	–25 dBm
	Maximum input power	–3 dBm
	DOM support	Available
	Fiber type	SMF
	Core/cladding size	9/125 µm
	Modal bandwidth	–
	Distance	10 km (6.2 miles)

Table 37: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series

Ethernet Standard	Specifications			
10GBASE-SR	Product SKU number	QFX-SFP-10GE-USR		
	Rate	10 Gbps		
	Connector type	LC		
	Fiber count	Dual		
	Transmitter wavelength	850 nm		
	Minimum launch power	–7.3 dBm		
	Maximum launch power	–1.3 dBm		
	Minimum receiver sensitivity	–11.1 dBm		
	Maximum input power	–1 dBm		
	DOM support	Available		
	Fiber type	MMF	MMF	MMF
	Core/cladding size	62.5/125 µm	50/125 µm	50/125 µm
	Fiber grade	OM1	OM2	OM3 (OM4 compatible)
	Modal bandwidth	200 MHz/km	500 MHz/km	1500 MHz/km
	Distance	10 m (32 ft)	30 m (98 ft)	100 m (328 ft)

Table 37: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications					
10GBASE-SR	Product SKU number	QFX-SFP-10GE-SR				
	Rate	10 Gbps				
	Connector type	LC				
	Transmitter wavelength	850 nm				
	Minimum launch power	–7.3 dBm				
	Maximum launch power	–1 dBm				
	Minimum receiver sensitivity	–9.9 dBm				
	Maximum input power	–1 dBm				
	DOM support	Available				
	Fiber type	MMF	MMF	MMF	MMF	MMF
	Core/cladding size	62.5/125 µm	62.5/125 µm	50/125 µm	50/125 µm	50/125 µm
	Fiber grade	FDDI	OM1	–	OM2	OM3 (OM4 compatible)
	Modal bandwidth	160 MHz/km	200 MHz/km	400 MHz/km	500 MHz/km	1500 MHz/km
	Distance	26 m (85 ft)	33 m (108 ft)	66 m (216 ft)	82 m (269 ft)	300 m (984 ft)

Table 37: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications	
10GBASE-LR	Product SKU number	QFX-SFP-10GE-LR
	Rate	10 Gbps
	Connector type	LC
	Transmitter wavelength	1310 nm
	Minimum launch power	–8.2 dBm
	Maximum launch power	0.5 dBm
	Minimum receiver sensitivity	–18 dBm
	Maximum input power	0.5 dBm
	DOM support	Available
	Fiber type	SMF
	Core/cladding size	9/125 µm
	Modal bandwidth	–
	Distance	10 km (6.2 miles)

Table 37: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications	
10GBASE-ER	Product SKU Number	QFX-SFP-10GE-ER
	Rate	10 Gbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1550 nm
	Minimum launch power	–4.7 dBm
	Maximum launch power	4 dBm
	Minimum receiver sensitivity	–11.3 dBm
	Maximum input power	–1 dBm
	DOM support	Available
	Fiber type	SMF
	Core/cladding size	9/125 µm
	Modal bandwidth	–
	Distance	40 km (24.8 miles)

Table 37: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications	
10GBASE-ZR	Product SKU Number	EX-SFP-10GE-ZR
	Rate	10 Gbps
	Connection Type	LC
	Fiber count	Dual
	Transmitter wavelength	1550 ;nm
	Minimum launch power	0
	Maximum launch power	5 dBM
	Maximum receiver sensitivity	-20 dBM
	Maximum input power	–
	DOM support	Available
	Fiber type	SMF

Table 38: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series

Ethernet Standard	Specifications	
40GBASE-SR4	Product SKU number	QFX-QSFP-40G-SR4
	Rate	40 Gbps
	Connector type	12-ribbon multimode fiber crossover cable with female MPO connectors NOTE: See *Cable Specifications for QSFP+ Transceivers* for more information.
	Fiber count	12
	Transmitter wavelength	850 nm
	Minimum launch power	–7.6 dBm (per lane)
	Maximum launch power	2.4 dBm (per lane)
	Maximum receiver sensitivity	–5.4 dBm
	Maximum input power	4 dBm
	DOM support	Available
	Fiber type	MMF

Table 38: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications		
40GBASE-ESR4	Product SKU number	QFX-QSFP-40G-ESR4	
	Rate	40 Gbps	
	Connector type	12-ribbon multimode fiber crossover cable with female MPO connectors NOTE: See *Cable Specifications for QSFP+ Transceivers* for more information.	
	Fiber count	12	
	Transmitter wavelength	850 nm	
	Minimum launch power	–4.3 dBm (per lane)	
	Maximum launch power	–1 dBm (per lane)	
	Maximum receiver sensitivity	–7.5 dBm	
	Maximum input power	–1 dBm	
	DOM support	Available	
	Fiber type	MMF	MMF
	Core/cladding size	50/125 µm	50/125 µm
	Fiber grade	OM3	OM4
	Modal bandwidth	2000 MHz/km	4700 MHz/km
	Distance	300 m (984 ft)	400 m (1312 ft)

Table 38: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications	
40GBASE-LR4	Product SKU number	JNP-QSFP-40G-LR4
	Rate	40 Gbps (10 Gbps per lane)
	Connector type	LC
	Fiber count	Dual
	Lane wavelength	Lane 0–1264.5 nm through 1277.5 nm Lane 1–1284.5 nm through 1297.5 nm Lane 2–1304.5 nm through 1317.5 nm Lane 3–1324.5 nm through 1337.5 nm
	Minimum launch power	-7.0 dBm (per lane)
	Maximum launch power	2.3 dBm (per lane)
	DOM support	Available
	Fiber type	SMF
	Core/cladding size	9/125 μm
	Distance	10 km (6.2 miles)

Table 38: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications		
40GBASE-LX4 NOTE: Not available for QFX3008, QFX3500, or QFX3600	Product SKU Number	JNP-QSFP-40G-LX4	
	Rate	40 Gbps (10 Gbps per lane)	
	Fiber count	Dual	
	Lane wavelength (typical)	Lane 0–1271 nm Lane 1–1291 nm Lane 2–1311 nm Lane 3–1331 nm	
	Minimum launch power	-7.0 dBm (per lane)	
	Maximum launch power	4.3 dBm (per lane)	
	Maximum power draw	3.5 W	
	DOM support	Available	
	Fiber type	MMF	MMF
	Core/cladding size	50/125 µm	50/125 µm
	Fiber grade	OM3	OM4
	Modal bandwidth	2000 MHz/km	4700 MHz/km
	Distance	100 m (328 ft)	150 m (492 ft)

Table 38: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications		
4x10BASE-IR NOTE: QFX5100-48S and QFX5100-24Q only	Product SKU Number	JNP-QSFP-4x10GE-IR	Parallel Single Mode
	Rate	40 Gbps (10 Gbps per lane)	
	Connector type	Single mode fiber ribbon cable with female, MPO-APC connector (angled 8 degrees) NOTE: See *Cable Specifications for QSFP+ Transceivers* for more information.	
	Fiber count	12	
	Lane wavelength (typical)	Lanes 0 through 3–1310 nm	
	Minimum launch power	-6.0 dBm (per lane)	
	Maximum launch power	1.5 dBm (per lane)	
	DOM support	Available	
	Fiber type	SMF	
	Core/cladding size	9/125 µm	
	Distance	1.4 km (.9 miles)	

Table 38: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series *(continued)*

Ethernet Standard	Specifications	
40GBASE-IR4 NOTE: QFX5100-48S and QFX5100-24Q only	Product SKU Number	JNP-QSFP-40GE-IR4
	Rate	40 Gbps (10 Gbps per lane)
	Connector type	LC
	Fiber count	Dual
	Lane wavelength (typical)	Lane 0–1271 nm Lane 1–1291 nm Lane 2–1311 nm Lane 3–1331 nm
	Minimum launch power	-7.0 dBm (per lane)
	Maximum launch power	2.3 dBm (per lane)
	DOM support	Available
	Fiber type	SMF
	Core/cladding size	9/125 μm
	Distance	2 km (1.24 miles)

Related Documentation

- Interface Specifications for SFP+ DAC Cables for the QFX Series on page 139
- Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 145
- Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 149
- *Installing a Transceiver in a QFX Series Device*
- *Removing a Transceiver from a QFX Series Device*

Interface Specifications for SFP+ DAC Cables for the QFX Series

Supported Platforms QFabric System, QFX Series standalone switches

Small form-factor pluggable plus (SFP+) direct attach copper (DAC) cables, also known as Twinax cables, are suitable for in-rack connections between servers and either the QFX5100-48S, QFX5100-96S, or QFX3500 devices. Juniper Networks SFP+ DAC cables may also be used in QFX Virtual Chassis and Virtual Chassis Fabric (VCF).

CAUTION: We highly recommend using Juniper Network DAC cables. You can use DAC cables purchased from a third party at your own risk. If there is a problem with the cable or transceiver, support will not be provided. If you choose to use a third-party cable, it should meet the specifications described in Table 40 on page 141 and Table 41 on page 143.

Table 39 on page 140 describes the Junos OS software releases that supports third-party DAC cables. Prior releases only permitted Juniper Networks DAC cables.

Table 39: Third-Party SFP+ DAC Cable Support

Platform	Third-Party DAC Cable Support Added
QFX3500 Node device in a QFabric system	Junos OS 11.3X30.6
QFX3500 device as a standalone switch	Junos OS 11.3R4
QFX5100 device as a standalone switch	Junos OS 13.2X51-D10

NOTE: This topic does not describe which devices support these transceivers. For information about which transceivers are supported on QFX Series devices, see the following topics:

- Interface Support for the QFX3600 Device on page 111
- Interface Support for the QFX3500 Device on page 115
- Interface Support for the QFX5100 Device on page 120

The cables are hot-removable and hot-insertable. A cable consists of a cable assembly that connects directly into two SFP+ modules, one at each end of the cable. The cables use integrated duplex serial data links for bidirectional communication and are designed for data rates up to 10 Gbps. There are two types of DAC cables:

- Passive DAC cables have no signal amplification built into the cable assembly. Table 40 on page 141 describes the passive DAC cable specifications.
- Active DAC cables have signal amplification and equalization built into the cable assembly. Table 41 on page 143 describes the active DAC cable specifications.

Table 40: SFP+ Passive Direct Attach Copper Cable Specifications

Product Number	Specifications	
QFX-SFP-DAC-1M	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.015 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	1% maximum
	Time delay	4.3 nsec/m
	Length	1 m (3.3 ft)
QFX-SFP-DAC-3M	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.015 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	1% maximum
	Time delay	4.3 nsec/m
	Length	3 m (9.9 ft)

Table 40: SFP+ Passive Direct Attach Copper Cable Specifications *(continued)*

Product Number	Specifications	
QFX-SFP-DAC-5M	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.015 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	24 AWG
	Minimum cable bend radius	1.25 in. (3.2 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Time delay	4.3 nsec/m
	Length	5 m (16.4 ft)

NOTE: Active Direct Attach Cooper Cable Specifications are not available for the QFX5100-48T.

Table 41: SFP+ Active Direct Attach Copper Cable Specifications

Product Number	Specifications	
QFX-SFP-DAC-1MA	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.627 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Length	1 m (3.3 ft)
QFX-SFP-DAC-3MA	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.627 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Length	3 m (9.9 ft)

Table 41: SFP+ Active Direct Attach Copper Cable Specifications *(continued)*

Product Number	Specifications	
QFX-SFP-DAC-5MA	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.627 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Length	5 m (16.4 ft)
QFX-SFP-DAC-7MA	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.627 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Length	7 m (23 ft)

Table 41: SFP+ Active Direct Attach Copper Cable Specifications *(continued)*

Product Number	Specifications	
QFX-SFP-DAC-10MA QFX5100 only	Rate	10-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.627 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	28 AWG
	Minimum cable bend radius	2 in. (5 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2% maximum
	Length	10 m (32.8 ft)

Related Documentation

- Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 125
- Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 145
- Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 149
- *Installing a Transceiver in a QFX Series Device*
- *Removing a Transceiver from a QFX Series Device*

Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series

Supported Platforms QFabric System, QFX Series standalone switches

Quad small form-factor pluggable plus (QSFP+) transceiver to four small form-factor pluggable plus (SFP+) direct-attach copper (DAC) breakout cables are suitable for in-rack connections between servers and the QFX Series.

You can use breakout cables purchased from a third party. These cables should meet the specifications described in Table 43 on page 147. Table 42 on page 146 describes the Junos OS software releases that supports third-party DAC breakout cables. Earlier releases do not support third-party breakout cables.

Table 42: Third-Party QSFP+ DAC Breakout Cable Support

Platform	Third-Party DAC Breakout Cable Support Added
QFX3600 Node device in a QFabric system	Junos OS 12.2X50-D10
QFX3600 device as a standalone switch	Junos OS 12.2X50-D20
QFX3500 device as a standalone switch	Junos OS 11.3R4
QFX5100 device as a standalone switch	Junos OS 13.2X51-D10

NOTE: This topic does not describe which devices support these transceivers. For information about which transceivers are supported on QFX Series devices, see the following topics:

- Interface Support for the QFX5100 Device on page 120
- Interface Support for the QFX3600 Device on page 111
- Interface Support for the QFX3500 Device on page 115

The cables are hot-removable and hot-insertable. A breakout cable consists of a QSFP+ transceiver on one end and four SFP+ transceivers on the other end. The QSFP+ transceiver connects directly into the QSFP+ access port on the QFX Series device. The cables use high-performance integrated duplex serial data links for bidirectional communication on four links simultaneously. The SFP+ links are designed for data rates up to 10 Gbps each. Passive breakout cables have no signal amplification built into the cable assembly. There are two types of DAC cables:

- Passive DAC cables have no signal amplification built into the cable assembly. Table 43 on page 147 describes the passive QSFP+ DAC breakout cable specifications.
- Active DAC cables have signal amplification and equalization built into the cable assembly. Table 44 on page 148 describes the passive QSFP+ DAC breakout cable specifications.

Table 43: QSFP+ DAC Passive Breakout Cable Specifications

Product SKU	Specifications	
QFX-QSFP-DACBO-1M NOTE: Not available on the QFX5100-48T	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Time delay	4.3 nsec/m
	Length	1 m (3.3 ft)
QFX-QSFP-DACBO-3M NOTE: Not available on the QFX5100-48T	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Time delay	4.3 nsec/m
	Length	3 m (9.9 ft)

Table 43: QSFP+ DAC Passive Breakout Cable Specifications *(continued)*

JNP-QSFP-DACBO-10M	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	28 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Time delay	4.5 nsec/m
	Length	10 m (32.8 ft)

Table 44: QSFP+ Active DAC Breakout Cable Specifications

Product SKU	Specifications	
JNP-QSFP-DACBO-5MA	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	0.3 in. (0.762 cm)
	Cable characteristic impedance	100 ohms
	Time delay	4.5 nec/m
	Length	5 m (16.4 ft)

Table 44: QSFP+ Active DAC Breakout Cable Specifications *(continued)*

Product SKU	Specifications	
JNP-QSFP-DACBO-7MA	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	0.3 in. (0.762 cm))
	Cable characteristic impedance	100 ohms
	Time delay	4.5 nsec/m
	Length	7 m (22.9 ft)

Related Documentation

- Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 125
- Interface Specifications for SFP+ DAC Cables for the QFX Series on page 139
- Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 149
- *Installing a Transceiver in a QFX Series Device*
- *Removing a Transceiver from a QFX Series Device*

Interface Specifications for QSFP+ DAC Cables for the QFX Series

Supported Platforms QFabric System, QFX Series standalone switches

Quad small form-factor pluggable plus (QSFP+) direct-attach copper (DAC) cables are suitable for connections between QFX3500, QFX3600, and QFX5100 devices operating as a standalone switch and QFX3600 Node devices, and between QFX3500 or QFX3600 Node devices and QFX3600-I Interconnect devices. Juniper Networks QSFP+ DAC cables may also be used in QFX Virtual Chassis and Virtual Chassis Fabric (VCF).

NOTE: The QSFP+ DAC cables consist of a cable assembly terminated with QSFP+ transceivers on either end. If you use the QSFP+ DAC cable as the data plane connection between a QFX3600-I and QFX3600 or QFX3500 Node device, the interface is automatically configured to operate at 40 Gbps. If you use the QSFP+ DAC cable to interconnect a QFX3600 Node device with another device, the interface is automatically configured to operate as four 10-Gigabit Ethernet interfaces over one cable.

CAUTION: We highly recommend using Juniper Networks DAC cables. You can use DAC cables purchases from a third party at your own risk. If there is a problem with the cable or the transceiver, support will not be provided. If you choose to use a third-party able, it should meet the specifications described in Table 46 on page 151.

Table 45 on page 150 describes the Junos OS software releases that supports third-party DAC breakout cables. Earlier releases do not support third-party breakout cables.

Table 45: Third-Party QSFP+ DAC Cable Support

Platform	Third-Party DAC Cable Support Added
QFX3600 Node device in a QFX3000-M QFabric system	Junos OS 12.2X50-D10
QFX3600 device as a standalone switch	Junos OS 12.2X50-D20
QFX3500 Node device in a QFX3000-M QFabric system	Junos OS 12.2X50-D10
QFX3500 device as a standalone switch	Junos OS 12.2X50-D10
QFX5100 device as a standalone switch	Junos OS 12.2X51-D10

NOTE: This topic does not describe which devices support these transceivers. For information about which transceivers are supported on QFX Series devices, see the following topics:

- Interface Support for the QFX3600 Device on page 111
- Interface Support for the QFX3500 Device on page 115
- Interface Support for the QFX5100 Device on page 120

The cables are hot-removable and hot-insertable. A cable consists of a cable assembly that connects directly into two QSFP+ modules, one at each end of the cable. The cables use integrated duplex serial data links for bidirectional communication and are designed for data rates up to 40 Gbps.

Passive DAC cables have no signal amplification built into the cable assembly. Table 46 on page 151 describes the passive DAC cable specifications for QSFP+.

Active DAC cables have signal amplification and equalization built into the cable assembly. Table 47 on page 153 describes the active DAC cable specifications.

Table 46: Interface Specifications for Passive Copper QSFP+ DAC Cables

Product Number	Specifications	
QFX-QSFP-DAC-1M	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.015 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	1% maximum
	Time delay	4.3 nsec/m
	Length	1 m (3.3 ft)

Table 46: Interface Specifications for Passive Copper QSFP+ DAC Cables *(continued)*

Product Number	Specifications	
QFX-QSFP-DAC-3M	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.015 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	1% maximum
	Time delay	4.3 nsec/m
	Length	3 m (9.9 ft)
JNP-QSFP-DAC-5M	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption (per end)	0.015 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	1 in. (2.54 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	1% maximum
	Time delay	4.3 nsec/m
	Length	5 m (16.4 ft)

Table 47: Interface Specifications for Active Copper QSFP+ DAC Cables

Product Number	Specifications	
JNP-QSFP-DAC-5MA	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption	0.015 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	0.3 in. (0.762 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	% maximum
	Time delay	4.3 nsec/m
	Length	5 m (16.4 ft)
JNP-QSFP-DAC-7MA	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption	0.015 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	30 AWG
	Minimum cable bend radius	0.3 in. (0.762 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2 % maximum
	Time delay	4.3 nsec/m
	Length	7 m (22.9 ft)

Table 47: Interface Specifications for Active Copper QSFP+ DAC Cables *(continued)*

Product Number	Specifications	
JNP-QSFP-DAC-10MA	Rate	40-Gbps full-duplex serial transmission
	Connector type	Copper pigtail
	Supply voltage	3.3 V
	Power consumption	0.058 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	28 AWG
	Minimum cable bend radius	0.3 in. (0.762 cm)
	Cable characteristic impedance	100 ohms
	Crosstalk between pairs	2 % maximum
	Time delay	4.3 nsec/m
	Length	10 m (32.8 ft)

Related Documentation

- Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 125
- Interface Specifications for SFP+ DAC Cables for the QFX Series on page 139
- Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 145
- *Installing a Transceiver in a QFX Series Device*
- *Removing a Transceiver from a QFX Series Device*

Cable Specifications for Copper-Based Control Plane Connections for the QFabric System

Supported Platforms QFabric System

QFX Series devices support using RJ-45 patch cables to interconnect the copper-based QFabric system control plane. The RJ-45 patch cables connect to 1000BASE-T ports on the network modules in the QFX3100 Director device and the management ports in the QFX3500 Node device, QFX3600 Node device, and QFX3600-I Interconnect device. In the QFX3008-I Interconnect device Control Board, the RJ-45 patch cables are used with 1000BASE-T SFP modules (Juniper model number QFX-SFP-1GE-T) installed in the SFP+ ports.

NOTE: For information about the QFX-SFP-1GE-T SFP module, see "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125.

Table 48 on page 155 lists the specifications for the cables that connect the QFabric system control plane.

Table 48: Cable Specifications for Copper-Based Control Plane Connections for the QFabric System

Port on QFX Series Device	Cable Specification	Maximum Length	Device Receptacle
• QFX3100 Director device network module ports • QFX3008-I Interconnect device Control Board management ports (with 1000BASE-T SFP module) • QFX3600-I Interconnect device management (**C0** and **C1**) ports • QFX3600 Node device management (**C0** and **C1**) ports • QFX3500 Node device management (**C0** and **C1**) ports	Category 5 cable or equivalent suitable for 1000BASE-T operation with RJ-45 connectors	328 feet (100 meters)	RJ-45

Related Documentation

- Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 280
- *Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting a QFX3600-I Interconnect Device to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- Connecting a QFX3500 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 288
- Connecting a QFX3600 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 286
- *Connecting a QFX3500 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting a QFX3600 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- Connecting a QFX5100 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 291
- *Connecting a QFX5100 Node Device to a QFX3600-I Interconnect Device*

CHAPTER 8

Power

AC Power Specifications for a QFX3100 Director Device

Supported Platforms QFabric System

Table 49 on page 157 describes the AC power specifications for a QFX3100 Director device.

Table 49: AC Power Specifications for a QFX3100 Director Device

Item	Specifications
AC input voltage	Operating range: 100–240 VAC

Table 49: AC Power Specifications for a QFX3100 Director Device *(continued)*

Item	Specifications
AC input line frequency	50–60 Hz
AC input current rating	• 5 A at 100 VAC • 2 A at 240 VAC
Typical power consumption	476 W
Maximum power consumption	220 W

Related Documentation

- *AC Power Supply in a QFX3100 Director Device*
- AC Power Cord Specifications for a QFX3100 Director Device on page 158

AC Power Cord Specifications for a QFX3100 Director Device

Supported Platforms QFabric System

Detachable AC power cords are supplied with the QFX3100 Director device. The coupler is type C13 as described by International Electrotechnical Commission (IEC) standard 60320. The plug at the male end of the power cord fits into the power source outlet that is standard for your geographical location.

CAUTION: The supplied AC power cord for the switches is intended for use with the QFX3100 Director device only and not for any other use.

NOTE: In North America, AC power cords must not exceed 4.5 meters (approximately 14.75 feet) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52 and Canadian Electrical Code (CEC) Section 4-010(3). The cords supplied with the QFX3100 Director device are in compliance.

Table 50 on page 158 lists AC power cord specifications provided for each country or region.

Table 50: AC Power Cord Specifications for a QFX3100 Director Device

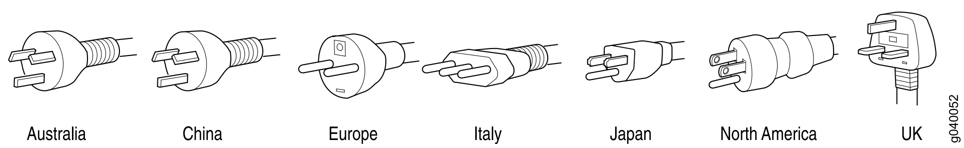
Country or Region	Electrical Specifications	Plug Standards
Australia	250 VAC, 10 A, 50 Hz	AS/NZ 3112-1993
China	250 VAC, 10 A, 50 Hz	GB2099.1 1996 and GB1002 1996 (CH1-10P)

Table 50: AC Power Cord Specifications for a QFX3100 Director Device *(continued)*

Country or Region	Electrical Specifications	Plug Standards
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16/VII
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	JIS 8303
Korea	250 VAC, 10A, 50 Hz	CEE 7/4
North America	125 VAC, 13 A, 60 Hz	NEMA 5-15
Switzerland	250 VAC, 10A, 50 Hz	SEV 1011 SEV 6534/2
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363A

Figure 20 on page 159 illustrates the plug on the power cord for some of the countries or regions listed in Table 50 on page 158.

Figure 20: AC Plug Types



Related Documentation

- *AC Power Supply in a QFX3100 Director Device*
- *General Safety Guidelines and Warnings*
- *General Electrical Safety Guidelines and Warnings*
- *Prevention of Electrostatic Discharge Damage*

AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays

Supported Platforms QFX3000-G

Table 51 on page 159 lists the AC power system specifications for a QFX3008-I Interconnect device using single-phase wiring trays.

Table 51: AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays

Item	Specifications
AC input voltage	200–240 VAC
AC input line frequency	50–60 Hz

Table 51: AC Power Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays *(continued)*

Item	Specifications
AC system current rating	16 A per appliance inlet (48 A per wiring tray)
AC system input power	9000 W (3000 W per power supply)

Related Documentation

- *AC Power Supply in a QFX3008-I Interconnect Device*
- *AC Power Supply LEDs on a QFX3008-I Interconnect Device*
- AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 161

AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays

Supported Platforms QFX3000-G

Table 52 on page 160 lists the AC power system specifications for a QFX3008-I Interconnect device using three-phase delta wiring trays.

Table 52: AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays

Item	Specifications
AC input voltage	200–240 VAC
AC input line frequency	50–60 Hz
AC system current rating	40 A
AC system input power	13,333 W

Related Documentation

- *AC Power Supply in a QFX3008-I Interconnect Device*
- *AC Power Supply LEDs on a QFX3008-I Interconnect Device*
- AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 163

AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays

Supported Platforms QFX3000-G

Table 53 on page 161 lists the AC power system specifications for a QFX3008-I Interconnect device using three-phase wye wiring trays.

Table 53: AC Power Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays

Item	Specifications
AC input voltage	380 VAC
AC input line frequency	50–60 Hz
AC system current rating	24 A
AC system input power	13,333 W

Related Documentation

- *AC Power Supply in a QFX3008-I Interconnect Device*
- *AC Power Supply LEDs on a QFX3008-I Interconnect Device*
- AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 164

AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays

Supported Platforms QFX3000-G

Most sites distribute power through a main conduit that leads to frame-mounted power distribution panels, one of which can be located at the top of the rack that houses the device. AC power cords connect each wiring tray to the power distribution panel.

Three detachable AC power cords, each 2.5 m (approximately 8 ft) long, are required for each single-phase wiring tray. Depending on your configuration, these power cords are supplied with your device. The appliance coupler at the female end of the cord inserts into one of the three appliance inlets on the faceplate of the single-phase wiring tray. The coupler is type C19 as described by International Electrotechnical Commission (IEC) standard 60320. The plug at the male end of the power cord fits into the power source receptacle that is standard for your geographical location.

WARNING: The QFX3008-I Interconnect device is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth.

WARNING: The AC power cord for the device is intended for use with the device only and not for any other use.

WARNING: Translation from Japanese: The attached power cable is only for this product. Do not use the cable for another product.

注意

附属の電源コードセットはこの製品専用です。
他の電気機器には使用しないでください。

g017253

CAUTION: Power cords and cables must not block access to device components or drape where people could trip on them.

NOTE: In North America, AC power cords must not exceed 4.5 m (approximately 14.75 ft) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52, and Canadian Electrical Code (CEC) Section 4-010(3). The cords supplied with the router are in compliance.

Table 54 on page 162 provides specifications for the AC power cord provided for each region supported.

Table 54: AC Power Cord Specifications for a Single-Phase Wiring Tray

Country/Region	Electrical Specifications	Plug Standards
Australia	250 VAC, 15 A, 50 Hz	AS/NZS 3112 Type SAA/3/15
China	250 VAC, 16 A, 50 Hz	GB 1002 Type PRC/3/16
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 16 A, 50 Hz	CEE (7) VII Type VIIG
Italy	250 VAC, 16 A, 50 Hz	CEI 23-16 Type I/3/16
Japan	250 VAC, 16 A, 50 Hz	NEMA 6-20 Type N6/20
		NEMA L6-20 Type NEMA Locking
	125VAC, 15A, 50 Hz	NEMA 5-20 Type N5/20
North America	250 VAC, 16 A, 50 Hz	NEMA 6-20 Type N6/20
		NEMA L6-20 Type NEMA Locking
	125 VAC, 20 A, 50 Hz	NEMA 5-20 Type N5/20

Table 54: AC Power Cord Specifications for a Single-Phase Wiring Tray *(continued)*

Country/Region	Electrical Specifications	Plug Standards
South Korea	250 VAC, 16 A, 50 Hz	CEE(7) VII Type VIIG
Switzerland	250 VAC, 16 A, 50 Hz	SEV 5934-2 Type 23G
United Kingdom	250 VAC, 13 A, 50 Hz	BS 1363/A Type BS89/13

Related Documentation

- *AC Power Supply in a QFX3008-I Interconnect Device*
- *General Electrical Safety Guidelines and Warnings*
- *AC Power Electrical Safety Guidelines*
- *AC Power Disconnection Warning*
- Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 206

AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays

Supported Platforms QFX3000-G

Most sites distribute power through a main conduit that leads to frame-mounted power distribution panels, one of which can be located at the top of the rack that houses the device. An AC power cord connects each wiring tray to the power distribution panel.

WARNING: The QFX3008-I Interconnect device is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth.

CAUTION: Power cords and cables must not block access to device components or drape where people could trip on them.

Each three-phase AC wiring tray has a metal wiring compartment that contains the AC terminal block and ground. There are two types of three-phase wiring trays: *delta* (three-wire) and *wye* (four-wire). The *delta* AC terminal block consists of three input terminals labeled **L1**, **L2**, and **L3**, from top to bottom in the common three-phase naming convention.

You must provide cords appropriate for your geographical location. The AC power cord wires insert into the AC terminal block on the wiring tray.

The power cords you provide must comply with the specifications listed in Table 55 on page 164.

NOTE: In North America, AC power cords must not exceed 4.5 m (approximately 14.75 ft) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52, and Canadian Electrical Code (CEC) Section 4-010(3).

Table 55: Three-Phase Delta AC Power Cord Specifications

Electrical Rating	Plug Type	Plug Color	Cord or Cable Type
250 VAC, 60 A	International Electrotechnical Commission (IEC) 60309	Blue	The cord or cable must be HAR compliant, IEC 60245 (designation 60245 IEC 53) or IEC 60227 (designation 60227 IEC 53); or meet one of the following standards (North America): SV, SVE, SVO, SVOO, SVT, SVTO, SVTOO, SP-2, SPE-2, SPT-2, NISP-2, NISPE-2, NISPT-2, SP-3, SPE-3, SPT-3, SJ, SJE, SJO, SJOO, SJT, SJTO, SJTOO, S, SE, SO, SOO, ST, STO, STOO

Related Documentation

- *AC Power Supply in a QFX3008-I Interconnect Device*
- *Wiring Tray in a QFX3008-I Interconnect Device*
- *AC Power Electrical Safety Guidelines*
- *AC Power Disconnection Warning*
- *General Electrical Safety Guidelines and Warnings*
- Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 213

AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays

Supported Platforms QFX3000-G

Most sites distribute power through a main conduit that leads to frame-mounted power distribution panels, one of which can be located at the top of the rack that houses the device. An AC power cord connects each wiring tray to the power distribution panel.

WARNING: The QFX3008-I Interconnect device is pluggable type A equipment installed in a restricted-access location. It has a separate protective earthing terminal provided on the chassis in addition to the grounding pin of the power supply cord. This separate protective earthing terminal must be permanently connected to earth.

CAUTION: Power cords and cables must not block access to device components or drape where people could trip on them.

Each three-phase AC wiring tray has a metal wiring compartment that contains the AC terminal block and ground. There are two types of three-phase wiring trays: *delta* (three-wire) and *wye* (four-wire). The *wye* AC terminal block consists of four input terminals labeled **N**, **L1**, **L2**, and **L3**, from top to bottom in the common three-phase naming convention.

You must provide cords appropriate for your geographical location. The AC power cord wires insert into the AC terminal block on the wiring tray.

The power cords you provide must comply with the specifications listed in Table 56 on page 165.

NOTE: In North America, AC power cords must not exceed 4.5 m (approximately 14.75 ft) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52, and Canadian Electrical Code (CEC) Section 4-010(3).

Table 56: Three-Phase Delta AC Power Cord Specifications

Electrical Rating	Plug Type	Plug Color	Cord or Cable Type
400 VAC, 32 A	International Electrotechnical Commission (IEC) 60309	Red	The cord or cable must be HAR compliant, IEC 60245 (designation 60245 IEC 53) or IEC 60227 (designation 60227 IEC 53); or meet one of the following standards (North America): SV, SVE, SVO, SVOO, SVT, SVTO, SVTOO, SP-2, SPE-2, SPT-2, NISP-2, NISPE-2, NISPT-2, SP-3, SPE-3, SPT-3, SJ, SJE, SJO, SJOO, SJT, SJTO, SJTOO, S, SE, SO, SOO, ST, STO, STOO

Related Documentation

- *AC Power Supply in a QFX3008-I Interconnect Device*
- *Wiring Tray in a QFX3008-I Interconnect Device*
- *AC Power Electrical Safety Guidelines*
- *AC Power Disconnection Warning*
- *General Electrical Safety Guidelines and Warnings*
- Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 217

AC Power Specifications for a QFX3600 or QFX3600-I Device

Supported Platforms QFabric System, QFX3600

Table 57 on page 166 describes the AC power specifications for a QFX3600 or QFX3600-I device.

Table 57: AC Power Specifications for a QFX3600 or QFX3600-I Device

Item	Specification
AC input voltage	Operating range: • 100–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	• 4 A at 100VAC • 2 A at 240 VAC
Typical power consumption	255 W
Maximum power consumption	345 W

Related Documentation

- AC Power Cord Specifications for a QFX Series Device on page 168
- *AC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *General Safety Guidelines and Warnings*
- *General Electrical Safety Guidelines and Warnings*

AC Power Specifications for a QFX3500 Device

Supported Platforms QFabric System, QFX3500

Table 58 on page 166 describes the AC power specifications for a QFX3500 device.

Table 58: AC Power Specifications for a QFX3500 Device

Item	Specification
AC input voltage	Operating range: • 100–127 VAC • 200–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	• 7.8 A at 100–127 VAC • 3.8 A at 200–240 VAC
Typical power consumption	230 W
Maximum power consumption	365 W

Related Documentation

- AC Power Cord Specifications for a QFX Series Device on page 168
- *AC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *General Safety Guidelines and Warnings*
- *General Electrical Safety Guidelines and Warnings*

AC Power Specifications for a QFX5100 Device

Supported Platforms QFabric System, QFX5100

Table 59 on page 167 describes the AC power specifications for a QFX5100 switch.

Table 59: AC Power Specifications for a QFX5100 Switch

Item	Specification
AC input voltage	Operating range: • 100 / 240 VAC
AC input line frequency	50–60 Hz (all product SKUs)
AC input current rating	• 4.5 A at 100–120 VAC • 2.0 A at 200–240 VAC
Typical power consumption	
QFX5100-24Q	230 W
QFX5100-48S	230 W
QFX5100-48T	322 W
QFX5100-96S	315 W
Maximum power consumption	
QFX5100-24Q	365 W
QFX5100-48S	365 W
QFX5100-48T	395 W
QFX5100-96S	470 W

Related Documentation

- AC Power Cord Specifications for a QFX Series Device on page 168
- *AC Power Supply for a QFX5100 Device*

- *General Safety Guidelines and Warnings*
- *General Electrical Safety Guidelines and Warnings*

AC Power Cord Specifications for a QFX Series Device

Supported Platforms QFabric System, QFX Series standalone switches

Detachable AC power cords are shipped with the chassis, if you include them as part of your order. The coupler is type C13 as described by International Electrotechnical Commission (IEC) standard 60320. The plug at the male end of the power cord fits into the power source outlet that is standard for your geographical location.

NOTE: In North America, AC power cords must not exceed 4.5 meters (approximately 14.75 feet) in length, to comply with National Electrical Code (NEC) Sections 400-8 (NFPA 75, 5-2.2) and 210-52 and Canadian Electrical Code (CEC) Section 4-010(3). The cords that can be ordered for the QFX3500, QFX3600, QFX3600-I, and QFX5100 devices are in compliance.

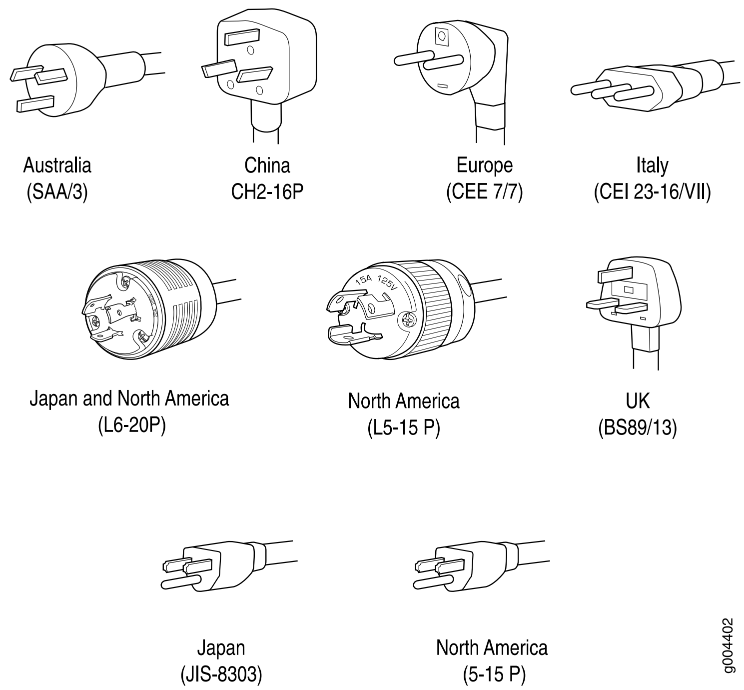
Table 60 on page 168 lists AC power cord specifications provided for each country or region.

Table 60: AC Power Cord Specifications

Country/Region	Electrical Specifications	Plug Standards
Australia	250 VAC, 10 A, 50 Hz	AS/NZ 3112-1993
China	250 VAC, 10 A, 50 Hz	GB2099.1 1996 and GB1002 1996 (CH1-10P)
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16/VII
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	JIS 8303
North America	125 VAC, 13 A, 60 Hz	NEMA 5-15
South Korea	250 VAC, 10 A, 60 Hz	KSC 8305
Switzerland	250 VAC, 10 A, 50 Hz	SEV 1011 SEV 6534/2
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363A

Figure 21 on page 169 illustrates the plug on the power cord for some of the countries or regions listed in Table 60 on page 168.

Figure 21: AC Plug Types



Related Documentation

- *AC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *General Safety Guidelines and Warnings*
- *General Electrical Safety Guidelines and Warnings*
- *Prevention of Electrostatic Discharge Damage*
- *AC Power Supply for a QFX5100 Device*

DC Power Specifications for a QFX3600 or QFX3600-I Device

Supported Platforms QFabric System, QFX3600

Table 61 on page 169 describes the DC power specifications for a QFX3600 or QFX3600-I device.

Table 61: DC Power Specifications for a QFX3600 or QFX3600-I Device

Item	Specifications
DC input voltage	• Minimum operating voltage: –40 VDC • Nominal operating voltage: –48 VDC • Operating voltage range: –40 VDC through –72 VDC
DC input current rating	8 A maximum at nominal operating voltage (–48 VDC)
Typical power consumption	341 W

Table 61: DC Power Specifications for a QFX3600 or QFX3600-I Device *(continued)*

Item	Specifications
Maximum power consumption	252 W

Related Documentation

- *DC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *DC Power Supply LEDs on a QFX3500, QFX3600, or QFX3600-I Device*

DC Power Specifications for a QFX3500 Device

Supported Platforms QFabric System, QFX3500

Table 62 on page 170 describes the DC power specifications for a QFX3500 device.

Table 62: DC Power Specifications for a QFX3500 Device

Item	Specifications
DC input voltage	• Minimum operating voltage: –40 VDC • Nominal operating voltage: –48 VDC • Operating voltage range: –40 VDC through –72 VDC
DC input current rating	7 A maximum at nominal operating voltage (–48 VDC)
Typical power consumption	250 W
Maximum power consumption	385 W

Related Documentation

- *DC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *DC Power Supply LEDs on a QFX3500, QFX3600, or QFX3600-I Device*

DC Power Specifications for a QFX5100 Device

Supported Platforms QFX5100

Table 63 on page 171 describes the DC power specifications for DC product SKUs of the QFX5100 switch.

Table 63: DC Power Specifications for a QFX5100 Switch

Item	Product SKUs	Specifications
DC input voltage	QFX5100-24Q QFX5100-48S QFX5100-48T	• Rated operating voltage: –48 VDC to -60 VDC • Operating voltage range: -40 VDC through –72 VDC
	QFX5100-96S	• Rated operating voltage: VDC -48 VDC to -60 VDC • Operating voltage range: –40 VDC through -72 VDC
DC input current rating	QFX5100-24Q QFX5100-48S QFX5100-48T QFX5100-96S	10 A maximum
Typical power consumption	QFX5100-48S QFX5100-48T QFX5100-24Q	300 W
	QFX5100-96S	315 W
Maximum power consumption	QFX5100-24Q QFX5100-48S QFX5100-48T	385 W
	QFX5100-96S	470 W

Related Documentation

- *DC Power Supply in a QFX5100 Device*
- *DC Power Supply LEDs on a QFX5100 Device*

CHAPTER 9

Installing a QFX3100 Director Device

Installing and Connecting a QFX3100 Director Device

Supported Platforms QFabric System

To install and connect a QFX3100 Director device:

1. Follow instructions in “Unpacking a QFX3100 Director Device” on page 174.
2. Mount the QFX3100 Director device by following instructions appropriate for your site:
   - “Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet” on page 176 (using the mounting brackets provided)
   - “Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet” on page 177 (using the mounting brackets provided)
3. Follow instructions in “Connecting AC Power to a QFX3100 Director Device” on page 179 to connect power.
4. See “QFX3000-G QFabric System Installation Overview” on page 95 for information about the steps to install and configure your QFX3000-G QFabric system. See *QFX3000-M QFabric System Installation Overview* for information about the steps to install and configure your QFX3000-M QFabric system.

Related Documentation

- *Rack Requirements for a QFX3100 Director Device*
- *Cabinet Requirements for a QFX3100 Director Device*
- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3100 Director Device*

Unpacking a QFX3100 Director Device

Supported Platforms QFabric System

The QFX3100 Director devices are shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box and quick start instructions.

CAUTION: QFX3100 Director devices are maximally protected inside the shipping carton. Do not unpack the Director devices until you are ready to begin installation.

To unpack a QFX3100 Director device (see Figure 22 on page 175):

1. Move the shipping carton to a staging area as close to the installation site as possible but where you have enough room to remove the system components.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Remove the accessory box and verify the contents against the parts inventory.
5. Pull out the packing material holding the QFX3100 Director device in place.
6. Verify the components received against the inventory provided in Table 64 on page 175.
7. Save the shipping carton and packing materials in case you need to move or ship the device later.

Figure 22: Unpacking a QFX3100 Director Device

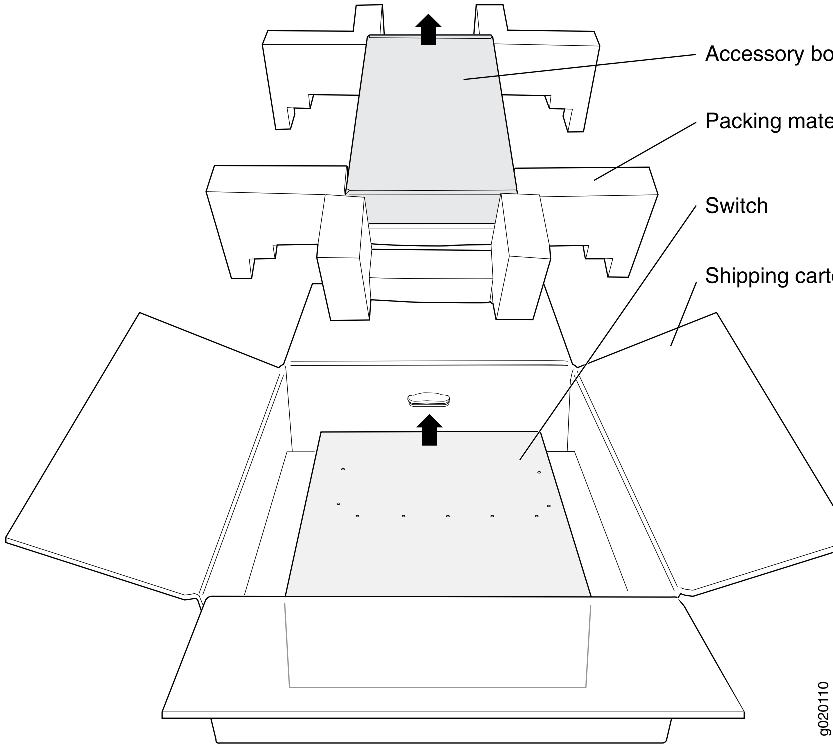


Table 64: Inventory of Components Provided with a QFX3100 Director Device

Component	Quantity
QFX3100 Director device	1
Fan module (installed)	3
AC power supply module (installed)	2
4-port Ethernet network module (installed)	2
Hard disk drive (HDD) module (installed)	2
Mounting screws	8
Two-post rack-mount kit	1
Four-post rack-mount kit	1

Related Documentation

- Installing and Connecting a QFX3100 Director Device on page 173

Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet

Supported Platforms QFabric System

You can mount a QFX3100 Director device on two posts of a 19-in. rack or cabinet by using the mounting brackets provided with the device. (The remainder of this topic uses "rack" to mean "rack or cabinet.")

You can mount the QFX3100 Director device on four posts of a four-post rack by using the side rail brackets provided with the device. See "Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet" on page 177.

Before mounting the device on two posts in a rack:

- Verify that the site meets the requirements described in *Site Preparation Checklist for a QFX3100 Director Device*.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read *General Safety Guidelines and Warnings*.
- Remove the device from the shipping carton (see "Unpacking a QFX3100 Director Device" on page 174).

Ensure that you have the following parts and tools available:

- Electrostatic discharge (ESD) grounding strap (provided)
- Phillips (+) screwdriver, number 2
- Four mid-mount mounting brackets and mounting screws (provided)
- Screws to secure the chassis to the rack (not provided)

NOTE: **One person must be available to lift the QFX3100 Director device while another secures it to the rack.**

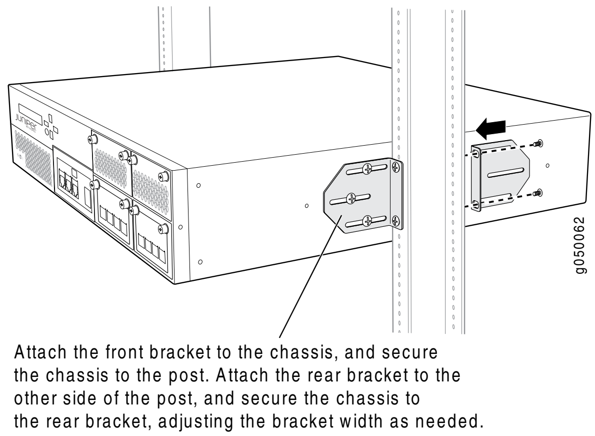
CAUTION: **If you are mounting multiple units on the rack, mount the heaviest unit at the bottom and mount the others from bottom to top in order of decreasing weight.**

To mount the QFX3100 Director device on two posts in a rack:

1. Place the QFX3100 Director device on a flat, stable surface.
2. Align one mid-mount bracket to the mid-mount bracket holes near the center of the side of the QFX3100 Director device. Ensure that the bracket is aligned with the mounting holes and that the bracket face is facing the rack post.
3. Attach the mounting bracket to the QFX3100 Director device.

4. Mount the attached mounting bracket to the rack post. Tighten all screws.
5. Attach the mounting bracket on the opposite end of the same side to the QFX3100 Director device and mount it to the rack post. Tighten all screws.
6. Repeat this procedure for the mounting brackets on the opposite side of the QFX3100 Director device. Tighten all screws.
7. Ensure that the QFX3100 Director device chassis is level by verifying that all screws on one side of the rack are aligned with the screws on the other side. See Figure 23 on page 177.

Figure 23: Mounting the QFX3100 Director Device on Two Posts in a Rack



Related Documentation

- *Rack-Mounting and Cabinet-Mounting Warnings*
- Installing and Connecting a QFX3100 Director Device on page 173
- Connecting AC Power to a QFX3100 Director Device on page 179

Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet

Supported Platforms QFabric System

You can mount a QFX3100 Director device on four posts of a 19-in. rack or cabinet by using the adjustable rear mounting brackets provided. (The remainder of this topic uses “rack” to mean “rack or cabinet.”)

Before mounting the QFX3100 Director device on four posts in a rack:

- Verify that the site meets the requirements described in *Site Preparation Checklist for a QFX3100 Director Device*.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read *General Safety Guidelines and Warnings*.
- Remove the QFX3100 Director device from the shipping carton (see “Unpacking a QFX3100 Director Device” on page 174).

Ensure that you have the following parts and tools available:

- Electrostatic discharge (ESD) grounding strap (provided).
- Phillips (+) screwdriver, number 2.
- Screws to secure the chassis and mounting brackets to the rack (not provided).
- One pair of adjustable rear mounting brackets (provided). These mounting brackets support the rear of the chassis, and must be installed.
- Screws to attach the mounting brackets to the chassis (provided).

CAUTION: **If you are mounting multiple units on a rack, mount the heaviest unit at the bottom of the rack and mount the other units from the bottom of the rack to the top in decreasing order of the weight of the units.**

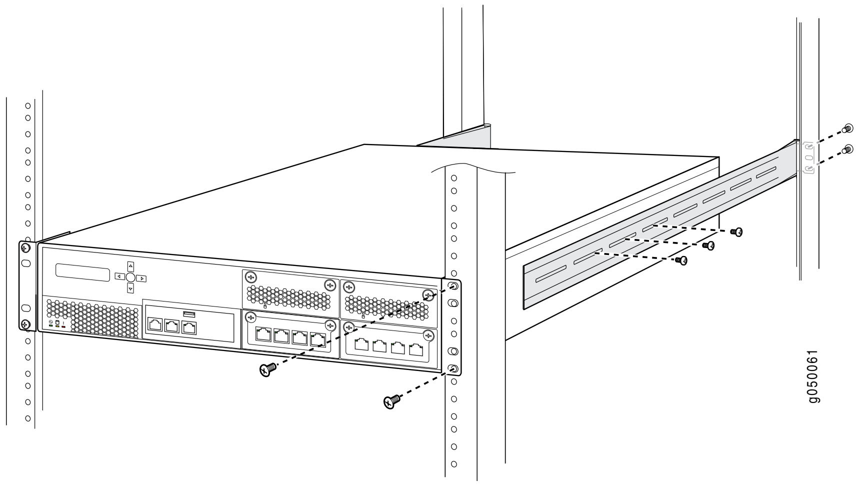
To mount the QFX3100 Director device on four posts in a rack:

1. Place the QFX3100 Director device on a flat, stable surface.
2. Measure the distance between the front and rear rack rails. Using this measurement, attach the adjustable rear mounting brackets on the chassis using the provided screws.
3. Flip the hinged rack-mounting plates at the end of the brackets outward.

   NOTE: **The device weighs approximately 41.2 lb (18.73 kg). Installing the QFX3100 Director device in a rack or cabinet requires one person to lift it and a second person to secure it to the rack.**

4. Have one person grasp both sides of the device, lift it, and position it in the rack, aligning the bracket holes with the holes in the rack.
5. Have a second person install a mounting screw—and cage nut and washer if your rack requires them—in each of the four bracket holes to secure the device to the front rack rails.
6. While still supporting the chassis, have the second person install a mounting screw—and cage nut and washer if your rack requires them—in each of the four bracket holes on the adjustable rear mounting brackets to secure the device to the rear rack rails.
7. Ensure that the chassis is level by verifying that all the screws on the front of the rack are aligned with the screws at the back of the rack. See Figure 24 on page 179.

Figure 24: Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet



Related Documentation

- *Connecting Earth Ground to an EX Series Switch*
- Connecting AC Power to a QFX3100 Director Device on page 179
- Installing and Connecting a QFX3100 Director Device on page 173
- *Rack-Mounting and Cabinet-Mounting Warnings*

Connecting AC Power to a QFX3100 Director Device

Supported Platforms QFabric System

The power supply in a QFX3100 Director device is a hot-removable and hot-insertable field-replaceable unit (FRU) located on the far right side of the rear panel. You can remove and replace a single power supply without powering off the QFX3100 Director device or disrupting QFX3100 Director device functions.

Before you begin connecting AC power to a QFX3100 Director device:

- Install the power supply in the chassis. See *Installing a Power Supply in a QFX3100 Director Device*.

NOTE: Each power supply must be connected to a dedicated power source outlet to ensure power supply redundancy.

Ensure that you have the following parts and tools available:

- A power cord appropriate for your geographical location

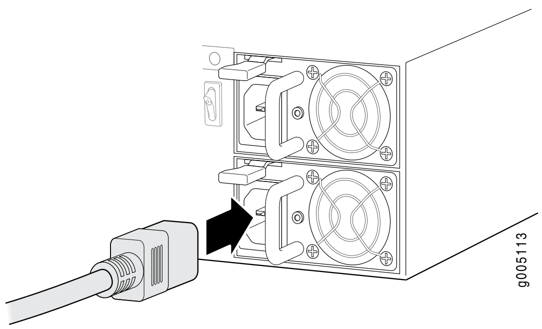
To connect AC power to a QFX3100 Director device (see Figure 25 on page 180):

1. Ensure that the power supplies are fully inserted in the QFX3100 Director device.
2. Locate the power cords shipped with the QFX3100 Director device; the cords have plugs appropriate for your geographical location. See "AC Power Cord Specifications for a QFX3100 Director Device" on page 158.

   WARNING: **Ensure that the power cord does not block access to QFX3100 Director device components or drape where people can trip on it.**

3. Insert the coupler end of the power cord into the AC power cord inlet on the AC power supply faceplate (see Figure 25 on page 180).

Figure 25: Connecting an AC Power Cord to an AC Power Supply in a QFX3100 Director Device



4. If the AC power source outlet has a power switch, set it to the OFF (O) position.
5. Insert the power cord plug into an AC power source outlet.
6. If the AC power source outlet has a power switch, set it to the ON (|) position.
7. Repeat these steps for the second AC power supply.
8. Press the power switch on the rear panel of the QFX3100 Director device to power on the device.

   NOTE: **Momentarily pressing the power switch causes the system to power on or causes a power event to the operating system, which causes a graceful shutdown. Pressing the power switch for 4 seconds or longer causes an abrupt power shutdown.**

9. Verify that the power LED on the power supply is lit and is on steadily.

Related Documentation

- Installing and Connecting a QFX3100 Director Device on page 173

- *AC Power Supply in a QFX3100 Director Device*

Connecting a QFX Series Device to a Management Console

Supported Platforms QFabric System, QFX Series standalone switches

The QFX Series has a console port with an RJ-45 connector. Use the console port to connect the device to a management console or to a console server.

Ensure that you have an RJ-45 to DB-9 rollover cable available. An RJ-45 cable with an RJ-45 to DB-9 adapter is provided with the device.

NOTE: If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to the QFX Series, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the device and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

To connect the QFX Series to a management console (see Figure 26 on page 181 and Figure 27 on page 181):

1. Connect one end of the Ethernet cable to the console port (labeled **CON**).
2. Connect the other end of the Ethernet cable into the console server (see Figure 26 on page 181) or management console (see Figure 27 on page 181).

Figure 26: Connecting the QFX Series to a Management Console Through a Console Server

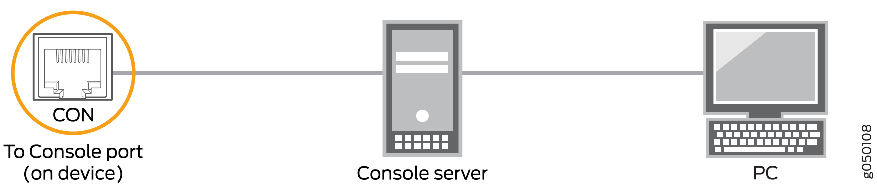


Figure 27: Connecting the QFX Series Directly to a Management Console

Related Documentation

- *Console Port Connector Pinouts for the QFX Series*

Powering On a QFX3100 Director Device

Supported Platforms QFabric System

Before you power on the QFX3100 Director device, ensure that:

- All required QFX3100 Director device components are installed.
- You understand how to protect the QFX3100 Director device from electrostatic damage. See *Prevention of Electrostatic Discharge Damage*.

Ensure that you have the following parts and tools available to power on the QFX3100 Director device:

- An external management device such as a PC to monitor the startup process—For connecting a management device to the console port, see "Connecting a QFX Series Device to a Management Console" on page 181. For connecting a management device to the management port, see "Connecting a QFX3100 Director Device to a Network for Out-of-Band Management" on page 282.

NOTE: You cannot use the management (MGMT) port to perform the initial configuration of the QFX3100 Director device. You must configure the management ports before you can successfully connect to the QFX3100 Director device using these ports. See "Performing the QFabric System Initial Setup on a QFX3100 Director Group" on page 411.

When you power on the QFX3100 Director devices in the Director group for the first time the first device to be powered on assumes the Director Group 0 (*dg0*) role. The second device to be powered on assumes the Director Group 1 (*dg1`*) role.

To power on the QFX3100 Director device:

1. Ensure that the power supplies are fully inserted in the QFX3100 Director device and that each of their handles is flush against the faceplate.
2. Ensure that the source power cord is inserted securely into the appliance inlet for each AC power supply.
3. Switch on the site circuit breakers.
4. Press the power switch on the rear panel of the QFX3100 Director device to power on the device.

   NOTE: Pressing the power switch momentarily either causes the system to power on or causes a graceful shutdown. Pressing the power switch for 4 seconds or longer causes an abrupt power shutdown.

5. Observe the power supply faceplate LEDs. If the power supply is installed correctly and functioning normally, the AC power supply LED is green.
6. On the external management device, monitor the startup process to ensure that the system boots properly.

NOTE: After you power on a power supply, wait for at least 60 seconds before you turn it off. After you power off a power supply, wait for at least 60 seconds before you turn it back on.

Related Documentation

- *Powering Off a QFX3100 Director Device*
- *AC Power Supply in a QFX3100 Director Device*
- AC Power Cord Specifications for a QFX3100 Director Device on page 158

CHAPTER 10

Installing a QFX3008-I Interconnect Device

Installing and Connecting a QFX3008-I Interconnect Device

Supported Platforms QFX3000-G

Before you begin, ensure that the installation site meets the requirements described in *Site Preparation Checklist for a QFX3008-I Interconnect Device*.

To install and connect a QFX3008-I Interconnect device:

1. Follow the instructions in "Unpacking a QFX3008-I Interconnect Device" on page 186.
2. Install the mounting hardware on your four-post or two-post rack or cabinet by following the instructions in "Installing QFX3008-I Interconnect Device Mounting Hardware on Four-Post Racks or Cabinets" on page 189 or "Installing QFX3008-I Interconnect Device Mounting Hardware on Two-Post Racks" on page 197.
3. Mount the device by following the instructions in "Mounting a QFX3008-I Interconnect Device on a Rack or Cabinet Using a Mechanical Lift" on page 201.
4. Connect the QFX3008-I Interconnect device to earth ground.

   See "Connecting Earth Ground to a QFX3008-I Interconnect Device" on page 204.
5. Connect power to the device.

   See "Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays" on page 206, "Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays" on page 213, and "Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays" on page 217.
6. (Optional) Install the cable management system or lockable front doors, by following the instructions in *Installing the Cable Management System on a QFX3008-I Interconnect Device* and *Installing the Lockable Front Doors on a QFX3008-I Interconnect Device*.
7. See "QFX3000-G QFabric System Installation Overview" on page 95 for information about the next steps to install and configure your QFX3000 QFabric system.

Related Documentation

- *Rack Requirements for a QFX3008-I Interconnect Device*
- *Cabinet Requirements for a QFX3008-I Interconnect Device*
- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device*
- *Chassis Lifting Guidelines for a QFX3008-I Interconnect Device*

Unpacking a QFX3008-I Interconnect Device

Supported Platforms QFX3000-G

After you prepare the installation site as described in *Site Preparation Checklist for a QFX3008-I Interconnect Device*, you may unpack the device.

NOTE: The device is maximally protected inside the shipping box. Do not unpack it until you are ready to begin installation.

Before you begin, ensure that you have the following parts and tools available to unpack the QFX3008-I Interconnect Device:

- Phillips (+) screwdriver, number 2
- A 5/16-in. open-end or socket wrench to remove the bracket bolts from the shipping pallet
- A box cutter or packing knife to slice open the tape that seals the top of the box

The device ships in a cardboard box that has a two-layer wooden pallet base with foam cushioning between the layers. The device chassis is bolted to the pallet base. Quick Start installation instructions and a cardboard accessory box are also included in the shipping crate.

To unpack the device:

1. Move the shipping box to a staging area as close to the installation site as possible. Make sure there is enough space to remove components from the chassis if necessary. While the chassis is bolted to the pallet, you can use a forklift or pallet jack to move it.
2. Remove the cardboard cover, foam padding, and accessory box.
3. Unpack the accessory box and lay out the contents so that they are ready for use.
4. Verify that your order includes all appropriate parts. See "Parts Inventory (Packing List) for a QFX3008-I Interconnect Device" on page 187.
5. Use a 5/16-in. open-end or socket wrench and a number 2 Phillips screwdriver to remove the four sets of bracket bolts and screws that secure the chassis to the shipping pallet. Store the brackets and bolts inside the accessory box.
6. Save the shipping box, pallet, and packing materials in case you need to move or ship the device at a later time.

Related Documentation

- Mounting a QFX3008-I Interconnect Device on a Rack or Cabinet Using a Mechanical Lift on page 201

Parts Inventory (Packing List) for a QFX3008-I Interconnect Device

Supported Platforms QFX3000-G

The device shipment includes a packing list. Check the parts you receive in the shipping crate against the items on the packing list. The packing list specifies the part number and description of each part in your order. The parts shipped depend on the configuration you order.

If any part on the packing list is missing, contact your customer service representative or contact Juniper Networks customer care from within the U.S. or Canada by telephone at 1-800-638-8296. For international-dial or direct-dial options in countries without toll-free numbers, see http://www.juniper.net/support/requesting-support.html .

Table 65 on page 188 lists the parts and their quantities in the packing list for a QFX3008-I Interconnect device.

Table 65: Parts List for QFX3008-I Interconnect Device Configurations

Component	Quantity
Chassis, including the midplane and rack-mounting brackets	1
Cable manager	1 (optional)
Lockable front door	1 (optional)
Control Boards	2
16-port QSFP+ front cards	1–8
Rear cards	8
Power supplies	6
Wiring trays	2
Top fan tray	1
Bottom fan tray and front panel display	1
Side fan trays	8
Front air filter	1
Side air filters	8
Cover panels for slots without installed components	Front card cover panels: 0–7

Table 66 on page 188, Table 67 on page 189, and Table 68 on page 189 list the parts contained in the accessory box.

Table 66: QFX3008-I Interconnect Device Accessory Kit Contents

Item	Quantity
Chassis grounding lug	1
UNC ¼-20 screws to attach the chassis grounding lug to the protective earth terminal on the chassis	2
Electrostatic discharge (ESD) grounding strap	1
RJ-45 cable and RJ-45 to DB-9 adapter for console port connection	1
QFX3008-I Interconnect Device Quick Start	1

Table 66: QFX3008-I Interconnect Device Accessory Kit Contents *(continued)*

Item	Quantity
End User License Agreement (EULA)	1
RoHS Compliance and Warranty Information Card	1

Table 67: QFX3008-I Interconnect Device Rack Install Accessory Kit Contents

Item	Quantity
Four-post rack mounting shelf	1
Rear support bracket for four-post rack mounting	1
UNC 8/32 flat-head screws to attach the four-post rack mounting shelf to the rear support bracket	6
Rear anchor bracket for four-post rack mounting	2
UNC ¼-20 screws to attach the rear anchor bracket to the protective earth terminal on the chassis	2
M6 screws to attach the rear anchor bracket to the protective earth terminal on the chassis	2
Large mounting shelf for two-post rack mounting	1
Small mounting shelf for two-post rack mounting	1
Adjustable center-mounting flanges for two-post rack mounting	2
UNC 10/32 screws to attach center-mounting flanges to the chassis	12

Table 68: QFX3008-I Interconnect Device Wiring Tray Accessory Kit Part Contents

Item	Quantity
Strain relief connector	2 (delta or wye three-phase wiring trays only)
90-degree connector	2 (delta or wye three-phase wiring trays only)
Power cords	6 (single-phase wiring trays only)

Related Documentation

- Unpacking a QFX3008-I Interconnect Device on page 186
- *QFX3008-I Interconnect Device Overview*

Installing QFX3008-I Interconnect Device Mounting Hardware on Four-Post Racks or Cabinets

Supported Platforms QFX3000-G

Before you install the QFX3008-I Interconnect device in a four-post rack or cabinet, you must first install mounting hardware and remove the center-mounting brackets from the chassis.

NOTE: In a rack, the device uses 21 U. You can mount two QFX3008-I Interconnect devices on a 42 U rack provided that the racks meet the strength requirements to support the combined weight of the devices. If you are mounting two QFX3008-I Interconnect devices on a rack, mount the first device on the bottom of the rack.

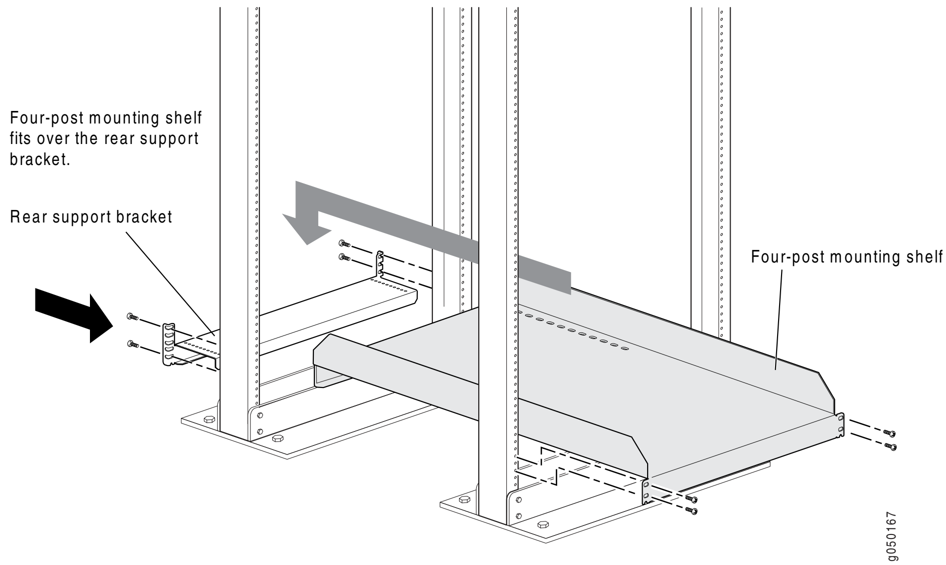
There are two styles of mounting hardware for the QFX3008-I Interconnect device. One style of mounting hardware uses a large shelf that spans the four rack posts and rests on a rear support bracket. The other style of mounting hardware uses a large shelf on the front posts, a smaller shelf on the rear posts, and spacer bars mounted to the rack posts to ensure proper alignment of rack-mounting screws. Figure 28 on page 191 and Figure 29 on page 194 depict the different styles of mounting hardware.

Depending on which style of mounting hardware you have, perform one of the first two tasks, then remove the center-mounting brackets from the chassis:

Installing Four-Post Mounting Shelf and Rear Support Bracket for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

Figure 28 on page 191 depicts the four-post mounting shelf and rear support bracket mounting hardware. If the mounting hardware included with your QFX3008-I Interconnect device instead includes spacer bars and two shelves, see "Installing Spacer Bars and Shelves for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting" on page 193.

Figure 28: Installing Four-Post Mounting Shelf and Rear Support Bracket for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting



For a four-post rack or cabinet, Table 69 on page 191 specifies the holes in which you insert mounting screws (an **X** indicates a mounting hole location), and cage nuts if needed. The hole distances are relative to one of the standard "U" divisions on the rack.

Table 69: Four-Post Mounting Shelf and Rear Support Bracket Hole Locations

Hole	Distance Above U Division		Four-Post Mounting Shelf	Rear Support Bracket
6	3.25 in. (8.3 cm)	1.86 U		X
5	2.63 in. (6.7 cm)	1.5 U		X
4	2 in. (5.1 cm)	1.14 U		X
3	1.5 in. (3.8 cm)	0.86 U	X	X
2	0.88 in. (2.2 cm)	0.5 U	X	X
1	0.25 in. (0.6 cm)	0.14 U	X	X

- Installing Cage Nuts for the Four-Post Mounting Shelf and Support Bracket for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting on page 192
- Installing the Rear Support Bracket for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting on page 192
- Installing the Four-Post Mounting Shelf for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting on page 192

Installing Cage Nuts for the Four-Post Mounting Shelf and Support Bracket for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

For racks without threaded holes, you must install cage nuts on the rack or cabinet rails in the locations specified in Table 69 on page 191 (an **X** indicates a mounting hole location).

Before you begin, ensure that you have 18 cage nuts appropriate for your rack or cabinet.

To install the cage nuts in the proper locations:

1. On the front rack or cabinet, install cage nuts in the holes specified in Table 69 on page 191 for the large shelf.
2. On the rear rack or cabinet, install cage nuts in the holes specified in Table 69 on page 191 for the support bracket.

Installing the Rear Support Bracket for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

To mount the chassis on a four-post rack or cabinet, you must first install the four-post mounting shelf and rear support bracket on the rack or cabinet.

Before you begin, ensure that you have the following parts and tools available to install the rear support bracket:

- A Phillips (+) screwdriver, number 2 or 3, depending on the size of your rack mounting screws (not provided)
- 12 mounting screws appropriate for your rack to attach the rear support bracket to the rack (not provided)

To install the rear support bracket:

1. On the rear of each rear rack rail, partially insert a mounting screw 1 U below where you intend to install the chassis.
2. Install the rear support bracket on the rear of the rear rack rails. Rest the bottom slot of the rear support bracket on a mounting screw. The rear support bracket extends toward the center of the rack.
3. Partially insert screws into the open holes in the rear support bracket. Tighten all the screws.

Installing the Four-Post Mounting Shelf for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

To mount the chassis on a four-post rack or cabinet, you must first install the four-post rack mounting shelf and rear support bracket on the rack or cabinet.

Before you begin, ensure that you have the following parts and tools available to install the four-post rack mounting shelf:

- A Phillips (+) screwdriver, number 2 or 3, depending on the size of your rack mounting screws (not provided)

- Six mounting screws appropriate for your rack to attach the four-post rack mounting shelf to the rack (not provided)
- UNC 8/32 flat-head screws to attach the four-post rack mounting shelf to the rear support bracket (provided)

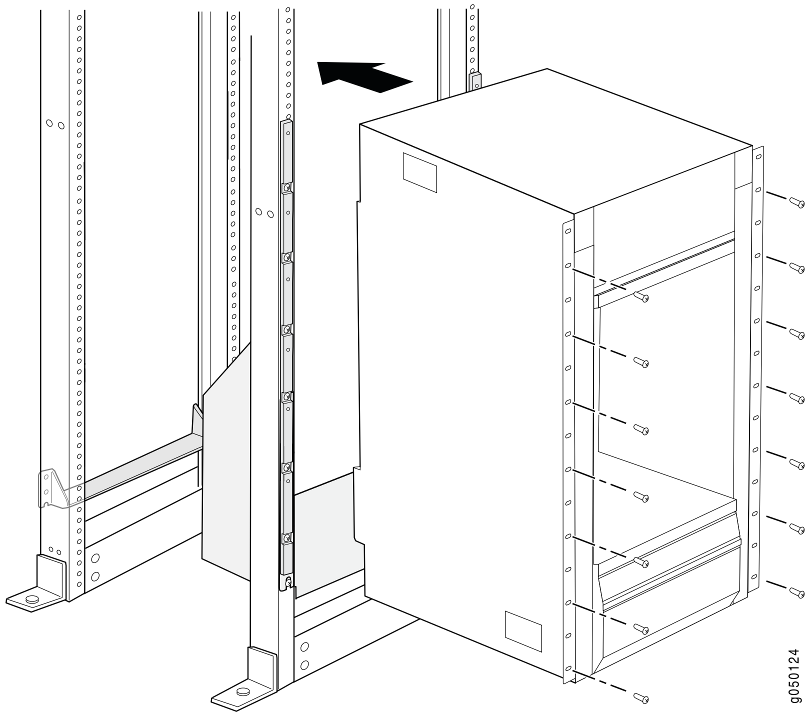
To install the four-post rack mounting shelf:

1. On the front of each front rack rail, partially insert a mounting screw 1 U below where you intend to install the chassis.
2. Install the four-post rack mounting shelf on the front rack rails. Rest the front of the four-post rack mounting shelf on the mounting screws you installed on the front rack rails. Rest the back of the four-post rack mounting shelf on top of the rear support bracket.
3. Partially insert screws into the open holes in the four-post rack mounting shelf. Tighten all the screws.
4. Fasten the four-post mounting shelf to the rear support bracket by partially inserting the flat-head screws provided in the accessory kit into the open holes on top of the four-post mounting shelf. Several holes are provided on top of the shelf. Two holes on each side of the shelf will align with the holes in the rear support bracket. Tighten all the screws.

Installing Spacer Bars and Shelves for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

Figure 29 on page 194 depicts the spacer bars and small and large shelf mounting hardware. If the mounting hardware included with your QFX3008-I Interconnect device instead includes a large shelf that spans the four posts, and rear support bracket, see “Installing Four-Post Mounting Shelf and Rear Support Bracket for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting” on page 190.

Figure 29: Installing Spacer Bar and Shelves for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting



For a four-post rack or cabinet, Table 70 on page 194 specifies the holes in which you insert mounting screws (an **X** indicates a mounting hole location), and cage nuts if needed. The hole distances are relative to one of the standard "U" divisions on the rack. For reference, the bottom of all mounting shelves is at 0.04 in. (0.02 U) above a U division.

Table 70: Four-Post Rack or Cabinet Mounting Hole Locations

Hole	Distance Above U Division		Large Shelf	Spacer Bars	Small Shelf
51	29.51 in. (74.9 cm)	16.86 U		X	
42	24.26 in. (61.6 cm)	13.86 U		X	
33	19.01 in. (48.3 cm)	10.86 U		X	
30	17.26 in. (43.8 cm)	9.86 U	X		
24	13.76 in. (34.9 cm)	7.86 U		X	
15	8.51 in. (21.6 cm)	4.86 U		X	
6	3.26 in. (8.3 cm)	1.86 U		X	
3	1.51 in. (3.8 cm)	0.86 U			X

Table 70: Four-Post Rack or Cabinet Mounting Hole Locations *(continued)*

Hole	Distance Above U Division		Large Shelf	Spacer Bars	Small Shelf
2	0.88 in. (2.2 cm)	0.50 U	X		X
1	0.25 in. (0.6 cm)	0.14 U			X

- Installing Cage Nuts for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting on page 195
- Installing the Small Mounting Shelf for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting on page 195
- Installing the Large Mounting Shelf and Spacer Bars for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting on page 196

Installing Cage Nuts for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

For racks without threaded holes, you must install cage nuts on the rack or cabinet rails in the locations specified in Table 70 on page 194 (an **X** indicates a mounting hole location).

Before you begin, ensure that you have 22 cage nuts appropriate for your rack or cabinet.

To install the cage nuts in the proper locations:

1. On the front rack or cabinet, install cage nuts in the holes specified in Table 70 on page 194 for the large shelf and the spacer bars.
2. On the rear rack or cabinet, install cage nuts in the holes specified in Table 70 on page 194 for the small shelf.

Installing the Small Mounting Shelf for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

To mount the chassis on a four-post rack or cabinet, you must first install the mounting shelves and spacer bars on the rack or cabinet.

Before you begin, ensure that you have the following parts and tools available to install the small mounting shelf:

- A Phillips (+) screwdriver, number 2 or 3, depending on the size of your rack mounting screws
- Six mounting screws appropriate for your rack to attach the small mounting shelf to the rack

To install the small mounting shelf:

1. On the back of each rear rack rail, partially insert a mounting screw into the lowest hole specified in Table 70 on page 194 for the small shelf.

2. Install the small shelf on the back rack rails. Rest the bottom slot of each ear on a mounting screw. The small shelf installs on the back of the rear rails, extending toward the center of the rack. The bottom of the small shelf should align with the bottom of the large shelf.
3. Partially insert screws into the open holes in the ears of the small shelf. Tighten all the screws.

Installing the Large Mounting Shelf and Spacer Bars for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

To mount the chassis on a four-post rack or cabinet, you must first install the mounting shelves and spacer bars on the rack or cabinet.

Before you begin, ensure that you have the following parts and tools available to install the large mounting shelf and spacer bars:

- A Phillips (+) screwdriver, number 2 or 3, depending on the size of your rack mounting screws
- 16 mounting screws appropriate for your rack to attach the large mounting shelf and spacer bars to the rack

To install the large mounting shelf and spacer bars:

1. On the front of each front rack rail, partially insert a mounting screw into the lowest hole specified in Table 70 on page 194 for the large shelf.
2. Install the large shelf on the front rack rails. Rest the bottom slot of each ear on a mounting screw.
3. Partially insert a mounting screw into the top hole in each ear of the large shelf. Tighten all the screws.
4. The device is shipped with each spacer bar attached to the rear of each front-mounting flange. Remove each spacer bar by removing the seven screws that fasten the spacer bar to the front-mounting bracket.
5. Place one of the spacer bars over an ear of the installed large shelf. Position the notch in the rear of the spacer bar so the upper part of the bar is flush with the rack rail and the lower part is flush with the ear of the shelf.
6. Insert a mounting screw into each of the nonthreaded holes in the recesses of the spacer bar to secure the spacer bar.
7. Repeat Step 5 and Step 6 for the other spacer bar.
8. Tighten all the screws.

Removing the Adjustable Center-Mounting Brackets for QFX3008-I Interconnect Device Four-Post Rack or Cabinet Mounting

Before you begin, ensure that you have a number 2 Phillips (+) screwdriver.

To remove the adjustable center-mounting brackets:

1. Loosen the three screws at the top and bottom of each bracket.
2. Remove the center-mounting brackets.

TIP: Save the center-mounting brackets and screws in case you need to move the device to a two-post rack at a later time.

Related Documentation

- *Site Preparation Checklist for a QFX3008-I Interconnect Device*

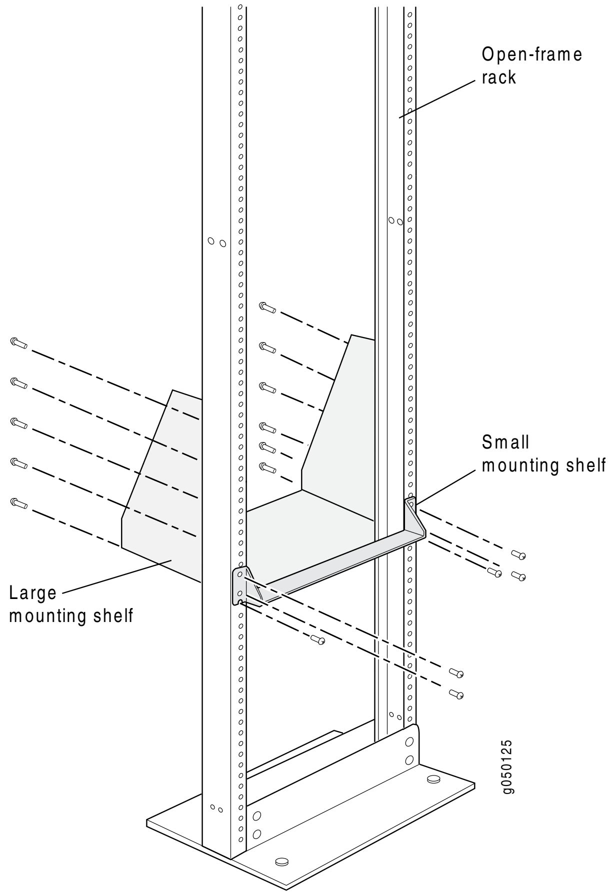
Installing QFX3008-I Interconnect Device Mounting Hardware on Two-Post Racks

Supported Platforms QFX3000-G

Before you install the QFX3008-I Interconnect device in a two-post rack, you must first install mounting hardware on the rack (see Figure 30 on page 198). If spacer bars were included in your shipment, they are not needed for this mounting option; however, you can leave them attached to the front-mounting brackets.

NOTE: In a rack, the device uses 21 U. You can mount two QFX3008-I Interconnect devices on a 42 U rack provided that the racks meet the strength requirements to support the combined weight of the devices. If you are mounting two QFX3008-I Interconnect devices on a rack, mount the first device on the bottom of the rack.

Figure 30: Installing the Mounting Hardware for a Two-Post Rack



For a two-post rack, Table 71 on page 198 specifies the holes in which you insert mounting screws (an X indicates a mounting hole location), and cage nuts if needed. The hole distances are relative to one of the standard “U” divisions on the rack. For reference, the bottom of all mounting shelves is at 0.04 in. (0.02 U) above a U division.

Table 71: Two-Post Rack Mounting Hole Locations

Hole	Distance Above “U” Division		Large Shelf	Small Shelf
30	17.26 in. (43.8 cm)	9.86 U	X	
27	15.51 in. (39.4 cm)	8.86 U	X	
24	13.76 in. (34.9 cm)	7.86 U	X	
21	12.01 in. (30.5 cm)	6.86 U	X	
18	10.26 in. (26.0 cm)	5.86 U	X	
15	8.51 in. (21.6 cm)	4.86 U	X	

Table 71: Two-Post Rack Mounting Hole Locations *(continued)*

Hole	Distance Above “U” Division		Large Shelf	Small Shelf
12	6.76 in. (17.1 cm)	3.86 U	X	
9	5.01 in. (12.7 cm)	2.86 U	X	
6	3.26 in. (8.3 cm)	1.86 U	X	
3	1.51 in. (3.8 cm)	0.86 U	X	X
2	0.88 in. (2.2 cm)	0.50 U	X	X
1	0.25 in. (0.6 cm)	0.14 U		X

This topic describes these tasks:

1. Installing Cage Nuts for QFX3008-I Interconnect Device Two-Post Rack Mounting on page 199
2. Installing the Small Mounting Shelf for QFX3008-I Interconnect Device Two-Post Rack Mounting on page 199
3. Installing the Large Mounting Shelf for QFX3008-I Interconnect Device Two-Post Rack Mounting on page 200

Installing Cage Nuts for QFX3008-I Interconnect Device Two-Post Rack Mounting

For racks without threaded holes, you must install cage nuts on the rack rails in the locations specified in Table 71 on page 198 (an X indicates a mounting hole location). The hole distances are relative to one of the standard “U” divisions on the rack rails. The bottom of all mounting shelves is at 0.04 in. (0.02 U) above a U division.

Before you begin, ensure that you have 28 cage nuts appropriate for your rack.

To install the cage nuts in the proper locations:

1. On the front rack rail, install cage nuts in the holes specified in Table 71 on page 198 for the small shelf.
2. On the front rack rail, install cage nuts for the center-mounting brackets. The center-mounting brackets have holes for rack-mounting screws, spaced at 3.5 in. (8.89 cm).
3. On the rear rack rail, install cage nuts in the holes specified in Table 71 on page 198 for the large shelf.

Installing the Small Mounting Shelf for QFX3008-I Interconnect Device Two-Post Rack Mounting

To mount the chassis on a two-post rack, you must first install the mounting shelves on the rack.

Before you begin, ensure that you have the following parts and tools available to install the small mounting shelf:

- A Phillips (+) screwdriver, number 2 or 3, depending on the size of your rack mounting screws
- Six mounting screws appropriate for your rack to attach the small mounting shelf to the rack

1. On the front of each rack rail, partially insert a mounting screw into the lowest hole specified in Table 71 on page 198 for the small shelf.
2. Install the small shelf on the rack. Rest the bottom slot of each ear on a mounting screw. The small shelf installs on the front of the rails, extending away from the rack. The bottom of the small shelf should align with the bottom of the large shelf
3. Partially insert screws into the open holes in the ears of the small shelf. Tighten all the screws.

Installing the Large Mounting Shelf for QFX3008-I Interconnect Device Two-Post Rack Mounting

To mount the chassis on a two-post rack, you must first install the mounting shelves on the rack.

Before you begin, ensure that you have the following parts and tools available to install the large mounting shelf:

- A Phillips (+) screwdriver, number 2 or 3, depending on the size of your rack mounting screws
- 22 mounting screws appropriate for your rack to attach the large mounting shelf to the rack

To install the large mounting shelf and spacer bars:

1. On the rear of each rack rail, partially insert a mounting screw into the lowest hole specified in Table 71 on page 198 for the large shelf.
2. Install the large shelf on the rack. Rest the bottom slot of each ear on a mounting screw.
3. Partially insert screws into the open holes in the ears of the large shelf. Tighten all the screws.

Related Documentation

- Understanding Interconnect Devices on page 23
- *QFX3008-I Interconnect Device Overview*
- *Field-Replaceable Units in a QFX3008-I Interconnect Device*
- *Installing the Cable Management System on a QFX3008-I Interconnect Device*

Mounting a QFX3008-I Interconnect Device on a Rack or Cabinet Using a Mechanical Lift

Supported Platforms QFX3000-G

The QFX3008-I Interconnect device ships installed with front-mounting brackets and center-mounting brackets on the chassis for mounting the device on a 19-in. equipment rack or cabinet. (The remainder of this topic uses “rack” to mean “rack or cabinet.”) The chassis also comes with mounting shelves and brackets to support it in the rack.

Because of the chassis size and weight, we require using a mechanical lift to install the device.

CAUTION: **Before mounting the device in a rack, have a qualified technician verify that the rack is strong enough to support the device’s weight and is adequately supported at the installation site.**

NOTE: **In a rack, the chassis occupies 21 U. You can mount two devices on a 42 U rack provided that the racks meet the strength requirements to support the combined weight of the devices. If you are mounting two devices on a rack, mount the first device on the bottom of the rack.**

Before mounting a QFX3008-I Interconnect device in a rack:

1. Verify that the site meets the requirements described in *Site Preparation Checklist for a QFX3008-I Interconnect Device*.
2. Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure. See*Clearance Requirements for Airflow and Hardware Maintenance for a QFX3008-I Interconnect Device* for detailed information.
3. Read *General Safety Guidelines and Warnings*, with particular attention to *Chassis Lifting Guidelines for a QFX3008-I Interconnect Device*.
4. Unpack the device as described in “Unpacking a QFX3008-I Interconnect Device” on page 186.
5. In a four-post rack, install the mounting hardware at the desired position as described in “Installing QFX3008-I Interconnect Device Mounting Hardware on Four-Post Racks or Cabinets” on page 189. In a two-post rack, install the mounting hardware at the desired position as described in “Installing QFX3008-I Interconnect Device Mounting Hardware on Two-Post Racks” on page 197.

Before you begin, ensure that you have the following parts and tools available to mount the device in a rack:

- A mechanical lift with a load capacity of at least 750 lb (341 kg). If you do not have a lift rated for 750 lb (341 kg), you must remove all components from the chassis and use a lift rated for at least 250 lb (114 kg). The weight of an empty QFX3008-I Interconnect device and midplane is approximately 205 lb (93 kg).
- Phillips (+) screwdriver, number 2 or number 3, depending on the size of your rack mounting screws, for mounting the device in a rack (not provided)
- Mounting screws appropriate for your rack (not provided)
- Rear support anchors to secure the chassis to the four-post mounting shelf and rear support bracket (provided)

NOTE: **Earlier versions of the four-post rack mounting hardware did not require the rear support anchors. If your four-post rack mounting hardware includes spacer bars and two shelves the rear support anchors are not required.**

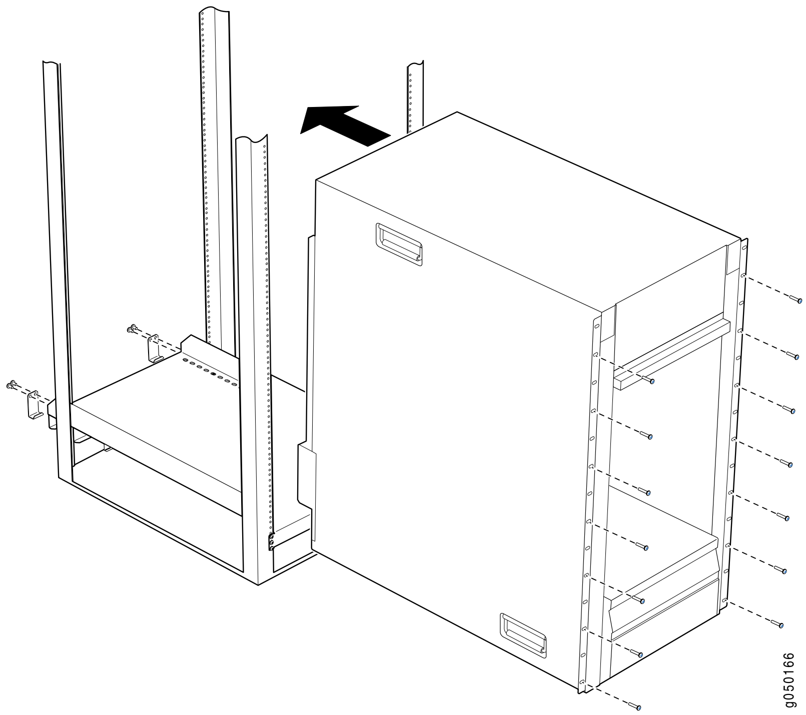
- Four screws, two UNC 1/4-20 (right side) screws and two M6 (left side) screws, to secure the rear support anchors to the chassis (provided)

To mount the QFX3008-I Interconnect device in a rack using a mechanical lift (see Figure 31 on page 203 and Figure 32 on page 204):

1. Load the device onto the lift, making sure it rests securely on the lift platform.
2. Using the lift, position the device in front of the rack, centering it in front of the mounting shelves installed in the rack.
3. Lift the chassis approximately 0.75 in. (1.9 cm) above the surface of the mounting shelves. Position the chassis in the rack as close as possible to resting on the support that the mounting shelves provide.
4. In a four-post rack, carefully slide the device onto the mounting shelves until the front-mounting brackets ("ears") attached to the chassis contact the rack rails. The handles on the side of the chassis can be used to help position the Interconnect device in the rack.

   In a two-post rack, carefully slide the device onto the mounting shelves until the center-mounting brackets ("ears") attached to the chassis contact the rack rails. The handles on the side of the chassis can be used to help position the QFX3008-I Interconnect device in the rack.

Figure 31: Installing a QFX3008-I Interconnect Device in a Four-Post Rack



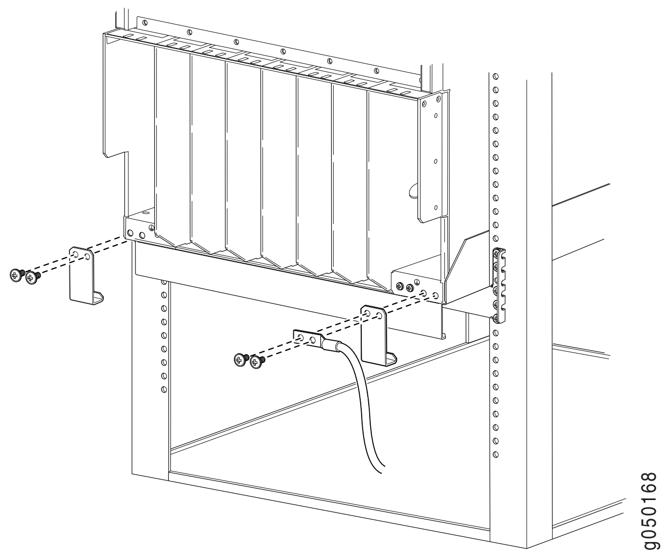
5. Move the lift away from the rack.
6. Ensure the mounting brackets are flush with the front of the rack.
7. Install a mounting screw into each of the open front-mounting holes aligned with the rack, starting from the bottom.
8. Visually inspect the alignment of the device. If the device is installed properly in the rack, all the mounting screws on one side of the rack are aligned with the mounting screws on the opposite side, and the device is level.
9. After ensuring that the device is aligned properly, tighten the screws.
10. In a four-post rack, hook the rear support anchors around the bottom rear flange of the mounting shelf so that its holes line up with the grounding lug screw holes at the bottom left and right corner of the chassis rear.

    NOTE: Earlier versions of the four-post rack mounting hardware did not require the rear support anchors. If your four-post rack mounting hardware includes spacer bars and two shelves the rear support anchors are not required.

11. Secure the rear support anchors with the provided UNC 1/4-20 (right side) screws and M6 (left side) screws.

TIP: Because the rear support anchors are attached to the chassis grounding points, it is best to connect the chassis to earth ground while performing this step. See "Connecting Earth Ground to a QFX3008-I Interconnect Device" on page 204 for more information.

Figure 32: Attaching Rear Support Anchors to the QFX3008-I Chassis in a Four-Post Rack



Related Documentation

- Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 206
- Powering On a QFX3008-I Interconnect Device on page 221
- *Rack Requirements for a QFX3008-I Interconnect Device*
- *Cabinet Requirements for a QFX3008-I Interconnect Device*

Connecting Earth Ground to a QFX3008-I Interconnect Device

Supported Platforms QFX3000-G

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, we recommend that the QFX3008-I Interconnect device be adequately grounded before it is connected to power.

Two pairs of threaded inserts (PEM nuts) are provided on the QFX3008-I Interconnect device for connecting the device to earth ground. The first pair is sized for M6 screws and is located below the wiring tray on the bottom left corner at the rear of the chassis. The second pair is sized for UNC ¼-20 screws and is located below the second wiring tray on the bottom right corner at the rear of the chassis. The grounding points are spaced 0.625 in. (15.86 mm) apart. The grounding lug required is a Panduit LCD2-14A-Q or equivalent.

The accessory box shipped with the device includes a cable lug and two UNC ¼-20 screws with integrated washers. For power cord and grounding cable specifications, see “AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays” on page 161, “AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays” on page 163, “AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays” on page 164, and *Grounding Cable and Lug Specifications for a QFX3008-I Interconnect Device*.

Before you begin to connect the QFX3008-I Interconnect device to earth ground:

- Ensure that you understand how to prevent ESD damage. See *Prevention of Electrostatic Discharge Damage*.
- Ensure that a licensed electrician has attached the grounding lug to an appropriate grounding cable (see *Grounding Cable and Lug Specifications for a QFX3008-I Interconnect Device*).

CAUTION: **Using a grounding cable with an incorrectly attached lug can damage the device.**

Ensure you have the following tools and parts available to connect a QFX3008-I Interconnect device to earth ground:

- Electrostatic discharge (ESD) grounding strap
- Grounding cable (not provided) with attached lug
- Screws and split washers to secure the grounding lug to the protective earthing terminal (two UNC ¼-20 screws with integrated washers are provided)
- Phillips (+) torque screwdriver, number 2

CAUTION: **You must use an appropriate torque-controlled tool to tighten the screws on the grounding lug. Applying excessive torque damages the grounding lug or chassis. Ground lugs should be installed with SAE Grade 5 screws or better at no more than 72 in-lb (8 Nm).**

To connect a QFX3008-I Interconnect device to earth ground (see Figure 33 on page 206):

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the approved ESD site grounding point.
2. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the device is installed.
3. Detach the ESD grounding strap from the site ESD grounding point.
4. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.

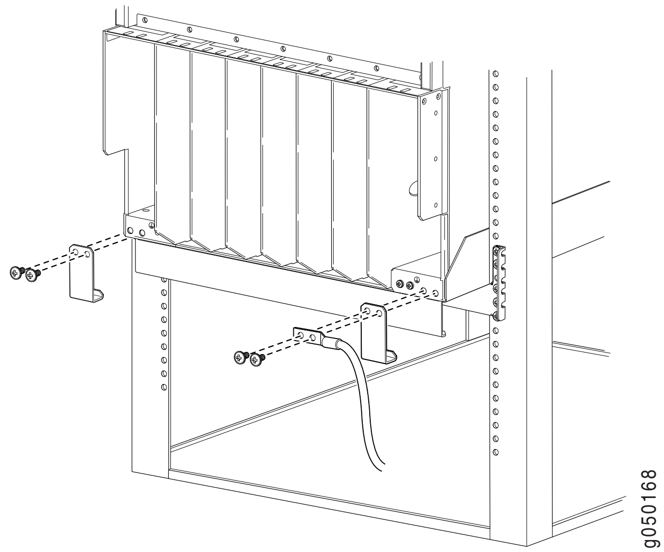
5. In a four-post rack, place the grounding lug attached to the grounding cable over one of the rear support anchors, as shown in Figure 33 on page 206.

   In a two-post rack, place the grounding cable lug over the grounding points on the bottom rear of the chassis below the wiring trays.

   The left pair is sized for M6 screws, and the right pair is sized for UNC ¼-20 screws.

6. Using the torque screwdriver, secure the grounding lug to the protective earthing terminal.

Figure 33: Connecting a Grounding Cable to a QFX3008-I Interconnect Device



Related Documentation

- *Site Preparation Checklist for a QFX3008-I Interconnect Device*

Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays

Supported Platforms QFX3000-G

A QFX3008-I Interconnect device is configured with six AC power supplies and two wiring trays.

CAUTION: Mixing different types of wiring trays in the same chassis is not a supported configuration.

CAUTION: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, the QFX3008-I Interconnect device must be adequately grounded before it is connected to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the QFX3008-I Interconnect device to connect to earth ground. For instructions on connecting a QFX3008-I Interconnect device to ground using a separate grounding conductor, see "Connecting Earth Ground to a QFX3008-I Interconnect Device" on page 204.

A QFX3008-I Interconnect device receives additional grounding when you plug the power supply in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location. See "AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays" on page 161.

NOTE: Each wiring tray AC appliance inlet must be connected to a dedicated AC power source outlet.

Before you begin to connect power to the device:

- Ensure that you understand how to prevent ESD damage. See *Prevention of Electrostatic Discharge Damage*.
- Install power supplies in the device. See *Installing an AC Power Supply in a QFX3008-I Interconnect Device*.
- Install single-phase wiring trays in the device. See *Installing a Wiring Tray in a QFX3008-I Interconnect Device*.

Ensure that you have the following parts and tools available to connect power to the device:

- Electrostatic discharge (ESD) grounding strap
- Power cords appropriate for your geographical location. See "AC Power Cord Specifications for a QFX3008-I Interconnect Device with Single-Phase Wiring Trays" on page 161.

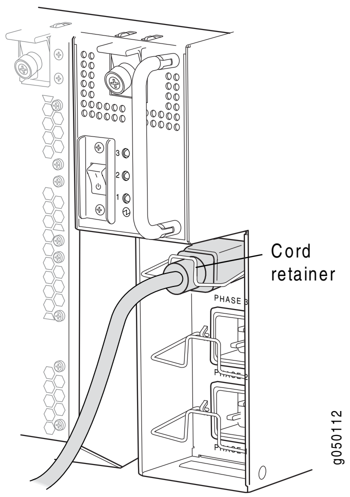
WARNING: Ensure that the power cords do not block access to device components or drape where people can trip on them.

To connect AC power to a QFX3008-I Interconnect device with single-phase wiring trays (see Figure 34 on page 208:

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Ensure that the wiring tray is fully inserted and latched securely in the chassis. See *Installing a Wiring Tray in a QFX3008-I Interconnect Device*.

3. Set the switch, which is near the top of the wiring tray faceplate, to the OFF (O) position.
4. Locate the power cord or cords shipped with the device; the cords have plugs appropriate for your geographical location.
5. Insert the coupler end of the power cord into the AC appliance inlet on the wiring tray faceplate. See Figure 34 on page 208.

Figure 34: Connecting an AC Power Cord to a Single-Phase Wiring Tray



6. If the AC power source outlet has a power device, set it to the OFF (O) position.
7. Insert the power cord plug into an AC power source outlet.
8. Repeat Step 5 through Step 7 for each AC appliance inlet on the wiring tray faceplate.
9. If the AC power source outlet has a power device, set it to the ON (|) position.
10. Verify that each LED on the wiring tray faceplate is lit solid green. Verify that each LED on the power supply faceplate is lit solid green.

Related Documentation

- Powering On a QFX3008-I Interconnect Device on page 221
- *Wiring Tray in a QFX3008-I Interconnect Device*
- *Wiring Tray LEDs on a QFX3008-I Interconnect Device*

Preparing Delta and Wye Three-Phase Power Cords

Supported Platforms QFX3000-G

A QFX3008-I Interconnect device can be configured with two three-phase wiring trays. Delta and wye wiring configurations are available. A licensed electrician must prepare the power cords that you provide for installation in the wiring tray. Several parts included with the wiring trays enable the power cords to be dressed in different positions. If you need the power cable to be routed up to the top of a rack, you must use the included 90º connector to enable the power cord to be routed upward (see Figure 35 on page 209).

The 90º connector provides more flexibility to position the power cord outside the width of the chassis. Alternatively, if the power cords will be routed down to the bottom of the rack, or space limitations prevent you from extending the width of the chassis footprint, you can use the flat connector to install the power cord (see Figure 36 on page 209). Figure 37 on page 210 and Figure 38 on page 210 show the power cords installed on the wiring trays in the two different positions. Figure 39 on page 211 shows the wiring tray being installed in the chassis, using the flat connector.

Figure 35: Assembling a Power Cord Using a 90º Connector

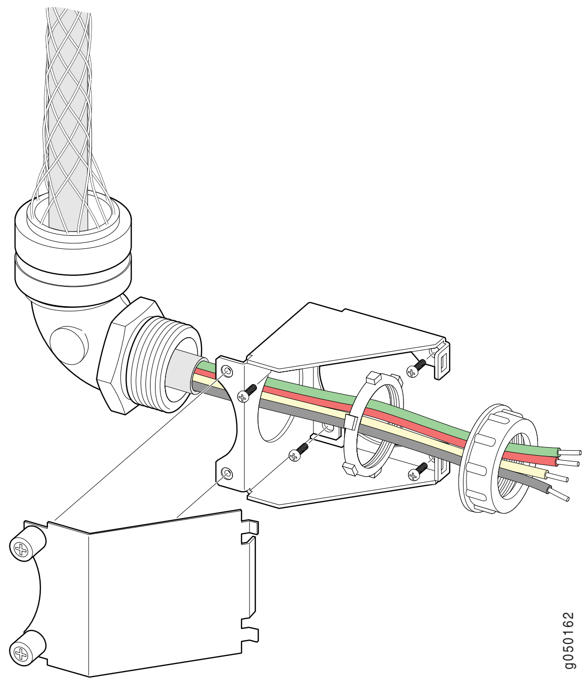


Figure 36: Assembling a Power Cord Using a Flat Connector

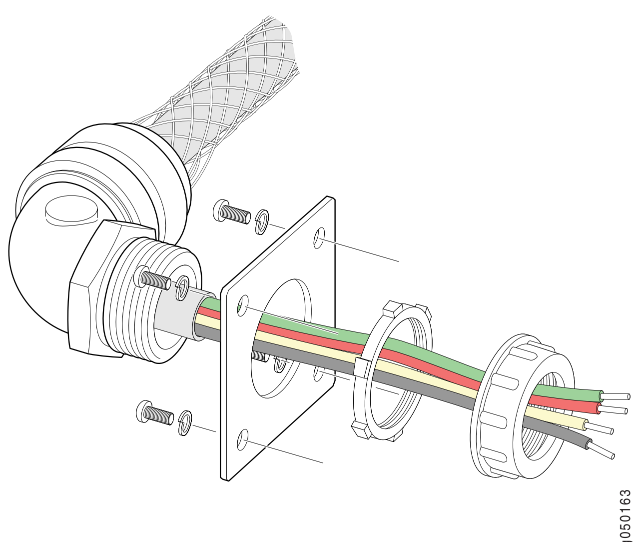


Figure 37: Wye Wiring Tray with a 90° Connector Installed

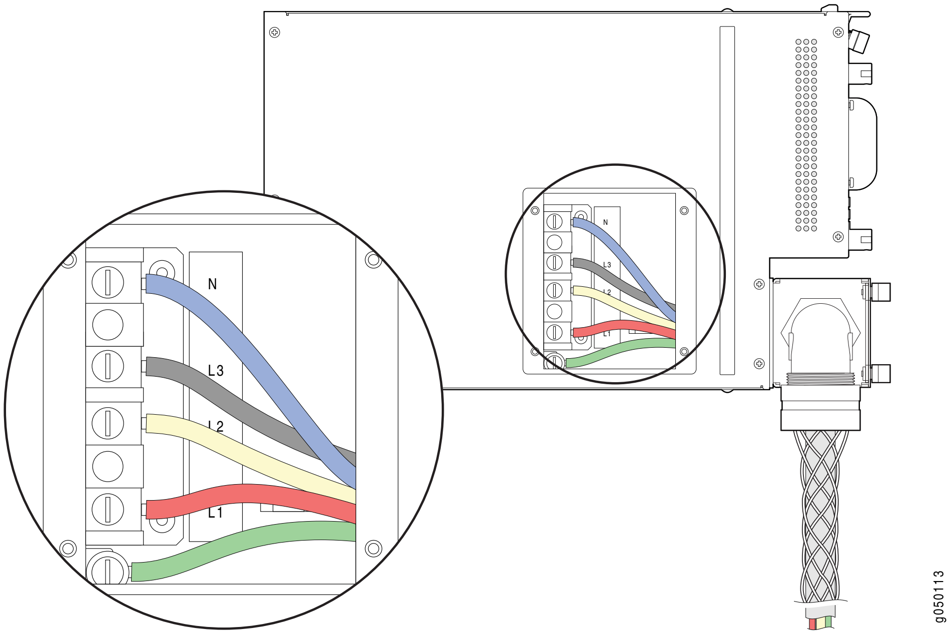


Figure 38: Delta Wiring Tray with a Flat Connector Installed

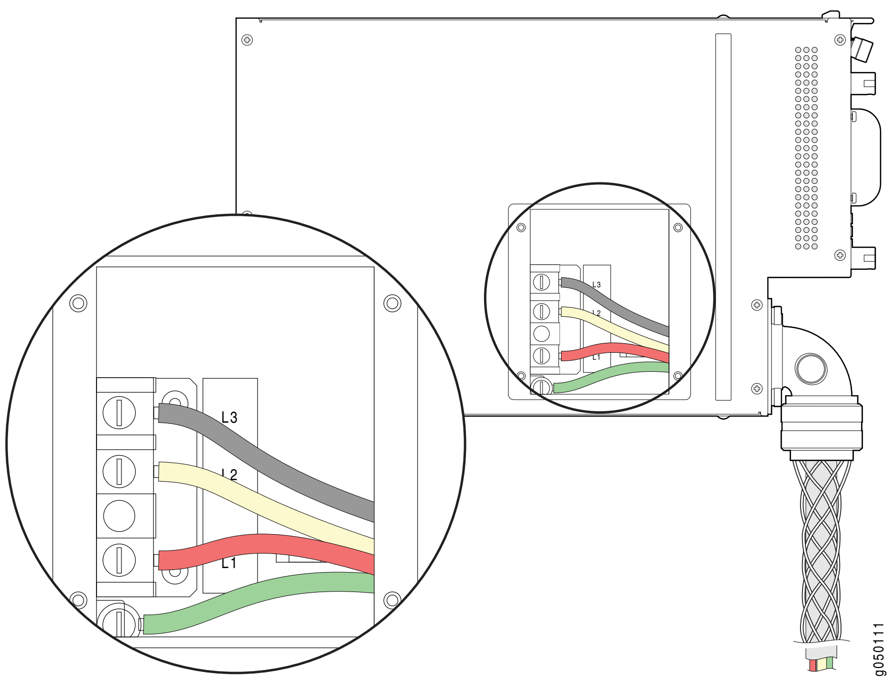
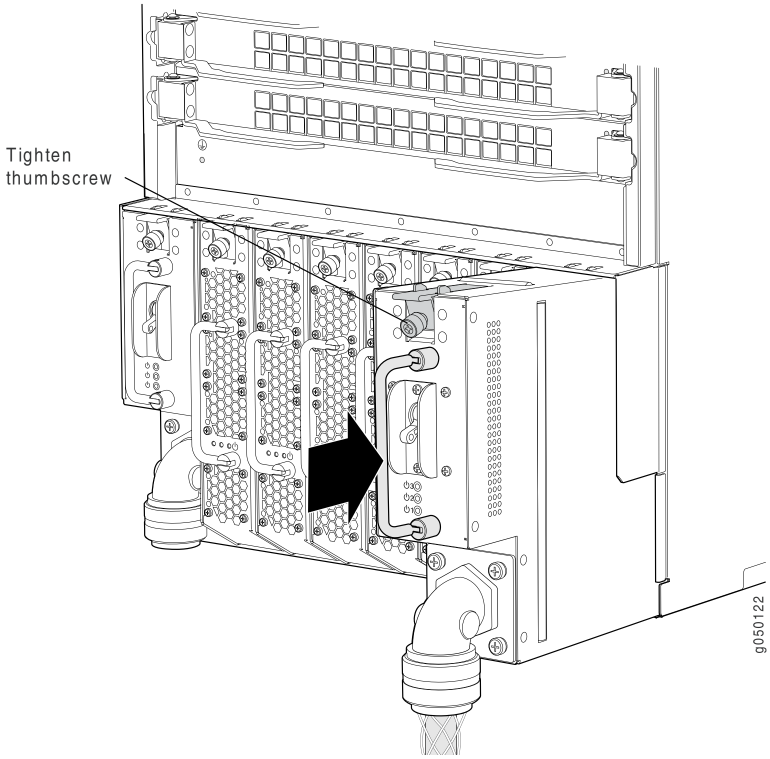


Figure 39: Installing a Three-Phase Wiring Tray with a Power Cord Installed



CAUTION: Mixing different types of wiring trays in the same chassis is not a supported configuration.

CAUTION: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, a QFX3008-I Interconnect device must be adequately grounded before it is connected to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the QFX3008-I Interconnect device to connect to earth ground. For instructions on connecting a QFX3008-I Interconnect device to ground using a separate grounding conductor, see "Connecting Earth Ground to a QFX3008-I Interconnect Device" on page 204.

A QFX3008-I Interconnect device receives additional grounding when you plug the wiring tray in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location. See "AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays" on page 163 or "AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays" on page 164.

NOTE: Each wiring tray must be connected to a dedicated AC power source outlet.

Before you begin to prepare the wiring trays for installation:

- Ensure that you understand how to prevent ESD damage. See *Prevention of Electrostatic Discharge Damage*.

Ensure that you have the following parts and tools available to prepare the wiring trays for installation:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 2
- Power cords appropriate for your wiring trays and geographical location. See "AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays" on page 163 or "AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays" on page 164.

WARNING: Ensure that the power cords do not block access to device components or drape where people can trip on them.

To prepare three-phase power cords for installation:

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Ensure that the power cords are not connected to power outlets. Switch off the customer site circuit breakers. Ensure that the voltage across the AC power source is 0 V and that there is no chance that the voltage might become active during installation.
3. Remove a wiring tray from the chassis. See *Removing a Wiring Tray from a QFX3008-I Interconnect Device*.
4. Flip the breaker on the wiring tray faceplate to the OFF (O) position.
5. Using a number 2 Phillips (+) screwdriver, loosen and remove the screws and washers that hold the square flat connector to the wiring tray. Keep the screws and washers.
6. Depending on how you want to dress the power cords, decide whether to use the 90º connector to attach the power cord to the wiring tray or the square flat connector that you removed in Step 5.
7. Insert the power cord in the wire strain relief by compressing the wire strain relief to enlarge the opening. Pull enough cord through the strain relief to allow easy wiring connections to the terminal block.

8. Remove first the plastic, then the metal retaining nuts from the wire strain relief, and place either the 90º connector or flat connector over the threaded portion of the wire strain relief as shown in Figure 35 on page 209 or Figure 36 on page 209.
9. Screw first the metal, then the plastic retaining nuts on the threaded portion of the wire strain relief to complete the assembly.
10. Route the wiring through the hole in the wiring tray, and using a number 2 Phillips (+) screwdriver, attach the connector to the wiring tray using the screws and washers you removed in Step 5.

    TIP: If you are ready to make the wiring connections to the terminal block, see "Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays" on page 213 or "Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays" on page 217.

11. Repeat Step 3 through Step 10 for the other wiring tray.

Related Documentation

- Powering On a QFX3008-I Interconnect Device on page 221
- *Wiring Tray in a QFX3008-I Interconnect Device*
- *Wiring Tray LEDs on a QFX3008-I Interconnect Device*

Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays

Supported Platforms QFX3000-G

A QFX3008-I Interconnect device is configured with six AC power supplies and two wiring trays.

CAUTION: Mixing different types of wiring trays in the same chassis is not a supported configuration.

CAUTION: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, the QFX3008-I Interconnect device must be adequately grounded before it is connected to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the QFX3008-I Interconnect device to connect to earth ground. For instructions on connecting a QFX3008-I Interconnect device to ground using a separate grounding conductor, see "Connecting Earth Ground to a QFX3008-I Interconnect Device" on page 204.

A QFX3008-I Interconnect device receives additional grounding when you plug the power supply in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location. See "AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays" on page 163.

NOTE: Each wiring tray must be connected to a dedicated AC power source outlet.

Before you begin to connect power to the device:

- Ensure that you understand how to prevent ESD damage. See *Prevention of Electrostatic Discharge Damage*.
- Ensure that a licensed electrician has prepared the power cords. See "Preparing Delta and Wye Three-Phase Power Cords" on page 208.

Ensure that you have the following parts and tools available to connect power to the device:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- Slotted (–) screwdriver, 1/4 inch, with a torque range between 23 in-lb (2.6 Nm) and 25 in-lb (2.8 Nm)

CAUTION: You must use an appropriate torque-controlled tool to tighten the screws on the terminal block. Applying excessive torque damages the terminal block and the wiring tray. The absolute maximum torque that may be applied to this screw is 50 in-lb (5.6 Nm).

WARNING: Ensure that the power cords do not block access to device components or drape where people can trip on them.

To connect AC power to three-phase delta wiring trays:

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Ensure that the power cords are not connected to power outlets. Switch off the customer site circuit breakers. Ensure that the voltage across the AC power source is 0 V and that there is no chance that the voltage might become active during installation.

3. If the wiring tray is installed in the chassis, remove it. See *Removing a Wiring Tray from a QFX3008-I Interconnect Device*. The power cord must be attached to the wiring tray as described in "Preparing Delta and Wye Three-Phase Power Cords" on page 208.
4. Ensure that the power switch on the wiring tray faceplate is in the OFF (O) position.
5. Using a number 1 Phillips (+) screwdriver, loosen the four screws on the metal AC wiring compartment on the side of the wiring tray (see Figure 40 on page 216).
6. Open the metal door of the wiring tray compartment.

7. Connect the wires to the AC terminal block on the three-phase delta wiring tray (Figure 40 on page 216). Use a 1/4-in. slotted screwdriver to loosen the input terminal or grounding point screw, insert each wire into the grounding point or input terminal, and tighten the screw to between 23 in-lb (2.6 Nm) and 25 in-lb (2.8 Nm).

   CAUTION: **You must use an appropriate torque-controlled tool to tighten the screws on the terminal block. Applying excessive torque damages the terminal block and the wiring tray. The absolute maximum torque that may be applied to this screw is 50 in-lb (5.6 Nm).**

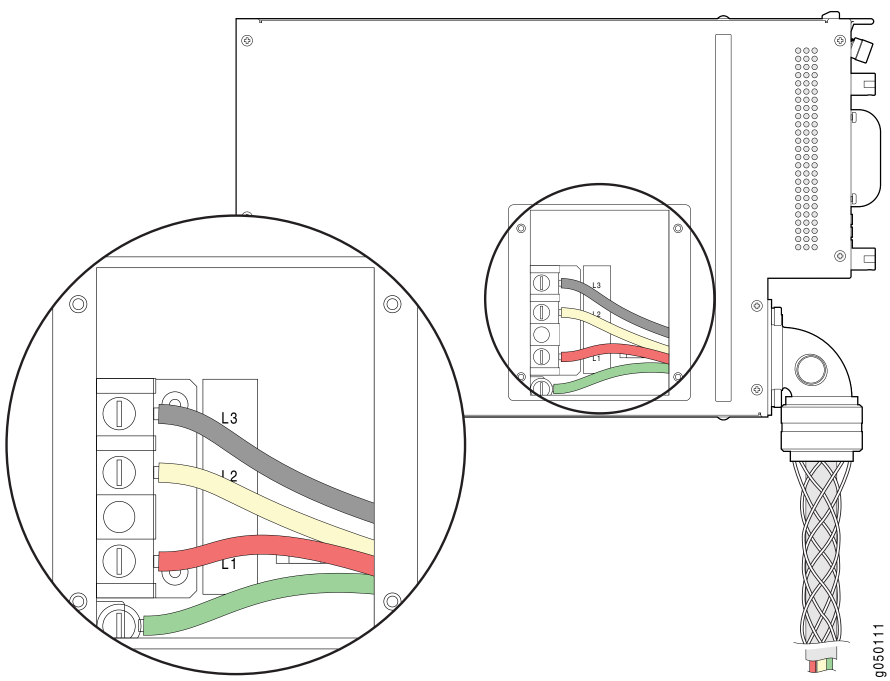
   a. Insert the wire labeled **GND** into the grounding point labeled **GND**.

   b. Insert the wire labeled **L1** into the **L1** input terminal.

   c. Insert the wire labeled **L2** into the **L2** input terminal.

   d. Insert the wire labeled **L3** into the **L3** input terminal.

Figure 40: Connecting Power to a Three-Phase Delta AC Power Supply



   NOTE: The color of each AC power wire might vary.

8. Verify that the power cable connections are correct.

9. Replace the cover on the wiring compartment, and using a number 1 Phillips (+) screwdriver, tighten the four screws.
10. Repeat Step 3 through Step 9 for the other wiring tray.

Related Documentation

- Powering On a QFX3008-I Interconnect Device on page 221
- *Wiring Tray in a QFX3008-I Interconnect Device*
- *Wiring Tray LEDs on a QFX3008-I Interconnect Device*

Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays

Supported Platforms QFX3000-G

A QFX3008-I Interconnect device is configured with six AC power supplies and two wiring trays.

CAUTION: Mixing different types of wiring trays in the same chassis is not a supported configuration.

CAUTION: To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, the QFX3008-I Interconnect device must be adequately grounded before it is connected to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the QFX3008-I Interconnect device to connect to earth ground. For instructions on connecting a QFX3008-I Interconnect device to ground using a separate grounding conductor, see "Connecting Earth Ground to a QFX3008-I Interconnect Device" on page 204.

A QFX3008-I Interconnect device receives additional grounding when you plug the power supply in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location. See "AC Power Cord Specifications for a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays" on page 164.

NOTE: Each wiring tray must be connected to a dedicated AC power source outlet.

Before you begin to connect power to the device:

- Ensure that you understand how to prevent ESD damage. See *Prevention of Electrostatic Discharge Damage*.

- Ensure that a licensed electrician has prepared the power cords. See "Preparing Delta and Wye Three-Phase Power Cords" on page 208.

Ensure that you have the following parts and tools available to connect power to the device:

- Electrostatic discharge (ESD) grounding strap
- Phillips (+) screwdriver, number 1
- Slotted (–) screwdriver, 1/4 inch, with a torque range between 23 in-lb (2.6 Nm) and 25 in-lb (2.8 Nm)

CAUTION: **You must use an appropriate torque-controlled tool to tighten the screws on the terminal block. Applying excessive torque damages the terminal block and the wiring tray. The absolute maximum torque that may be applied to this screw is 50 in-lb (5.6 Nm).**

WARNING: **Ensure that the power cords do not block access to device components or drape where people can trip on them.**

To connect AC power to three-phase wye wiring trays:

1. Attach the ESD grounding strap to your bare wrist, and connect the strap to the ESD point on the chassis.
2. Ensure that the power cords are not connected to power outlets. Switch off the customer site circuit breakers. Ensure that the voltage across the AC power source is 0 V and that there is no chance that the voltage might become active during installation.
3. If the wiring tray is installed in the chassis, remove it. See *Removing a Wiring Tray from a QFX3008-I Interconnect Device*. The power cord must be attached to the wiring tray as described in "Preparing Delta and Wye Three-Phase Power Cords" on page 208.
4. Ensure that the power switch on the wiring tray faceplate is in the OFF (O) position.
5. Using a number 1 Phillips (+) screwdriver, loosen the four screws on the metal AC wiring compartment on the side of the wiring tray (see Figure 41 on page 219).
6. Open the metal door of the wiring tray compartment.

7. Connect the wires to the AC terminal block on the three-phase wye wiring tray (Figure 41 on page 219). Use a 1/4-in. slotted screwdriver to loosen the input terminal or grounding point screw, insert each wire into the grounding point or input terminal, and tighten the screw to between 23 in-lb (2.6 Nm) and 25 in-lb (2.8 Nm).

   CAUTION: You must use an appropriate torque-controlled tool to tighten the screws on the terminal block. Applying excessive torque damages the terminal block and the wiring tray. The absolute maximum torque that may be applied to this screw is 50 in-lb (5.6 Nm).

   a. Insert the wire labeled **GND** into the grounding point labeled **GND**.

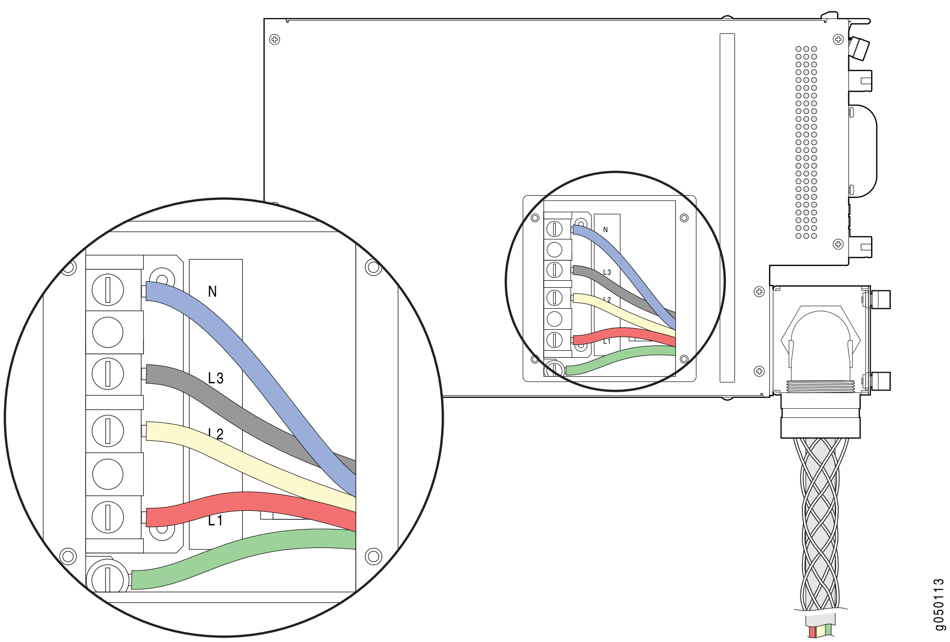
   b. Insert the wire labeled **L1** into the **L1** input terminal.

   c. Insert the wire labeled **L2** into the **L2** input terminal.

   d. Insert the wire labeled **L3** into the **L3** input terminal.

   e. Insert the wire labeled **N** into the **N** input terminal

Figure 41: Connecting Power to the Three-Phase Wye Wiring Tray



   NOTE: The color of each AC power wire might vary.

8. Verify that the power cable connections are correct.

9. Replace the cover on the wiring compartment, and using a number 1 Phillips (+) screwdriver, tighten the four screws.
10. Repeat Step 3 through Step 9 for the other wiring tray.

Related Documentation

- Powering On a QFX3008-I Interconnect Device on page 221
- *Wiring Tray in a QFX3008-I Interconnect Device*
- *Wiring Tray LEDs on a QFX3008-I Interconnect Device*

Connecting a QFX Series Device to a Management Console

Supported Platforms QFabric System, QFX Series standalone switches

The QFX Series has a console port with an RJ-45 connector. Use the console port to connect the device to a management console or to a console server.

Ensure that you have an RJ-45 to DB-9 rollover cable available. An RJ-45 cable with an RJ-45 to DB-9 adapter is provided with the device.

NOTE: If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to the QFX Series, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the device and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

To connect the QFX Series to a management console (see Figure 26 on page 181 and Figure 27 on page 181):

1. Connect one end of the Ethernet cable to the console port (labeled **CON**).
2. Connect the other end of the Ethernet cable into the console server (see Figure 26 on page 181) or management console (see Figure 27 on page 181).

Figure 42: Connecting the QFX Series to a Management Console Through a Console Server

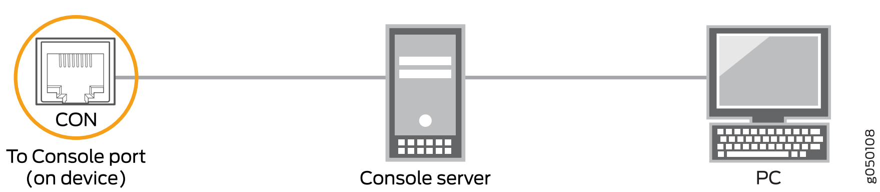


Figure 43: Connecting the QFX Series Directly to a Management Console

Related Documentation

- *Console Port Connector Pinouts for the QFX Series*

Powering On a QFX3008-I Interconnect Device

Supported Platforms QFX3000-G

Before you power on the QFX3008-I Interconnect device, ensure that:

- You understand how to protect the device from electrostatic damage. See *Prevention of Electrostatic Discharge Damage*.
- You have connected the QFX3008-I Interconnect device to the QFabric system control plane and management network. See “QFX3000-G QFabric System Installation Overview” on page 95.

Ensure that you have the following parts and tools available to power on the device:

- An electrostatic discharge (ESD) grounding strap.

To power on the device:

1. Attach the ESD grounding strap to your bare wrist and connect the strap to the ESD point on the chassis.
2. Ensure that the power supplies are fully inserted in the chassis.
3. Ensure that the source power cords are installed correctly for each wiring tray, and the wiring trays are fully inserted in the chassis.
4. Switch on the site circuit breakers.
5. Set a wiring tray’s switch to the ON (|) position. Observe the power supply and wiring tray faceplate LEDs. If the wiring trays are installed correctly and functioning normally, the LEDs light green and remain constantly lit.
6. Repeat Step 5 for the second wiring tray installed in the device.

Related Documentation

- *Installing an AC Power Supply in a QFX3008-I Interconnect Device*
- Connecting AC Power to a QFX3008-I Interconnect Device with Single-Phase Wiring Trays on page 206
- Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Delta Wiring Trays on page 213

- Connecting AC Power to a QFX3008-I Interconnect Device with Three-Phase Wye Wiring Trays on page 217

- *Powering Off a QFX3008-I Interconnect Device*

CHAPTER 11

Installing a QFX3600 Node Device

Installing and Connecting a QFX3600 or QFX3600-I Device

Supported Platforms QFabric System, QFX3600

To install and connect a QFX3600 or QFX3600-I device:

1. Follow the instructions in "Unpacking a QFX3600 or QFX3600-I Device" on page 224.
2. Mount the device by following the instructions appropriate for your site:
   - Mounting a QFX3600 or QFX3600-I Device on Two Posts in a Rack or Cabinet on page 225
   - Mounting a QFX3600 or QFX3600-I Device on Four Posts in a Rack or Cabinet on page 227
3. Follow the instructions in "Connecting Earth Ground to QFX3600 or QFX3600-I Devices" on page 231.
4. Follow the instructions for connecting power as appropriate for your site:
   - Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 233
   - Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 235
5. Depending on how you will be using the QFX3600 or QFX3600-I device, take one of the following actions:

- If you are using the QFX3600 device as a standalone switch, follow the instructions in *Configuring a QFX3600 Device as a Standalone Switch*.
- If you are using the QFX3600 device as a Node device in a QFX3000-G QFabric system, see "QFX3000-G QFabric System Installation Overview" on page 95 for information about the steps to install and configure your QFX3000-G QFabric system.
- If you are using the QFX3600 device as a Node device in a QFX3000-M QFabric system, see *QFX3000-M QFabric System Installation Overview* for information about the steps to install and configure your QFX3000-M QFabric system.
- If you are using the QFX3600-I device as an Interconnect device in a QFX3000-M QFabric system, see *QFX3000-M QFabric System Installation Overview* for information about the steps to install and configure your QFX3000-M QFabric system.

Related Documentation

- *Rack Requirements for a QFX3600 or QFX3600-I Device*
- *Cabinet Requirements for a QFX3600 or QFX3600-I Device*
- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3600 or QFX3600-I Device*

Unpacking a QFX3600 or QFX3600-I Device

Supported Platforms QFabric System, QFX3600

The QFX3600 or QFX3600-I device chassis is a rigid sheet-metal structure that houses the hardware components. QFX3600 and QFX3600-I devices are shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box and quick start instructions.

CAUTION: **QFX3600 and QFX3600-I devices are maximally protected inside the shipping carton. Do not unpack the device until you are ready to begin installation.**

To unpack a QFX3600 or QFX3600-I device:

1. Move the shipping carton to a staging area as close to the installation site as possible, but where you have enough room to remove the system components.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Remove the accessory box and verify the contents against the inventory included in the box. Table 72 on page 225 lists the inventory of components supplied with a QFX3600 or QFX3600-I device.
5. Pull out the packing material holding the device in place.

6. Verify the chassis components received:
   - Three fan trays
   - Two power supplies
7. Save the shipping carton and packing materials in case you need to move or ship the device later.

Table 72: Accessory Kit Part Contents

Parts	Quantity
Chassis grounding lug	1
M5 screws to attach the chassis grounding lug to the protective earth terminal on the chassis	2
Electrostatic discharge (ESD) grounding strap NOTE: Use only clip-style ESD grounding straps with the chassis grounding lug.	1
SFP/SFP+ port dust covers	2
QSFP+ port dust covers	16
RJ-45 cable and RJ-45 to DB-9 adapter for console port connection	1
Mounting brackets for front-mounting in a four-post rack or cabinet	2
M4 flat-head screws to attach the brackets for front-mounting in a rack or cabinet	6
Rear installation blades for front-mounting in a four-post rack or cabinet	2
Mounting brackets for front-mounting in a two-post rack or cabinet	2
Mounting brackets for mid-mounting in a two-post rack or cabinet	2
M4 pan-head screws to attach the brackets for front-mounting or mid-mounting in a rack or cabinet	6

Related Documentation

- Installing and Connecting a QFX3600 or QFX3600-I Device on page 223

Mounting a QFX3600 or QFX3600-I Device on Two Posts in a Rack or Cabinet

Supported Platforms QFabric System, QFX3600

You can mid-mount a QFX3600 or QFX3600-I device on two posts of a 19-in. rack or cabinet by using the mounting brackets provided with the device. (The remainder of this topic uses “rack” to mean “rack or cabinet.”)

You can also mount the device on four posts of a four-post rack by using the mounting brackets provided with the device. See “Mounting a QFX3600 or QFX3600-I Device on Four Posts in a Rack or Cabinet” on page 227.

The holes in the mounting brackets are placed at 1 U (1.75 in., or 4.45 cm.) apart so that the device can be mounted in any rack that provides holes spaced at that distance.

Before mounting a QFX3600 or QFX3600-I device on two posts in a rack:

- Ensure you understand how to prevent electrostatic discharge (ESD) damage. See *Prevention of Electrostatic Discharge Damage*.
- Verify that the site meets the requirements described in *Site Preparation Checklist for a QFX3600 or QFX3600-I Device*.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read *General Safety Guidelines and Warnings*, with particular attention to *Chassis Lifting Guidelines for a QFX3600 or QFX3600-I Device*.
- Remove the device from the shipping carton (see "Unpacking a QFX3600 or QFX3600-I Device" on page 224).

Ensure that you have the following parts and tools available:

- ESD grounding strap (provided)
- One pair of mounting brackets depending on how you want to mount the device (provided)
  - Use the front/rear mounting brackets (part number 540-038579) to front-mount or rear-mount the device.
  - Use the mid-mounting brackets (part number 540-038665) to mid-mount the device.
- 6 Phillips 4x6-mm pan-head mounting screws (provided)
- Four screws to secure the chassis to the rack (not provided)
- Appropriate screwdriver for the mounting screws (not provided)

NOTE: **One person must be available to lift the device while another secures the device to the rack.**

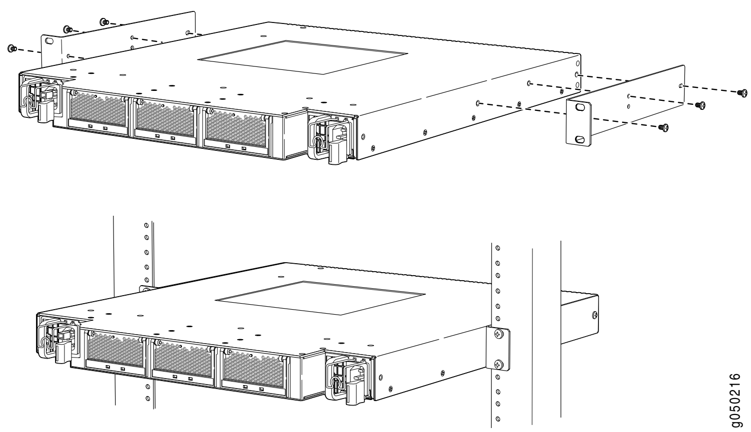
CAUTION: **If you are mounting multiple device on a rack, mount a device in the bottom of the rack first and proceed to mount the rest of the devices from bottom to top.**

To mount the device on two posts in a rack:

1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
2. Place the device on a flat, stable surface.

3. Align the mid-mounting brackets (part number 540-038665) with the holes on the side panels of the device chassis, such that the mounting ears are in the center of the side panels. See Figure 44 on page 227.
4. Insert mounting screws into the aligned holes. Tighten the screws.
5. Have one person grasp both sides of the device, lift the device, and position it in the rack, aligning the mounting ear holes with the threaded holes in the rack or cabinet rail. Align the bottom mounting ear hole in both the mounting brackets with a hole in each rack rail, making sure the chassis is level. See Figure 44 on page 227.
6. Have a second person secure the device to the rack by using the appropriate screws. Tighten the screws.
7. Ensure that the device chassis is level by verifying that all screws on one side of the rack are aligned with the screws on the other side.

Figure 44: Mounting the Device on Two Posts in a Rack



Related Documentation

- *Rack-Mounting and Cabinet-Mounting Warnings*
- Connecting Earth Ground to QFX3600 or QFX3600-I Devices on page 231
- Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 233
- Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 235

Mounting a QFX3600 or QFX3600-I Device on Four Posts in a Rack or Cabinet

Supported Platforms QFabric System, QFX3600

You can front-mount or rear-mount a QFX3600 or QFX3600-I device on four posts in a 19-in. rack or cabinet by using the mounting brackets and installation blades provided with the device. (The remainder of this topic uses “rack” to mean “rack or cabinet.”) The front and rear rack rails must be spaced between 19.3 in. (49 cm) and 36 in. (91.4 cm) front to back.

You can also mount the device on two posts of a 19-in. rack or cabinet by using the mounting brackets provided with the device. See "Mounting a QFX3600 or QFX3600-I Device on Two Posts in a Rack or Cabinet" on page 225.

The holes in the mounting brackets and installation blades are placed at 1 U (1.75 in., or 4.45 cm.) apart so that the device can be mounted in any rack that provides holes spaced at that distance.

Before you begin mounting a QFX3600 or QFX3600-I device on the rack or cabinet:

- Ensure you understand how to prevent electrostatic discharge (ESD) damage. See *Prevention of Electrostatic Discharge Damage*.
- Verify that the site meets the requirements described in *Site Preparation Checklist for a QFX3600 or QFX3600-I Device*.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read "General Site Guidelines" on page 102, with particular attention to *Chassis Lifting Guidelines for a QFX3600 or QFX3600-I Device*.
- Remove the device from the shipping carton (see "Unpacking a QFX3600 or QFX3600-I Device" on page 224).

Ensure that you have the following parts and tools available to mount the device on four posts in a rack:

- ESD grounding strap (provided).
- One pair of mounting brackets (part number 540-038596) (provided).
- One pair of rear installation blades (part number 540-038598). These installation blades support the rear of the chassis, and must be installed (provided).
- 6 Phillips 4x5-mm flat-head mounting screws (provided).
- Eight screws to secure the chassis and rear installation blades to the rack (not provided).
- Appropriate screwdriver for the mounting screws (not provided).

WARNING: **QFX3600 and QFX3600-I devices must be supported at all four corners. Mounting the chassis using only the front brackets damages the chassis and can result in serious bodily injury.**

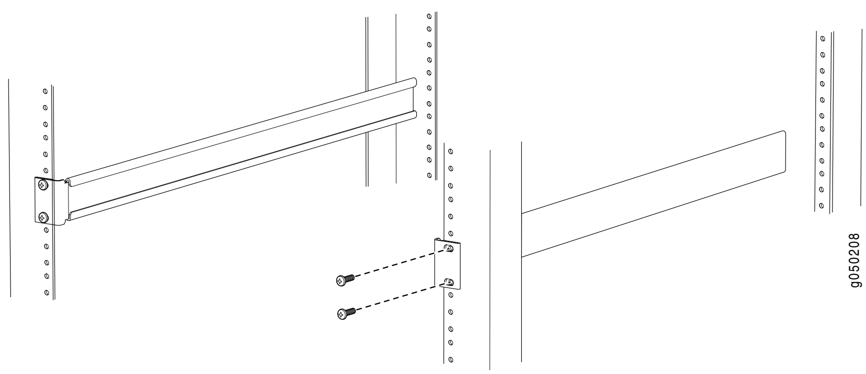
CAUTION: **If you are installing the QFX3600 or QFX3600-I device above 60 in. (152.4 cm) from the floor, you must remove the power supplies and fan trays before attempting to install the device, or ask someone to assist you during the installation.**

CAUTION: If you are mounting multiple devices on a rack, mount the device in the lowest position of the rack first, and proceed to mount the rest of the devices from bottom to top.

To mount the device on four posts in a rack:

1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
2. Decide where to position the device in the rack.
3. Install the rear installation blades. See Figure 45 on page 229.
   a. With two mounting screws—and cage nuts and washers if your rack requires them—attach one of the rear installation blades to the left rear of the rack at the point where you want to mount the device. Tighten the screws.
   b. Position the second rear installation blade at the desired position in the right rear of the rack, so that it is on the same rack level as the left rear installation blade. If the right and left rear installation blades are not on the same level, the chassis will rest at an angle in the rack instead of resting flat and level.
   c. With two mounting screws—and cage nuts and washers if your rack requires them—attach the second rear installation blade to the right rear of the rack at the point where you want to mount the device. Tighten the screws.

Figure 45: Attaching the Installation Blades to the Rear of the Rack



4. Prepare the device for mounting.
   a. Place the device on a flat, stable surface.
   b. Align the mounting brackets along the front or rear of the side panels of the device chassis depending on how you want to mount the device. For example, if you want to front-mount the device, align the brackets along the front of the side panel such that the mounting ears are in the front of the device chassis. See Figure 46 on page 231.

c. Align the holes in the mounting brackets with holes on the side panels of the device chassis.

d. Insert mounting screws into the aligned holes. Tighten the screws.

5. Mount the device.

a. Grasp both sides of the device, lift it, and position it in the rack so that the rear of the chassis slides onto the installation blade. See Figure 46 on page 231.

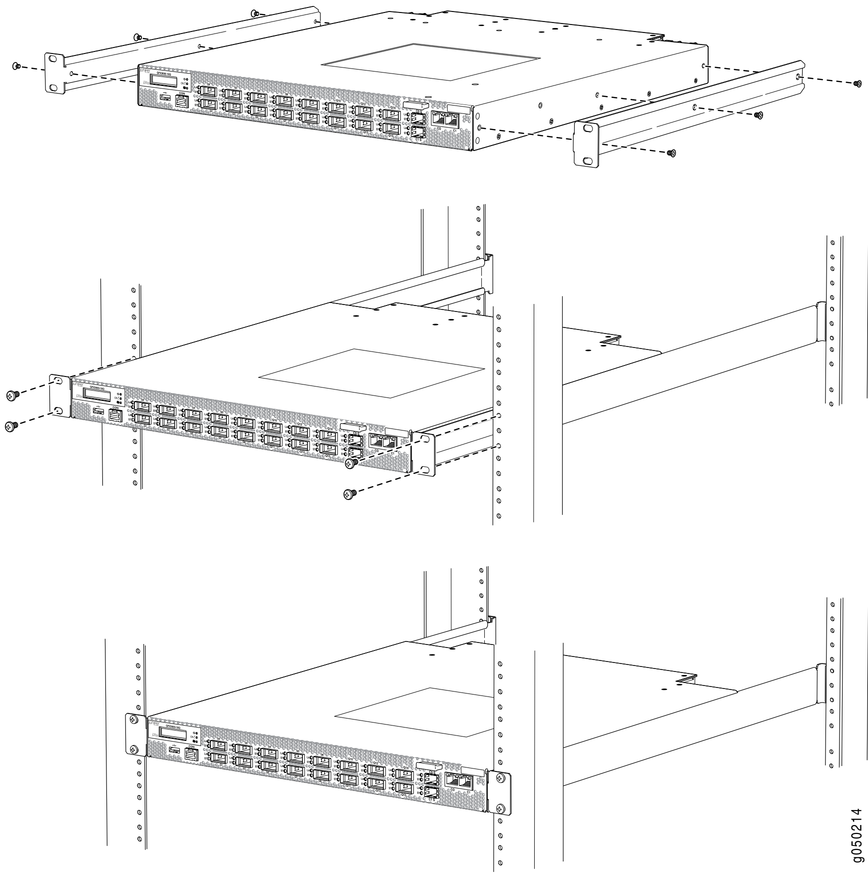
TIP: **If someone is assisting you, have one person stand at the rear of the rack where the installation blade is installed, to help guide the device onto the installation blade.**

b. Align the holes in the front brackets on the chassis with the holes in the rack. Ensure that the chassis is level.

c. With four mounting screws—and cage nuts and washers if your rack requires them—secure the front of the device to the rack. Tighten the screws.

d. Ensure that the device chassis is level by verifying that all screws on one side of the rack are aligned with the screws on the other side.

Figure 46: Mounting the Device on Four-Posts



Related Documentation

- *Rack-Mounting and Cabinet-Mounting Warnings*
- Connecting Earth Ground to QFX3600 or QFX3600-I Devices on page 231
- Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 233
- Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 235
- *Configuring a QFX3600 Device as a Standalone Switch*

Connecting Earth Ground to QFX3600 or QFX3600-I Devices

Supported Platforms QFabric System, QFX3600

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the QFX3600 and QFX3600-I devices to earth ground before you connect it to power.

For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the left rear of the chassis to connect to the earth ground (see Figure 47 on page 233).

Before you connect earth ground to the protective earthing terminal of a QFX3600 or QFX3600-I device, ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable.

CAUTION: **Using a grounding cable with an incorrectly attached lug can damage the switch.**

NOTE: **Mount your device in the rack or cabinet before attaching the grounding lug to the switch. See "Mounting a QFX3600 or QFX3600-I Device on Two Posts in a Rack or Cabinet" on page 225 and "Mounting a QFX3600 or QFX3600-I Device on Four Posts in a Rack or Cabinet" on page 227.**

Ensure that you have the following parts and tools available:

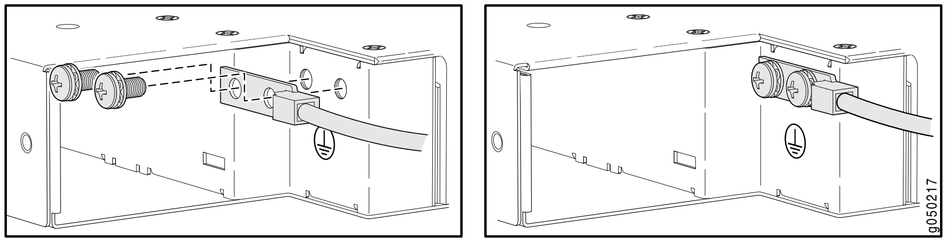
- Grounding cable for your QFX3600 or QFX3600-I device—The grounding cable must be 14 AWG (2 mm^2), minimum 90° C wire, or as permitted by the local code.
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD10-10A-L or equivalent. This grounding lug is provided in the accessory kit.
- Two M5 screws with integrated washers—The screws are used to secure the grounding lug to the protective earthing terminal. The screws are provided in the accessory kit.
- Phillips (+) screwdriver, number 2.

An AC-powered QFX3600 or QFX3600-I device chassis gains additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See "AC Power Cord Specifications for a QFX Series Device" on page 168.

To connect earth ground to a QFX3600 or QFX3600-I device:

1. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the device is mounted.
2. Place the grounding lug attached to the grounding cable over the protective earthing terminal.
3. Secure the grounding lug to the protective earthing terminal with screws.
4. Dress the grounding cable and ensure that it does not touch or block access to other switch components and that it does not drape where people could trip over it.

Figure 47: Connecting a Grounding Cable to a QFX3600 or QFX3600-I Device



Related Documentation

- *General Safety Guidelines and Warnings*
- *Grounded Equipment Warning*
- Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 233
- Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 235

Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device

Supported Platforms QFabric System, QFX3500, QFX3600

The power supply in QFX3500, QFX3600, and QFX3600-I devices is a hot-removable and hot-insertable field-replaceable unit (FRU). You can remove and replace it without powering off the device or disrupting device functions.

Ensure that you have a power cord appropriate for your geographical location available to connect AC power to the device.

Before you begin connecting AC power to the device:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have connected the device chassis to earth ground.

CAUTION: Before you connect power to the device, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the device (for example, by causing a short circuit).

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the device chassis to connect to the earth ground. For instructions on connecting earth ground, see "Connecting Earth Ground to a QFX3500 Device" on page 247 or "Connecting Earth Ground to QFX3600 or QFX3600-I Devices" on page 231. The device gains additional grounding when you plug the power supply in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location (see “AC Power Cord Specifications for a QFX Series Device” on page 168).

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX3500 device, see *Installing a Power Supply in a QFX3500 Device*. For instructions on installing a power supply in a QFX3600 or QFX3600-I device, see *Installing a Power Supply in a QFX3600 or QFX3600-I Device*.

NOTE: Each power supply must be connected to a dedicated power source outlet.

To connect AC power to a QFX3500, QFX3600, or QFX3600-I device:

1. Attach the grounding strap to your bare wrist and to a site ESD point.
2. Ensure that the power supplies are fully inserted in the chassis and the latches are secure. If only one power supply is installed, ensure a that blank cover panel is installed over the second power supply slot.
3. Locate the power cord or cords shipped with the device; the cords have plugs appropriate for your geographical location. See “AC Power Cord Specifications for a QFX Series Device” on page 168.

   WARNING: Ensure that the power cord does not block access to device components or drape where people can trip on it.

4. Connect each power supply to the power sources. Insert the coupler end of the power cord into the AC power cord inlet on the AC power supply faceplate.
5. Push the power cord retainer onto the power cord (see Figure 48 on page 234 or Figure 49 on page 235).

Figure 48: Connecting an AC Power Cord to an AC Power Supply in a QFX3500 Device

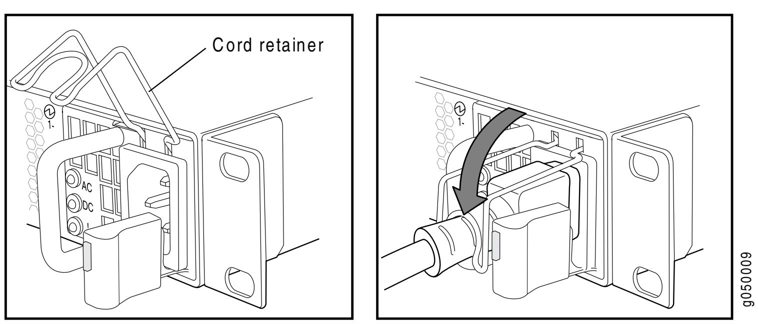
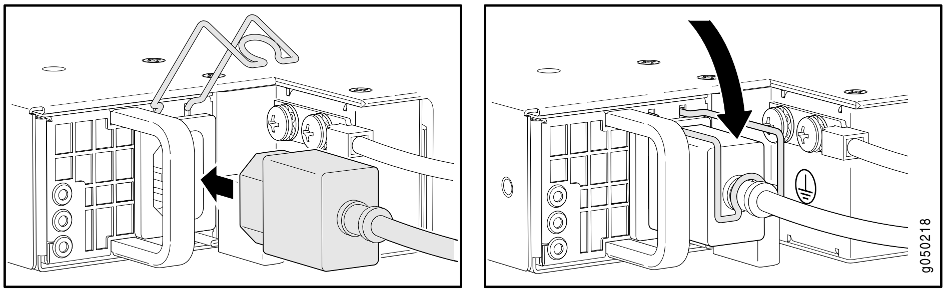


Figure 49: Connecting an AC Power Cord to an AC Power Supply in a QFX3600 or QFX3600-I Device



6. If the AC power source outlet has a power switch, set it to the OFF (O) position.

NOTE: The device powers on as soon as power is provided to the power supply. There is no power switch on the device.

7. Insert the power cord plug into an AC power source outlet.
8. If the AC power source outlet has a power switch, set it to the ON (|) position.
9. Verify that the AC and DC LEDs on each power supply are lit green.

   If the amber fault LED is lit, remove power from the power supply, and replace the power supply (see *Removing a Power Supply from a QFX3500 Device* or *Removing a Power Supply from a QFX3600 or QFX3600-I Device*). Do not remove the power supply until you have a replacement power supply ready: the power supplies or a blank cover panel must be installed in the device to ensure proper airflow.

CAUTION: Replace a failed power supply with a blank panel or new power supply within 1 minute of removal to prevent chassis overheating.

Related Documentation

- *AC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *AC Power Supply LEDs on a QFX3500, QFX3600, or QFX3600-I Device*

Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device

Supported Platforms QFabric System, QFX3500, QFX3600

The power supply in QFX3500, QFX3600, and QFX3600-I devices is a hot-removable and hot-insertable field-replaceable unit (FRU). You can remove and replace it without powering off the device or disrupting device functions.

WARNING: DC-powered QFX3500, QFX3600 and QFX3600-I devices are intended for installation only in a restricted access location.

NOTE: The battery returns of the DC power supply should be connected as an isolated DC return (DC-I).

Before you begin connecting DC power to the device:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have connected the device chassis to earth ground.

CAUTION: Before you connect power to the device, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the device (for example, by causing a short circuit).

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the device chassis to connect to the earth ground. For instructions on connecting earth ground, see "Connecting Earth Ground to a QFX3500 Device" on page 247 or "Connecting Earth Ground to QFX3600 or QFX3600-I Devices" on page 231.

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX3500 device, see *Installing a Power Supply in a QFX3500 Device*. For instructions on installing a power supply in a QFX3600 or QFX3600-I device, see *Installing a Power Supply in a QFX3600 or QFX3600-I Device*

Ensure that you have the following parts and tools available:

- DC power source cables (14–16 AWG) with ring lug (Molex 190700069 or equivalent) (not provided)
- Phillips (+) screwdriver, number 2 (not provided)
- Multimeter (not provided)

To connect DC power to a QFX3500, QFX3600 or QFX3600-I device:

1. Attach the grounding strap to your bare wrist and to a site ESD point.
2. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the battery plant, you can use a multimeter to verify the resistance of the –48V and RTN DC cables to chassis ground:
    - The cable with very low resistance (indicating a closed circuit) to chassis ground is positive (+) and will be installed on the V+ (return) DC power input terminal.

- The cable with very high resistance (indicating an open circuit) to chassis ground is negative (–) and will be installed on the V– (input) DC power input terminal.

CAUTION: You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (–) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the DC power input terminals on each power supply.

3. Ensure that the input circuit breaker is open so that the voltage across the DC power source cable leads is 0 V and that the cable leads do not become active while you are connecting DC power.

NOTE: The V+ terminals are referred to as +RTN, and V– terminals are referred to as –48 V in *DC Power Wiring Sequence Warning* and *DC Power Electrical Safety Guidelines*.

4. Ensure that the power supplies are fully inserted in the chassis.
5. Remove the terminal block cover. The terminal block cover is a piece of clear plastic that snaps into place over the terminal block (see Figure 50 on page 238).
6. Remove the screws on the terminals using the screwdriver. Save the screws.

WARNING: Ensure that the power cables do not block access to device components or drape where people can trip on them.

7. Connect each power supply to the power sources. Secure power source cables to the power supplies by screwing the ring lugs attached to the cables to the appropriate terminals by using the screw from the terminals (see Figure 51 on page 239 and Figure 50 on page 238).

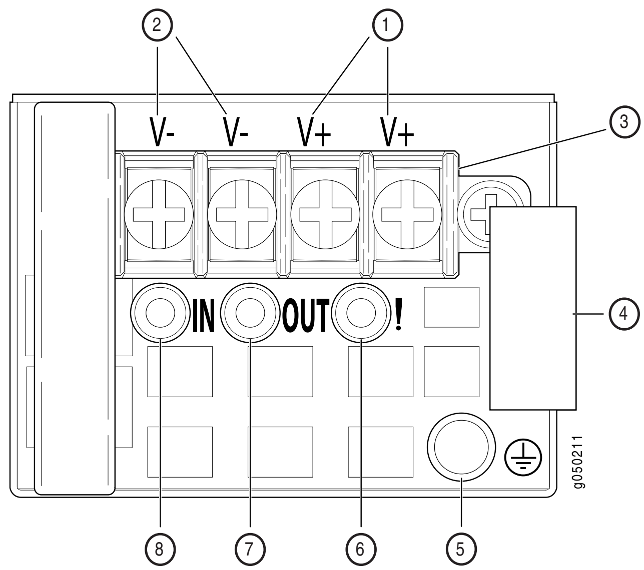
CAUTION: The DC power supply has four terminals labeled V+, V+, V–, and V– for connecting DC power source cables labeled positive (+) and negative (–). The V+ terminals are shunted internally together, as are the V- terminals. The same polarity terminal can be wired together from the same source to provide an additional current path in a higher power chassis. Do not connect the terminals to different sources. For example, connect –48 V from DC source feed A to the input terminals of one power supply and connect –48 V from feed B to the input terminals of the second power supply on the other side of the chassis. This configuration provides the commonly deployed A/B feed redundancy for the system.

a. Secure the ring lug of the positive (+) DC power source cable to the V+ terminal on the DC power supply.

b. Secure the ring lug of the negative (–) DC power source cable to the V– terminal on the DC power supply.

c. Tighten the screws on the power supply terminals until snug using the screwdriver. Do not overtighten—apply between 5 in-lb (0.56 Nm) and 6 in-lb (0.68 Nm) of torque to the screws.

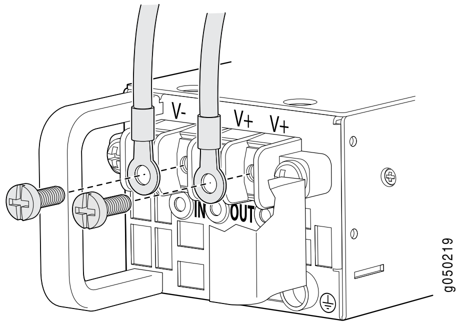
Figure 50: DC Power Supply Faceplate for a QFX3500, QFX3600 or QFX3600-I Device



1—Shunt positive input terminals	5—ESD grounding point
2—Shunt negative input terminals	6—Fault LED
3—Terminal block	7—Output LED
4—Ejector lever	8—Input LED

CAUTION: The V+ terminals are shunted internally together, as are the V- terminals. The same polarity terminal can be wired together from the same source to provide an additional current path in a higher power chassis. Do not connect the terminals to different sources.

Figure 51: Securing Ring Lugs to the Terminals on the QFX3500, QFX3600 or QFX3600-I DC Power Supply



8. Replace the terminal block cover.
9. Close the input circuit breaker.

NOTE: The device powers on as soon as power is provided to the power supply. There is no power switch on the device.

10. Verify that the **IN** and **OUT** LEDs on the power supply are lit green and are on steadily.

Related Documentation

- *DC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *DC Power Supply LEDs on a QFX3500, QFX3600, or QFX3600-I Device*

Connecting a QFX Series Device to a Management Console

Supported Platforms QFabric System, QFX Series standalone switches

The QFX Series has a console port with an RJ-45 connector. Use the console port to connect the device to a management console or to a console server.

Ensure that you have an RJ-45 to DB-9 rollover cable available. An RJ-45 cable with an RJ-45 to DB-9 adapter is provided with the device.

NOTE: If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to the QFX Series, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the device and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

To connect the QFX Series to a management console (see Figure 26 on page 181 and Figure 27 on page 181):

1. Connect one end of the Ethernet cable to the console port (labeled **CON**).

2. Connect the other end of the Ethernet cable into the console server (see Figure 26 on page 181) or management console (see Figure 27 on page 181).

Figure 52: Connecting the QFX Series to a Management Console Through a Console Server

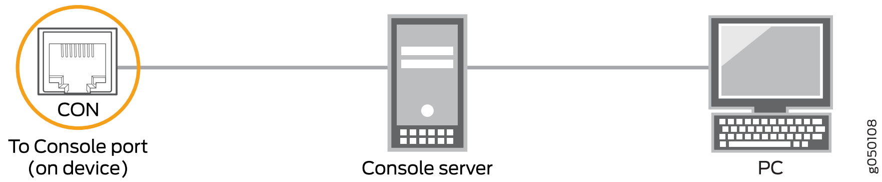


Figure 53: Connecting the QFX Series Directly to a Management Console

Related Documentation

- *Console Port Connector Pinouts for the QFX Series*

CHAPTER 12

Installing a QFX3500 Node Device

Installing and Connecting a QFX3500 Device

Supported Platforms QFabric System, QFX3500

To install and connect a QFX3500 device:

1. Follow the instructions in "Unpacking a QFX3500 Device" on page 242.
2. Mount the device by following the instructions in "Mounting a QFX3500 Device in a Rack or Cabinet" on page 243.
3. Follow the instructions in "Connecting Earth Ground to a QFX3500 Device" on page 247.
4. Follow the instructions in "Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device" on page 233.
5. Depending on how you will be using the QFX3500 device, do one of the following:
   - If you are using the QFX3500 device as a standalone switch, follow the instructions in *Configuring a QFX3500 Device as a Standalone Switch*.
   - If you are using the QFX3500 device as a Node device in a QFX3000-G QFabric system, see "QFX3000-G QFabric System Installation Overview" on page 95 for information about the steps to install and configure your QFX3000-G QFabric system.
   - If you are using the QFX3500 device as a Node device in a QFX3000-M QFabric system, see *QFX3000-M QFabric System Installation Overview* for information about the steps to install and configure your QFX3000-M QFabric system.

Related Documentation

- *Rack Requirements for a QFX3500 Device*
- *Cabinet Requirements for a QFX3500 Device*
- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX3500 Device*

Unpacking a QFX3500 Device

Supported Platforms QFabric System, QFX3500

The QFX3500 device chassis is a rigid sheet-metal structure that houses the hardware components. A QFX3500 device is shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box and quick start instructions.

CAUTION: **QFX3500 devices are maximally protected inside the shipping carton. Do not unpack the device until you are ready to begin installation.**

To unpack a QFX3500 device:

1. Move the shipping carton to a staging area as close to the installation site as possible, but where you have enough room to remove the system components.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Remove the accessory box and verify the contents against the inventory included in the box. Table 73 on page 242 lists the inventory of components supplied with a QFX3500 device.
5. Pull out the packing material holding the device in place.
6. Verify the chassis components received:
   - Management board
   - Two fan trays
   - One or two power supplies, depending on your order. If only one power supply is installed, a blank panel should be installed on the second power supply slot.
7. Save the shipping carton and packing materials in case you need to move or ship the device later.

Table 73: Inventory of Components Supplied with a QFX3500 Device

Component	Quantity
Chassis with management board, two fan trays, and one or two power supplies	1
Rear installation blades	2
RJ-45 cable and RJ-45 to DB-9 adapter	1

Table 73: Inventory of Components Supplied with a QFX3500 Device *(continued)*

Component	Quantity
SFP/SFP+ port dust covers	48
QSFP+ port dust covers	4
Electrostatic discharge (ESD) grounding strap	1

Related Documentation

- Mounting a QFX3500 Device in a Rack or Cabinet on page 243
- Installing and Connecting a QFX3500 Device on page 241

Mounting a QFX3500 Device in a Rack or Cabinet

Supported Platforms QFabric System, QFX3500

You can mount a QFX3500 device on four posts in a 19-in. rack or cabinet by using the mounting kits provided with the device. Choose one of the following two mounting kits provided for the different QFX3500 chassis configurations.

- If your installation kit has two rails and your QFX3500 has mounting holes integrated as part of the chassis, use "Two Mounting Rails Procedure" on page 244. This configuration aligns the management end of the device flush with the rack. The adjustable rails allow for installation into racks having different depths.
- If your installation kit has four rails and the QFX3500 does not have mounting holes as part of the chassis faceplate, use "Four Mounting Rails Procedure" on page 246. This configuration allows either end of the device to be mounted flush with the rack and still be adjustable for racks with different depths.

(The remainder of this topic uses "rack" to mean "rack or cabinet.") The front and rear rack rails must be spaced between 28 in. (71.1 cm) and 36 in. (91.4 cm) front to back.

This topic describes:

- Before You Begin Rack Installation on page 243
- Two Mounting Rails Procedure on page 244
- Four Mounting Rails Procedure on page 246

Before You Begin Rack Installation

Before you begin mounting a QFX3500 device in the rack or cabinet:

- If replacing an existing QFX3500, remove previous rack-mount hardware. The mounting bracket and mounting blade in this procedure is not compatible with other Juniper mounting kits.
- Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See *Prevention of Electrostatic Discharge Damage*.

- Verify that the site meets the requirements described in *Site Preparation Checklist for a QFX3500 Device*.
- Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
- Read "General Site Guidelines" on page 102, with particular attention to *Chassis Lifting Guidelines for a QFX3500 Device*.
- Remove the device from the shipping carton (see "Unpacking a QFX3500 Device" on page 242).

Ensure that you have the following parts and tools available to mount the device on four posts in a rack:

- ESD grounding strap (provided).
- One pair of rear installation blades. These installation blades support the rear of the chassis and must be installed (provided).
- Eight screws to secure the chassis and rear installation blades to the rack (not provided).
- Appropriate screwdriver for the mounting screws (not provided).

WARNING: **The QFX3500 device must be supported at all four corners. Mounting the chassis using only the front brackets will damage the chassis and can result in serious bodily injury.**

CAUTION: **If you are installing the QFX3500 device above 60 in. (152.4 cm) from the floor, you must remove the power supplies, fan trays, and management board before attempting to install the device, or ask someone to assist you during the installation.**

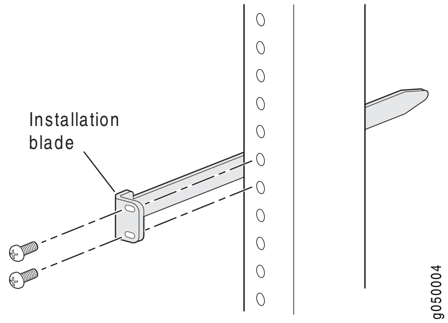
CAUTION: **If you are mounting multiple devices on a rack, mount the device in the lowest position of the rack first and proceed to mount the rest of the devices from bottom to top.**

Two Mounting Rails Procedure

To mount the device on four posts in a rack using the two rails kit:

1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
2. With two mounting screws—and cage nuts and washers if your rack requires them—attach one of the rear installation blades to the rear of the rack at the point where you want to mount the device. Tighten the screws. The blade helps support the rear of the chassis. You install the second rear installation blade after securing both front mounting brackets. See Figure 54 on page 245.

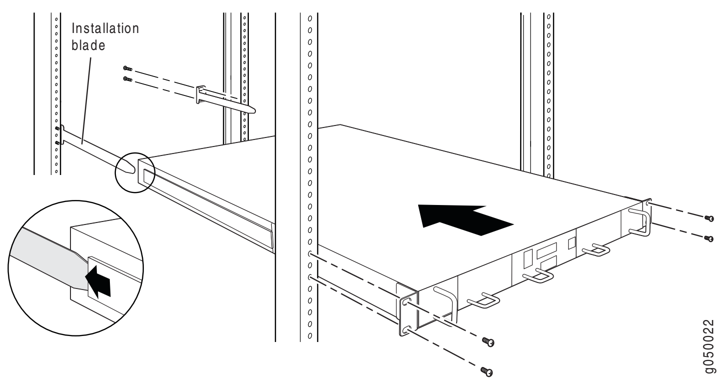
Figure 54: Installing an Installation Blade in a Rack



3. Grasp both sides of the device, lift it, and position it in the rack so that the blade receptacle at the rear of the chassis catches and slides onto the installation blade. See Figure 55 on page 245.

TIP: If someone is assisting you, have one person stand at the rear of the rack where the installation blade is installed, to help guide the device onto the installation blade.

Figure 55: Mounting the QFX3500 Device on Four Posts in a Rack Using Two Rail Kit



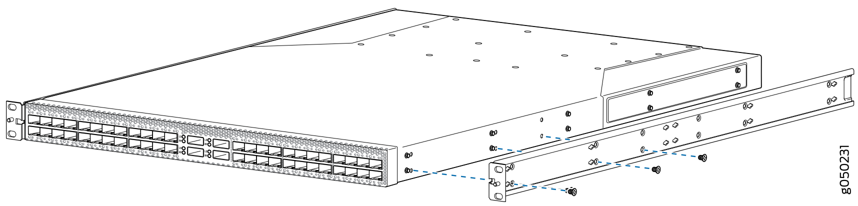
4. Align the holes in the front brackets on the chassis with the holes in the rack. Ensure that the chassis is level.
5. With four mounting screws—and cage nuts and washers if your rack requires them—secure the front of the device to the rack. Insert the first screw on the opposite corner from the rear installation blade you installed. Tighten the screws.
6. Ensure that the device chassis is level by verifying that all the screws on the front of the rack are aligned with the screws at the back of the rack.
7. With two mounting screws—and cage nuts and washers if your rack requires them—slide the second rear mounting blade into the blade receptacle on the chassis, and secure it to the rear of the rack by tightening the screws. You might need to loosen and adjust the first mounting blade to install the second blade.

Four Mounting Rails Procedure

To mount the device on four posts in a rack using the four rails kit:

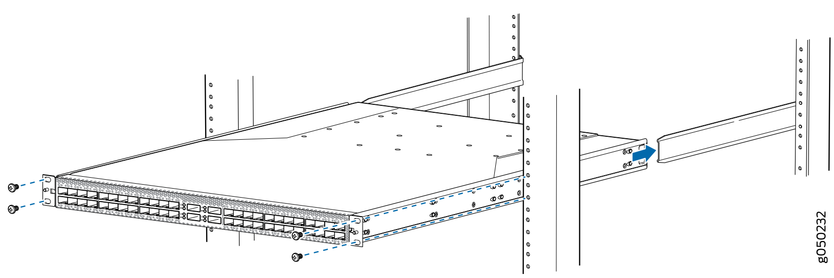
1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
2. Decide whether the management end of the device or the ports are to be placed at the front of the rack.
3. Align the holes in the mounting rail with the button fasteners on the side of the device and slide the holes over the fasteners to click into place. See Figure 56 on page 246 to see the proper alignment.

Figure 56: Attaching Mounting Rail to the QFX3500



4. With three mounting screws—and cage nuts and washers if your rack requires them—attach the mounting rail to the device. Tighten the screws.
5. Repeats steps 3 and 4 on the opposite side of the device. One end of the device now has front facing mounting holes, the other end none.
6. With two mounting screws—and cage nuts and washers if your rack requires them—attach one of the rear installation blades to the rear of the rack at the point where you want to mount the device. Tighten the screws. The blade helps support the rear of the chassis. You install the second rear installation blade after securing both front mounting brackets. See Figure 54 on page 245 for detail on installing the rear blade.
7. Grasp both sides of the device, lift it, and position it in the rack so that the blade receptacle at the rear of the chassis catches and slides onto the installation blade. See Figure 57 on page 246.

Figure 57: Slide Mounting Rail onto the Rear Mounting Blade



8. Align the holes in the mounting brackets with the holes in the rack. Ensure that the chassis is level.

9. With four front mounting screws–and cage nuts and washers if your rack requires them–attach the mounting bracket to the rack. Insert the first screw on the opposite corner from the mounting blade. Tighten the screws.
10. Ensure that the switch chassis is level by verifying that the screws on the front of the rack are aligned with the screws at the back of the rack.
11. With two mounting screws—and cage nuts and washers if your rack requires them—slide the second rear mounting blade into the blade receptacle on the mounting blade, and secure it to the rear of the rack by tightening the screws. You might need to loosen and adjust the other mounting blade to install the second blade.

Related Documentation

- *Rack-Mounting and Cabinet-Mounting Warnings*
- Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 233
- *Configuring a QFX3500 Device as a Standalone Switch*

Connecting Earth Ground to a QFX3500 Device

Supported Platforms QFabric System, QFX3500

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the QFX3500 device to earth ground before you connect it to power.

For installations that require a separate grounding conductor to the chassis, you must attach a protective earthing terminal bracket on the QFX3500 device left front mounting bracket to connect to the earth ground (see Figure 58 on page 249).

Before you connect earth ground to the protective earthing terminal of a QFX3500 device, ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable.

CAUTION: **Using a grounding cable with an incorrectly attached lug can damage the device.**

NOTE: **Mount your device in the rack or cabinet before attaching the grounding lug to the device. See "Mounting a QFX3500 Device in a Rack or Cabinet" on page 243.**

Ensure that you have the following parts and tools available:

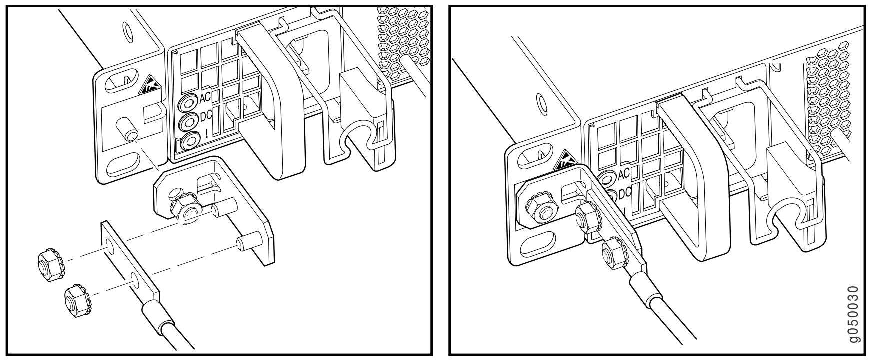
- Protective earthing terminal bracket—This L-shaped bracket attaches to a post on the QFX3500 device left front mounting bracket, providing a protective earthing terminal for the device. This bracket is provided in the accessory kit.
- Grounding cable for your QFX3500 device—The grounding cable must be 14 AWG (2 mm^2), minimum 90° C wire, or as permitted by the local code.
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD10-10A-L or equivalent. This grounding lug is provided in the accessory kit.
- Three M4 hex nuts with integrated washers—One nut and washer are required to secure the grounding lug bracket to the left front mounting bracket, and two nuts and washers are used to secure the grounding lug to the grounding lug bracket protective earthing terminal. Four nuts are provided in the accessory kit.
- 7-mm wrench or socket with driver to attach all three nuts.

An AC-powered QFX3500 device chassis gains additional grounding when you plug the power supply in the device into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See "AC Power Cord Specifications for a QFX Series Device" on page 168.

To connect earth ground to a QFX3500 device:

1. Secure the provided protective earthing terminal bracket to the threaded post on the QFX3500 device left front mounting bracket with the nut provided. The posts on the protective earthing terminal bracket should point to the left. See Figure 58 on page 249.

Figure 58: Connecting a Grounding Cable to a QFX3500 Device



2. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the device is mounted.
3. Place the grounding lug attached to the grounding cable over the protective earthing terminal on the protective earthing terminal bracket.
4. Secure the grounding lug to the protective earthing terminal with two nuts.
5. Dress the grounding cable and ensure that it does not touch or block access to other device components and that it does not drape where people could trip over it.

Related Documentation

- *General Safety Guidelines and Warnings*
- *Grounded Equipment Warning*
- Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 233
- Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 235

Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device

Supported Platforms QFabric System, QFX3500, QFX3600

The power supply in QFX3500, QFX3600, and QFX3600-I devices is a hot-removable and hot-insertable field-replaceable unit (FRU). You can remove and replace it without powering off the device or disrupting device functions.

Ensure that you have a power cord appropriate for your geographical location available to connect AC power to the device.

Before you begin connecting AC power to the device:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have connected the device chassis to earth ground.

CAUTION: Before you connect power to the device, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the device (for example, by causing a short circuit).

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the device chassis to connect to the earth ground. For instructions on connecting earth ground, see "Connecting Earth Ground to a QFX3500 Device" on page 247 or "Connecting Earth Ground to QFX3600 or QFX3600-I Devices" on page 231. The device gains additional grounding when you plug the power supply in the device into a grounded AC power outlet by using the AC power cord appropriate for your geographical location (see "AC Power Cord Specifications for a QFX Series Device" on page 168).

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX3500 device, see *Installing a Power Supply in a QFX3500 Device*. For instructions on installing a power supply in a QFX3600 or QFX3600-I device, see *Installing a Power Supply in a QFX3600 or QFX3600-I Device*.

NOTE: Each power supply must be connected to a dedicated power source outlet.

To connect AC power to a QFX3500, QFX3600, or QFX3600-I device:

1. Attach the grounding strap to your bare wrist and to a site ESD point.
2. Ensure that the power supplies are fully inserted in the chassis and the latches are secure. If only one power supply is installed, ensure a that blank cover panel is installed over the second power supply slot.
3. Locate the power cord or cords shipped with the device; the cords have plugs appropriate for your geographical location. See "AC Power Cord Specifications for a QFX Series Device" on page 168.

   WARNING: Ensure that the power cord does not block access to device components or drape where people can trip on it.

4. Connect each power supply to the power sources. Insert the coupler end of the power cord into the AC power cord inlet on the AC power supply faceplate.
5. Push the power cord retainer onto the power cord (see Figure 48 on page 234 or Figure 49 on page 235).

Figure 59: Connecting an AC Power Cord to an AC Power Supply in a QFX3500 Device

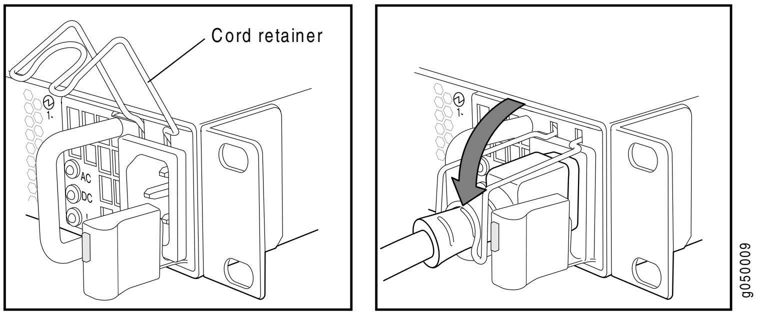
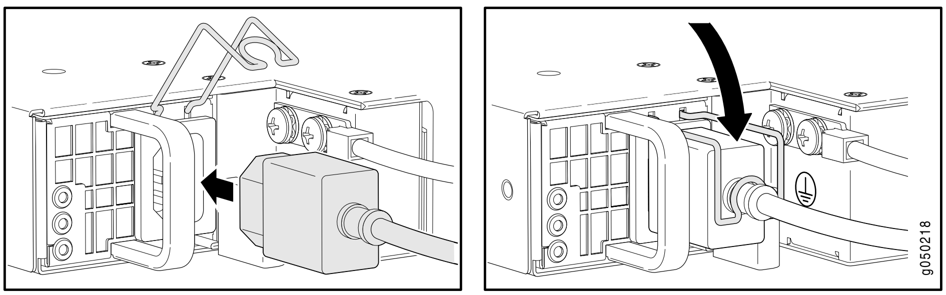


Figure 60: Connecting an AC Power Cord to an AC Power Supply in a QFX3600 or QFX3600-I Device



6. If the AC power source outlet has a power switch, set it to the OFF (O) position.

   NOTE: The device powers on as soon as power is provided to the power supply. There is no power switch on the device.

7. Insert the power cord plug into an AC power source outlet.
8. If the AC power source outlet has a power switch, set it to the ON (|) position.
9. Verify that the AC and DC LEDs on each power supply are lit green.

   If the amber fault LED is lit, remove power from the power supply, and replace the power supply (see *Removing a Power Supply from a QFX3500 Device* or *Removing a Power Supply from a QFX3600 or QFX3600-I Device*). Do not remove the power supply until you have a replacement power supply ready: the power supplies or a blank cover panel must be installed in the device to ensure proper airflow.

   CAUTION: Replace a failed power supply with a blank panel or new power supply within 1 minute of removal to prevent chassis overheating.

Related Documentation

- *AC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *AC Power Supply LEDs on a QFX3500, QFX3600, or QFX3600-I Device*

Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device

Supported Platforms QFabric System, QFX3500, QFX3600

The power supply in QFX3500, QFX3600, and QFX3600-I devices is a hot-removable and hot-insertable field-replaceable unit (FRU). You can remove and replace it without powering off the device or disrupting device functions.

WARNING: DC-powered QFX3500, QFX3600 and QFX3600-I devices are intended for installation only in a restricted access location.

NOTE: The battery returns of the DC power supply should be connected as an isolated DC return (DC-I).

Before you begin connecting DC power to the device:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have connected the device chassis to earth ground.

  CAUTION: Before you connect power to the device, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the device (for example, by causing a short circuit).

  To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the device chassis to connect to the earth ground. For instructions on connecting earth ground, see "Connecting Earth Ground to a QFX3500 Device" on page 247 or "Connecting Earth Ground to QFX3600 or QFX3600-I Devices" on page 231.

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX3500 device, see *Installing a Power Supply in a QFX3500 Device*. For instructions on installing a power supply in a QFX3600 or QFX3600-I device, see *Installing a Power Supply in a QFX3600 or QFX3600-I Device*

Ensure that you have the following parts and tools available:

- DC power source cables (14–16 AWG) with ring lug (Molex 190700069 or equivalent) (not provided)
- Phillips (+) screwdriver, number 2 (not provided)

- Multimeter (not provided)

To connect DC power to a QFX3500, QFX3600 or QFX3600-I device:

1. Attach the grounding strap to your bare wrist and to a site ESD point.
2. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the battery plant, you can use a multimeter to verify the resistance of the –48V and RTN DC cables to chassis ground:
   - The cable with very low resistance (indicating a closed circuit) to chassis ground is positive (+) and will be installed on the V+ (return) DC power input terminal.
   - The cable with very high resistance (indicating an open circuit) to chassis ground is negative (–) and will be installed on the V– (input) DC power input terminal.

   CAUTION: **You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (–) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the DC power input terminals on each power supply.**

3. Ensure that the input circuit breaker is open so that the voltage across the DC power source cable leads is 0 V and that the cable leads do not become active while you are connecting DC power.

   NOTE: The V+ terminals are referred to as +RTN, and V– terminals are referred to as –48 V in *DC Power Wiring Sequence Warning* and *DC Power Electrical Safety Guidelines*.

4. Ensure that the power supplies are fully inserted in the chassis.
5. Remove the terminal block cover. The terminal block cover is a piece of clear plastic that snaps into place over the terminal block (see Figure 50 on page 238).
6. Remove the screws on the terminals using the screwdriver. Save the screws.

   WARNING: **Ensure that the power cables do not block access to device components or drape where people can trip on them.**

7. Connect each power supply to the power sources. Secure power source cables to the power supplies by screwing the ring lugs attached to the cables to the appropriate terminals by using the screw from the terminals (see Figure 51 on page 239 and Figure 50 on page 238).

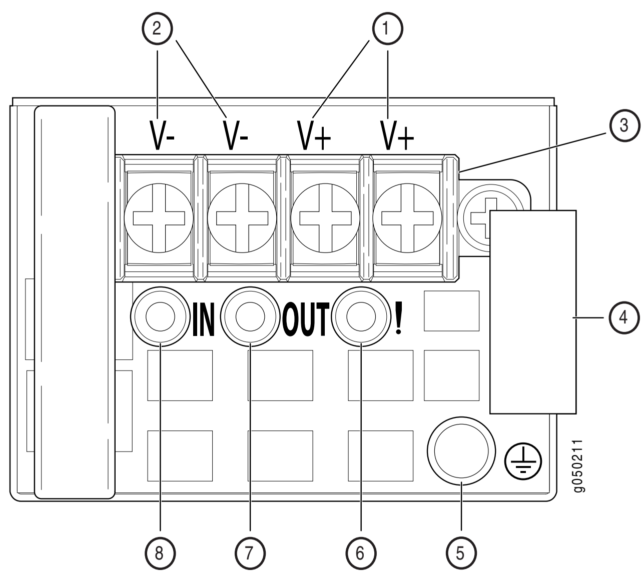
CAUTION: The DC power supply has four terminals labeled V+, V+, V–, and V– for connecting DC power source cables labeled positive (+) and negative (–). The V+ terminals are shunted internally together, as are the V- terminals. The same polarity terminal can be wired together from the same source to provide an additional current path in a higher power chassis. Do not connect the terminals to different sources. For example, connect –48 V from DC source feed A to the input terminals of one power supply and connect –48 V from feed B to the input terminals of the second power supply on the other side of the chassis. This configuration provides the commonly deployed A/B feed redundancy for the system.

a. Secure the ring lug of the positive (+) DC power source cable to the V+ terminal on the DC power supply.

b. Secure the ring lug of the negative (–) DC power source cable to the V– terminal on the DC power supply.

c. Tighten the screws on the power supply terminals until snug using the screwdriver. Do not overtighten—apply between 5 in-lb (0.56 Nm) and 6 in-lb (0.68 Nm) of torque to the screws.

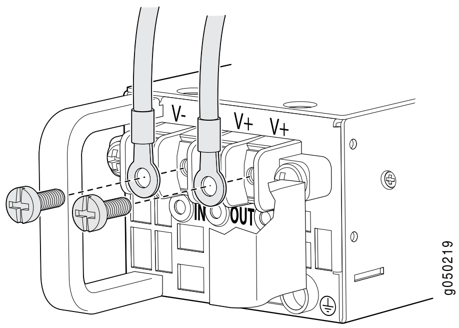
Figure 61: DC Power Supply Faceplate for a QFX3500, QFX3600 or QFX3600-I Device



1—Shunt positive input terminals	5—ESD grounding point
2—Shunt negative input terminals	6—Fault LED
3—Terminal block	7—Output LED
4—Ejector lever	8—Input LED

CAUTION: The V+ terminals are shunted internally together, as are the V- terminals. The same polarity terminal can be wired together from the same source to provide an additional current path in a higher power chassis. Do not connect the terminals to different sources.

Figure 62: Securing Ring Lugs to the Terminals on the QFX3500, QFX3600 or QFX3600-I DC Power Supply



8. Replace the terminal block cover.
9. Close the input circuit breaker.

NOTE: The device powers on as soon as power is provided to the power supply. There is no power switch on the device.

10. Verify that the **IN** and **OUT** LEDs on the power supply are lit green and are on steadily.

Related Documentation

- *DC Power Supply for a QFX3500, QFX3600, or QFX3600-I Device*
- *DC Power Supply LEDs on a QFX3500, QFX3600, or QFX3600-I Device*

Connecting a QFX Series Device to a Management Console

Supported Platforms QFabric System, QFX Series standalone switches

The QFX Series has a console port with an RJ-45 connector. Use the console port to connect the device to a management console or to a console server.

Ensure that you have an RJ-45 to DB-9 rollover cable available. An RJ-45 cable with an RJ-45 to DB-9 adapter is provided with the device.

NOTE: If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to the QFX Series, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the device and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

To connect the QFX Series to a management console (see Figure 26 on page 181 and Figure 27 on page 181):

1. Connect one end of the Ethernet cable to the console port (labeled **CON**).
2. Connect the other end of the Ethernet cable into the console server (see Figure 26 on page 181) or management console (see Figure 27 on page 181).

Figure 63: Connecting the QFX Series to a Management Console Through a Console Server

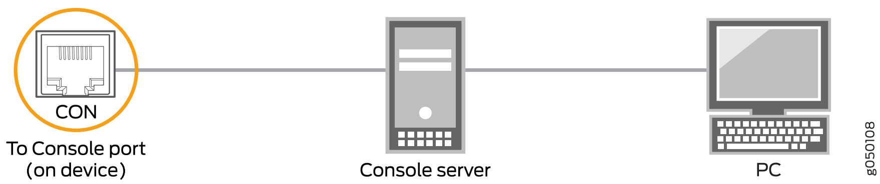


Figure 64: Connecting the QFX Series Directly to a Management Console

Related Documentation

- *Console Port Connector Pinouts for the QFX Series*

CHAPTER 13

Installing a QFX5100 Node Device

Installing and Connecting a QFX5100 Device

Supported Platforms QFabric System, QFX5100

You can mount a QFX5100 switch:

- Flush with the front of a 19-in. four-post rack. Use the standard mounting brackets provided with the switch for this configuration.
- Recessed 2 in. (5 cm) from the front of a 19-in. four-post rack. Use the extension bracket provided in the standard mounting kit for this configuration. Recessed mounting is primarily used in enclosed cabinets.

NOTE: **The 2 U, QFX5100-96S switch, can be rack mounted in either a standard two or four-post cabinet.**

To install and connect a QFX5100 switch:

1. Follow the instructions in "Unpacking a QFX5100 Device" on page 258..
2. Determine how the switch is to be mounted.

   Flush or recessed mounted in a rack or cabinet, see "Mounting a QFX5100 Device in a Rack or Cabinet" on page 259.
3. Follow the instructions in:

   a. Connecting Earth Ground to a QFX5100 Device on page 264

b. Connecting DC Power to a QFX5100 Device on page 269

c. *Configuring a QFX5100 Device*

4. Depending on how you plan to use the QFX5100 switch, do one of the following:
   - If you are using the QFX5100 switch as a standalone switch, follow the instructions in *Configuring a QFX5100 Device*.
   - If you are using the QFX5100 switch as a Node device in a QFX3000-G QFabric system, see "QFX3000-G QFabric System Installation Overview" on page 95 for information about the steps to install and configure your QFX3000-G QFabric system.
   - If you are using the QFX5100 switch as a Node device in a QFX3000-M QFabric system, see *QFX3000-M QFabric System Installation Overview* for information about the steps to install and configure your QFX3000-M QFabric system.
   - If you are using the QFX5100 switch in a Virtual Chassis Fabric, see *Connecting a QFX5100 Device in a Virtual Chassis Fabric*

Related Documentation

- *Rack Requirements for a QFX5100 Device*
- *Cabinet Requirements for a QFX5100 Device*
- *Clearance Requirements for Airflow and Hardware Maintenance for a QFX5100 Device*

Unpacking a QFX5100 Device

Supported Platforms QFabric System, QFX5100

The QFX5100 switch chassis is a rigid sheet-metal structure that houses the hardware components. A QFX5100 switch is shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box and quick start instructions.

CAUTION: **QFX5100 switches are maximally protected inside the shipping carton. Do not unpack the switch until you are ready to begin installation.**

To unpack a QFX5100 switch:

1. Move the shipping carton to a staging area as close to the installation site as possible, but where you have enough room to remove the system components.
2. Position the carton so that the arrows are pointing up.
3. Open the top flaps on the shipping carton.
4. Remove the accessory box and verify the contents against the inventory included in the box. Table 74 on page 259 lists the inventory of components supplied with a QFX5100 switch.
5. Pull out the packing material holding the switch in place.
6. Verify the chassis components received:

- Two power supplies
- Fan modules
  - Five fan modules for QFX5100-24Q and QFX5100-48S
  - Two fan modules for QFX5100-96S
- QFX5100-24Q only: If you ordered the optional high-speed uplink modules, they are packaged as components and must be installed in the switch.

7. Save the shipping carton and packing materials in case you need to move or ship the switch later.

Table 74: Inventory of Components Supplied with a QFX5100 Switch

Component	Quantity
Chassis with five fan modules and two power supplies. The QFX5100-96S has three fan modules.	1
Rear mounting blades	2
Front mounting brackets	2
Extension brackets	2
RJ-45 cable and RJ-45 to DB-9 adapter	1

Related Documentation

- Mounting a QFX5100 Device in a Rack or Cabinet on page 259
- Installing and Connecting a QFX5100 Device on page 257

Mounting a QFX5100 Device in a Rack or Cabinet

Supported Platforms QFabric System, QFX5100

You can mount all QFX5100 switches on a four post 19-in. rack or cabinet using the mounting kit provided with the device.

For four post rack or cabinet installations, the mounting kit contains two front mounting rails with two matching rear mounting blades. This configuration allows either end of the switch to be mounted flush with the rack and still be adjustable for racks with different depths.

The mounting kit for the QFX5100-96S has mounting rails, blades, and brackets for the four-post configuration.

(The remainder of this topic uses “rack” to mean “rack or cabinet.”) The front and rear rack rails must be spaced between 28 in. (71.1 cm) and 36 in. (91.4 cm) front to back.

This topic describes:

Before You Begin Rack Installation

Before you begin mounting a QFX5100 switch in the rack or cabinet:

1. Ensure that you understand how to prevent electrostatic discharge (ESD) damage. See *Prevention of Electrostatic Discharge Damage*.
2. Verify that the site meets the requirements described in *Site Preparation Checklist for a QFX5100 Device*.
3. Place the rack in its permanent location, allowing adequate clearance for airflow and maintenance, and secure it to the building structure.
4. Read “General Site Guidelines” on page 102, with particular attention to *Chassis Lifting Guidelines for a QFX5100 Device*.
5. Remove the switch from the shipping carton (see “Unpacking a QFX5100 Device” on page 258).
6. Ensure that you have the following parts and tools available to mount the switch in a rack:
   - ESD grounding strap (not provided).
   - Blades, rails, or brackets (provided).
     - For four-post installations:
       - One pair of rear mounting blades. These mounting blades support the rear of the chassis and must be installed (provided).
       - One pair of front mounting rails. The mounting blades slide into the mounting rails to support the switch (provided).
       - Screws to secure the mounting rails to the chassis (provided).
         - Twelve screws for QFX5100-24Q and QFX5100-48S
         - Twenty-four screws for QFX5100-96S
       - Eight screws to secure the chassis and rear installation blades to the rack (not provided).
     - For two-post installations:
       - One pair of mounting brackets (provided).
       - Sixteen screens for attaching the brackets to the chassis (provided).
       - Four screws to secure the mounting brackets and chassis to the post (not provided).

- Appropriate screwdriver for the mounting screws (not provided).
- Two power cords with plugs appropriate to your geographical location (provided).
- RJ-45 cable and RJ-45 to DB-9 serial port adapter (provided).
- Management host, such as a PC laptop, with a serial port (not provided).

Optional equipment: Grounding cable kit with bracket, lug, and three nuts with integrated washers.

WARNING: **The 1 U versions of QFX5100 switches must be supported at all four corners. Mounting the chassis using only the front brackets will damage the chassis and can result in serious bodily injury.**

CAUTION: **All QFX5100 switches require two people for installation. If you are installing the QFX5100 switch above 60 in. (152.4 cm) from the floor, you can remove the power supplies and fan modules to minimize the weight before attempting to install the switch.**

CAUTION: **If you are mounting multiple switches on a rack, mount the switch in the lowest position of the rack first. Proceed to mount the rest of the switches from the bottom to the top of the rack to minimize the risk of the rack toppling.**

Four Post Procedure

To mount the switch on four posts in a rack using the provided mounting kit:

1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
2. Decide whether the Field Replaceable Unit (FRU) end of the switch or the port end is to be placed at the front of the rack. Position the switch in such a manner that the **AIR IN** labels on components are next to the cold aisle and **AIR OUT** labels on components are next to the hot aisle.
3. Align the holes in the mounting rail with the holes on the side of the chassis. See Figure 56 on page 246 to see the proper alignment for the QFX5100-24Q switch and Figure 66 on page 262 for the alignment for the QFX5100-48S switch and Figure 67 on page 262 for the QFX5100-96S switch.

Figure 65: Attaching Mounting Rails to the QFX5100-24Q

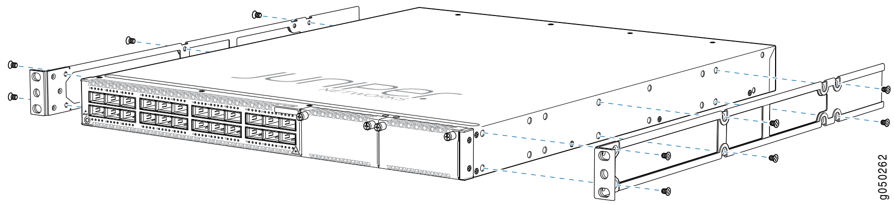


Figure 66: Attaching Mounting Rails to the QFX5100-48S

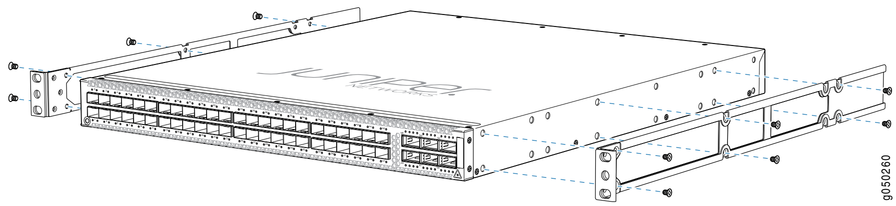
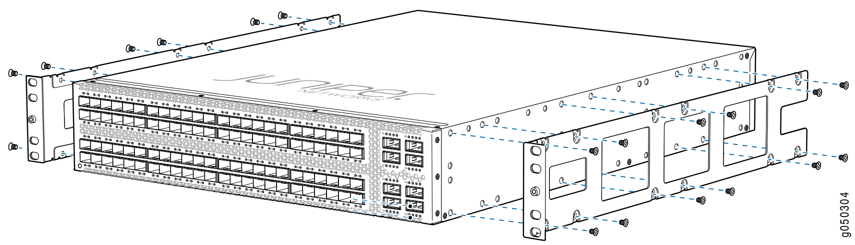


Figure 67: Attaching Mounting Rails to the QFX5100-96S



4. Attach the mounting rail to the switch using the mounting screws (and cage nuts and washers if your rack requires them). Tighten the screws.
5. Repeats steps 4 and 5 on the opposite side of the switch.
6. Have one person grasp both sides of the switch, lift it, and position it in the rack so that the front bracket is aligned with the rack holes.
7. Have a second person secure the front of the switch to the rack using four mounting screws (and cage nuts and washers if your rack requires them.) Tighten the screws.. See Figure 57 on page 246 and Figure 69 on page 263 for examples of connecting the mounting rails and blades.

Figure 68: Attach 1 U Switch to Rack

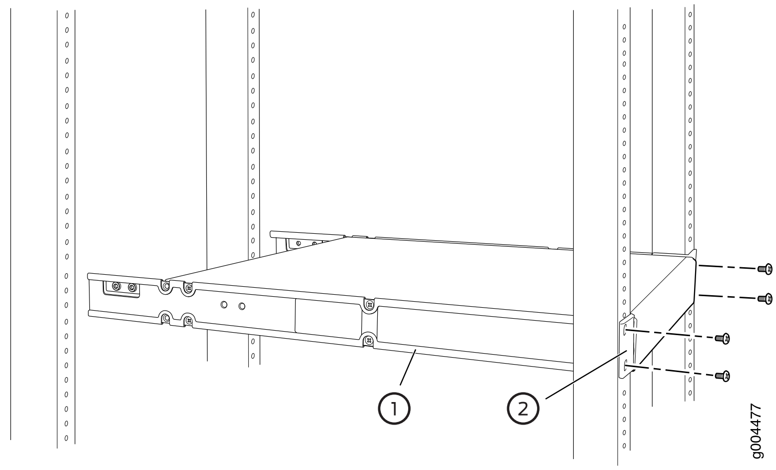
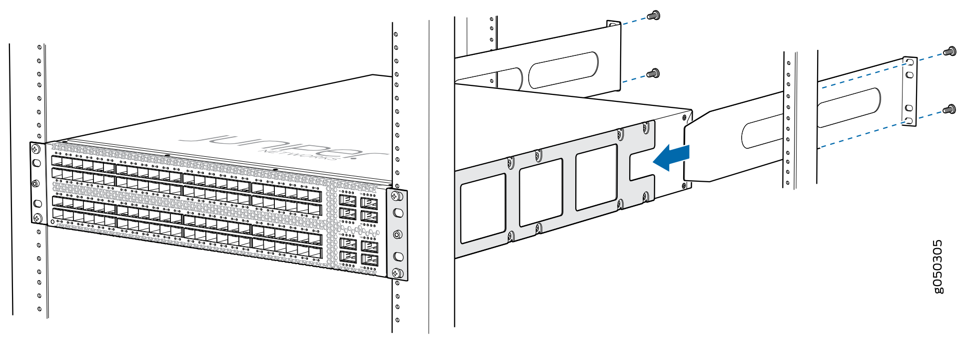
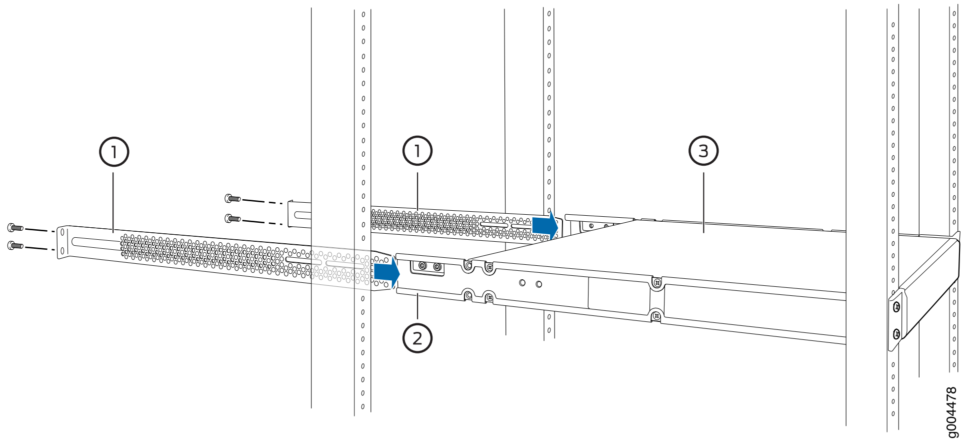


Figure 69: Slide Mounting Rail onto the QFX5100-96S Rear Mounting Blade



8. Continue to support the switch while sliding the rear mounting-blades into the channel of the side mounting-rails and securing the blades to the rack. Use the four mounting screws (and cage nuts and washers if your rack requires them) to attach each blade to the rack. (Use eight front-mounting screws for the QFX5100-96S.) Tighten the screws. See Figure 70 on page 264.

Figure 70: Slide Mounting Blade into 1 U Mounting Rail



9. Ensure that the switch chassis is level by verifying that all the screws on the front of the rack are aligned with the screws at the back of the rack.

Related Documentation

- *Rack-Mounting and Cabinet-Mounting Warnings*
- Connecting AC Power to a QFX5100 Device on page 266
- Connecting Earth Ground to a QFX5100 Device on page 264

Connecting Earth Ground to a QFX5100 Device

Supported Platforms QFabric System, QFX5100

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the QFX5100 switch to earth ground before you connect it to power.

For installations that require a separate grounding conductor to the chassis, you must attach a protective earthing terminal bracket on the QFX5100 switch left front mounting bracket to connect to the earth ground (see Figure 71 on page 266).

Before you connect earth ground to the protective earthing terminal of a QFX5100 switch, ensure that a licensed electrician has attached an appropriate grounding lug to the grounding cable.

CAUTION: **Using a grounding cable with an incorrectly attached lug can damage the switch.**

NOTE: **Mount your switch in the rack or cabinet before attaching the grounding lug to the switch. See** "Mounting a QFX5100 Device in a Rack or Cabinet" on page 259.

Ensure that you have the following parts and tools available:

- Protective earthing terminal bracket—This bracket attaches to the QFX5100 switch chassis through the left front mounting bracket, providing a protective earthing terminal for the switch.
- Grounding cable for your QFX5100 switch—The grounding cable must be 14 AWG (2 mm^2), minimum 90° C wire, or as permitted by the local code.
- Grounding lug for your grounding cable—The grounding lug required is a Panduit LCD10-10A-L or equivalent.
- Two M4 hex nuts with integrated washers—Two nuts and washers are used to secure the grounding lug to the grounding lug bracket protective earthing terminal. Four nuts are provided in the accessory kit.
- 7-mm wrench or socket with driver to attach the two nuts.

An AC-powered QFX5100 switch chassis gains additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See "AC Power Cord Specifications for a QFX Series Device" on page 168.

To connect earth ground to a QFX5100 switch:

1. Secure the provided protective earthing terminal bracket through the QFX5100 switch mounting bracket to the chassis with the nut provided. The posts on the protective earthing terminal bracket should point to the left. See Figure 71 on page 266 and Figure 72 on page 266.

Figure 71: Connecting a Grounding Cable to a 1 U QFX5100 Switch

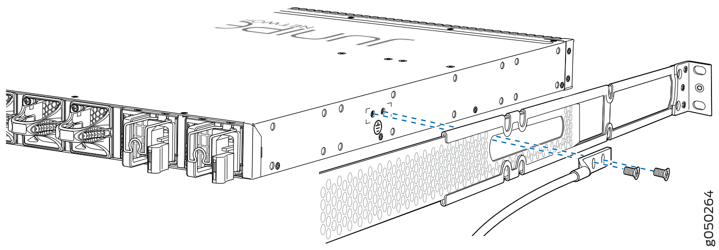
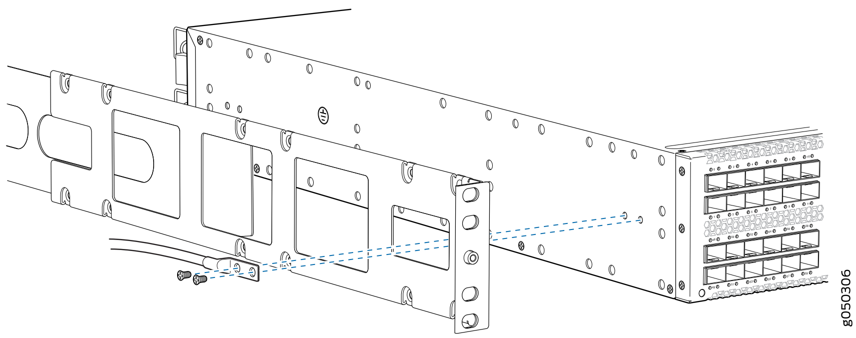


Figure 72: Connecting a Grounding Cable to the 2 U QFX5100-96S Switch



2. Connect one end of the grounding cable to a proper earth ground, such as the rack in which the switch is mounted.
3. Place the grounding lug attached to the grounding cable over the protective earthing terminal on the protective earthing terminal bracket.
4. Secure the grounding lug to the protective earthing terminal with two nuts.
5. Dress the grounding cable and ensure that it does not touch or block access to other device components and that it does not drape where people could trip over it.

Related Documentation

- *General Safety Guidelines and Warnings*
- *Grounded Equipment Warning*
- Connecting AC Power to a QFX5100 Device on page 266
- Connecting DC Power to a QFX5100 Device on page 269

Connecting AC Power to a QFX5100 Device

Supported Platforms QFabric System, QFX5100

The power supply in a QFX5100 switch is a hot-removable and hot-insertable field-replaceable unit (FRU). You can remove and replace it without powering off the switch or disrupting switch functions.

Ensure that you have a power cord appropriate for your geographical location available to connect AC power to the switch.

Before you begin connecting AC power to the switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have connected the switch chassis to earth ground.

CAUTION: Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit).

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the switch chassis to connect to the earth ground. For instructions on connecting earth ground, see "Connecting Earth Ground to a QFX5100 Device" on page 264. The switch gains additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using the AC power cord appropriate for your geographical location (see *AC Power Supply for a QFX5100 Device*).

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX5100 switch, see *Installing a Power Supply in a QFX5100 Device*.

NOTE: Each power supply must be connected to a dedicated power source outlet.

To connect AC power to a QFX5100 switch:

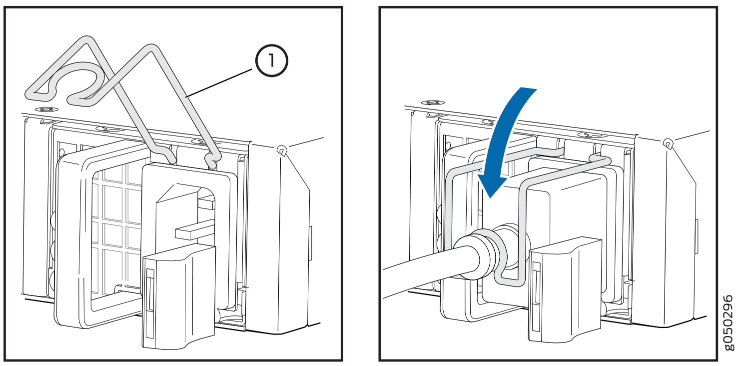
1. Attach the grounding strap to your bare wrist and to a site ESD point.
2. Ensure that the power supplies are fully inserted in the chassis and the latches are secure. If only one power supply is installed, ensure a that blank cover panel is installed over the second power supply slot.
3. Locate the power cord or cords shipped with the switch; the cords have plugs appropriate for your geographical location. See "AC Power Cord Specifications for a QFX Series Device" on page 168.

WARNING: Ensure that the power cord does not block access to device components or drape where people can trip on it.

4. Connect each power supply to the power sources. Insert the coupler end of the power cord into the AC power cord inlet on the AC power supply faceplate.

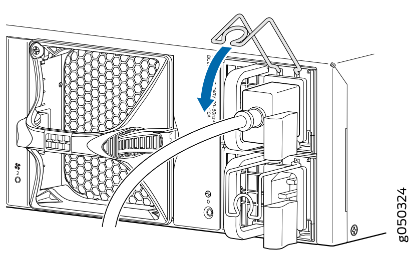
5. Push the power cord retainer onto the power cord (see Figure 73 on page 268 and Figure 74 on page 268).

Figure 73: Connecting an AC Power Cord to an AC Power Supply in a 1 U QFX5100 Switch



1— Power cord retainer

Figure 74: Connecting an AC Power Cord to an AC Power Supply in a 2 U QFX5100 Switch



6. If the AC power source outlet has a power switch, set it to the OFF (O) position.

NOTE: The switch powers on as soon as power is provided to the power supply. There is no power switch on the device.

7. Insert the power cord plug into an AC power source outlet.

8. If the AC power source outlet has a power switch, set it to the ON (|) position.

9. Verify that the AC and DC LEDs on each power supply are lit green.

   If the amber fault LED is lit, remove power from the power supply, and replace the power supply (see *Removing a Power Supply from a QFX5100 Device*). Do not remove the power supply until you have a replacement power supply ready: the power supplies or a blank cover panel must be installed in the switch to ensure proper airflow.

CAUTION: Replace a failed power supply with a blank panel or new power supply within 1 minute of removal to prevent chassis overheating.

Related Documentation

- *AC Power Supply for a QFX5100 Device*
- *AC Power Supply LEDs on a QFX5100 Device*

Connecting DC Power to a QFX5100 Device

Supported Platforms QFabric System, QFX5100

The power supply in a QFX5100 switch is a hot-removable and hot-insertable field-replaceable unit (FRU). You can remove and replace it without powering off the switch or disrupting switch functions.

WARNING: DC-powered QFX5100 switches are intended for installation only in a restricted access location.

NOTE: The battery returns of the DC power supply should be connected as an isolated DC return (DC-I).

Before you begin connecting DC power to the switch:

- Ensure that you have taken the necessary precautions to prevent electrostatic discharge (ESD) damage (see *Prevention of Electrostatic Discharge Damage*).
- Ensure that you have connected the switch chassis to earth ground.

CAUTION: Before you connect power to the switch, a licensed electrician must attach a cable lug to the grounding and power cables that you supply. A cable with an incorrectly attached lug can damage the switch (for example, by causing a short circuit).

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the chassis to earth ground before you connect it to power. For installations that require a separate grounding conductor to the chassis, use the protective earthing terminal on the switch chassis to connect to the earth ground. For instructions on connecting earth ground, see "Connecting Earth Ground to a QFX5100 Device" on page 264.

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX5100 switch, see *Installing a Power Supply in a QFX5100 Device*.

Ensure that you have the following parts and tools available:

- DC power source cables (14–16 AWG) with ring lug (Molex 190700069 or equivalent) (not provided)
- Phillips (+) screwdriver, number 2 (not provided)
- Multimeter (not provided)

To connect DC power to a QFX5100 switch:

1. Attach the grounding strap to your bare wrist and to a site ESD point.
2. Verify that the DC power cables are correctly labeled before making connections to the power supply. In a typical power distribution scheme where the return is connected to chassis ground at the battery plant, you can use a multimeter to verify the resistance of the –48V and RTN DC cables to chassis ground:
   - The cable with very low resistance (indicating a closed circuit) to chassis ground is positive (+) and will be installed on the V+ (return) DC power input terminal.
   - The cable with very high resistance (indicating an open circuit) to chassis ground is negative (–) and will be installed on the V– (input) DC power input terminal.

   CAUTION: You must ensure that power connections maintain the proper polarity. The power source cables might be labeled (+) and (–) to indicate their polarity. There is no standard color coding for DC power cables. The color coding used by the external DC power source at your site determines the color coding for the leads on the power cables that attach to the DC power input terminals on each power supply.

3. Ensure that the input circuit breaker is open so that the voltage across the DC power source cable leads is 0 V and that the cable leads do not become active while you are connecting DC power.

   NOTE: The V+ terminals are referred to as +RTN, and V– terminals are referred to as –48 V in *DC Power Wiring Sequence Warning* and *DC Power Electrical Safety Guidelines*.

4. Ensure that the power supplies are fully inserted in the chassis.
5. Remove the terminal block cover. The terminal block cover is a piece of clear plastic that snaps into place over the terminal block (see Figure 75 on page 272).
6. Remove the screws on the terminals using the screwdriver. Save the screws.

WARNING: Ensure that the power cables do not block access to device components or drape where people can trip on them.

7. Connect each power supply to the power sources. Secure power source cables to the power supplies by screwing the ring lugs attached to the cables to the appropriate terminals by using the screw from the terminals (see Figure 75 on page 272 and Figure 76 on page 272).

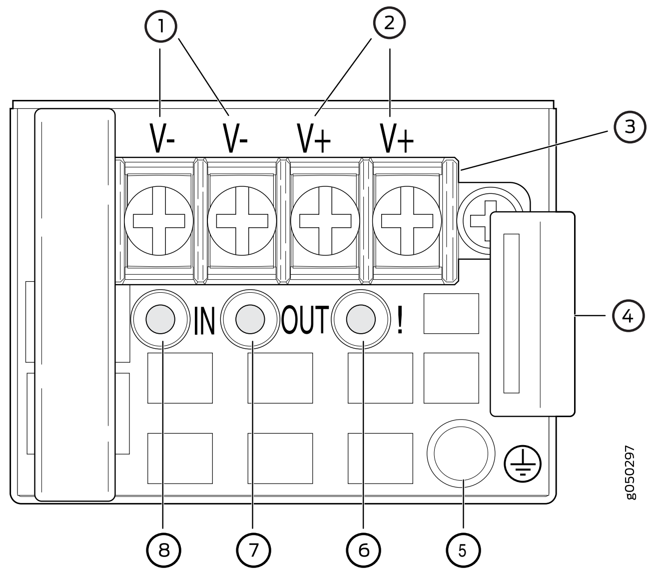
   CAUTION: The DC power supply has four terminals labeled V+, V+, V–, and V– for connecting DC power source cables labeled positive (+) and negative (–). The V+ terminals are shunted internally together, as are the V- terminals. The same polarity terminal can be wired together from the same source to provide an additional current path in a higher power chassis. Do not connect the terminals to different sources. For example, connect –48 V from DC source feed A to the input terminals of one power supply and connect –48 V from feed B to the input terminals of the second power supply on the other side of the chassis. This configuration provides the commonly deployed A/B feed redundancy for the system.

   a. Secure the ring lug of the positive (+) DC power source cable to the V+ terminal on the DC power supply.

   b. Secure the ring lug of the negative (–) DC power source cable to the V– terminal on the DC power supply.

   c. Tighten the screws on the power supply terminals until snug using the screwdriver. Do not overtighten—apply between 5 in-lb (0.56 Nm) and 6 in-lb (0.68 Nm) of torque to the screws.

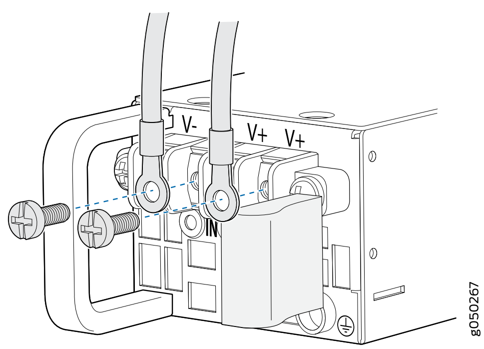
Figure 75: DC Power Supply Faceplate for a QFX5100 Switch



1—Shunt negative input terminals (+RTN)	5—ESD grounding point
2—Shunt positive input terminals (-48V)	6—Fault LED
3—Terminal block	7—Output LED
4—Ejector lever	8—Input LED

CAUTION: The V+ terminals are shunted internally together, as are the V- terminals. The same polarity terminal can be wired together from the same source to provide an additional current path in a higher power chassis. Do not connect the terminals to different sources.

Figure 76: Securing Ring Lugs to the Terminals on the QFX5100 DC Power Supply



8. Replace the terminal block cover.
9. Close the input circuit breaker.

NOTE: The switch powers on as soon as power is provided to the power supply. There is no power switch on the device.

10. Verify that the **IN** and **OUT** LEDs on the power supply are lit green and are on steadily.

Related Documentation

- *DC Power Supply in a QFX5100 Device*
- *DC Power Supply LEDs on a QFX5100 Device*

Connecting a QFX Series Device to a Management Console

Supported Platforms QFabric System, QFX Series standalone switches

The QFX Series has a console port with an RJ-45 connector. Use the console port to connect the device to a management console or to a console server.

Ensure that you have an RJ-45 to DB-9 rollover cable available. An RJ-45 cable with an RJ-45 to DB-9 adapter is provided with the device.

NOTE: If your laptop or PC does not have a DB-9 male connector pin and you want to connect your laptop or PC directly to the QFX Series, use a combination of the RJ-45 cable and RJ-45 to DB-9 adapter supplied with the device and a USB to DB-9 male adapter. You must provide the USB to DB-9 male adapter.

To connect the QFX Series to a management console (see Figure 26 on page 181 and Figure 27 on page 181):

1. Connect one end of the Ethernet cable to the console port (labeled **CON**).
2. Connect the other end of the Ethernet cable into the console server (see Figure 26 on page 181) or management console (see Figure 27 on page 181).

Figure 77: Connecting the QFX Series to a Management Console Through a Console Server

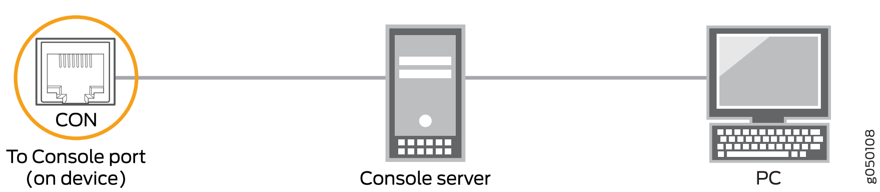


Figure 78: Connecting the QFX Series Directly to a Management Console

Related Documentation

- *Console Port Connector Pinouts for the QFX Series*

CHAPTER 14

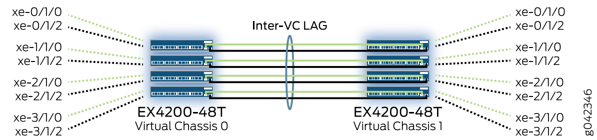
Cabling a Copper-Based Control Plane for the QFX3000-G QFabric System

Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two Virtual Chassis. If you are creating a copper-based control plane network, you use four EX4200-48T Ethernet switches in each Virtual Chassis. For redundancy and communication, you must connect the two Virtual Chassis using the 10-Gigabit Ethernet uplink module ports configured as a link aggregation group (LAG) (see Figure 79 on page 276).

Figure 79: QFX3000-G QFabric System Copper-Based Control Plane—Inter-Virtual Chassis LAG Connections



Before you begin to interconnect two Virtual Chassis for QFX3000-G QFabric system control plane redundancy:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). See "Installing and Connecting a QFX3100 Director Device" on page 173, "Installing and Connecting a QFX3008-I Interconnect Device" on page 185 "Installing and Connecting a QFX3600 or QFX3600-I Device" on page 223, and "Installing and Connecting a QFX3500 Device" on page 241.
- Install your Virtual Chassis hardware (EX4200 switches). See *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis of four members each. See *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.
- Ensure that you have installed a 10-Gigabit Ethernet SFP+ transceivers in ports **0** and **2** on each Virtual Chassis member uplink module (see *Installing a Transceiver in an EX Series Switch*). EX4200 uplink modules only support SFP+ transceivers installed in ports **0** and **2**. For a list of supported transceivers, see *Pluggable Transceivers Supported on EX4200 Switches*.

  Instead of using optical transceivers, you can use 10-Gigabit Ethernet SFP+ direct-attach (DAC) cables. For a list of supported DAC cables, see *SFP+ Direct Attach Cables for EX Series Switches*. The procedure below assumes you are using optical transceivers, but the port mappings in Table 75 on page 276 also apply to DAC cables.
- Ensure that you have appropriate fiber-optic cables (see *Pluggable Transceivers Supported on EX4200 Switches*).
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for EX Series Switches*).
- Use Table 75 on page 276 to determine the copper-based control plane Virtual Chassis-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see "Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane" on page 336.

Table 75: Virtual Chassis-to-Virtual Chassis Copper-Based Control Plane Port Assignments

Member 0	Member 1	Member 2	Member 3
Connect **xe-0/1/0** to **xe-0/1/0**	Connect **xe-1/1/0** to **xe-1/1/0**	Connect **xe-2/1/0** to **xe-2/1/0**	Connect **xe-3/1/0** to **xe-3/1/0**

Table 75: Virtual Chassis-to-Virtual Chassis Copper-Based Control Plane Port Assignments *(continued)*

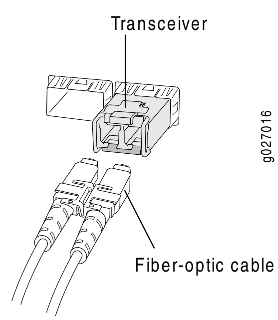
Member 0	Member 1	Member 2	Member 3
Connect **xe-0/1/2** to **xe-0/1/2**	Connect **xe-1/1/2** to **xe-1/1/2**	Connect **xe-2/1/2** to **xe-2/1/2**	Connect **xe-3/1/2** to **xe-3/1/2**

To interconnect two Virtual Chassis for QFabric system control plane redundancy (see Figure 79 on page 276 and Figure 79 on page 276):

WARNING: **Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.**

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the SFP+ optical transceiver in port **0** on member **0** of the first Virtual Chassis. Save the cap.
3. Insert the cable connector into the optical transceiver (see Figure 80 on page 277).

Figure 80: Connecting a Fiber-Optic Cable to an Optical Transceiver Installed in an EX Series Switch



4. If the connector at the other end of the fiber-optic cable is covered by a rubber safety cap, remove the cap. Save the cap.
5. Remove the rubber safety cap from the SFP+ optical transceiver in port **0** on member **0** of the *second* Virtual Chassis. Save the cap.
6. Insert the cable connector into the optical transceiver.
7. Repeat Step 1 through Step 6 for each uplink module port, following the port assignments in Table 75 on page 276.
8. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

CAUTION: Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Related Documentation

- Installing and Connecting a QFX3100 Director Device on page 173

Connecting QFX3100 Director Devices in a Director Group

Supported Platforms QFabric System

A QFabric system requires two QFX3100 Director devices interconnected as a QFX3100 Director *group* (see Figure 81 on page 278 and Figure 83 on page 279).

Figure 81: QFX3100 Director Group Control Plane Connections for QFX3000-G QFabric System Using Copper-Based Control Plane

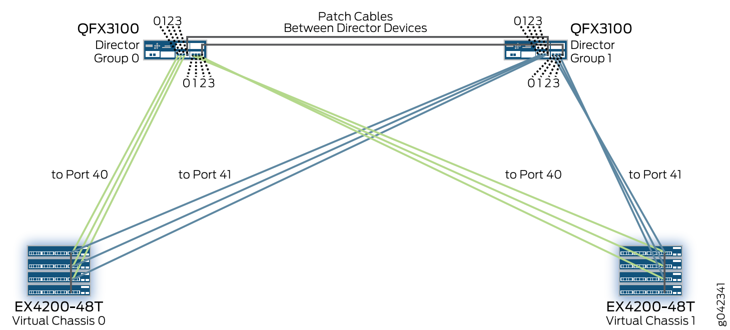


Figure 82: QFX3100 Director Group Control Plane Connections for QFX3000-G QFabric System Using Fiber-Based Control Plane

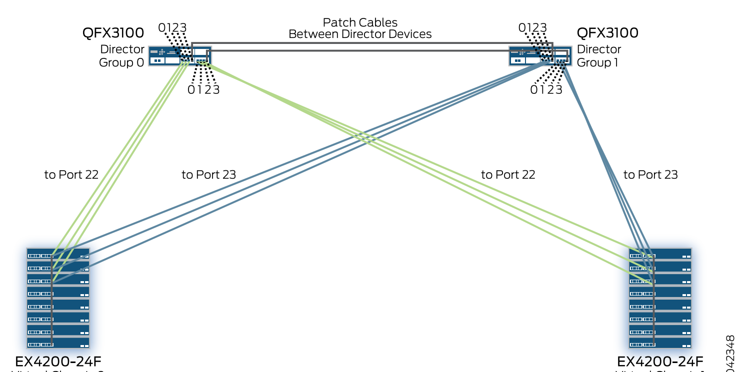
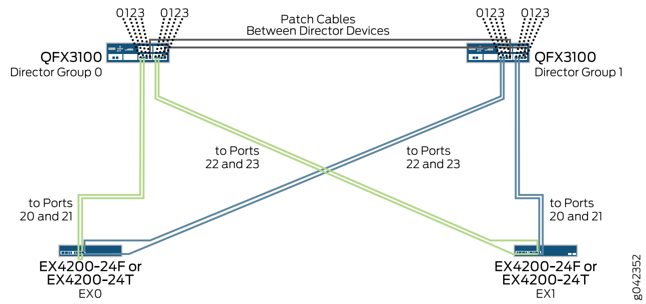


Figure 83: QFX3100 Director Group Control Plane Connections for QFX3000-M QFabric System



The second QFX3100 Director device provides redundancy for the control plane and management network.

Before you begin to connect QFX3100 Director devices in a Director group:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see “Installing and Connecting a QFX3100 Director Device” on page 173, “Installing and Connecting a QFX3008-I Interconnect Device” on page 185, “Installing and Connecting a QFX3600 or QFX3600-I Device” on page 223, and “Installing and Connecting a QFX3500 Device” on page 241.

> NOTE: **For a copper-based QFX3000-M QFabric system control plane network, use QFX3100 Director devices with RJ-45 network modules installed. For a fiber-based control plane network, use QFX3100 Director devices with SFP network modules installed.**

- Ensure that you have appropriate transceivers and cables available. For cable specifications, see “Cable Specifications for Copper-Based Control Plane Connections for the QFabric System” on page 154 and “Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 125.

To connect QFX3100 Director devices in a Director group (see Figure 81 on page 278):

> WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. Connect the port labeled **3** on the first network module on one of the Director devices to the corresponding port (labeled **3**) on the first network module on the second Director device.
2. Connect the port labeled **3** on the *second* network module on one of the Director devices to the corresponding port (labeled **3**) on the *second* network module on the second Director device.

Related Documentation

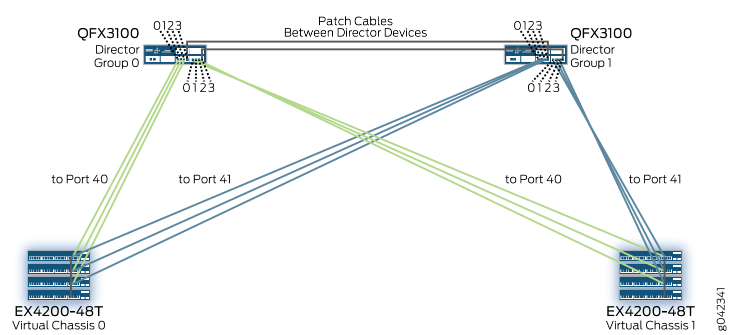
- Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 280
- Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-G QFabric System Control Plane Network on page 300
- *Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network*

Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two Virtual Chassis composed of EX4200 switches. If you are creating a copper-based control plane network, you use four EX4200-48T Ethernet switches in each Virtual Chassis. QFX3100 Director devices have two RJ-45 or SFP network modules. Use the RJ-45 network module ports to connect the QFX3100 Director group to each Virtual Chassis (see Figure 84 on page 280).

Figure 84: QFX3100 Director Group to Virtual Chassis Connections for QFX3000-G QFabric System



Use the following QFX3100 Director devices and EX4200 switches for a copper-based QFX3000-G QFabric system control plane network:

- QFX3100 Director devices with RJ-45 network modules installed. Each RJ-45 network module provides four RJ-45 ports labeled **0** through **3**.
- EX4200-48T switches with an SFP+ uplink module installed.

Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see “Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane” on page 336).

Before you begin to connect a QFX3100 Director device to the copper-based QFX3000-G control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). See “Installing and Connecting a QFX3100 Director Device” on page 173, “Installing and Connecting a QFX3008-I Interconnect Device” on page 185, “Installing and Connecting a QFX3600 or QFX3600-I Device” on page 223, and “Installing and Connecting a QFX3500 Device” on page 241.
- Install your Virtual Chassis hardware (EX4200 switches). See *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis switches of four members each. See *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.
- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. See “Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy” on page 275.
- Connect the two QFX3100 Director devices to create a Director group. See “Connecting QFX3100 Director Devices in a Director Group” on page 278.
- Ensure that you have enough RJ-45 patch cables available, and ensure that the cables meet the specifications described in “Cable Specifications for Copper-Based Control Plane Connections for the QFabric System” on page 154.

To connect a QFX3100 Director device to the QFX3000-G QFabric control plane network (see Figure 84 on page 280):

1. Connect both network modules on the first Director device (labeled **DG0** in Figure 84 on page 280) to the two Virtual Chassis (labeled **VC0** and **VC1** in Figure 84 on page 280). You connect the first three ports (labeled **0** through **2**) on the first network module to the first Virtual Chassis (**VC0**. You connect the first three ports on the second network module (also labeled **0** through **2**) to the second Virtual Chassis (**VC0VC1**). The ports used are the same on each Virtual Chassis.

Table 76: QFX3100 Director Device-to-Virtual Chassis Control Plane Port Assignments for DG0

Network Module Port 0	Network Module Port 1	Network Module Port 2	Network Module Port 3
Virtual Chassis port **ge-0/0/40**	Virtual Chassis port **ge-1/0/40**	Virtual Chassis port **ge-2/0/40**	Connect this port to the identical port on the other Director device. See “Connecting QFX3100 Director Devices in a Director Group” on page 278 .

2. Connect both network modules on the *second* Director device (labeled **DG1** in Figure 84 on page 280) to the two Virtual Chassis (labeled **VC0** and **VC1** in Figure 84 on page 280). You connect the first three ports on the first network module to the first Virtual Chassis (**VC0**). You connect the first three ports on the second network module to the second Virtual Chassis (**VC1**). The ports used are the same on each Virtual Chassis.

Table 77: Second QFX3100 Director Device-to-Virtual Chassis Control Plane Port Assignments for DG1

Network Module Port 0	Network Module Port 1	Network Module Port 2	Network Module Port 3
Virtual Chassis port **ge-0/0/41**	Virtual Chassis port **ge-1/0/41**	Virtual Chassis port **ge-2/0/41**	Connect this port to the identical port on the other Director device. See "Connecting QFX3100 Director Devices in a Director Group" on page 278 .

Related Documentation

- Installing and Connecting a QFX3100 Director Device on page 173

Connecting a QFX3100 Director Device to a Network for Out-of-Band Management

Supported Platforms QFabric System

Use the management port on your QFX3100 Director device to connect each Director device in your Director group to your out-of-band management network.

NOTE: **You cannot use the management port to perform the initial configuration of the QFX3100 Director device. You must configure the management port before you can successfully connect to the QFX3100 Director device using this port. See "Performing the QFabric System Initial Setup on a QFX3100 Director Group" on page 411.**

Ensure that you have an RJ-45 patch cable available.

To connect a QFX3100 Director device to a network for out-of-band management:

1. Connect one end of the Ethernet cable to the management port (labeled **MGMT** on the Director device front panel).
2. Connect the other end of the Ethernet cable to your management device or management network.
3. Repeat these steps for the second Director device.

Related Documentation

- *Management Port Connector Pinouts for the QFX Series*
- *Cable Specifications for Console and Management Connections for the QFX Series*
- Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 280
- *Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network*

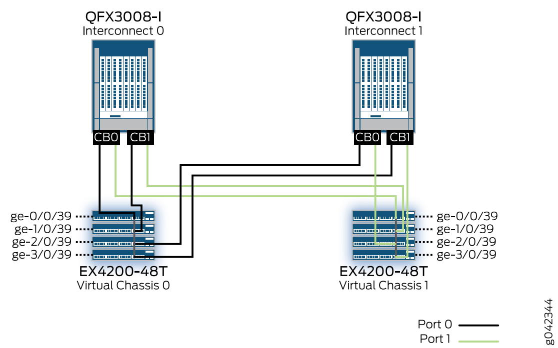
- Connecting a QFX Series Device to a Management Console on page 181

Connecting a QFX3008-I Interconnect Device to a Copper-Based QFX3000-G QFabric System Control Plane Network

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFabric system devices in your network to two Virtual Chassis composed of four EX4200 switches each. QFX3008-I Interconnect Devices have four small form factor pluggable plus (SFP+) management ports on each Control Board. Use the SFP+ management ports to connect the QFX3008-I Interconnect Devices to each Virtual Chassis (see Figure 85 on page 283.

Figure 85: QFX3008-I Interconnect Device Control Plane Connections



Specific ports have been reserved on the Virtual Chassis to connect to the Interconnect devices, Node devices, and QFX3100 Director devices in your QFabric system. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also enables the use of a standard Virtual Chassis configuration (see "Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane" on page 336).

Before you begin to connect a QFX3008-I Interconnect Device to the copper-based QFX3000-G QFabric system control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see "Installing and Connecting a QFX3100 Director Device" on page 173, "Installing and Connecting a QFX3008-I Interconnect Device" on page 185, "Installing and Connecting a QFX3600 or QFX3600-I Device" on page 223, and "Installing and Connecting a QFX3500 Device" on page 241.
- Install your Virtual Chassis hardware. For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis of four EX4200-48T switches each. For more information, see *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.

- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. For more information, see “Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy” on page 275.
- Ensure that 1000BASE-T SFP transceivers are installed in port **0** and port **1** on both Control Boards for each QFX3008-I Interconnect device (see *Installing a Transceiver in a QFX Series Device*). For a list of supported transceivers and required cables, see “Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 125.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports you are using on each EX4200 switch (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers, see *Pluggable Transceivers Supported on EX4200 Switches*.
- Ensure that you have four RJ-45 patch cables available for each Interconnect device. For cable specifications, see “Cable Specifications for Copper-Based Control Plane Connections for the QFabric System” on page 154.
- Use Table 78 on page 284 to determine the QFX3008-I Interconnect device-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.

NOTE: The two Control Boards in each Interconnect device are labeled CB0 and CB1 in Figure 85 on page 283 and Table 78 on page 284. Interconnect devices IC2 and IC3 are not shown in Figure 85 on page 283 and describe the port mappings for the optional third and fourth Interconnect devices

Table 78: Interconnect Device Port Mappings

Interconnect Device	Virtual Chassis VC0	Virtual Chassis VC1
IC0	• **CB0, port 0** to **ge-0/0/39** • **CB1, port 0** to **ge-1/0/39**	• **CB0, port 1** to **ge-0/0/39** • **CB1, port 1** to **ge-1/0/39**
IC1	• **CB0, port 0** to **ge-2/0/39** • **CB1, port 0** to **ge-3/0/39**	• **CB0, port 1** to **ge-2/0/39** • **CB1, port 1** to **ge-3/0/39**
IC2	• **CB0, port 0** to **ge-0/0/38** • **CB1, port 0** to **ge-1/0/38**	• **CB0, port 1** to **ge-0/0/38** • **CB1, port 1** to **ge-1/0/38**
IC3	• **CB0, port 0** to **ge-2/0/38** • **CB1, port 0** to **ge-3/0/38**	• **CB0, port 1** to **ge-2/0/38** • **CB1, port 1** to **ge-3/0/38**

To connect each QFX3008-I Interconnect Device to the QFX3000-G QFabric system control plane network (see Figure 85 on page 283:

1. Connect the first Interconnect device.
   a. Connect one end of the first RJ-45 patch cable to the first SFP management port (labeled **0**) on the first Control Board (labeled **CB 0**).
   b. Connect the other end of that cable to port **ge-0/0/39** on the first Virtual Chassis.
   c. Connect one end of the second RJ-45 patch cable to the second SFP management port (labeled **1**) on the first Control Board (labeled **CB 0**).
   d. Connect the other end of that cable to port **ge-0/0/39** on the *second* Virtual Chassis.
   e. Connect one end of the third RJ-45 patch cable to the first SFP management port (labeled **0**) on the second Control Board (labeled **CB 1**).
   f. Connect the other end of that cable to port **ge-1/0/39** on the first Virtual Chassis.
   g. Connect one end of the fourth RJ-45 patch cable to the second SFP management port (labeled **1**) on the second Control Board (labeled **CB 1**).
   h. Connect the other end of that cable to port **ge-1/0/39** on the *second* Virtual Chassis.
2. Connect the second Interconnect device.
   a. Connect one end of the first RJ-45 patch cable to the first SFP management port (labeled **0**) on the first Control Board (labeled **CB 0**).
   b. Connect the other end of that cable to port **ge-2/0/39** on the first Virtual Chassis.
   c. Connect one end of the second RJ-45 patch cable to the second SFP management port (labeled **1**) on the first Control Board (labeled **CB 0**).
   d. Connect the other end of that cable to port **ge-2/0/39** on the *second* Virtual Chassis.
   e. Connect one end of the third RJ-45 patch cable to the first SFP management port (labeled **0**) on the second Control Board (labeled **CB 1**).
   f. Connect the other end of that cable to port **ge-3/0/39** on the first Virtual Chassis.
   g. Connect one end of the fourth RJ-45 patch cable to the second SFP management port (labeled**1**) on the second Control Board (labeled **CB 1**).
   h. Connect the other end of that cable to port **ge-3/0/39** on the *second* Virtual Chassis.
3. (Optional) Connect the third Interconnect device.
   a. Connect one end of the first RJ-45 patch cable to the first SFP management port (labeled **0**) on the first Control Board (labeled **CB 0**).
   b. Connect the other end of that cable to port **ge-0/0/38** on the first Virtual Chassis.
   c. Connect one end of the second RJ-45 patch cable to the second SFP management

port (labeled **1**) on the first Control Board (labeled **CB 0**).

d. Connect the other end of that cable to port **ge-0/0/38** on the *second* Virtual Chassis.

e. Connect one end of the third RJ-45 patch cable to the first SFP management port (labeled **0**) on the second Control Board (labeled **CB 1**).

f. Connect the other end of that cable to port **ge-1/0/38** on the first Virtual Chassis.

g. Connect one end of the fourth RJ-45 patch cable to the second SFP management port (labeled **1**) on the second Control Board (labeled **CB 1**).

h. Connect the other end of that cable to port **ge-1/0/38** on the *second* Virtual Chassis.

4. (Optional) Connect the fourth Interconnect device.

   a. Connect one end of the first RJ-45 patch cable to the first SFP management port (labeled **0**) on the first Control Board (labeled **CB 0**).

   b. Connect the other end of that cable to port **ge-2/0/38** on the first Virtual Chassis.

   c. Connect one end of the second RJ-45 patch cable to the second SFP management port (labeled **1**) on the first Control Board (labeled **CB 0**).

   d. Connect the other end of that cable to port **ge-2/0/38** on the *second* Virtual Chassis.

   e. Connect one end of the third RJ-45 patch cable to the first SFP management port (labeled **0**) on the second Control Board (labeled **CB 1**).

   f. Connect the other end of that cable to port **ge-3/0/38** on the first Virtual Chassis.

   g. Connect one end of the fourth RJ-45 patch cable to the second SFP management port (labeled **1**) on the second Control Board (labeled **CB 1**).

   h. Connect the other end of that cable to port **ge-3/0/38** on the *second* Virtual Chassis.

Related Documentation

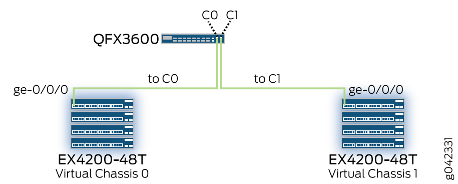
- Connecting a QFX3500 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 288
- Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 321
- Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 280
- Connecting QFX3100 Director Devices in a Director Group on page 278

Connecting a QFX3600 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX series devices in your network to two Virtual Chassis composed of four EX4200 switches each. QFX3600 Node devices have two management ports with RJ-45 connectors. Use the management ports to connect the QFX3600 Node device to each Virtual Chassis (see Figure 86 on page 287).

Figure 86: QFX3600 Node Device Control Plane Connections



Before you begin to cable the QFX3000-G QFabric system control plane and management network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see “Installing and Connecting a QFX3100 Director Device” on page 173, “Installing and Connecting a QFX3008-I Interconnect Device” on page 185, “Installing and Connecting a QFX3600 or QFX3600-I Device” on page 223, and “Installing and Connecting a QFX3500 Device” on page 241.
- Install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis switches of one member each. For more information, see *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.
- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. For more information, see “Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy” on page 275.
- Ensure that you have two RJ-45 patch cables available. For cable specifications, see “Cable Specifications for Copper-Based Control Plane Connections for the QFabric System” on page 154.
- Use Table 79 on page 288 to determine the QFX3600 Node device-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see “Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane” on page 336).

NOTE: The numerical identifiers for each Node device below are not preassigned to the Node devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Node device port you connect (Node 0) will be connected to port ge-0/0/0 on Virtual Chassis member 0.

Table 79: QFX3600 Node Device-to-Virtual Chassis Control Plane Port Assignments

Member 0	Member 1	Member 2	Member 3
Node 0: **ge-0/0/0**	Node 32: **ge-1/0/0**	Node 64: **ge-2/0/0**	Node 96: **ge-3/0/0**
Node 1: **ge-0/0/1**	Node 33: **ge-1/0/1**	Node 65: **ge-2/0/1**	Node 97: **ge-3/0/1**
...	...	...	...
Node 30: **ge-0/0/30**	Node 62: **ge-1/0/30**	Node 94: **ge-2/0/30**	Node 126: **ge-3/0/30**
Node 31: **ge-0/0/31**	Node 63: **ge-1/0/31**	Node 95: **ge-2/0/31**	Node 127: **ge-3/0/31**

To connect a QFX3600 Node device to the QFX3000-G QFabric system control plane network (see Figure 86 on page 287):

1. Connect one end of the first RJ-45 patch cable to the first management port (labeled **0**) on the Node device front panel.
2. Connect the other end of that cable to the appropriate member and port on the Virtual Chassis. See Table 79 on page 288.
3. Connect one end of the second RJ-45 patch cable to the second management port (labeled **C1**) on the Node device front panel.
4. Connect the other end of that cable to the appropriate member and port on the *second* Virtual Chassis. This should be the same member number and port number that you connected to in Step 2. For example, if you connected the first cable to **ge-0/0/0** on Member **0** on the first Virtual Chassis, you connect the second cable to **ge-0/0/0** on Member **0** on the second Virtual Chassis.
5. Repeat this procedure for each Node device.

Related Documentation

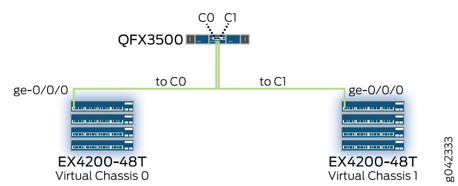
- Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 280
- Connecting QFX3100 Director Devices in a Director Group on page 278
- Connecting a QFX3008-I Interconnect Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 283
- Connecting a QFX3600 Node Device to a QFX3008-I Interconnect Device on page 319
- Connecting a QFX3500 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 288
- Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 321

Connecting a QFX3500 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX series devices in your network to two Virtual Chassis composed of EX4200 switches. If you are creating a copper-based control plane network, you use four EX4200-48T Ethernet switches in each Virtual Chassis. QFX3500 Node devices have an RJ-45 or SFP management board. Use the RJ-45 management ports (labeled **C0** and **C1**) to connect the QFX3500 Node device to each Virtual Chassis (see Figure 87 on page 289).

Figure 87: QFX3500 Node Device Control Plane Connections



Use the following QFX3500 Node devices and EX4200 switches for a copper-based QFX3000-M QFabric system control plane network:

- QFX3500 Node devices with an RJ-45 management board installed. The RJ-45 management board provides two RJ-45 1-Gbps management ports labeled **C0** and **C1**.
- EX4200-48T switches with an SFP+ uplink module installed.

Before you begin to connect a QFX3500 Node device to the QFX3000-G QFabric system control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see "Installing and Connecting a QFX3100 Director Device" on page 173, "Installing and Connecting a QFX3008-I Interconnect Device" on page 185, "Installing and Connecting a QFX3600 or QFX3600-I Device" on page 223, and "Installing and Connecting a QFX3500 Device" on page 241.
- Install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis switches of four members each. For more information, see *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.
- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. For more information, see "Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy" on page 275.
- Ensure that you have two RJ-45 patch cables available. For cable specifications, see "Cable Specifications for Copper-Based Control Plane Connections for the QFabric System" on page 154.
- Use Table 80 on page 290 to determine the QFX3500 Node device-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard

Virtual Chassis configuration (see “Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane” on page 336).

NOTE: The numerical identifiers for each Node device below are not preassigned to the Node devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Node device port (Node 0) is connected to port **ge-0/0/0** on each Virtual Chassis.

Table 80: QFX3500 Node Device-to-Virtual Chassis Copper-Based Control Plane Port Assignments

Member 0	Member 1	Member 2	Member 3
Node 0: **ge-0/0/0**	Node 32: **ge-1/0/0**	Node 64: **ge-2/0/0**	Node 96: **ge-3/0/0**
Node 1: **ge-0/0/1**	Node 33: **ge-1/0/1**	Node 65: **ge-2/0/1**	Node 97: **ge-3/0/1**
...	...	...	...
Node 30: **ge-0/0/30**	Node 62: **ge-1/0/30**	Node 94: **ge-2/0/30**	Node 126: **ge-3/0/30**
Node 31: **ge-0/0/31**	Node 63: **ge-1/0/31**	Node 95: **ge-2/0/31**	Node 127: **ge-3/0/31**

To connect a QFX3500 Node device to the QFX3000-G QFabric system control plane network (see Figure 87 on page 289):

1. Connect one end of the first RJ-45 patch cable to the first management port (labeled **C0**) on the Node device management board.
2. Connect the other end of that cable to the appropriate member and port on the Virtual Chassis. See Table 80 on page 290.
3. Connect one end of the second RJ-45 patch cable to the second management port (labeled **C1**) on the Node device management board.
4. Connect the other end of that cable to the appropriate member and port on the *second* Virtual Chassis. This should be the same member number and port number that you connected to in Step 2. For example, if you connected the first cable to **ge-0/0/0** on the first Virtual Chassis, you connect the second cable to **ge-0/0/0** on the second Virtual Chassis.
5. Repeat this procedure for each Node device.

Related Documentation

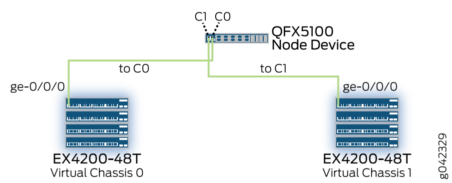
- Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 321
- Connecting a QFX3600 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 286

Connecting a QFX5100 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX series devices in your network to two Virtual Chassis composed of EX4200 switches. If you are creating a copper-based control plane network, you use four EX4200-48T Ethernet switches in each Virtual Chassis. QFX5100-48S Node devices have an RJ-45 **C0** located under the **CON** port, and an SFP cage **C1** that can be used as a copper management port. Use the RJ-45 management port (labeled **C0** and the SFP management port **C1**) to connect the QFX5100 Node device to each Virtual Chassis. See Figure 88 on page 291 for a cabling example.

Figure 88: QFX5100 Node Device Control Plane Connections



Use the following QFX5100 Node devices and EX4200 switches for a copper-based QFX3000-M QFabric system control plane network:

- QFX5100 Node devices with:
  - em0–RJ-45 (1000BASE-T) management Ethernet port (**C0**)
  - em1–SFP management Ethernet port (**C1**) cage (socket for 1 GbE copper SFP)
- EX4200-48T switches with an SFP+ uplink module installed.

Before you begin to connect a QFX5100-48S Node device to the QFX3000-G QFabric system control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see “Installing and Connecting a QFX3100 Director Device” on page 173, “Installing and Connecting a QFX3008-I Interconnect Device” on page 185, “Installing and Connecting a QFX3600 or QFX3600-I Device” on page 223, “Installing and Connecting a QFX3500 Device” on page 241, and “Installing and Connecting a QFX5100 Device” on page 257.
- Install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis switches of four members each. For more information, see *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.
- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. For more information, see “Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy” on page 275.

- Ensure that you have two RJ-45 patch cables available. For cable specifications, see "Cable Specifications for Copper-Based Control Plane Connections for the QFabric System" on page 154.
- Use Table 81 on page 292 to determine the QFX5100-48S Node device-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see "Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane" on page 336).

NOTE: **The numerical identifiers for each Node device below are not preassigned to the Node devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Node device port (Node 0) is connected to port ge-0/0/0 on each Virtual Chassis.**

Table 81: QFX5100-48S Node Device-to-Virtual Chassis Copper-Based Control Plane Port Assignments

Member 0	Member 1	Member 2	Member 3
Node 0: ge-0/0/0	Node 32: ge-1/0/0	Node 64: ge-2/0/0	Node 96: ge-3/0/0
Node 1: ge-0/0/1	Node 33: ge-1/0/1	Node 65: ge-2/0/1	Node 97: ge-3/0/1
...	...	...	...
Node 30: ge-0/0/30	Node 62: ge-1/0/30	Node 94: ge-2/0/30	Node 126: ge-3/0/30
Node 31: ge-0/0/31	Node 63: ge-1/0/31	Node 95: ge-2/0/31	Node 127: ge-3/0/31

To connect a QFX5100-48S Node device to the QFX3000-G QFabric system control plane network):

1. Connect one end of the first RJ-45 patch cable to the management port (labeled **C0**) on the Node device management board.
2. Connect the other end of that cable to the appropriate member and port on the Virtual Chassis. See Table 81 on page 292.
3. Connect one end of the second RJ-45 patch cable to the second management port (labeled **C1**) on the Node device management board.
4. Connect the other end of that cable to the appropriate member and port on the *second* Virtual Chassis. This should be the same member number and port number that you connected to in Step 2. For example, if you connected the first cable to ge-0/0/0 on the first Virtual Chassis, you connect the second cable to ge-0/0/0 on the second Virtual Chassis.
5. Repeat this procedure for each Node device.

Related Documentation

- Connecting a QFX5100 Node Device to a QFX3008-I Interconnect Device on page 322
- Connecting a QFX3600 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 286

CHAPTER 15

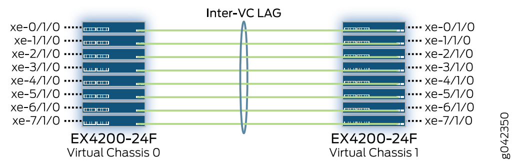
Cabling a Fiber-Based Control Plane for the QFX3000-G QFabric System

Interconnecting Two Virtual Chassis for Fiber-Based QFX3000-G QFabric System Control Plane Redundancy

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two Virtual Chassis. If you are creating a fiber-based control plane network, you use eight EX4200-24F Ethernet switches in each Virtual Chassis. For redundancy and communication, you must connect the two Virtual Chassis using the 10-Gigabit Ethernet uplink module ports configured as a link aggregation group (LAG) (see Figure 89 on page 296).

Figure 89: QFX3000-G QFabric System Fiber-Based Control Plane—Inter-Virtual Chassis LAG Connections



Before you begin to interconnect two Virtual Chassis for QFX3000-G QFabric system control plane redundancy:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). See "Installing and Connecting a QFX3100 Director Device" on page 173, "Installing and Connecting a QFX3008-I Interconnect Device" on page 185 "Installing and Connecting a QFX3600 or QFX3600-I Device" on page 223, and "Installing and Connecting a QFX3500 Device" on page 241.
- Install your Virtual Chassis hardware (EX4200 switches). See *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis of eight members each. See *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.
- Ensure that you have installed a 10-Gigabit Ethernet SFP+ transceivers in port **0** on each Virtual Chassis member uplink module (see *Installing a Transceiver in an EX Series Switch*). EX4200 uplink modules only support SFP+ transceivers installed in ports **0** and **2**. For a list of supported transceivers, see *Pluggable Transceivers Supported on EX4200 Switches*.

  Instead of using optical transceivers, you can use 10-Gigabit Ethernet SFP+ direct-attach (DAC) cables. For a list of supported DAC cables, see *SFP+ Direct Attach Cables for EX Series Switches*. The procedure below assumes you are using optical transceivers, but the port mappings in Table 82 on page 296 also apply to DAC cables.
- Ensure that you have appropriate fiber-optic cables (see *Pluggable Transceivers Supported on EX4200 Switches*).
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for EX Series Switches*).
- Use Table 82 on page 296 to determine the fiber-based control plane Virtual Chassis-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see "Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System" on page 378.

Table 82: Virtual Chassis-to-Virtual Chassis Fiber-Based Control Plane Port Assignments

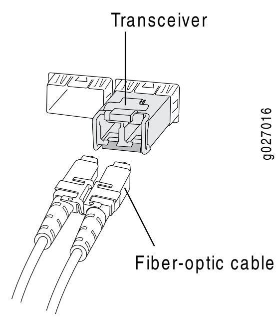
Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7
xe-0/1/0 to **xe-0/1/0**	**xe-1/1/0** to **xe-1/1/0**	**xe-2/1/0** to **xe-2/1/0**	**xe-3/1/0** to **xe-3/1/0**	**xe-4/1/0** to **xe-4/1/0**	**xe-5/1/0** to **xe-5/1/0**	**xe-6/1/0** to **xe-6/1/0**	**xe-7/1/0** to **xe-7/1/0**

To interconnect two Virtual Chassis for QFabric system control plane redundancy (see Figure 89 on page 296):

WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the SFP+ optical transceiver in port **0** on member **0** of the first Virtual Chassis. Save the cap.
3. Insert the cable connector into the optical transceiver (see Figure 80 on page 277).

Figure 90: Connecting a Fiber-Optic Cable to an Optical Transceiver Installed in an EX Series Switch



4. If the connector at the other end of the fiber-optic cable is covered by a rubber safety cap, remove the cap. Save the cap.
5. Remove the rubber safety cap from the SFP+ optical transceiver in port **0** on member **0** of the *second* Virtual Chassis. Save the cap.
6. Insert the cable connector into the optical transceiver.
7. Repeat Step 1 through Step 6 for each uplink module port, following the port assignments in Table 82 on page 296.
8. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

   CAUTION: Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

   Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Related Documentation

- Installing and Connecting a QFX3100 Director Device on page 173

Connecting QFX3100 Director Devices in a Director Group

Supported Platforms QFabric System

A QFabric system requires two QFX3100 Director devices interconnected as a QFX3100 Director *group* (see Figure 81 on page 278 and Figure 83 on page 279).

Figure 91: QFX3100 Director Group Control Plane Connections for QFX3000-G QFabric System Using Copper-Based Control Plane

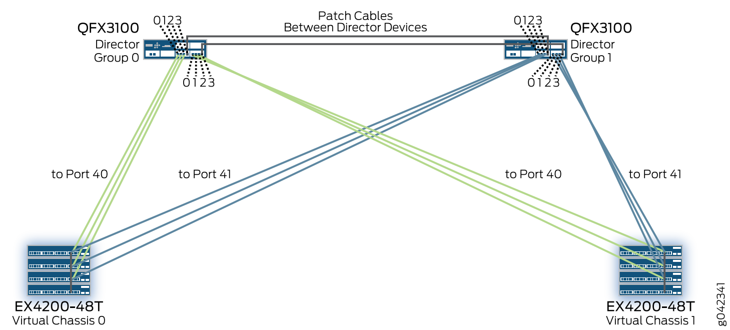


Figure 92: QFX3100 Director Group Control Plane Connections for QFX3000-G QFabric System Using Fiber-Based Control Plane

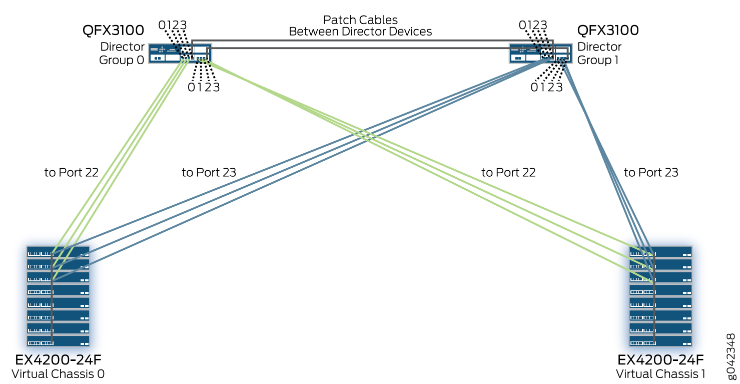
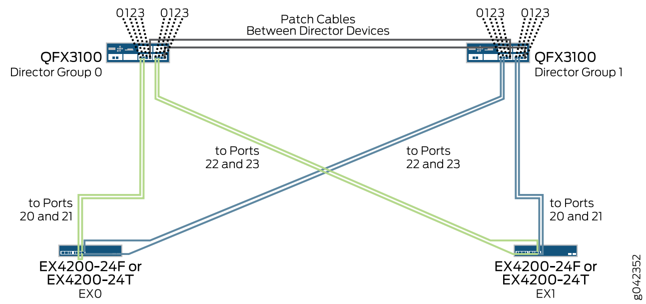


Figure 93: QFX3100 Director Group Control Plane Connections for QFX3000-M QFabric System



The second QFX3100 Director device provides redundancy for the control plane and management network.

Before you begin to connect QFX3100 Director devices in a Director group:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see “Installing and Connecting a QFX3100 Director Device” on page 173, “Installing and Connecting a QFX3008-I Interconnect Device” on page 185, “Installing and Connecting a QFX3600 or QFX3600-I Device” on page 223, and “Installing and Connecting a QFX3500 Device” on page 241.

NOTE: **For a copper-based QFX3000-M QFabric system control plane network, use QFX3100 Director devices with RJ-45 network modules installed. For a fiber-based control plane network, use QFX3100 Director devices with SFP network modules installed.**

- Ensure that you have appropriate transceivers and cables available. For cable specifications, see “Cable Specifications for Copper-Based Control Plane Connections for the QFabric System” on page 154 and “Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 125.

To connect QFX3100 Director devices in a Director group (see Figure 81 on page 278):

WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

1. Connect the port labeled **3** on the first network module on one of the Director devices to the corresponding port (labeled **3**) on the first network module on the second Director device.
2. Connect the port labeled **3** on the *second* network module on one of the Director devices to the corresponding port (labeled **3**) on the *second* network module on the second Director device.

Related Documentation

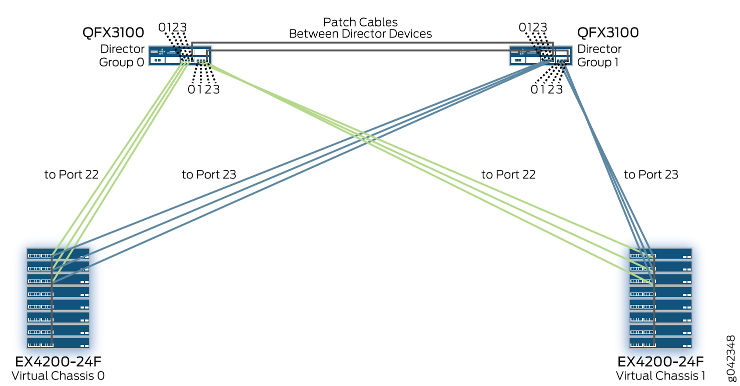
- Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 280
- Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-G QFabric System Control Plane Network on page 300
- *Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network*

Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-G QFabric System Control Plane Network

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two Virtual Chassis composed of EX4200 switches. If you are creating a fiber-based control plane network, you use eight EX4200-24F Ethernet switches in each Virtual Chassis. QFX3100 Director devices have two RJ-45 or SFP network modules network modules. Use the SFP network module ports to connect the QFX3100 Director group to each Virtual Chassis (see Figure 94 on page 300).

Figure 94: QFX3100 Director Group to Virtual Chassis Connections for QFX3000-G QFabric System



Use the following QFX3100 Director devices and EX4200 switches for a fiber-based QFX3000-M QFabric system control plane network:

- QFX3100 Director devices with SFP network modules installed. Each SFP network module provides four SFP ports labeled **0** through **3**.
- EX4200-24F switches with an SFP+ uplink module installed.

Specific ports have been reserved on the Virtual Chassis to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see “Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System” on page 378).

Before you begin to connect a QFX3100 Director device to the fiber-based QFX3000-G QFabric system control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). See “Installing and Connecting a QFX3100 Director Device” on page 173, “Installing and Connecting a QFX3008-I Interconnect Device” on page 185, “Installing and Connecting a QFX3600 or QFX3600-I Device” on page 223, and “Installing and Connecting a QFX3500 Device” on page 241.
- Install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis switches of eight members each. See *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.
- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. See “Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy” on page 275.
- Connect the two QFX3100 Director devices to create a Director group. See “Connecting QFX3100 Director Devices in a Director Group” on page 278.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports labeled **0** and **1** on both the network modules on each QFX3100 Director device (see *Installing a Transceiver in a QFX Series Device*). For a list of supported transceivers and required cables, see “Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 125.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports labeled **22** and **23** on member **0**, **1**, and **2** (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers and required cables, see *Pluggable Transceivers Supported on EX4200 Switches*.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports you are using on each EX4200 switch (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers, see *Pluggable Transceivers Supported on EX4200 Switches*.
- Ensure that you have appropriate fiber-optic cables (see “Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 125).
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for the QFX Series*).

To connect a QFX3100 Director device to the fiber-based QFX3000-G QFabric control plane network (see Figure 94 on page 300):

WARNING: **Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.**

1. Connect both network modules on the first Director device (labeled **DG0** in Figure 94 on page 300) to the two Virtual Chassis (labeled **VC0** and **VC1** in Figure 94 on page 300). You connect the first three ports (labeled **0** through **2**) on the first network module to the first Virtual Chassis (**VC0**). You connect the first two ports on the second network module (also labeled **0** through **2**) to the second Virtual Chassis (**VC1**). The ports used are the same on each Virtual Chassis.

Table 83: QFX3100 Director Device-to-VIrtual Chassis Control Plane Port Assignments for DG0

Network Module Port 0	Network Module Port 1	Network Module Port 2	Network Module Port 3
Virtual Chassis port **ge-0/0/22**	Virtual Chassis port **ge-1/0/22**	Virtual Chassis port **ge-2/0/22**	Connect this port to the identical port on the other Director device. See “Connecting QFX3100 Director Devices in a Director Group” on page 278.

2. Connect both network modules on the *second* Director device (labeled **DG1** in Figure 94 on page 300) to the two Virtual Chassis (labeled **VC0** and **VC1** in Figure 94 on page 300). You connect the first three ports on the first network module to the first Virtual Chassis (**VC0**). You connect the first three ports on the second network module to the second Virtual Chassis (**VC1**). The ports used are the same on each Virtual Chassis.

Table 84: Second QFX3100 Director Device-to-Virtual Chassis Control Plane Port Assignments for DG1

Network Module Port 0	Network Module Port 1	Network Module Port 2	Network Module Port 3
Virtual Chassis port **ge-0/0/23**	Virtual Chassis port **ge-1/0/23**	Virtual Chassis port **ge-2/0/23**	Connect this port to the identical port on the other Director device. See “Connecting QFX3100 Director Devices in a Director Group” on page 278.

Related Documentation

- Installing and Connecting a QFX3100 Director Device on page 173

Connecting a QFX3100 Director Device to a Network for Out-of-Band Management

Supported Platforms QFabric System

Use the management port on your QFX3100 Director device to connect each Director device in your Director group to your out-of-band management network.

NOTE: **You cannot use the management port to perform the initial configuration of the QFX3100 Director device. You must configure the management port before you can successfully connect to the QFX3100 Director device using this port. See** "Performing the QFabric System Initial Setup on a QFX3100 Director Group" on page 411.

Ensure that you have an RJ-45 patch cable available.

To connect a QFX3100 Director device to a network for out-of-band management:

1. Connect one end of the Ethernet cable to the management port (labeled **MGMT** on the Director device front panel).
2. Connect the other end of the Ethernet cable to your management device or management network.
3. Repeat these steps for the second Director device.

Related Documentation

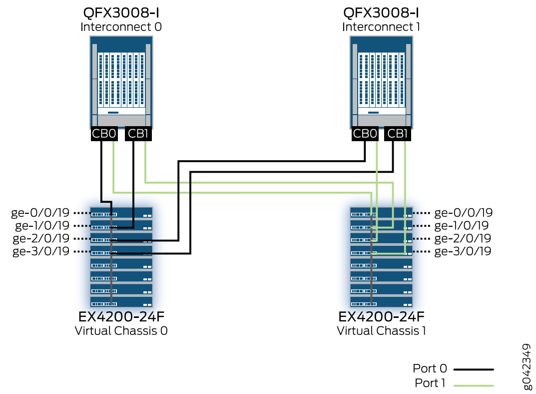
- *Management Port Connector Pinouts for the QFX Series*
- *Cable Specifications for Console and Management Connections for the QFX Series*
- Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 280
- *Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network*
- Connecting a QFX Series Device to a Management Console on page 181

Connecting a QFX3008-I Interconnect Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two Virtual Chassis composed of EX4200 switches. If you are creating a fiber-based control plane network, you use eight EX4200-24F Ethernet switches in each Virtual Chassis. QFX3008-I Interconnect Devices have four small form factor pluggable plus (SFP+) management ports on each Control Board (**CB0** and **CB1**). Use the SFP+ management ports to connect the QFX3008-I Interconnect Devices to each Virtual Chassis (see Figure 95 on page 304).

Figure 95: QFX3000-G QFabric System Fiber-Based Control Plane—Interconnect Device to Virtual Chassis Connections



Specific ports have been reserved on the Virtual Chassis to connect to the Interconnect devices, Node devices, and QFX3100 Director devices in your QFabric system. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also enables the use of a standard Virtual Chassis configuration (see “Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System” on page 378).

Before you begin to connect a QFX3008-I Interconnect Device to the fiber-based QFX3000-G QFabric system control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see “Installing and Connecting a QFX3100 Director Device” on page 173, “Installing and Connecting a QFX3008-I Interconnect Device” on page 185, “Installing and Connecting a QFX3600 or QFX3600-I Device” on page 223, and “Installing and Connecting a QFX3500 Device” on page 241.
- Install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis of eight EX4200-24F switches each. For more information, see *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.
- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. For more information, see “Interconnecting Two Virtual Chassis for Fiber-Based QFX3000-G QFabric System Control Plane Redundancy” on page 295.
- Ensure that 1-Gigabit Ethernet SFP transceivers are installed in port **0** and port **1** on both Control Boards for each QFX3008-I Interconnect device (see *Installing a Transceiver in a QFX Series Device*). For a list of supported transceivers and required cables, see “Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 125.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports you are using on each EX4200 switch (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers, see *Pluggable Transceivers Supported on EX4200 Switches*.

- Ensure that you have appropriate fiber-optic cables (see "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125).
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for the QFX Series*).
- Use Table 85 on page 305 to determine the QFX3008-I Interconnect device-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.

NOTE: The two Control Boards in each Interconnect device are labeled CB0 and CB1 in Figure 95 on page 304 and Table 85 on page 305. Interconnect devices IC2 and IC3 are not shown in Figure 95 on page 304 and describe the port mappings for the optional third and fourth Interconnect devices

Table 85: Interconnect Device Port Mappings

Interconnect Device	Virtual Chassis VC0	Virtual Chassis VC1
IC0	• **CB0, port 0** to **ge-0/0/19** • **CB1, port 0** to **ge-1/0/19**	• **CB0, port 1** to **ge-0/0/19** • **CB1, port 1** to **ge-1/0/19**
IC1	• **CB0, port 0** to **ge-2/0/19** • **CB1, port 0** to **ge-3/0/19**	• **CB0, port 1** to **ge-2/0/19** • **CB1, port 1** to **ge-3/0/19**
IC2	• **CB0, port 0** to **ge-0/0/18** • **CB1, port 0** to **ge-1/0/18**	• **CB0, port 1** to **ge-0/0/18** • **CB1, port 1** to **ge-1/0/18**
IC3	• **CB0, port 0** to **ge-2/0/18** • **CB1, port 0** to **ge-3/0/18**	• **CB0, port 1** to **ge-2/0/18** • **CB1, port 1** to **ge-3/0/18**

To connect each QFX3600-I Interconnect device to the fiber-based control plane network:

WARNING: Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.

NOTE: Before you connect each cable to a device, if the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. If the transceiver is covered with a rubber safety cap, remove the cap. Save the caps for future use.

1. Connect the first QFX3008-I Interconnect device.
   a. Connect one end of the first fiber optic cable to the SFP optical transceiver in the first management port labeled (labeled **0**) on the first Control Board (labeled **CB 0**).
   b. Connect the other end of that cable to port **ge-0/0/19** on the first Virtual Chassis.
   c. Connect one end of the second fiber optic cable to the SFP optical transceiver in the second management port (labeled **1**) on **CB0**.
   d. Connect the other end of that cable to port **ge-0/0/19** on the *second* Virtual Chassis.
   e. Connect one end of the third fiber optic cable to the SFP optical transceiver in the first management port labeled (labeled **0**) on the *second* Control Board (labeled **CB 1**).
   f. Connect the other end of that cable to port **ge-1/0/19** on the first Virtual Chassis.
   g. Connect one end of the fourth fiber optic cable to the SFP optical transceiver in the second management port (labeled **1**) on **CB1**.
   h. Connect the other end of that cable to port **ge-1/0/19** on the *second* Virtual Chassis.
2. Connect the second QFX3008-I Interconnect device.
   a. Connect one end of the first fiber optic cable to the SFP optical transceiver in the first management port labeled (labeled **0**) on the first Control Board (labeled **CB 0**).
   b. Connect the other end of that cable to port **ge-2/0/19** on the first Virtual Chassis.
   c. Connect one end of the second fiber optic cable to the SFP optical transceiver in the second management port (labeled **1**) on **CB0**.
   d. Connect the other end of that cable to port **ge-2/0/19** on the *second* Virtual Chassis.
   e. Connect one end of the third fiber optic cable to the SFP optical transceiver in the first management port labeled (labeled **0**) on the *second* Control Board (labeled

CB 1).

f. Connect the other end of that cable to port **ge-3/0/19** on the first Virtual Chassis.

g. Connect one end of the fourth fiber optic cable to the SFP optical transceiver in the second management port (labeled **1**) on **CB1**.

h. Connect the other end of that cable to port **ge-3/0/19** on the *second* Virtual Chassis.

3. (Optional) Connect the third QFX3008-I Interconnect device.

   a. Connect one end of the first fiber optic cable to the SFP optical transceiver in the first management port labeled (labeled **0**) on the first Control Board (labeled **CB 0**).

   b. Connect the other end of that cable to port **ge-0/0/18** on the first Virtual Chassis.

   c. Connect one end of the second fiber optic cable to the SFP optical transceiver in the second management port (labeled **1**) on **CB0**.

   d. Connect the other end of that cable to port **ge-0/0/18** on the *second* Virtual Chassis.

   e. Connect one end of the third fiber optic cable to the SFP optical transceiver in the first management port labeled (labeled **0**) on the *second* Control Board (labeled **CB 1**).

   f. Connect the other end of that cable to port **ge-1/0/18** on the first Virtual Chassis.

   g. Connect one end of the fourth fiber optic cable to the SFP optical transceiver in the second management port (labeled **1**) on **CB1**.

   h. Connect the other end of that cable to port **ge-1/0/18** on the *second* Virtual Chassis.

4. Connect the fourth QFX3008-I Interconnect device.

   a. Connect one end of the first fiber optic cable to the SFP optical transceiver in the first management port labeled (labeled **0**) on the first Control Board (labeled **CB 0**).

   b. Connect the other end of that cable to port **ge-2/0/18** on the first Virtual Chassis.

   c. Connect one end of the second fiber optic cable to the SFP optical transceiver in the second management port (labeled **1**) on **CB0**.

   d. Connect the other end of that cable to port **ge-2/0/18** on the *second* Virtual Chassis.

   e. Connect one end of the third fiber optic cable to the SFP optical transceiver in the first management port labeled (labeled **0**) on the *second* Control Board (labeled **CB 1**).

   f. Connect the other end of that cable to port **ge-3/0/18** on the first Virtual Chassis.

   g. Connect one end of the fourth fiber optic cable to the SFP optical transceiver in the second management port (labeled **1**) on **CB1**.

h. Connect the other end of that cable to port **ge-3/0/18** on the *second* Virtual Chassis.

Related Documentation

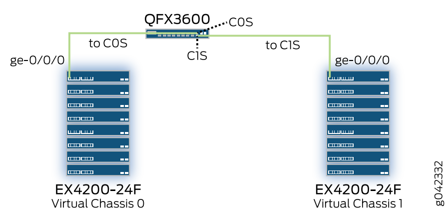
- Connecting a QFX3600 Node Device to a QFX3008-I Interconnect Device on page 319
- Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 321

Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two Virtual Chassis composed of EX4200 switches. If you are creating a fiber-based control plane network, you use eight EX4200-24F Ethernet switches in each Virtual Chassis. QFX3600 Node devices have RJ-45 and SFP management ports. Use the SFP management ports (labeled **C0S** and **C1S**) to connect the QFX3500 Node device to each Virtual Chassis (see Figure 96 on page 308).

Figure 96: QFX3600 Node Device Fiber-Based Control Plane Connections for QFX3000-M QFabric System



Use the following QFX3600 Node devices and EX4200 switches for a fiber-based QFX3000-G QFabric system control plane network:

- QFX3600 Node devices.
- EX4200-24F switches with an SFP+ uplink module installed.

Before you begin to connect a QFX3600 Node device to the fiber-based QFX3000-G QFabric system control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see "Installing and Connecting a QFX3100 Director Device" on page 173, "Installing and Connecting a QFX3008-I Interconnect Device" on page 185, "Installing and Connecting a QFX3600 or QFX3600-I Device" on page 223, and "Installing and Connecting a QFX3500 Device" on page 241.
- Install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis switches of eight members each. See *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.

- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. See "Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy" on page 275.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in management ports **C0S** and **C1S** on each QFX3600 Node device (see *Installing a Transceiver in a QFX Series Device*). For a list of supported transceivers and required cables, see "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports you are using on each EX4200 switch (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers, see *Pluggable Transceivers Supported on EX4200 Switches*.
- Ensure that you have appropriate fiber-optic cables (see "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125).
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for the QFX Series*).
- Use Table 86 on page 309 to determine the QFX3600 Node device-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see "Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System" on page 378).

NOTE: The numerical identifiers for each Node device below are not preassigned to the Node devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Node device (Node 0) is connected to port ge-0/0/0 on each Virtual Chassis.

Table 86: QFX3600 Node Device-to-Virtual Chassis Fiber-Based Control Plane Port Assignments

Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7
Node: 0 **ge-0/0/0**	Node: 16 **ge-1/0/0**	Node: 32 **ge-2/0/0**	Node: 48 **ge-3/0/0**	Node: 64 **ge-4/0/0**	Node: 80 **ge-5/0/0**	Node: 96 **ge-6/0/0**	Node: 112 **ge-7/0/0**
Node: 1 **ge-0/0/1**	Node: 17 **ge-1/0/1**	Node: 33 **ge-2/0/1**	Node: 49 **ge-3/0/1**	Node: 65 **ge-4/0/1**	Node: 81 **ge-5/0/1**	Node: 97 **ge-6/0/1**	Node: 113 **ge-7/0/1**
...	...	...	...	...	...	...	...
Node: 14 **ge-0/0/14**	Node: 30 **ge-1/0/14**	Node: 46 **ge-2/0/14**	Node: 62 **ge-3/0/14**	Node: 78 **ge-4/0/14**	Node: 94 **ge-5/0/14**	Node: 110 **ge-6/0/14**	Node: 126 **ge-7/0/14**

Table 86: QFX3600 Node Device-to-Virtual Chassis Fiber-Based Control Plane Port Assignments *(continued)*

Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7
Node: 15 **ge-0/0/15**	Node: 31 **ge-1/0/15**	Node: 47 **ge-2/0/15**	Node: 63 **ge-3/0/15**	Node: 79 **ge-4/0/15**	Node: 95 **ge-5/0/15**	Node: 111 **ge-6/0/15**	Node: 127 **ge-7/0/15**

To connect a QFX3600 Node device to the fiber-based QFX3000-G QFabric system control plane network (see Figure 96 on page 308):

WARNING: **Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.**

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the SFP optical transceiver in the first SFP management port (labeled **C0S**) on the Node device front panel. Save the cap.
3. Insert the cable connector into the optical transceiver.
4. Connect the other end of that cable to the appropriate port on the first Virtual Chassis. See Table 86 on page 309.
5. Remove the rubber safety cap from the SFP optical transceiver in the second SFP management port (labeled **C1S**) on the Node device front panel. Save the cap.
6. Insert the cable connector into the optical transceiver.
7. Connect the other end of that cable to the appropriate port on the *second* EX4200 switch. This should be the same port number that you connected to in Step 4. For example, if you connected the first cable to **ge-0/0/0** on the first Virtual Chassis, you connect the second cable to **ge-0/0/0** on the second Virtual Chassis.
8. Repeat this procedure for each QFX3600 Node device.
9. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

   CAUTION: **Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.**

   Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Related Documentation

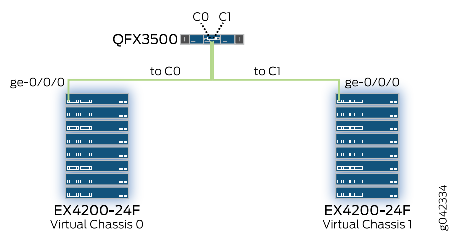
- *Connecting a QFX3600-I Interconnect Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device*
- *Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network*
- Connecting QFX3100 Director Devices in a Director Group on page 278

Connecting a QFX3500 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two Virtual Chassis composed of EX4200 switches. If you are creating a fiber-based control plane network, you use eight EX4200-24F Ethernet switches in each Virtual Chassis. QFX3500 Node devices have an RJ-45 or SFP management board. Use the SFP management ports (labeled **C0** and **C1**) to connect the QFX3500 Node device to each Virtual Chassis (see Figure 97 on page 311).

Figure 97: QFX3500 Node Device Fiber-Based Control Plane Connections for QFX3000-G QFabric System



Use the following QFX3500 Node devices and EX4200 switches for a fiber-based QFX3000-G QFabric system control plane network:

- QFX3500 Node devices with an SFP management board installed. The SFP management board provides two small form-factor pluggable (SFP) 1-Gbps management ports labeled **C0** and **C1**.
- EX4200-24F switches with an SFP+ uplink module installed.

Before you begin to connect a QFX3500 Node device to the fiber-based QFX3000-M QFabric system control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see "Installing and Connecting a QFX3100 Director Device" on page 173, "Installing and Connecting a QFX3008-I Interconnect Device" on page 185, "Installing and Connecting a QFX3600 or QFX3600-I Device" on page 223, and "Installing and Connecting a QFX3500 Device" on page 241.
- Install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis switches of eight members each. See *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.
- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. See "Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy" on page 275.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in management ports **C0** and **C1** on each QFX3500 Node device (see *Installing a Transceiver in a QFX Series Device*). For a list of supported transceivers and required cables, see "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports you are using on each EX4200 switch (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers, see *Pluggable Transceivers Supported on EX4200 Switches*.
- Ensure that you have appropriate fiber-optic cables (see "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125).
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for the QFX Series*).
- Use Table 87 on page 312 to determine the QFX3500 Node device-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see "Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System" on page 378).

NOTE: The numerical identifiers for each Node device below are not preassigned to the Node devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Node device (Node 0) is connected to port ge-0/0/0 on each Virtual Chassis.

Table 87: QFX3500 Node Device-to-Virtual Chassis Fiber-Based Control Plane Port Assignments

Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7
Node: 0 **ge-0/0/0**	Node: 16 **ge-1/0/0**	Node: 32 **ge-2/0/0**	Node: 48 **ge-3/0/0**	Node: 64 **ge-4/0/0**	Node: 80 **ge-5/0/0**	Node: 96 **ge-6/0/0**	Node: 112 **ge-7/0/0**

Table 87: QFX3500 Node Device-to-Virtual Chassis Fiber-Based Control Plane Port Assignments *(continued)*

Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7
Node: 1 **ge-0/0/1**	Node: 17 **ge-1/0/1**	Node: 33 **ge-2/0/1**	Node: 49 **ge-3/0/1**	Node: 65 **ge-4/0/1**	Node: 81 **ge-5/0/1**	Node: 97 **ge-6/0/1**	Node: 113 **ge-7/0/1**
...	...	...	...	...	...	...	...
Node: 14 **ge-0/0/14**	Node: 30 **ge-1/0/14**	Node: 46 **ge-2/0/14**	Node: 62 **ge-3/0/14**	Node: 78 **ge-4/0/14**	Node: 94 **ge-5/0/14**	Node: 110 **ge-6/0/14**	Node: 126 **ge-7/0/14**
Node: 15 **ge-0/0/15**	Node: 31 **ge-1/0/15**	Node: 47 **ge-2/0/15**	Node: 63 **ge-3/0/15**	Node: 79 **ge-4/0/15**	Node: 95 **ge-5/0/15**	Node: 111 **ge-6/0/15**	Node: 127 **ge-7/0/15**

To connect a QFX3500 Node device to the fiber-based QFX3000-G QFabric system control plane network (see Figure 97 on page 311):

WARNING: **Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.**

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the SFP optical transceiver in the first management port (labeled **C0**) on the Node device management board. Save the cap.
3. Insert the cable connector into the optical transceiver.
4. Connect the other end of that cable to the appropriate port on the first Virtual Chassis. See Table 87 on page 312.
5. Remove the rubber safety cap from the SFP optical transceiver in the second management port (labeled **C1**) on the Node device management board. Save the cap.
6. Insert the cable connector into the optical transceiver.
7. Connect the other end of that cable to the appropriate port on the *second* Virtual Chassis. This should be the same port number that you connected to in Step 4. For example, if you connected the first cable to **ge-0/0/0** on the first Virtual Chassis, you connect the second cable to **ge-0/0/0** on the second Virtual Chassis.
8. Repeat this procedure for each QFX3500 Node device.
9. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

CAUTION: Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Related Documentation

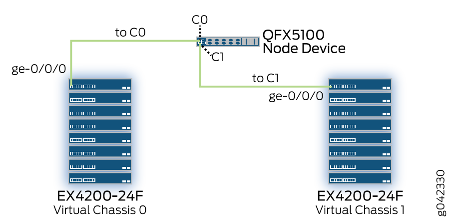
- Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 321
- Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network on page 308

Connecting a QFX5100 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network

Supported Platforms QFX3000-G

A QFX3000-G QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two Virtual Chassis composed of EX4200 switches. If you are creating a fiber-based control plane network, you use eight EX4200-24F Ethernet switches in each Virtual Chassis. QFX5100 Node devices have an RJ-45 management port and one or two small form-factor pluggable (SFP) cages for copper or fiber SFP modules. For an all-fiber connection, place an 1 Gbps fiber SFP in the **C0** and **C1** management ports to connect the QFX5100-48S Node device to each Virtual Chassis, (see Figure 98 on page 314.)

Figure 98: QFX5100 Node Device Fiber-Based Control Plane Connections for QFX3000-G QFabric System



Use the following QFX5100-48S Node devices and EX4200 switches for a fiber-based QFX3000-G QFabric system control plane network:

- QFX5100-48S Node devices with two 1-Gbps SFP modules installed in the management ports labeled **C0** and **C1**.
- EX4200-24F switches with an SFP+ uplink module installed.

Before you begin to connect a QFX5100-48S Node device to the fiber-based QFX3000-M QFabric system control plane network:

- Install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see "Installing and Connecting a QFX3100 Director Device" on page 173, "Installing and Connecting a QFX3008-I Interconnect Device" on page 185, "Installing and Connecting a QFX3600 or QFX3600-I Device" on page 223, "Installing and Connecting a QFX3500 Device" on page 241 and "Installing and Connecting a QFX5100 Device" on page 257.
- Install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis switches of eight members each. See *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.
- Interconnect the two Virtual Chassis switches using the 10-Gigabit Ethernet SFP+ uplink ports. See "Interconnecting Two Virtual Chassis for Copper-Based QFX3000-G QFabric System Control Plane Redundancy" on page 275.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in both management ports labeled **C0** on each QFX5100 Node device (see *Installing a Transceiver in a QFX Series Device*). For a list of supported transceivers and required cables, see "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports you are using on each EX4200 switch (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers, see *Pluggable Transceivers Supported on EX4200 Switches*.
- Ensure that you have appropriate fiber-optic cables (see "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125).
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for the QFX Series*).
- Use Table 88 on page 315 to determine the QFX5100 Node device-to-Virtual Chassis port mappings. Specific ports have been reserved on the Virtual Chassis to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration (see "Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System" on page 378).

NOTE: The numerical identifiers for each Node device below are not preassigned to the Node devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Node device (Node 0) is connected to port ge-0/0/0 on each Virtual Chassis.

Table 88: QFX5100 Node Device-to-Virtual Chassis Fiber-Based Control Plane Port Assignments

Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7
Node: 0	Node: 16	Node: 32	Node: 48	Node: 64	Node: 80	Node: 96	Node: 112
ge-0/0/0	ge-1/0/0	ge-2/0/0	ge-3/0/0	ge-4/0/0	ge-5/0/0	ge-6/0/0	ge-7/0/0

Table 88: QFX5100 Node Device-to-Virtual Chassis Fiber-Based Control Plane Port Assignments *(continued)*

Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7
Node: 1 ge-0/0/1	Node: 17 ge-1/0/1	Node: 33 ge-2/0/1	Node: 49 ge-3/0/1	Node: 65 ge-4/0/1	Node: 81 ge-5/0/1	Node: 97 ge-6/0/1	Node: 113 ge-7/0/1
...	...	...	...	...	...	...	...
Node: 14 ge-0/0/14	Node: 30 ge-1/0/14	Node: 46 ge-2/0/14	Node: 62 ge-3/0/14	Node: 78 ge-4/0/14	Node: 94 ge-5/0/14	Node: 110 ge-6/0/14	Node: 126 ge-7/0/14
Node: 15 ge-0/0/15	Node: 31 ge-1/0/15	Node: 47 ge-2/0/15	Node: 63 ge-3/0/15	Node: 79 ge-4/0/15	Node: 95 ge-5/0/15	Node: 111 ge-6/0/15	Node: 127 ge-7/0/15

To connect a QFX5100 Node device to the fiber-based QFX3000-G QFabric system control plane network:

WARNING: **Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.**

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the SFP optical transceiver in the first management port (labeled **C0**) on the Node device management panel. Save the cap.
3. Insert the cable connector into the optical transceiver.
4. Connect the other end of that cable to the appropriate port on the first Virtual Chassis. See Table 88 on page 315.
5. Remove the rubber safety cap from the SFP optical transceiver in the second management port (labeled **C1**) on the Node device management panel. Save the cap.
6. Insert the cable connector into the optical transceiver.
7. Connect the other end of that cable to the appropriate port on the *second* Virtual Chassis. This should be the same port number that you connected to in Step 4. For example, if you connected the first cable to ge-0/0/0 on the first Virtual Chassis, you connect the second cable to ge-0/0/0 on the second Virtual Chassis.
8. Repeat this procedure for each QFX5100 Node device.
9. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

CAUTION: Do not bend fiber-optic cables beyond their minimum bend radius. An arc smaller than a few inches in diameter can damage the cables and cause problems that are difficult to diagnose.

Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Related Documentation

- Connecting a QFX5100 Node Device to a QFX3008-I Interconnect Device on page 322
- Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network on page 308

CHAPTER 16

Cabling the Data Plane for the QFX3000-G QFabric System

Connecting a QFX3600 Node Device to a QFX3008-I Interconnect Device

Supported Platforms QFX3000-G

To form the data plane in a QFX3000-G QFabric system, you connect the QSFP+ uplink ports (labeled **Q0** through **Q7**) on the QFX3600 Node device to the QSFP+ ports on the 16-port QSFP+ front cards in a QFX3008-I Interconnect device.

NOTE: By default, four ports (labeled **Q0** through **Q3**) are configured for 40-Gbps uplink connections between your QFX3600 Node device and your Interconnect device. Optionally, you can choose to configure the first eight ports (labeled Q0 through Q7) for the uplink connections (see "Configuring the Port Type on QFX3600 Node Devices" on page 440).

CAUTION: For redundancy, each QFX3600 Node device must be connected to each QFX3008-I Interconnect device. For example, if you have two QFX3008-I Interconnect devices, then at least one uplink port on each QFX3600 Node device must be connected to each QFX3008-I Interconnect device. If you are connecting four uplink ports to two QFX3008-I Interconnect devices, we recommend connecting two uplink ports to each Interconnect device, each to a different front card. If you are connecting eight uplink ports to two QFX3008-I Interconnect devices, we recommend connecting four uplink ports to each Interconnect device, each to a different front card.

Before you begin to cable the QFX3000-G QFabric system data plane:

- Review “Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 125 for information about the optical interface characteristics.
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for the QFX Series*).
- Ensure you have installed QSFP+ transceivers in each port you are using. See *Installing a Transceiver in a QFX Series Device*.
- Ensure that you have appropriate fiber-optic cables (see “Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 125).

To connect a QFX3600 Node device to a QFX3008-I Interconnect device:

WARNING: **Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.**

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the QSFP+ optical transceiver on the QFX3600 Node device. Save the cap.
3. Insert the cable connector into the optical transceiver.
4. If the connector at the other end of the fiber-optic cable is covered by a rubber safety cap, remove the cap. Save the cap.
5. Remove the rubber safety cap from the QSFP+ optical transceiver on the 16-port QSFP+ front card on the QFX3008-I Interconnect device. Save the cap.
6. Insert the cable connector into the optical transceiver.
7. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

   CAUTION: **Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.**

   Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Related Documentation

- Configuring the Port Type on QFX3600 Node Devices on page 440
- Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 125

Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device

Supported Platforms QFX3000-G

To form the data plane in a QFX3000-G QFabric system, you connect the QSFP+ uplink ports (labeled **Q0** through **Q3**) on the QFX3500 Node device to the QSFP+ ports on the 16-port QSFP+ front cards in a QFX3008-I Interconnect device.

The number of uplink connections from your Node device to your Interconnect devices determines the oversubscription ratio on the Node device.

CAUTION: **For redundancy, each QFX3500 Node device must be connected to *each* QFX3008-I Interconnect device. For example, if you have two QFX3008-I Interconnect devices, then at least one uplink port on each QFX3500 Node device must be connected to each QFX3008-I Interconnect device. If you have four QFX3008-I Interconnect devices, then each uplink port should be connected to a different QFX3008-I Interconnect device. If you are connecting all four uplink ports to two QFX3008-I Interconnect devices, we recommend connecting two uplink ports to each Interconnect device, each to a different front card.**

Before you begin to cable the QFX3000-G QFabric system data plane:

- Review "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125 for information about the optical interface characteristics.
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for the QFX Series*).
- Ensure you have installed QSFP+ transceivers in each port you are using. See *Installing a Transceiver in a QFX Series Device*.
- Ensure that you have appropriate fiber-optic cables (see "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125).

To connect a QFX3500 Node device to a QFX3008-I Interconnect device:

WARNING: **Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.**

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Remove the rubber safety cap from the QSFP+ optical transceiver on the QFX3500 Node device. Save the cap.
3. Insert the cable connector into the optical transceiver.

4. If the connector at the other end of the fiber-optic cable is covered by a rubber safety cap, remove the cap. Save the cap.
5. Remove the rubber safety cap from the QSFP+ optical transceiver on the 16-port QSFP+ front card on the QFX3008-I Interconnect device. Save the cap.
6. Insert the cable connector into the optical transceiver.
7. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

CAUTION: Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.

Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Related Documentation

• Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 125

Connecting a QFX5100 Node Device to a QFX3008-I Interconnect Device

Supported Platforms QFX3000-G

To form the data plane in a QFX3000-G QFabric system, you connect the QSFP+ uplink ports (labeled **48** through **51**) on the QFX5100-48 Node device to the QSFP+ ports on the 16-port QSFP+ front cards in a QFX3008-I Interconnect device.

The number of uplink connections from your Node device to your Interconnect devices determines the oversubscription ratio on the Node device (see "Understanding Port Oversubscription on Node Devices" on page 32).

CAUTION: For redundancy, each QFX5100-48S Node device must be connected to *each* QFX3008-I Interconnect device. For example, if you have two QFX3008-I Interconnect devices, then at least one uplink port on each QFX5100-48S Node device must be connected to each QFX3008-I Interconnect device. If you have four QFX3008-I Interconnect devices, then each uplink port should be connected to a different QFX3008-I Interconnect device. If you are connecting four uplink ports to two QFX3008-I Interconnect devices, we recommend connecting two uplink ports to each Interconnect device, each to a different front card.

Before you begin to cable the QFX3000-G QFabric system data plane:

- Review "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125 for information about the optical interface characteristics.
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for the QFX Series*).
- Ensure you have installed QSFP+ transceivers in each port you are using. See *Installing a Transceiver in a QFX Series Device*.
- Ensure that you have appropriate fiber-optic cables (see "Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 125).

To connect a QFX5100-48S Node device to a QFX3008-I Interconnect device:

WARNING: **Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cables connected to transceivers emit laser light that can damage your eyes.**

1. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
2. Insert the cable connector into the optical transceiver.
3. If the connector at the other end of the fiber-optic cable is covered by a rubber safety cap, remove the cap. Save the cap.
4. Remove the rubber safety cap from the QSFP+ optical transceiver on the 16-port QSFP+ front card on the QFX3008-I Interconnect device. Save the cap.
5. Insert the cable connector into the optical transceiver.
6. Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop. Placing fasteners on a loop helps cables maintain their shape.

   CAUTION: **Do not bend fiber-optic cables beyond their minimum bend radius. Bending the cables beyond their minimum bend radius can damage the cables and cause problems that are difficult to diagnose.**

   Do not let fiber-optic cables hang free from the connector. Do not allow fastened loops of cables to dangle, which stresses the cables at the fastening point.

Related Documentation

- Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 125

PART 3

Configuration

CHAPTER 17

Initial Setup

QFabric System Initial and Default Configuration Information

Supported Platforms QFabric System

Once you install the hardware for the QFabric system, you can configure the Junos operating system (Junos OS) to begin using the system. This topic discusses which setup activities you need to perform and which activities are handled automatically by the QFabric system.

The fabric manager Routing Engine in the Director group automatically handles some of the initial setup activities, including:

- Assignment of IP addresses and unique identifiers to each QFabric system component by way of the management control plane
- Inclusion of all QFabric system devices within the default partition
- Establishment of interdevice communication and connectivity through the use of a fabric provisioning protocol and a fabric management protocol

The initial configuration tasks you need to perform to bring up the QFabric system and make it operational include:

- Converting any standalone devices, such as QFX3500 and QFX3600 devices, to Node device mode (see “Converting the Device Mode for a QFabric System Component” on page 329)
- Setting up the QFabric system control plane cabling, topology, and configuration
  - To set up the control plane cabling, topology, and configuration for the QFX3000-G QFabric system, see “Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane” on page 336.
  - To set up a copper or fiber-based control plane cabling, topology, and configuration for the QFX3000-M QFabric system, see *Example: Configuring EX4200 Switches for the QFX3000-M QFabric System Control Plane*.
- Accessing the Director group through a console connection, turning on the devices, and running through the initial setup script (see “Performing the QFabric System Initial Setup on a QFX3100 Director Group” on page 411), which prompts you to:
  - Set IP addresses for the Director devices in the Director group.
  - Set an IP address for the default partition.
  - Add the software serial number for your QFabric system. (Review the e-mail containing the software serial number that you received from Juniper Networks when you purchased your QFabric system.)
  - Set the starting MAC address and the range of MAC addresses for the QFabric system. (See “Generating the MAC Address Range for a QFabric System” on page 410 for this information.)
  - Set a root password for the Director devices.
  - Set a root password for the QFabric system components, such as Node devices, Interconnect devices, and infrastructure.
- Logging into the default partition by using the IP address you configured when you ran the Director group initial setup script (See “Gaining Access to the QFabric System Through the Default Partition” on page 421)
- Configuring basic system settings for the default partition, such as time, location, and default gateways

  NOTE: **Unlike other Juniper Networks devices that run Junos OS, a QFabric system does not have a default factory configuration (containing the basic configuration settings for system logging, interfaces, protocols, and so on) that is loaded when you first install and power on the Director devices. Therefore, you must configure all the settings required for your QFabric system through the default partition CLI.**

- Configuring aliases for Node devices (see “Configuring Aliases for the QFabric System” on page 430)
- Configuring VLANs and interfaces for the QFabric system devices

- Configuring redundant server Node groups to provide resiliency for server and storage connections (see "Configuring Node Groups for the QFabric System" on page 447)
- Configuring a network Node group to connect the QFabric system to external networks (see "Configuring Node Groups for the QFabric System" on page 447)
- Configuring the port type on QFX3600 Node devices (see "Configuring the Port Type on QFX3600 Node Devices" on page 440)
- Configuring routing protocols to run on the network Node group interfaces and reach external networks

  NOTE: When you configure routing protocols on the QFabric system, you must use interfaces from the Node devices assigned to the network Node group. If you try to configure routing protocols on interfaces from the Node devices assigned to server Node groups, the configuration commit operation fails.

- Generating and adding the license keys for the QFabric system (see "Generating the License Keys for a QFabric System" on page 459 and "Adding New Licenses (CLI Procedure)" on page 461)

Related Documentation

- QFX3000-G QFabric System Installation Overview on page 95
- *QFX3000-M QFabric System Installation Overview*
- Converting the Device Mode for a QFabric System Component on page 329
- Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane on page 336
- *Example: Configuring EX4200 Switches for the QFX3000-M QFabric System Control Plane*
- Generating the MAC Address Range for a QFabric System on page 410
- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411
- Understanding QFabric System Administration Tasks and Utilities on page 417
- Gaining Access to the QFabric System Through the Default Partition on page 421
- Configuring Aliases for the QFabric System on page 430
- Configuring Node Groups for the QFabric System on page 447
- Configuring the Port Type on QFX3600 Node Devices on page 440
- Generating the License Keys for a QFabric System on page 459
- Adding New Licenses (CLI Procedure) on page 461

Converting the Device Mode for a QFabric System Component

Supported Platforms QFabric System

You can configure some devices to act as a standalone switch or participate in a QFabric system in a particular role. To change the role of your device, you must set the device mode. Table 89 on page 330 shows the device modes available for various devices.

Table 89: Support for device mode options

Device mode	QFX3500	QFX3600	QFX5100
Interconnect device	N/A	Supported	N/A
Node device	Supported	Supported	Supported
Standalone	Supported	Supported	N/A

To convert a device to a different mode, issue the **request chassis device-mode** command and specify the desired device mode. You verify the current and future device mode with the **show chassis device-mode** command.

When you convert a device from standalone mode to either Node device or Interconnect device mode, the software prepares the device to be configured automatically by the QFabric system. However, changing the device mode erases all configuration data on the device.

NOTE: **The QFX3600 switch requires Jloader Release 1.1.8 before you can convert the switch to Interconnect device mode. For more information, see:** Jloader 1.1.8 Release for QFX-Series Platforms.

CAUTION: **We recommend that you back up your device configuration to an external location before converting a device to a different device mode.**

The following procedures illustrate the conversion options available when you modify a device mode:

- Convert from standalone switch mode to Node device mode
- Convert from Node device mode to Interconnect device mode
- Convert from Interconnect device mode to Node device mode
- Convert from Node device mode or Interconnect device mode to standalone switch mode

Standalone Switch to Node Device

To convert your device from standalone mode to Node device mode, follow these steps:

1. Connect to your standalone device through the console port and log in as the root user.
2. Back up your device configuration to an external location.

   root@switch# **save *configuration-name external-path***
3. Upgrade the software on your device to a QFabric system **Node and Interconnect device** software package that matches the QFabric system complete software package used by your QFabric system. If the complete software package for your QFabric system is named **jinstall-qfabric-13.2X52-D10.2.rpm**, you need to install the **jinstall-qfabric-5-13.2X52-D10.2-domestic-signed.tgz** package on your QFX5100 device and the **jinstall-qfx-13.2X52-D10.2-domestic-signed.tgz** package on your QFX3500 or QFX3600 device. Matching the two software packages ensures a smooth and successful addition of the device to the QFabric system inventory.

   root@switch# **request system software add *software-package-name* reboot**

   NOTE: After you install the correct software, the QFX5100 device is placed into Node device mode by default and cannot be converted to any other mode in Junos OS Release 13.2X52-D10.

4. Check the current device mode by issuing the **show chassis device-mode** command.

   ```
   root@switch> show chassis device-mode
   Current device-mode : Standalone
   Future device-mode after reboot : Standalone
   ```
5. Issue the **request chassis device-mode** command and select the desired device mode.

   ```
   root@switch> request chassis device-mode node-device
   Device mode set to 'node-device' mode.
   Please reboot the system to complete the process.
   ```
6. Verify the future device mode by issuing the **show chassis device-mode** command.

   ```
   root@switch> show chassis device-mode
   Current device-mode : Standalone
   Future device-mode after reboot : Node-device
   ```
7. Reboot the device.

   ```
   root@switch> request system reboot
   Reboot the system ? [yes,no] (no) yes

   Shutdown NOW!
   [pid 34992]

   root@switch>

   *** FINAL System shutdown message from root@switch ***
   System going down IMMEDIATELY
   ```
8. Verify that the new device mode has been enabled by issuing the **show chassis device-mode** command.

   ```
   root@switch> show chassis device-mode
   ```



```
Current device-mode : Node-device
Future device-mode after reboot : Node-device
```

9. To enable a converted device to participate in the QFabric system, locate the applicable network cables for your device and connect the device ports to the control plane and data plane.

10. (Optional) If you change the device back from Node device mode to standalone mode, restore the saved backup configuration from your external location.

    `root@switch#` **load** ***configuration-name external-path***

Node Device to Interconnect Device

To convert your device from Node device mode to Interconnect device mode, follow these steps:

1. From the default partition CLI prompt, back up your QFabric system configuration to an external location.

   `user@qfabric#` **save** ***configuration-name external-path***

2. Connect to your device through the console port and log in as the root user.

3. Check the current device mode by issuing the **show chassis device-mode** command.

   ```
   root@switch> show chassis device-mode
   Current device-mode : Node-device
   Future device-mode after reboot : Node-device
   ```

4. Issue the **request chassis device-mode** command and select the desired device mode.

   ```
   root@switch> request chassis device-mode interconnect-device
   Device mode set to 'interconnect-device' mode.
   Please reboot the system to complete the process.
   ```

5. Verify the future device mode by issuing the **show chassis device-mode** command.

   ```
   root@switch> show chassis device-mode
   Current device-mode : Node-device
   Future device-mode after reboot : Interconnect-device
   ```

6. Reboot the device.

   ```
   root@switch> request system reboot
   Reboot the system ? [yes,no] (no) yes

   Shutdown NOW!
   [pid 34992]

   root@switch>

   *** FINAL System shutdown message from root@switch ***
   System going down IMMEDIATELY
   ```

7. Verify that the new device mode has been enabled by issuing the **show chassis device-mode** command.

   ```
   root@switch> show chassis device-mode
   ```



```
Current device-mode : Interconnect-device
Future device-mode after reboot : Interconnect-device
```

8. To enable a converted device to participate in the QFabric system in its new role, move the device to a different rack (as needed), locate the applicable network cables for your device, connect the device ports to the control plane and data plane per the design for your specific QFabric system, and reconfigure any aliases for the device at the QFabric default partition CLI prompt.

Interconnect Device to Node Device

To convert your device from Interconnect device mode to Node device mode, follow these steps:

1. From the default partition CLI prompt, back up your QFabric system configuration to an external location.

   `user@qfabric#` **save** ***configuration-name external-path***
2. Connect to your device through the console port and log in as the root user.
3. Check the current device mode by issuing the **show chassis device-mode** command.

   ```
   root@switch> show chassis device-mode
   Current device-mode : Interconnect-device
   Future device-mode after reboot : Interconnect-device
   ```
4. Issue the **request chassis device-mode** command and select the desired device mode.

   ```
   root@switch> request chassis device-mode node-device
   Device mode set to 'node-device' mode.
   Please reboot the system to complete the process.
   ```
5. Verify the future device mode by issuing the **show chassis device-mode** command.

   ```
   root@switch> show chassis device-mode
   Current device-mode : Interconnect-device
   Future device-mode after reboot : Node-device
   ```
6. Reboot the device.

   ```
   root@switch> request system reboot
   Reboot the system ? [yes,no] (no) yes

   Shutdown NOW!
   [pid 34992]

   root@switch>

   *** FINAL System shutdown message from root@switch ***
   System going down IMMEDIATELY
   ```
7. Verify that the new device mode has been enabled by issuing the **show chassis device-mode** command.

   ```
   root@switch> show chassis device-mode
   Current device-mode : Node-device
   Future device-mode after reboot : Node-device
   ```
8. To enable a converted device to participate in the QFabric system in its new role, move the device to a different rack (as needed), locate the applicable network cables for your device, connect the device ports to the control plane and data plane per the

design for your specific QFabric system, and reconfigure any aliases for the device at the QFabric default partition CLI prompt.

QFabric Component (Interconnect or Node Device) to Standalone Switch

To convert your QFabric component from either Interconnect device mode or Node device mode to standalone switch mode, follow these steps:

1. From the default partition CLI prompt, back up your QFabric system configuration to an external location.

   `user@qfabric#` **save** ***configuration-name external-path***
2. Connect to the desired QFabric component through the console port of the device and log in as the root user.
3. Check the current device mode by issuing the **show chassis device-mode** command.

   ```
   root@node1> show chassis device-mode
   Current device-mode : Node-device
   Future device-mode after reboot : Node-device
   ```
4. Issue the **request chassis device-mode standalone** command to convert the component to standalone switch mode, while the component is still connected to the QFabric system.

   ```
   root@node1> request chassis device-mode standalone
   Device mode set to 'standalone' mode.
   Please reboot the system to complete the process.
   ```

   NOTE: Always convert the device mode to **standalone** before you remove the component from the QFabric system. If you remove the component from the QFabric system before converting the device mode to **standalone**, the switch might not operate properly. For example, the output of the **show chassis hardware** command might display no FPCs or interfaces for the switch.
5. Verify the future device mode by issuing the **show chassis device-mode** command.

   ```
   root@node1> show chassis device-mode
   Current device-mode : Node-device
   Future device-mode after reboot : Standalone
   ```
6. Reboot the component to complete the conversion process.

   ```
   root@node1> request system reboot
   Reboot the system ? [yes,no] (no) yes

   Shutdown NOW!
   [pid 34992]

   root@node1>
   ```



```
*** FINAL System shutdown message from root@node1 ***
System going down IMMEDIATELY
```

7. Disconnect and remove the component from the QFabric system. You may now operate the device as a standalone switch.

Related Documentation

- request chassis device-mode on page 539
- show chassis device-mode on page 571
- *Software Installation Overview*
- Connecting a QFX3500 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 288
- Connecting a QFX3600 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 286
- Connecting a QFX5100 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network on page 291
- Connecting a QFX3500 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network on page 311
- Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network on page 308
- Connecting a QFX5100 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network on page 314
- Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device on page 321
- Connecting a QFX3600 Node Device to a QFX3008-I Interconnect Device on page 319
- Connecting a QFX5100 Node Device to a QFX3008-I Interconnect Device on page 322
- *Connecting a QFX3500 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting a QFX3600 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting a QFX5100 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting a QFX3500 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting a QFX5100 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network*
- *Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device*
- *Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device*
- *Connecting a QFX5100 Node Device to a QFX3600-I Interconnect Device*

Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane

Supported Platforms QFabric System

This example shows you how to connect QFabric system components and configure the Virtual Chassis used by a copper-based QFX3000-G QFabric system control plane network. Proper wiring of Director devices, Interconnect devices, and Node devices to the Virtual Chassis, combined with a standard configuration, enables you to bring up the internal QFabric system management network and prepare your QFabric system for full operation.

Requirements

This example uses the following hardware and software components:

- One QFX3000-G QFabric system containing:
  - Two QFX3100 Director devices
  - Two QFX3008-I Interconnect devices
  - Eight QFX3500 Node devices
- Eight EX4200-48T switches, used to make two redundant Virtual Chassis with four members apiece
- Junos OS Release 12.3R6.6 for the EX Series switches used in the Virtual Chassis
- Junos OS Release 13.2X52-D10 for the QFX Series

Before you begin:

- Rack, mount, and install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see “Installing and Connecting a QFX3100 Director Device” on page 173, “Installing and Connecting a QFX3008-I Interconnect Device” on page 185, and “Installing and Connecting a QFX3500 Device” on page 241.
- Rack, mount, and install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis of four members each. For more information, see *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.

Overview

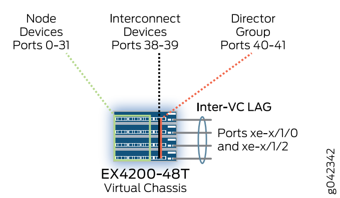
The QFX3000-G QFabric system control plane network connects the Director group, Interconnect devices, and Node devices in a QFabric system across a pair of redundant Virtual Chassis. By separating the management control plane from the data plane, the QFabric system can scale efficiently. The control plane network uses Gigabit Ethernet cabling and connections between components, and a 10-Gigabit Ethernet backbone between the redundant Virtual Chassis.

Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration included as part of this example. The standard configuration can scale from the minimum topology of eight Node devices shown in this example to the maximum of 128 Node devices for a fully implemented QFX3000-G QFabric system.

Topology

Figure 99 on page 337 shows the general port ranges where QFabric system devices must be connected to the Virtual Chassis. For each Virtual Chassis member, connect ports 0 through 31 to Node devices, ports 38 and 39 to Interconnect devices, and ports 40 and 41 to Director devices. Table 90 on page 338 shows the details of the QFabric system device-to-Virtual Chassis port mappings.

Figure 99: QFX3000-G QFabric System Control Plane—Virtual Chassis Port Ranges



CAUTION:

- The control plane network within a QFabric system should be considered a critical component of the system that should not be shared with other network traffic. In order to scale efficiently, the control plane network must be reserved for the QFabric system and its components. As a result, the ports of the QFabric system control plane must never be used for any purpose other than to transport QFabric system control plane traffic, and we neither recommend nor support the connection of other devices to the QFabric system control plane network.
- Do not install Junos Space and AI-Scripts (AIS) on the control plane network Virtual Chassis in a QFX3000-G QFabric system.

NOTE: Not all port numbers are represented in Table 90 on page 338, and ports 32 through 37 and ports 42 through 47 are reserved for future uses.

Table 90 on page 338 shows the specific mappings of QFabric system control plane network ports from the Virtual Chassis to the QFabric system components.

Table 90: QFX3000-G QFabric System Virtual Chassis Control Plane Port Assignments

Member 0	Member 1	Member 2	Member 3	Member Port Number	QFabric System Component
Node0 ge-0/0/0	Node32 ge-1/0/0	Node64 ge-2/0/0	Node96 ge-3/0/0	ge-*X*/0/0	Node devices
Node1 ge-0/0/1	Node33 ge-1/0/1	Node65 ge-2/0/1	Node97 ge-3/0/1	ge-*X*/0/1	Node devices
Node2 ge-0/0/2	Node34 ge-1/0/2	Node66 ge-2/0/2	Node98 ge-3/0/2	ge-*X*/0/2	Node devices
Node3 ge-0/0/3	Node35 ge-1/0/3	Node67 ge-2/0/3	Node99 ge-3/0/3	ge-*X*/0/3	Node devices
Node4 ge-0/0/4	Node36 ge-1/0/4	Node68 ge-2/0/4	Node100 ge-3/0/4	ge-*X*/0/4	Node devices
Node5 ge-0/0/5	Node37 ge-1/0/5	Node69 ge-2/0/5	Node101 ge-3/0/5	ge-*X*/0/5	Node devices
Node6 ge-0/0/6	Node38 ge-1/0/6	Node70 ge-2/0/6	Node102 ge-3/0/6	ge-*X*/0/6	Node devices
Node7 ge-0/0/7	Node39 ge-1/0/7	Node71 ge-2/0/7	Node103 ge-3/0/7	ge-*X*/0/7	Node devices
Node8 ge-0/0/8	Node40 ge-1/0/8	Node72 ge-2/0/8	Node104 ge-3/0/8	ge-*X*/0/8	Node devices
Node9 ge-0/0/9	Node41 ge-1/0/9	Node73 ge-2/0/9	Node105 ge-3/0/9	ge-*X*/0/9	Node devices
Node10 ge-0/0/10	Node42 ge-1/0/10	Node74 ge-2/0/10	Node106 ge-3/0/10	ge-*X*/0/10	Node devices

Table 90: QFX3000-G QFabric System Virtual Chassis Control Plane Port Assignments *(continued)*

Member 0	Member 1	Member 2	Member 3	Member Port Number	QFabric System Component
Node11 ge-0/0/11	Node43 ge-1/0/11	Node75 ge-2/0/11	Node107 ge-3/0/11	ge-*X*/0/11	Node devices
Node12 ge-0/0/12	Node44 ge-1/0/12	Node76 ge-2/0/12	Node108 ge-3/0/12	ge-*X*/0/12	Node devices
Node13 ge-0/0/13	Node45 ge-1/0/13	Node77 ge-2/0/13	Node109 ge-3/0/13	ge-*X*/0/13	Node devices
Node14 ge-0/0/14	Node46 ge-1/0/14	Node78 ge-2/0/14	Node110 ge-3/0/14	ge-*X*/0/14	Node devices
Node15 ge-0/0/15	Node47 ge-1/0/15	Node79 ge-2/0/15	Node111 ge-3/0/15	ge-*X*/0/15	Node devices
Node16 ge-0/0/16	Node48 ge-1/0/16	Node80 ge-2/0/16	Node112 ge-3/0/16	ge-*X*/0/16	Node devices
Node17 ge-0/0/17	Node49 ge-1/0/17	Node81 ge-2/0/17	Node113 ge-3/0/17	ge-*X*/0/17	Node devices
Node18 ge-0/0/18	Node50 ge-1/0/18	Node82 ge-2/0/18	Node114 ge-3/0/18	ge-*X*/0/18	Node devices
Node19 ge-0/0/19	Node51 ge-1/0/19	Node83 ge-2/0/19	Node115 ge-3/0/19	ge-*X*/0/19	Node devices
Node20 ge-0/0/20	Node52 ge-1/0/20	Node84 ge-2/0/20	Node116 ge-3/0/20	ge-*X*/0/20	Node devices
Node21 ge-0/0/21	Node53 ge-1/0/21	Node85 ge-2/0/21	Node117 ge-3/0/21	ge-*X*/0/21	Node devices
Node22 ge-0/0/22	Node54 ge-1/0/22	Node86 ge-2/0/22	Node118 ge-3/0/22	ge-*X*/0/22	Node devices
Node23 ge-0/0/23	Node55 ge-1/0/23	Node87 ge-2/0/23	Node119 ge-3/0/23	ge-*X*/0/23	Node devices

Table 90: QFX3000-G QFabric System Virtual Chassis Control Plane Port Assignments *(continued)*

Member 0	Member 1	Member 2	Member 3	Member Port Number	QFabric System Component
Node24 ge-0/0/24	Node56 ge-1/0/24	Node88 ge-2/0/24	Node120 ge-3/0/24	ge-*X*/0/24	Node devices
Node25 ge-0/0/25	Node57 ge-1/0/25	Node89 ge-2/0/25	Node121 ge-3/0/25	ge-*X*/0/25	Node devices
Node26 ge-0/0/26	Node58 ge-1/0/26	Node90 ge-2/0/26	Node122 ge-3/0/26	ge-*X*/0/26	Node devices
Node27 ge-0/0/27	Node59 ge-1/0/27	Node91 ge-2/0/27	Node123 ge-3/0/27	ge-*X*/0/27	Node devices
Node28 ge-0/0/28	Node60 ge-1/0/28	Node92 ge-2/0/28	Node124 ge-3/0/28	ge-*X*/0/28	Node devices
Node29 ge-0/0/29	Node61 ge-1/0/29	Node93 ge-2/0/29	Node125 ge-3/0/29	ge-*X*/0/29	Node devices
Node30 ge-0/0/30	Node62 ge-1/0/30	Node94 ge-2/0/30	Node126 ge-3/0/30	ge-*X*/0/30	Node devices
Node31 ge-0/0/31	Node63 ge-1/0/31	Node95 ge-2/0/31	Node127 ge-3/0/31	ge-*X*/0/31	Node devices
Reserved ge-0/0/32	Reserved ge-1/0/32	Reserved ge-2/0/32	Reserved ge-3/0/32	ge-*X*/0/32	Future use
...	...	...	...	...	...
Reserved ge-0/0/37	Reserved ge-1/0/37	Reserved ge-2/0/37	Reserved ge-3/0/37	ge-*X*/0/37	Future use
IC2 CB0 ge-0/0/38	IC2 CB1 ge-1/0/38	IC3 CB0 ge-2/0/38	IC3 CB1 ge-3/0/38	ge-*X*/0/38	Interconnect devices NOTE: On both Control Boards, use port 0 to connect to VC0, and port 1 to connect to VC1.

Table 90: QFX3000-G QFabric System Virtual Chassis Control Plane Port Assignments *(continued)*

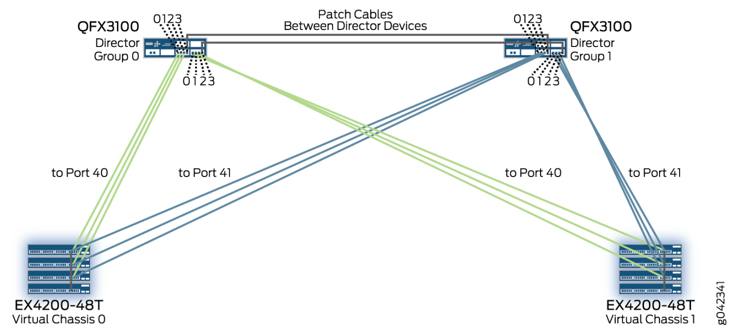
Member 0	Member 1	Member 2	Member 3	Member Port Number	QFabric System Component
IC0 CB0 ge-0/0/39	IC0 CB1 ge-1/0/39	IC1 CB0 ge-2/0/39	IC1 CB1 ge-3/0/39	ge-*X*/0/39	Interconnect devices NOTE: On both Control Boards, use port 0 to connect to VC0, and port 1 to connect to VC1.
DG0 port 0 ge-0/0/40	DG0 port 1 ge-1/0/40	DG0 port 2 ge-2/0/40	Reserved ge-3/0/40	ge-*X*/0/40	Director device 0
DG1 port 0 ge-0/0/41	DG1 port 1 ge-1/0/41	DG1 port 2 ge-2/0/41	Reserved ge-3/0/41	ge-*X*/0/41	Director device 1
Reserved ge-0/0/42	Reserved ge-1/0/42	Reserved ge-2/0/42	Reserved ge-3/0/42	ge-*X*/0/42	Future use
...	...	...	...	...	...
Reserved ge-0/0/47	Reserved ge-1/0/47	Reserved ge-2/0/47	Reserved ge-3/0/47	ge-*X*/0/47	Future use
Inter-VC xe-0/1/0	Inter-VC xe-1/1/0	Inter-VC xe-2/1/0	Inter-VC xe-3/1/0	Inter-VC xe-*X*/1/0	Inter-Virtual Chassis LAG
Inter-VC xe-0/1/2	Inter-VC xe-1/1/2	Inter-VC xe-2/1/2	Inter-VC xe-3/1/2	Inter-VC xe-*X*/1/2	Inter-Virtual Chassis LAG

Next, connect the Director devices to the Virtual Chassis. In general, you want to accomplish the following:

- Connect three ports from one network module in a Director device to the first Virtual Chassis, and three ports from the second network module to the second Virtual Chassis. You need to repeat these connections from the second Director device to both Virtual Chassis to provide resiliency for the system.
- Connect the Director devices to each other and create a Director group. You can use either straight-through RJ-45 patch cables or crossover cables, because the Director devices contain autosensing modules. Connect one port from each network module on the first Director device to one port in each network module on the second Director device.

Figure 100 on page 342 shows the specific ports on the Director group that you must connect to the Virtual Chassis and interconnect between the Director devices.

Figure 100: QFX3000-G QFabric System Control Plane—Director Group to Virtual Chassis Connections



In this specific example, connect ports 0, 1, and 2 from module 0 on Director device DG0 to port 40 on Virtual Chassis VC0 (ge-0/0/40, ge-1/0/40, and ge-2/0/40), and connect ports 0, 1, and 2 from module 1 to port 40 on Virtual Chassis VC1 (ge-0/0/40, ge-1/0/40, and ge-2/0/40).

For Director device DG1, connect ports 0, 1, and 2 from module 0 to port 41 on Virtual Chassis VC0 (ge-0/0/41, ge-1/0/41, and ge-2/0/41), and connect ports 0, 1, and 2 from module 1 to port 41 on Virtual Chassis VC1 (ge-0/0/41, ge-1/0/41, and ge-2/0/41).

To form the Director group, connect module 0, port 3 on Director device DG0 to module 0, port 3 on Director device DG1. Similarly, connect module 1, port 3 on Director device DG0 to module 1, port 3 on Director device DG1. Table 91 on page 342 shows the port mappings for the Director group in this example.

Table 91: Director Group Port Mappings

Director Device	Virtual Chassis VC0	Virtual Chassis VC1
DG0	• Module 0, port 0 to ge-0/0/40 on VC0 • Module 0, port 1 to ge-1/0/40 on VC0 • Module 0, port 2 to ge-2/0/40 on VC0 • Module 0, port 3 to module 0, port 3 on DG1	• Module 1, port 0 to ge-0/0/40 on VC1 • Module 1, port 1 to ge-1/0/40 on VC1 • Module 1, port 2 to ge-2/0/40 on VC1 • Module 1, port 3 to module 1, port 3 on DG1
DG1	• Module 0, port 0 to ge-0/0/41 on VC0 • Module 0, port 1 to ge-1/0/41 on VC0 • Module 0, port 2 to ge-2/0/41 on VC0 • Module 0, port 3 to module 0, port 3 on DG0	• Module 1, port 0 to ge-0/0/41 on VC1 • Module 1, port 1 to ge-1/0/41 on VC1 • Module 1, port 2 to ge-2/0/41 on VC1 • Module 1, port 3 to module 1, port 3 on DG0

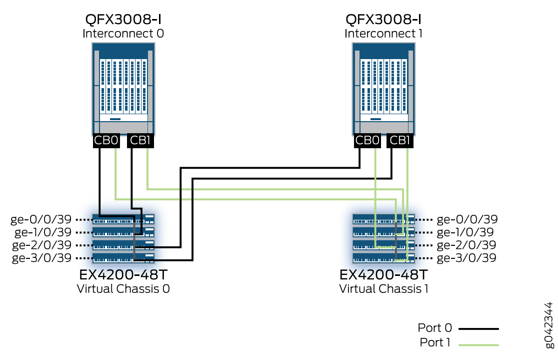
In the software, the ports of each network module are reversed, numbered from right to left, and incremented sequentially across modules. If you issue interface operational commands directly on the Director device, please note the following port mappings as shown in Table 92 on page 343:

Table 92: Hardware to Software Port Mappings for Director Device Network Modules

Network Module	Port 0	Port 1	Port 2	Port 3
Module 0	eth5	eth4	eth3	eth2
Module 1	eth9	eth8	eth7	eth6

Figure 101 on page 343 shows the specific ports on the Interconnect devices that you must connect to the Virtual Chassis. In general, connect one port from each Control Board module in an Interconnect device to the first Virtual Chassis, and a second port from each Control Board module to the second Virtual Chassis.

Figure 101: QFX3000-G QFabric System Control Plane—Interconnect Device to Virtual Chassis Connections



In this specific example, for both Interconnect devices IC0 and IC1, connect port 0 from CB0 and CB1 to Virtual Chassis VC0 and port 1 from CB0 and CB1 to Virtual Chassis VC1. Connect the port 0 cables to port 39 on Virtual Chassis VC0 (ge-0/0/39, ge-1/0/39, ge-2/0/39, and ge-3/0/39), and connect the port 1 cables to port 39 on Virtual Chassis VC1 (ge-0/0/39, ge-1/0/39, ge-2/0/39, and ge-3/0/39). Table 93 on page 343 shows the port mappings for the Interconnect devices in this example.

Table 93: Interconnect Device Port Mappings

Interconnect Device	Virtual Chassis VC0	Virtual Chassis VC1
IC0	• CB0, port 0 to ge-0/0/39 • CB1, port 0 to ge-1/0/39	• CB0, port 1 to ge-0/0/39 • CB1, port 1 to ge-1/0/39
IC1	• CB0, port 0 to ge-2/0/39 • CB1, port 0 to ge-3/0/39	• CB0, port 1 to ge-2/0/39 • CB1, port 1 to ge-3/0/39

As required, you can extend the number of Interconnect devices from two to four. For additional Interconnect devices IC2 and IC3, connect port 0 from CB0 and CB1 to Virtual Chassis VC0 and port 1 from CB0 and CB1 to Virtual Chassis VC1. Connect the port 0 cables to port 38 on Virtual Chassis VC0 (ge-0/0/38, ge-1/0/38, ge-2/0/38, and ge-3/0/38), and connect the port 1 cables to port 38 on Virtual Chassis VC1 (ge-0/0/38, ge-1/0/38, ge-2/0/38, and ge-3/0/38). Table 94 on page 344 shows the port mappings needed to extend the number of Interconnect devices in this example to four devices.

Table 94: Interconnect Device Port Mappings for Two Additional Devices

Interconnect Device	Virtual Chassis VC0	Virtual Chassis VC1
IC2	• CB0, port 0 to ge-0/0/38 • CB1, port 0 to ge-1/0/38	• CB0, port 1 to ge-0/0/38 • CB1, port 1 to ge-1/0/38
IC3	• CB0, port 0 to ge-2/0/38 • CB1, port 0 to ge-3/0/38	• CB0, port 1 to ge-2/0/38 • CB1, port 1 to ge-3/0/38

Figure 102 on page 344, Figure 103 on page 344, and Figure 104 on page 344 show the specific ports on the Node devices that you must connect to the Virtual Chassis. In general, connect the first management port from a Node device to the first Virtual Chassis, and the second management port to the second Virtual Chassis.

Figure 102: QFX3000-G QFabric System Control Plane—QFX3500 Node Device to Virtual Chassis Connections

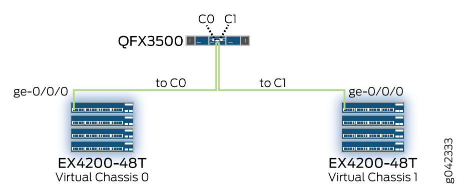


Figure 103: QFX3000-G QFabric System Control Plane—QFX3600 Node Device to Virtual Chassis Connections

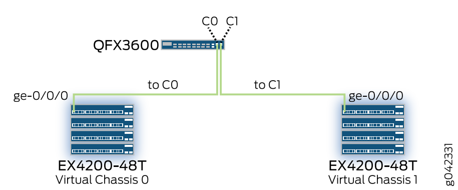
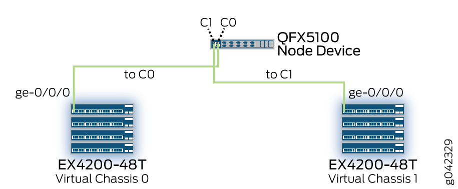


Figure 104: QFX3000-G QFabric System Control Plane—QFX5100 Node Device to Virtual Chassis Connections



In this specific example, for Node device Node0, connect port C0 (also known as me0) to Virtual Chassis 0 port ge-0/0/0, and connect port C1 (also known as me1) to Virtual Chassis 1 port ge-0/0/0.

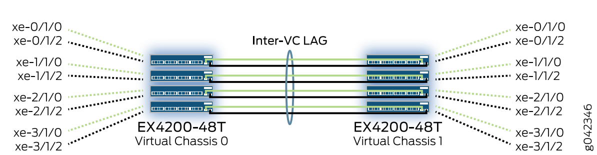
For the remaining seven Node devices, connect port C0 to the ge-0/0/*X* port on Virtual Chassis 0 that matches the Node device number. Similarly, connect port C1 to the port on Virtual Chassis 1 that matches the Node device number. For example, you would connect Node device Node5 to port ge-0/0/5. Table 95 on page 345 shows the full set of port mappings for the Node devices in this example.

Table 95: Node Device Port Mappings

Node Device	Virtual Chassis 0	Virtual Chassis 1
Node0	C0 to ge-0/0/0	C1 to ge-0/0/0
Node1	C0 to ge-0/0/1	C1 to ge-0/0/1
Node2	C0 to ge-0/0/2	C1 to ge-0/0/2
Node3	C0 to ge-0/0/3	C1 to ge-0/0/3
Node4	C0 to ge-0/0/4	C1 to ge-0/0/4
Node5	C0 to ge-0/0/5	C1 to ge-0/0/5
Node6	C0 to ge-0/0/6	C1 to ge-0/0/6
Node7	C0 to ge-0/0/7	C1 to ge-0/0/7

Figure 105 on page 345 shows the specific ports on the members of the first Virtual Chassis that you must connect to the members of the second Virtual Chassis. These connections create a link aggregation bundle (LAG) that provides redundancy and resiliency for the Virtual Chassis portion of the control plane. In general, connect each 10-Gigabit Ethernet uplink port from the first Virtual Chassis to the corresponding 10-Gigabit Ethernet uplink port on the second Virtual Chassis.

Figure 105: QFX3000-G QFabric System Control Plane—Inter-Virtual Chassis LAG Connections



In this specific example, for Virtual Chassis VC0, connect port xe-0/1/0 to Virtual Chassis VC1 port xe-0/1/0. For the remaining seven 10-Gigabit Ethernet uplink ports, connect each port from VC0 to the corresponding port on VC1. For example, you would connect the xe-2/1/2 port on VC0 to port xe-2/1/2 on VC1, and so on.

Table 96 on page 346 shows the full set of port mappings for the Virtual Chassis LAG connections in this example.

Table 96: Virtual Chassis LAG Port Mappings

VC0 and VC1	Member 0	Member 1	Member 2	Member 3
Uplink port 0	xe-0/1/0 to xe-0/1/0	xe-1/1/0 to xe-1/1/0	xe-2/1/0 to xe-2/1/0	xe-3/1/0 to xe-3/1/0
Uplink port 2	xe-0/1/2 to xe-0/1/2	xe-1/1/2 to xe-1/1/2	xe-2/1/2 to xe-2/1/2	xe-3/1/2 to xe-3/1/2

Configuration

CLI Quick Configuration

To quickly configure the QFabric system control plane Virtual Chassis, copy the following commands, paste them in a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

NOTE: The configuration files for a QFabric system control plane network are also available for download from the QFX Series section of the Junos OS software download page at https://www.juniper.net/support/downloads/junos.html .

```
set groups qfabric system commit synchronize
set groups qfabric chassis redundancy graceful-switchover
set groups qfabric chassis aggregated-devices ethernet device-count 10
set groups qfabric chassis fpc 0 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis fpc 1 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis fpc 2 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis fpc 3 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis lcd-menu fpc 0 menu-item maintenance-menu disable
set groups qfabric chassis lcd-menu fpc 1 menu-item maintenance-menu disable
set groups qfabric chassis lcd-menu fpc 2 menu-item maintenance-menu disable
set groups qfabric chassis lcd-menu fpc 3 menu-item maintenance-menu disable
set groups qfabric chassis alarm management-ethernet link-down ignore
set groups qfabric protocols rstp interface ae8.0 mode point-to-point
set groups qfabric protocols rstp interface all edge
set groups qfabric protocols rstp interface all no-root-port
set groups qfabric protocols rstp bpdu-block-on-edge
set groups qfabric protocols lldp interface all
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_3 loss-priority low code-points 110
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_3 loss-priority low code-points 111
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_2 loss-priority low code-points 100
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_2 loss-priority high code-points 101
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_0 loss-priority low code-points 010
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_0 loss-priority high code-points 001
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_3 loss-priority low code-points 110
```

```
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_3 loss-priority low code-points 111
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_2 loss-priority low code-points 100
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_2 loss-priority high code-points 101
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_0 loss-priority low code-points 010
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_0 loss-priority high code-points 001
set groups qfabric class-of-service forwarding-classes class class_3 queue-num 7
set groups qfabric class-of-service forwarding-classes class class_2 queue-num 2
set groups qfabric class-of-service forwarding-classes class class_0 queue-num 0
set groups qfabric class-of-service interfaces ge-*/0/* scheduler-map cpe_network_smap
set groups qfabric class-of-service interfaces ge-*/0/* unit 0 classifiers ieee-802.1
  onep_qfabric_classifier
set groups qfabric class-of-service interfaces ge-*/0/* unit 0 classifiers inet-precedence
  IP_qfabric_classifier
set groups qfabric class-of-service interfaces ae* scheduler-map cpe_network_smap
set groups qfabric class-of-service interfaces ae* unit 0 classifiers ieee-802.1
  onep_qfabric_classifier
set groups qfabric class-of-service interfaces ae* unit 0 classifiers inet-precedence
  IP_qfabric_classifier
set groups qfabric class-of-service scheduler-maps cpe_network_smap forwarding-class
  class_3 scheduler scheduler_3
set groups qfabric class-of-service scheduler-maps cpe_network_smap forwarding-class
  class_2 scheduler scheduler_2
set groups qfabric class-of-service scheduler-maps cpe_network_smap forwarding-class
  class_0 scheduler scheduler_0
set groups qfabric class-of-service schedulers scheduler_3 buffer-size percent 30
set groups qfabric class-of-service schedulers scheduler_3 priority strict-high
set groups qfabric class-of-service schedulers scheduler_2 transmit-rate percent 75
set groups qfabric class-of-service schedulers scheduler_2 buffer-size percent 30
set groups qfabric class-of-service schedulers scheduler_2 priority low
set groups qfabric class-of-service schedulers scheduler_0 transmit-rate percent 25
set groups qfabric class-of-service schedulers scheduler_0 buffer-size percent 40
set groups qfabric class-of-service schedulers scheduler_0 priority low
set groups qfabric ethernet-switching-options nonstop-bridging
set groups qfabric ethernet-switching-options storm-control interface all bandwidth
  10000
set groups qfabric vlans qfabric vlan-id 100
set groups qfabric vlans qfabric dot1q-tunneling
set groups qfabric-int interfaces <*> mtu 9216
set groups qfabric-int interfaces <*> unit 0 family ethernet-switching port-mode access
set groups qfabric-int interfaces <*> unit 0 family ethernet-switching vlan members
  qfabric
set groups qfabric-ae interfaces <*> aggregated-ether-options link-speed 1g
set groups qfabric-ae interfaces <*> aggregated-ether-options lacp active
set apply-groups qfabric
set interfaces interface-range Node_Device_Interfaces member "ge-[0-3]/0/[0-31]"
set interfaces interface-range Node_Device_Interfaces apply-groups qfabric-int
set interfaces interface-range Node_Device_Interfaces description "QFabric Node Device"
set interfaces interface-range Interconnect_Device_Interfaces member
  "ge-[0-3]/0/[38-39]"
set interfaces interface-range Interconnect_Device_Interfaces apply-groups qfabric-int
```



```
set interfaces interface-range Interconnect_Device_Interfaces description "QFabric
  Interconnect Device"
set interfaces interface-range Director_Device_DG0_LAG_Interfaces member
  "ge-[0-3]/0/40"
set interfaces interface-range Director_Device_DG0_LAG_Interfaces description "QFabric
  Director Device - DG0"
set interfaces interface-range Director_Device_DG0_LAG_Interfaces ether-options 802.3ad
  ae0
set interfaces interface-range Director_Device_DG1_LAG_Interfaces member
  "ge-[0-3]/0/41"
set interfaces interface-range Director_Device_DG1_LAG_Interfaces description "QFabric
  Director Device - DG1"
set interfaces interface-range Director_Device_DG1_LAG_Interfaces ether-options 802.3ad
  ae1
set interfaces interface-range Director_Device_DG2_LAG_Interfaces member
  "ge-[0-3]/0/42"
set interfaces interface-range Director_Device_DG2_LAG_Interfaces description "QFabric
  Director Device - DG2"
set interfaces interface-range Director_Device_DG2_LAG_Interfaces ether-options 802.3ad
  ae2
set interfaces interface-range Director_Device_DG3_LAG_Interfaces member
  "ge-[0-3]/0/43"
set interfaces interface-range Director_Device_DG3_LAG_Interfaces description "QFabric
  Director Device - DG3"
set interfaces interface-range Director_Device_DG3_LAG_Interfaces ether-options 802.3ad
  ae3
set interfaces interface-range Director_Device_DG4_LAG_Interfaces member
  "ge-[0-3]/0/44"
set interfaces interface-range Director_Device_DG4_LAG_Interfaces description "QFabric
  Director Device - DG4"
set interfaces interface-range Director_Device_DG4_LAG_Interfaces ether-options 802.3ad
  ae4
set interfaces interface-range Director_Device_DG5_LAG_Interfaces member
  "ge-[0-3]/0/45"
set interfaces interface-range Director_Device_DG5_LAG_Interfaces description "QFabric
  Director Device - DG5"
set interfaces interface-range Director_Device_DG5_LAG_Interfaces ether-options 802.3ad
  ae5
set interfaces interface-range Director_Device_DG6_LAG_Interfaces member
  "ge-[0-3]/0/46"
set interfaces interface-range Director_Device_DG6_LAG_Interfaces description "QFabric
  Director Device - DG6"
set interfaces interface-range Director_Device_DG6_LAG_Interfaces ether-options 802.3ad
  ae6
set interfaces interface-range Director_Device_DG7_LAG_Interfaces member
  "ge-[0-3]/0/47"
set interfaces interface-range Director_Device_DG7_LAG_Interfaces description "QFabric
  Director Device - DG7"
set interfaces interface-range Director_Device_DG7_LAG_Interfaces ether-options 802.3ad
  ae7
set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces member
  "xe-[0-3]/1/0"
set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces member
  "xe-[0-3]/1/2"
set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces description "QFabric
  Control Plane (Inter-VC LAG)"
```



```
set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces ether-options
  802.3ad ae8
set interfaces ae0 apply-groups qfabric-int
set interfaces ae0 apply-groups qfabric-ae
set interfaces ae0 description "QFabric Director Device - DG0"
set interfaces ae1 apply-groups qfabric-int
set interfaces ae1 apply-groups qfabric-ae
set interfaces ae1 description "QFabric Director Device - DG1"
set interfaces ae2 apply-groups qfabric-int
set interfaces ae2 apply-groups qfabric-ae
set interfaces ae2 description "QFabric Director Device - DG2"
set interfaces ae3 apply-groups qfabric-int
set interfaces ae3 apply-groups qfabric-ae
set interfaces ae3 description "QFabric Director Device - DG3"
set interfaces ae4 apply-groups qfabric-int
set interfaces ae4 apply-groups qfabric-ae
set interfaces ae4 description "QFabric Director Device - DG4"
set interfaces ae5 apply-groups qfabric-int
set interfaces ae5 apply-groups qfabric-ae
set interfaces ae5 description "QFabric Director Device - DG5"
set interfaces ae6 apply-groups qfabric-int
set interfaces ae6 apply-groups qfabric-ae
set interfaces ae6 description "QFabric Director Device - DG6"
set interfaces ae7 apply-groups qfabric-int
set interfaces ae7 apply-groups qfabric-ae
set interfaces ae7 description "QFabric Director Device - DG7"
set interfaces ae8 description "QFabric Control Plane (Inter-VC LAG)"
set interfaces ae8 mtu 9216
set interfaces ae8 aggregated-ether-options link-speed 10g
set interfaces ae8 aggregated-ether-options lacp active
set interfaces ae8 unit 0 family ethernet-switching vlan members qfabric
set system host-name qfabric-control-plane
set system services ssh
set system services telnet
set system services web-management http
set system syslog user * any emergency
set system syslog file messages any notice
set system syslog file messages authorization info
set system syslog file messages archive world-readable
set system syslog file messages explicit-priority
set system syslog file interactive-commands interactive-commands any
set system syslog file secure authorization info
set system syslog file default-log-messages any any
set system syslog file default-log-messages structured-data
set system syslog file console any error
set system syslog time-format millisecond
set interfaces vme unit 0 family inet address 192.168.157.26/24
set routing-options static route 0.0.0.0/0 next-hop 192.168.157.1
set virtual-chassis preprovisioned
set virtual-chassis member 0 role routing-engine
set virtual-chassis member 0 serial-number abc123
set virtual-chassis member 1 role routing-engine
set virtual-chassis member 1 serial-number def456
set virtual-chassis member 2 role line-card
set virtual-chassis member 2 serial-number ghi789
set virtual-chassis member 3 role line-card
```

set virtual-chassis member 3 serial-number jkl012

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure a Virtual Chassis for the QFabric system control plane network:

1. Create a configuration group to define global QFabric system control plane properties. Enable commit synchronization and graceful switchover, set up the number of aggregated Ethernet devices, configure alarm and LCD management, activate loop prevention, nonstop bridging, and storm control, configure Link Layer Discovery Protocol (LLDP), specify a global VLAN (VLAN 100) and 802.1q tunneling, define options for aggregated Ethernet interfaces, and enable the uplink module for 10-Gigabit Ethernet operation.

   Enable class of service (CoS) for the QFabric system control plane network. Establish forwarding classes, priorities, scheduler maps, classifiers, and queues for three types of traffic: control traffic, interdevice traffic, and best-effort traffic. Apply the qfabric group settings to the configuration.

```
[edit]
user@switch# set groups qfabric system commit synchronize
user@switch# set groups qfabric chassis redundancy graceful-switchover
user@switch# set groups qfabric chassis aggregated-devices ethernet device-count
  10
user@switch# set groups qfabric chassis fpc 0 pic 1 sfpplus pic-mode 10g
user@switch# set groups qfabric chassis fpc 1 pic 1 sfpplus pic-mode 10g
user@switch# set groups qfabric chassis fpc 2 pic 1 sfpplus pic-mode 10g
user@switch# set groups qfabric chassis fpc 3 pic 1 sfpplus pic-mode 10g
user@switch# set groups qfabric chassis lcd-menu fpc 0 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis lcd-menu fpc 1 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis lcd-menu fpc 2 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis lcd-menu fpc 3 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis alarm management-ethernet link-down
  ignore
user@switch# set groups qfabric protocols rstp interface ae8.0 mode point-to-point
user@switch# set groups qfabric protocols rstp interface all edge
user@switch# set groups qfabric protocols rstp interface all no-root-port
user@switch# set groups qfabric protocols rstp bpdu-block-on-edge
user@switch# set groups qfabric protocols lldp interface all
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_3 loss-priority low code-points 110
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_3 loss-priority low code-points 111
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_2 loss-priority low code-points 100
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_2 loss-priority high code-points
  101
```



```
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_0 loss-priority low code-points
  010
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_0 loss-priority high code-points
  001
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_3 loss-priority low code-points 110
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_3 loss-priority low code-points 111
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_2 loss-priority low code-points 100
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_2 loss-priority high code-points 101
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_0 loss-priority low code-points 010
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_0 loss-priority high code-points 001
user@switch# set groups qfabric class-of-service forwarding-classes class class_3
  queue-num 7
user@switch# set groups qfabric class-of-service forwarding-classes class class_2
  queue-num 2
user@switch# set groups qfabric class-of-service forwarding-classes class class_0
  queue-num 0
user@switch# set groups qfabric class-of-service interfaces ge-*/0/* scheduler-map
  cpe_network_smap
user@switch# set groups qfabric class-of-service interfaces ge-*/0/* unit 0
  classifiers ieee-802.1 onep_qfabric_classifier
user@switch# set groups qfabric class-of-service interfaces ge-*/0/* unit 0
  classifiers inet-precedence IP_qfabric_classifier
user@switch# set groups qfabric class-of-service interfaces ae* scheduler-map
  cpe_network_smap
user@switch# set groups qfabric class-of-service interfaces ae* unit 0 classifiers
  ieee-802.1 onep_qfabric_classifier
user@switch# set groups qfabric class-of-service interfaces ae* unit 0 classifiers
  inet-precedence IP_qfabric_classifier
user@switch# set groups qfabric class-of-service scheduler-maps
  cpe_network_smap forwarding-class class_3 scheduler scheduler_3
user@switch# set groups qfabric class-of-service scheduler-maps
  cpe_network_smap forwarding-class class_2 scheduler scheduler_2
user@switch# set groups qfabric class-of-service scheduler-maps
  cpe_network_smap forwarding-class class_0 scheduler scheduler_0
user@switch# set groups qfabric class-of-service schedulers scheduler_3 buffer-size
  percent 30
user@switch# set groups qfabric class-of-service schedulers scheduler_3 priority
  strict-high
user@switch# set groups qfabric class-of-service schedulers scheduler_2
  transmit-rate percent 75
user@switch# set groups qfabric class-of-service schedulers scheduler_2 buffer-size
  percent 30
user@switch# set groups qfabric class-of-service schedulers scheduler_2 priority
  low
user@switch# set groups qfabric class-of-service schedulers scheduler_0
  transmit-rate percent 25
user@switch# set groups qfabric class-of-service schedulers scheduler_0 buffer-size
  percent 40
```


user@switch# **set groups qfabric class-of-service schedulers scheduler_0 priority low**
user@switch# **set groups qfabric ethernet-switching-options nonstop-bridging**
user@switch# **set groups qfabric ethernet-switching-options storm-control interface all bandwidth 10000**
user@switch# **set groups qfabric vlans qfabric vlan-id 100**
user@switch# **set groups qfabric vlans qfabric dot1q-tunneling**
user@switch# **set groups qfabric-int interfaces <*> mtu 9216**
user@switch# **set groups qfabric-int interfaces <*> unit 0 family ethernet-switching port-mode access**
user@switch# **set groups qfabric-int interfaces <*> unit 0 family ethernet-switching vlan members qfabric**
user@switch# **set groups qfabric-ae interfaces <*> aggregated-ether-options link-speed 1g**
user@switch# **set groups qfabric-ae interfaces <*> aggregated-ether-options lacp active**
user@switch# **set apply-groups qfabric**

2. Configure interfaces for the QFabric system control plane network. Set the interface ranges where Node devices (0 through 31), Interconnect devices (38 and 39), and Director devices (40 and 41) connect to the control plane network through the Virtual Chassis. Configure the inter-Virtual Chassis LAG connections for the ae8 interface and apply the ae-interfaces configuration group to the remaining aggregated Ethernet interfaces (ae0 through ae7).

   [edit]
   user@switch# **set interfaces interface-range Node_Device_Interfaces member "ge-[0-3]/0/[0-31]"**
   user@switch# **set interfaces interface-range Node_Device_Interfaces apply-groups qfabric-int**
   user@switch# **set interfaces interface-range Node_Device_Interfaces description "QFabric Node Device"**
   user@switch# **set interfaces interface-range Interconnect_Device_Interfaces member "ge-[0-3]/0/[38-39]"**
   user@switch# **set interfaces interface-range Interconnect_Device_Interfaces apply-groups qfabric-int**
   user@switch# **set interfaces interface-range Interconnect_Device_Interfaces description "QFabric Interconnect Device"**
   user@switch# **set interfaces interface-range Director_Device_DG0_LAG_Interfaces member "ge-[0-3]/0/40"**
   user@switch# **set interfaces interface-range Director_Device_DG0_LAG_Interfaces description "QFabric Director Device - DG0"**
   user@switch# **set interfaces interface-range Director_Device_DG0_LAG_Interfaces ether-options 802.3ad ae0**
   user@switch# **set interfaces interface-range Director_Device_DG1_LAG_Interfaces member "ge-[0-3]/0/41"**
   user@switch# **set interfaces interface-range Director_Device_DG1_LAG_Interfaces description "QFabric Director Device - DG1"**
   user@switch# **set interfaces interface-range Director_Device_DG1_LAG_Interfaces ether-options 802.3ad ae1**
   user@switch# **set interfaces interface-range Director_Device_DG2_LAG_Interfaces member "ge-[0-3]/0/42"**
   user@switch# **set interfaces interface-range Director_Device_DG2_LAG_Interfaces description "QFabric Director Device - DG2"**
   user@switch# **set interfaces interface-range Director_Device_DG2_LAG_Interfaces ether-options 802.3ad ae2**


```
user@switch# set interfaces interface-range Director_Device_DG3_LAG_Interfaces
  member "ge-[0-3]/0/43"
user@switch# set interfaces interface-range Director_Device_DG3_LAG_Interfaces
  description "QFabric Director Device - DG3"
user@switch# set interfaces interface-range Director_Device_DG3_LAG_Interfaces
  ether-options 802.3ad ae3
user@switch# set interfaces interface-range Director_Device_DG4_LAG_Interfaces
  member "ge-[0-3]/0/44"
user@switch# set interfaces interface-range Director_Device_DG4_LAG_Interfaces
  description "QFabric Director Device - DG4"
user@switch# set interfaces interface-range Director_Device_DG4_LAG_Interfaces
  ether-options 802.3ad ae4
user@switch# set interfaces interface-range Director_Device_DG5_LAG_Interfaces
  member "ge-[0-3]/0/45"
user@switch# set interfaces interface-range Director_Device_DG5_LAG_Interfaces
  description "QFabric Director Device - DG5"
user@switch# set interfaces interface-range Director_Device_DG5_LAG_Interfaces
  ether-options 802.3ad ae5
user@switch# set interfaces interface-range Director_Device_DG6_LAG_Interfaces
  member "ge-[0-3]/0/46"
user@switch# set interfaces interface-range Director_Device_DG6_LAG_Interfaces
  description "QFabric Director Device - DG6"
user@switch# set interfaces interface-range Director_Device_DG6_LAG_Interfaces
  ether-options 802.3ad ae6
user@switch# set interfaces interface-range Director_Device_DG7_LAG_Interfaces
  member "ge-[0-3]/0/47"
user@switch# set interfaces interface-range Director_Device_DG7_LAG_Interfaces
  description "QFabric Director Device - DG7"
user@switch# set interfaces interface-range Director_Device_DG7_LAG_Interfaces
  ether-options 802.3ad ae7
user@switch# set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces
  member "xe-[0-3]/1/0"
user@switch# set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces
  member "xe-[0-3]/1/2"
user@switch# set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces
  description "QFabric Control Plane (Inter-VC LAG)"
user@switch# set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces
  ether-options 802.3ad ae8
user@switch# set interfaces ae0 apply-groups qfabric-int
user@switch# set interfaces ae0 apply-groups qfabric-ae
user@switch# set interfaces ae0 description "QFabric Director Device - DG0"
user@switch# set interfaces ae1 apply-groups qfabric-int
user@switch# set interfaces ae1 apply-groups qfabric-ae
user@switch# set interfaces ae1 description "QFabric Director Device - DG1"
user@switch# set interfaces ae2 apply-groups qfabric-int
user@switch# set interfaces ae2 apply-groups qfabric-ae
user@switch# set interfaces ae2 description "QFabric Director Device - DG2"
user@switch# set interfaces ae3 apply-groups qfabric-int
user@switch# set interfaces ae3 apply-groups qfabric-ae
user@switch# set interfaces ae3 description "QFabric Director Device - DG3"
user@switch# set interfaces ae4 apply-groups qfabric-int
user@switch# set interfaces ae4 apply-groups qfabric-ae
user@switch# set interfaces ae4 description "QFabric Director Device - DG4"
user@switch# set interfaces ae5 apply-groups qfabric-int
user@switch# set interfaces ae5 apply-groups qfabric-ae
user@switch# set interfaces ae5 description "QFabric Director Device - DG5"
```



```
user@switch# set interfaces ae6 apply-groups qfabric-int
user@switch# set interfaces ae6 apply-groups qfabric-ae
user@switch# set interfaces ae6 description "QFabric Director Device - DG6"
user@switch# set interfaces ae7 apply-groups qfabric-int
user@switch# set interfaces ae7 apply-groups qfabric-ae
user@switch# set interfaces ae7 description "QFabric Director Device - DG7"
user@switch# set interfaces ae8 description "QFabric Control Plane (Inter-VC LAG)"
user@switch# set interfaces ae8 mtu 9216
user@switch# set interfaces ae8 aggregated-ether-options link-speed 10g
user@switch# set interfaces ae8 aggregated-ether-options lacp active
user@switch# set interfaces ae8 unit 0 family ethernet-switching vlan members
  qfabric
```

3. Configure settings to enable the Virtual Chassis to interoperate with your management network. Set a hostname, system services (such as Telnet), system log thresholds, management interface parameters, default routes, Virtual Chassis preprovisioning, and any additional preferences you might have.

```
[edit]
user@switch# set system host-name qfabric-control-plane
user@switch# set system services ssh
user@switch# set system services telnet
user@switch# set system services web-management http
user@switch# set system syslog user * any emergency
user@switch# set system syslog file messages any notice
user@switch# set system syslog file messages authorization info
user@switch# set system syslog file messages archive world-readable
user@switch# set system syslog file messages explicit-priority
user@switch# set system syslog file interactive-commands interactive-commands
  any
user@switch# set system syslog file secure authorization info
user@switch# set system syslog file default-log-messages any any
user@switch# set system syslog file default-log-messages structured-data
user@switch# set system syslog file console any error
user@switch# set system syslog time-format millisecond
user@switch# set interfaces vme unit 0 family inet address 192.168.157.26/24
user@switch# set routing-options static route 0.0.0.0/0 next-hop 192.168.157.1
user@switch# set virtual-chassis preprovisioned
user@switch# set virtual-chassis member 0 role routing-engine
user@switch# set virtual-chassis member 0 serial-number abc123
user@switch# set virtual-chassis member 1 role routing-engine
user@switch# set virtual-chassis member 1 serial-number def456
user@switch# set virtual-chassis member 2 role line-card
user@switch# set virtual-chassis member 2 serial-number ghi789
user@switch# set virtual-chassis member 3 role line-card
user@switch# set virtual-chassis member 3 serial-number jkl012
```

Results To view the configuration, issue the **show** command in configuration mode or the **show configuration** command in operational mode. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

The following configuration is the standard configuration that applies universally to both Virtual Chassis in your QFabric system control plane network.

```
[edit]
```



```
groups {
  qfabric {
    system {
      commit {
        synchronize;
      }
    }
    chassis {
      redundancy {
        graceful-switchover;
      }
      aggregated-devices {
        ethernet {
          device-count 10;
        }
      }
      alarm {
        management-ethernet {
          link-down ignore;
        }
      }
      fpc 0 {
        pic 1 {
          sfpplus {
            pic-mode 10g;
          }
        }
      }
      fpc 1 {
        pic 1 {
          sfpplus {
            pic-mode 10g;
          }
        }
      }
      fpc 2 {
        pic 1 {
          sfpplus {
            pic-mode 10g;
          }
        }
      }
      fpc 3 {
        pic 1 {
          sfpplus {
            pic-mode 10g;
          }
        }
      }
      lcd-menu {
        fpc 0 {
          menu-item {
            maintenance-menu disable;
          }
        }
        fpc 1 {
```

```
                menu-item {
                    maintenance-menu disable;
                }
            }
            fpc 2 {
                menu-item {
                    maintenance-menu disable;
                }
            }
            fpc 3 {
                menu-item {
                    maintenance-menu disable;
                }
            }
        }
    }
    protocols {
        rstp {
            interface ae8.0 {
                mode point-to-point;
            }
            interface all {
                edge;
                no-root-port;
            }
            bpdu-block-on-edge;
        }
        lldp {
            interface all;
        }
    }
    class-of-service {
        classifiers {
            ieee-802.1 onep_qfabric_classifier {
                forwarding-class class_3 {
                    loss-priority low code-points [ 110 111 ];
                }
                forwarding-class class_2 {
                    loss-priority low code-points 100;
                    loss-priority high code-points 101;
                }
                forwarding-class class_0 {
                    loss-priority low code-points 010;
                    loss-priority high code-points 001;
                }
            }
            inet-precedence IP_qfabric_classifier {
                forwarding-class class_3 {
                    loss-priority low code-points [ 110 111 ];
                }
                forwarding-class class_2 {
                    loss-priority low code-points 100;
                    loss-priority high code-points 101;
                }
                forwarding-class class_0 {
                    loss-priority low code-points 010;
```

```
                    loss-priority high code-points 001;
                }
            }
        }
        forwarding-classes {
            class class_3 queue-num 7;
            class class_2 queue-num 2;
            class class_0 queue-num 0;
        }
        interfaces {
            ge-*/0/* {
                scheduler-map cpe_network_smap;
                unit 0 {
                    classifiers {
                        ieee-802.1 onep_qfabric_classifier;
                        inet-precedence IP_qfabric_classifier;
                    }
                }
            }
            ae* {
                scheduler-map cpe_network_smap;
                unit 0 {
                    classifiers {
                        ieee-802.1 onep_qfabric_classifier;
                        inet-precedence IP_qfabric_classifier;
                    }
                }
            }
        }
        scheduler-maps {
            cpe_network_smap {
                forwarding-class class_3 scheduler scheduler_3;
                forwarding-class class_2 scheduler scheduler_2;
                forwarding-class class_0 scheduler scheduler_0;
            }
        }
        schedulers {
            scheduler_3 {
                buffer-size percent 30;
                priority strict-high;
            }
            scheduler_2 {
                transmit-rate percent 75;
                buffer-size percent 30;
                priority low;
            }
            scheduler_0 {
                transmit-rate percent 25;
                buffer-size percent 40;
                priority low;
            }
        }
    }
    ethernet-switching-options {
        nonstop-bridging;
        storm-control {
```



```
                interface all {
                    bandwidth 10000;
                }
            }
        }
        vlans {
            qfabric {
                vlan-id 100;
                dot1q-tunneling;
            }
        }
    }
    qfabric-int {
        interfaces {
            <*> {
                mtu 9216;
                unit 0 {
                    family ethernet-switching {
                        port-mode access;
                        vlan {
                            members qfabric;
                        }
                    }
                }
            }
        }
    }
    qfabric-ae {
        interfaces {
            <*> {
                aggregated-ether-options {
                    link-speed 1g;
                    lacp {
                        active;
                    }
                }
            }
        }
    }
}
apply-groups [qfabric];
interfaces {
    interface-range Node_Device_Interfaces {
        member "ge-[0-3]/0/[0-31]";
        description "QFabric Node Device";
        apply-groups qfabric-int;
    }
    interface-range Interconnect_Device_Interfaces {
        member "ge-[0-3]/0/[38-39]";
        description "QFabric Interconnect Device";
        apply-groups qfabric-int;
    }
    interface-range Director_Device_DG0_LAG_Interfaces {
        member "ge-[0-3]/0/40";
        description "QFabric Director Device - DG0";
        ether-options {
```



```
      802.3ad ae0;
    }
  }
  interface-range Director_Device_DG1_LAG_Interfaces {
    member "ge-[0-3]/0/41";
    description "QFabric Director Device - DG1";
    ether-options {
      802.3ad ae1;
    }
  }
  interface-range Director_Device_DG2_LAG_Interfaces {
    member "ge-[0-3]/0/42";
    description "QFabric Director Device - DG2";
    ether-options {
      802.3ad ae2;
    }
  }
  interface-range Director_Device_DG3_LAG_Interfaces {
    member "ge-[0-3]/0/43";
    description "QFabric Director Device - DG3";
    ether-options {
      802.3ad ae3;
    }
  }
  interface-range Director_Device_DG4_LAG_Interfaces {
    member "ge-[0-3]/0/44";
    description "QFabric Director Device - DG4";
    ether-options {
      802.3ad ae4;
    }
  }
  interface-range Director_Device_DG5_LAG_Interfaces {
    member "ge-[0-3]/0/45";
    description "QFabric Director Device - DG5";
    ether-options {
      802.3ad ae5;
    }
  }
  interface-range Director_Device_DG6_LAG_Interfaces {
    member "ge-[0-3]/0/46";
    description "QFabric Director Device - DG6";
    ether-options {
      802.3ad ae6;
    }
  }
  interface-range Director_Device_DG7_LAG_Interfaces {
    member "ge-[0-3]/0/47";
    description "QFabric Director Device - DG7";
    ether-options {
      802.3ad ae7;
    }
  }
  interface-range Control_Plane_Inter_VC_LAG_Interfaces {
    member "xe-[0-3]/1/0";
    member "xe-[0-3]/1/2";
    description "QFabric Control Plane (Inter-VC LAG)";
```



```
        ether-options {
            802.3ad ae8;
        }
    }
    ae0 {
        apply-groups [ qfabric-int qfabric-ae ];
        description "QFabric Director Device - DG0";
    }
    ae1 {
        apply-groups [ qfabric-int qfabric-ae ];
        description "QFabric Director Device - DG1";
    }
    ae2 {
        apply-groups [ qfabric-int qfabric-ae ];
        description "QFabric Director Device - DG2";
    }
    ae3 {
        apply-groups [ qfabric-int qfabric-ae ];
        description "QFabric Director Device - DG3";
    }
    ae4 {
        apply-groups [ qfabric-int qfabric-ae ];
        description "QFabric Director Device - DG4";
    }
    ae5 {
        apply-groups [ qfabric-int qfabric-ae ];
        description "QFabric Director Device - DG5";
    }
    ae6 {
        apply-groups [ qfabric-int qfabric-ae ];
        description "QFabric Director Device - DG6";
    }
    ae7 {
        apply-groups [ qfabric-int qfabric-ae ];
        description "QFabric Director Device - DG7";
    }
    ae8 {
        description "QFabric Control Plane (Inter-VC LAG)";
        mtu 9216;
        aggregated-ether-options {
            link-speed 10g;
            lacp {
                active;
            }
        }
        unit 0 {
            family ethernet-switching {
                vlan {
                    members qfabric;
                }
            }
        }
    }
}
```


The following portion of the configuration applies to the specific requirements of your management network. Modify this section to meet the needs of your network.

```
[edit]
system {
  host-name qfabric-control-plane;
  services {
    ssh;
    telnet;
    web-management {
      http;
    }
  }
  syslog {
    user * {
      any emergency;
    }
    file messages {
      any notice;
      authorization info;
      archive world-readable;
      explicit-priority;
    }
    file interactive-commands {
      interactive-commands any;
    }
    file secure {
      authorization info;
    }
    file default-log-messages {
      any any;
      structured-data;
    }
    file console {
      any error;
    }
    time-format millisecond;
  }
}
interfaces {
  vme {
    unit 0 {
      family inet {
        address 192.168.157.26/24;
      }
    }
  }
}
routing-options {
  static {
    route 0.0.0.0/0 next-hop 192.168.157.1;
  }
}
virtual-chassis {
  preprovisioned;
  member 0 {
```

```
        role routing-engine;
        serial-number abc123;
    }
    member 1 {
        role routing-engine;
        serial-number def456;
    }
    member 2 {
        role line-card;
        serial-number ghi789;
    }
    member 3 {
        role line-card;
        serial-number jkl012;
    }
}
```

To verify the syntax of your configuration before committing it, enter **commit check** from configuration mode. If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the Virtual Chassis configuration is working properly.

- Verifying the QFabric System Control Plane—Virtual Chassis VC0 on page 362
- Verifying the QFabric System Control Plane—Virtual Chassis VC1 on page 370

Verifying the QFabric System Control Plane—Virtual Chassis VC0

Purpose Verify that your first Virtual Chassis is operational.

Action Connect to the Junos OS CLI of Virtual Chassis VC0, either from your management network or from the console port of the master Virtual Chassis member. In operational mode, enter the **show virtual-chassis status** and **show interfaces terse** commands.

Sample Output

```
{master:0}
user@vc0> show virtual-chassis status

Virtual Chassis ID: c809.2c5d.9f7b
                                          Mastership            Neighbor List
Member ID  Status   Serial No    Model    priority    Role      ID  Interface
0 (FPC 0)  Prsnt    BP0210471476 ex4200-48t      128  Master*    1  vcp-1
1 (FPC 1)  Prsnt    BP0210460181 ex4200-48t      128  Backup     0  vcp-0
                                                                 2  vcp-1
2 (FPC 2)  Prsnt    BP0210458724 ex4200-48t      128  Linecard   1  vcp-0
                                                                 3  vcp-1
3 (FPC 3)  Prsnt    BP0210477189 ex4200-48t      128  Linecard   2  vcp-0

Member ID for next new member: 4 (FPC 4)

{master:0}
user@vc0> show interfaces terse
```



```
Interface               Admin Link Proto    Local                 Remote
ge-0/0/0                up    up
ge-0/0/0.0              up    up   eth-switch
ge-0/0/1                up    up
ge-0/0/1.0              up    up   eth-switch
ge-0/0/2                up    up
ge-0/0/2.0              up    up   eth-switch
ge-0/0/3                up    up
ge-0/0/3.0              up    up   eth-switch
ge-0/0/4                up    up
ge-0/0/4.0              up    up   eth-switch
ge-0/0/5                up    up
ge-0/0/5.0              up    up   eth-switch
ge-0/0/6                up    up
ge-0/0/6.0              up    up   eth-switch
ge-0/0/7                up    up
ge-0/0/7.0              up    up   eth-switch
ge-0/0/8                up    down
ge-0/0/8.0              up    down eth-switch
ge-0/0/9                up    down
ge-0/0/9.0              up    down eth-switch
ge-0/0/10               up    down
ge-0/0/10.0             up    down eth-switch
ge-0/0/11               up    down
ge-0/0/11.0             up    down eth-switch
ge-0/0/12               up    down
ge-0/0/12.0             up    down eth-switch
ge-0/0/13               up    down
ge-0/0/13.0             up    down eth-switch
ge-0/0/14               up    down
ge-0/0/14.0             up    down eth-switch
ge-0/0/15               up    down
ge-0/0/15.0             up    down eth-switch
ge-0/0/16               up    down
ge-0/0/16.0             up    down eth-switch
ge-0/0/17               up    down
ge-0/0/17.0             up    down eth-switch
ge-0/0/18               up    down
ge-0/0/18.0             up    down eth-switch
ge-0/0/19               up    down
ge-0/0/19.0             up    down eth-switch
ge-0/0/20               up    down
ge-0/0/20.0             up    down eth-switch
ge-0/0/21               up    down
ge-0/0/21.0             up    down eth-switch
ge-0/0/22               up    down
ge-0/0/22.0             up    down eth-switch
ge-0/0/23               up    down
ge-0/0/23.0             up    down eth-switch
ge-0/0/24               up    down
ge-0/0/24.0             up    down eth-switch
ge-0/0/25               up    down
ge-0/0/25.0             up    down eth-switch
ge-0/0/26               up    down
ge-0/0/26.0             up    down eth-switch
ge-0/0/27               up    down
ge-0/0/27.0             up    down eth-switch
ge-0/0/28               up    down
ge-0/0/28.0             up    down eth-switch
ge-0/0/29               up    down
ge-0/0/29.0             up    down eth-switch
```

```
ge-0/0/30               up    down
ge-0/0/30.0             up    down eth-switch
ge-0/0/31               up    down
ge-0/0/31.0             up    down eth-switch
ge-0/0/32               up    down
ge-0/0/33               up    down
ge-0/0/34               up    down
ge-0/0/35               up    down
ge-0/0/36               up    down
ge-0/0/36.0             up    down eth-switch
ge-0/0/37               up    down
ge-0/0/37.0             up    down eth-switch
ge-0/0/38               up    down
ge-0/0/38.0             up    down eth-switch
ge-0/0/39               up    up
ge-0/0/39.0             up    up   eth-switch
ge-0/0/40               up    up
ge-0/0/40.0             up    up   aenet    --> ae0.0
ge-0/0/41               up    up
ge-0/0/41.0             up    up   aenet    --> ae1.0
ge-0/0/42               up    down
ge-0/0/42.0             up    down aenet    --> ae2.0
ge-0/0/43               up    down
ge-0/0/43.0             up    down aenet    --> ae3.0
ge-0/0/44               up    down
ge-0/0/44.0             up    down aenet    --> ae4.0
ge-0/0/45               up    down
ge-0/0/45.0             up    down aenet    --> ae5.0
ge-0/0/46               up    down
ge-0/0/46.0             up    down aenet    --> ae6.0
ge-0/0/47               up    down
ge-0/0/47.0             up    down aenet    --> ae7.0
xe-0/1/0                up    up
xe-0/1/0.0              up    up   aenet    --> ae8.0
xe-0/1/1                up    down
xe-0/1/2                up    up
xe-0/1/2.0              up    up   aenet    --> ae8.0
xe-0/1/3                up    down
ge-1/0/0                up    down
ge-1/0/0.0              up    down eth-switch
ge-1/0/1                up    down
ge-1/0/1.0              up    down eth-switch
ge-1/0/2                up    down
ge-1/0/2.0              up    down eth-switch
ge-1/0/3                up    down
ge-1/0/3.0              up    down eth-switch
ge-1/0/4                up    down
ge-1/0/4.0              up    down eth-switch
ge-1/0/5                up    down
ge-1/0/5.0              up    down eth-switch
ge-1/0/6                up    down
ge-1/0/6.0              up    down eth-switch
ge-1/0/7                up    down
ge-1/0/7.0              up    down eth-switch
ge-1/0/8                up    down
ge-1/0/8.0              up    down eth-switch
ge-1/0/9                up    down
ge-1/0/9.0              up    down eth-switch
ge-1/0/10               up    down
ge-1/0/10.0             up    down eth-switch
ge-1/0/11               up    down
```



```
ge-1/0/11.0             up    down eth-switch
ge-1/0/12               up    down
ge-1/0/12.0             up    down eth-switch
ge-1/0/13               up    down
ge-1/0/13.0             up    down eth-switch
ge-1/0/14               up    down
ge-1/0/14.0             up    down eth-switch
ge-1/0/15               up    down
ge-1/0/15.0             up    down eth-switch
ge-1/0/16               up    down
ge-1/0/16.0             up    down eth-switch
ge-1/0/17               up    down
ge-1/0/17.0             up    down eth-switch
ge-1/0/18               up    down
ge-1/0/18.0             up    down eth-switch
ge-1/0/19               up    down
ge-1/0/19.0             up    down eth-switch
ge-1/0/20               up    down
ge-1/0/20.0             up    down eth-switch
ge-1/0/21               up    down
ge-1/0/21.0             up    down eth-switch
ge-1/0/22               up    down
ge-1/0/22.0             up    down eth-switch
ge-1/0/23               up    down
ge-1/0/23.0             up    down eth-switch
ge-1/0/24               up    down
ge-1/0/24.0             up    down eth-switch
ge-1/0/25               up    down
ge-1/0/25.0             up    down eth-switch
ge-1/0/26               up    down
ge-1/0/26.0             up    down eth-switch
ge-1/0/27               up    down
ge-1/0/27.0             up    down eth-switch
ge-1/0/28               up    down
ge-1/0/28.0             up    down eth-switch
ge-1/0/29               up    down
ge-1/0/29.0             up    down eth-switch
ge-1/0/30               up    down
ge-1/0/30.0             up    down eth-switch
ge-1/0/31               up    down
ge-1/0/31.0             up    down eth-switch
ge-1/0/32               up    down
ge-1/0/33               up    down
ge-1/0/34               up    down
ge-1/0/35               up    down
ge-1/0/36               up    down
ge-1/0/36.0             up    down eth-switch
ge-1/0/37               up    down
ge-1/0/37.0             up    down eth-switch
ge-1/0/38               up    down
ge-1/0/38.0             up    down eth-switch
ge-1/0/39               up    up
ge-1/0/39.0             up    up   eth-switch
ge-1/0/40               up    up
ge-1/0/40.0             up    up   aenet    --> ae0.0
ge-1/0/41               up    up
ge-1/0/41.0             up    up   aenet    --> ae1.0
ge-1/0/42               up    down
ge-1/0/42.0             up    down aenet    --> ae2.0
ge-1/0/43               up    down
ge-1/0/43.0             up    down aenet    --> ae3.0
```



```
ge-1/0/44               up    down
ge-1/0/44.0             up    down aenet    --> ae4.0
ge-1/0/45               up    down
ge-1/0/45.0             up    down aenet    --> ae5.0
ge-1/0/46               up    down
ge-1/0/46.0             up    down aenet    --> ae6.0
ge-1/0/47               up    down
ge-1/0/47.0             up    down aenet    --> ae7.0
xe-1/1/0                up    up
xe-1/1/0.0              up    up   aenet    --> ae8.0
xe-1/1/1                up    down
xe-1/1/2                up    up
xe-1/1/2.0              up    up   aenet    --> ae8.0
xe-1/1/3                up    down
ge-2/0/0                up    down
ge-2/0/0.0              up    down eth-switch
ge-2/0/1                up    down
ge-2/0/1.0              up    down eth-switch
ge-2/0/2                up    down
ge-2/0/2.0              up    down eth-switch
ge-2/0/3                up    down
ge-2/0/3.0              up    down eth-switch
ge-2/0/4                up    down
ge-2/0/4.0              up    down eth-switch
ge-2/0/5                up    down
ge-2/0/5.0              up    down eth-switch
ge-2/0/6                up    down
ge-2/0/6.0              up    down eth-switch
ge-2/0/7                up    down
ge-2/0/7.0              up    down eth-switch
ge-2/0/8                up    down
ge-2/0/8.0              up    down eth-switch
ge-2/0/9                up    down
ge-2/0/9.0              up    down eth-switch
ge-2/0/10               up    down
ge-2/0/10.0             up    down eth-switch
ge-2/0/11               up    down
ge-2/0/11.0             up    down eth-switch
ge-2/0/12               up    down
ge-2/0/12.0             up    down eth-switch
ge-2/0/13               up    down
ge-2/0/13.0             up    down eth-switch
ge-2/0/14               up    down
ge-2/0/14.0             up    down eth-switch
ge-2/0/15               up    down
ge-2/0/15.0             up    down eth-switch
ge-2/0/16               up    down
ge-2/0/16.0             up    down eth-switch
ge-2/0/17               up    down
ge-2/0/17.0             up    down eth-switch
ge-2/0/18               up    down
ge-2/0/18.0             up    down eth-switch
ge-2/0/19               up    down
ge-2/0/19.0             up    down eth-switch
ge-2/0/20               up    down
ge-2/0/20.0             up    down eth-switch
ge-2/0/21               up    down
ge-2/0/21.0             up    down eth-switch
ge-2/0/22               up    down
ge-2/0/22.0             up    down eth-switch
ge-2/0/23               up    down
```



```
ge-2/0/23.0             up    down eth-switch
ge-2/0/24               up    down
ge-2/0/24.0             up    down eth-switch
ge-2/0/25               up    down
ge-2/0/25.0             up    down eth-switch
ge-2/0/26               up    down
ge-2/0/26.0             up    down eth-switch
ge-2/0/27               up    down
ge-2/0/27.0             up    down eth-switch
ge-2/0/28               up    down
ge-2/0/28.0             up    down eth-switch
ge-2/0/29               up    down
ge-2/0/29.0             up    down eth-switch
ge-2/0/30               up    down
ge-2/0/30.0             up    down eth-switch
ge-2/0/31               up    down
ge-2/0/31.0             up    down eth-switch
ge-2/0/32               up    down
ge-2/0/33               up    down
ge-2/0/34               up    down
ge-2/0/35               up    down
ge-2/0/36               up    down
ge-2/0/36.0             up    down eth-switch
ge-2/0/37               up    down
ge-2/0/37.0             up    down eth-switch
ge-2/0/38               up    down
ge-2/0/38.0             up    down eth-switch
ge-2/0/39               up    up
ge-2/0/39.0             up    up   eth-switch
ge-2/0/40               up    up
ge-2/0/40.0             up    up   aenet    --> ae0.0
ge-2/0/41               up    up
ge-2/0/41.0             up    up   aenet    --> ae1.0
ge-2/0/42               up    down
ge-2/0/42.0             up    down aenet    --> ae2.0
ge-2/0/43               up    down
ge-2/0/43.0             up    down aenet    --> ae3.0
ge-2/0/44               up    down
ge-2/0/44.0             up    down aenet    --> ae4.0
ge-2/0/45               up    down
ge-2/0/45.0             up    down aenet    --> ae5.0
ge-2/0/46               up    down
ge-2/0/46.0             up    down aenet    --> ae6.0
ge-2/0/47               up    down
ge-2/0/47.0             up    down aenet    --> ae7.0
xe-2/1/0                up    up
xe-2/1/0.0              up    up   aenet    --> ae8.0
xe-2/1/1                up    down
xe-2/1/2                up    up
xe-2/1/2.0              up    up   aenet    --> ae8.0
xe-2/1/3                up    down
ge-3/0/0                up    down
ge-3/0/0.0              up    down eth-switch
ge-3/0/1                up    down
ge-3/0/1.0              up    down eth-switch
ge-3/0/2                up    down
ge-3/0/2.0              up    down eth-switch
ge-3/0/3                up    down
ge-3/0/3.0              up    down eth-switch
ge-3/0/4                up    down
ge-3/0/4.0              up    down eth-switch
```



```
ge-3/0/5                up    down
ge-3/0/5.0              up    down eth-switch
ge-3/0/6                up    down
ge-3/0/6.0              up    down eth-switch
ge-3/0/7                up    down
ge-3/0/7.0              up    down eth-switch
ge-3/0/8                up    down
ge-3/0/8.0              up    down eth-switch
ge-3/0/9                up    down
ge-3/0/9.0              up    down eth-switch
ge-3/0/10               up    down
ge-3/0/10.0             up    down eth-switch
ge-3/0/11               up    down
ge-3/0/11.0             up    down eth-switch
ge-3/0/12               up    down
ge-3/0/12.0             up    down eth-switch
ge-3/0/13               up    down
ge-3/0/13.0             up    down eth-switch
ge-3/0/14               up    down
ge-3/0/14.0             up    down eth-switch
ge-3/0/15               up    down
ge-3/0/15.0             up    down eth-switch
ge-3/0/16               up    down
ge-3/0/16.0             up    down eth-switch
ge-3/0/17               up    down
ge-3/0/17.0             up    down eth-switch
ge-3/0/18               up    down
ge-3/0/18.0             up    down eth-switch
ge-3/0/19               up    down
ge-3/0/19.0             up    down eth-switch
ge-3/0/20               up    down
ge-3/0/20.0             up    down eth-switch
ge-3/0/21               up    down
ge-3/0/21.0             up    down eth-switch
ge-3/0/22               up    down
ge-3/0/22.0             up    down eth-switch
ge-3/0/23               up    down
ge-3/0/23.0             up    down eth-switch
ge-3/0/24               up    down
ge-3/0/24.0             up    down eth-switch
ge-3/0/25               up    down
ge-3/0/25.0             up    down eth-switch
ge-3/0/26               up    down
ge-3/0/26.0             up    down eth-switch
ge-3/0/27               up    down
ge-3/0/27.0             up    down eth-switch
ge-3/0/28               up    down
ge-3/0/28.0             up    down eth-switch
ge-3/0/29               up    down
ge-3/0/29.0             up    down eth-switch
ge-3/0/30               up    down
ge-3/0/30.0             up    down eth-switch
ge-3/0/31               up    down
ge-3/0/31.0             up    down eth-switch
ge-3/0/32               up    down
ge-3/0/33               up    down
ge-3/0/34               up    down
ge-3/0/35               up    down
ge-3/0/36               up    down
ge-3/0/36.0             up    down eth-switch
ge-3/0/37               up    down
```

```
ge-3/0/37.0             up    down eth-switch
ge-3/0/38               up    down
ge-3/0/38.0             up    down eth-switch
ge-3/0/39               up    up
ge-3/0/39.0             up    up   eth-switch
ge-3/0/40               up    down
ge-3/0/40.0             up    down aenet    --> ae0.0
ge-3/0/41               up    down
ge-3/0/41.0             up    down aenet    --> ae1.0
ge-3/0/42               up    down
ge-3/0/42.0             up    down aenet    --> ae2.0
ge-3/0/43               up    down
ge-3/0/43.0             up    down aenet    --> ae3.0
ge-3/0/44               up    down
ge-3/0/44.0             up    down aenet    --> ae4.0
ge-3/0/45               up    down
ge-3/0/45.0             up    down aenet    --> ae5.0
ge-3/0/46               up    down
ge-3/0/46.0             up    down aenet    --> ae6.0
ge-3/0/47               up    down
ge-3/0/47.0             up    down aenet    --> ae7.0
xe-3/1/0                up    up
xe-3/1/0.0              up    up   aenet    --> ae8.0
xe-3/1/1                up    down
xe-3/1/2                up    up
xe-3/1/2.0              up    up   aenet    --> ae8.0
xe-3/1/3                up    down
vcp-0                   up    down
vcp-0.32768             up    down
vcp-1                   up    up
vcp-1.32768             up    up
ae0                     up    up
ae0.0                   up    up   eth-switch
ae1                     up    up
ae1.0                   up    up   eth-switch
ae2                     up    down
ae2.0                   up    down eth-switch
ae3                     up    down
ae3.0                   up    down eth-switch
ae4                     up    down
ae4.0                   up    down eth-switch
ae5                     up    down
ae5.0                   up    down eth-switch
ae6                     up    down
ae6.0                   up    down eth-switch
ae7                     up    down
ae7.0                   up    down eth-switch
ae8                     up    up
ae8.0                   up    up   eth-switch
ae9                     up    down
bme0                    up    up
bme0.32768              up    up   inet     128.0.0.1/2
                                            128.0.0.16/2
                                            128.0.0.32/2
                                   tnp      0x10
bme0.32770              up    up   eth-switch
bme0.32771              down  up   eth-switch
bme0.32772              down  up   eth-switch
dsc                     up    up
gre                     up    up
ipip                    up    up
```

```
jsrv                    up    up
jsrv.1                  up    up   inet     128.0.0.127/2
lo0                     up    up
lo0.0                   up    up   inet     10.255.195.96       --> 0/0
                                   iso
47.0005.80ff.f800.0000.0108.0001.0102.5519.5096
                                   inet6    abcd::10:255:195:96
                                            fe80::2ac0:da0f:fc31:1e80
lsi                     up    up
me0                     up    up
me0.0                   up    up   inet     10.94.195.96/24
mtun                    up    up
pimd                    up    up
pime                    up    up
tap                     up    up
vlan                    up    up
vme                     up    up   inet     192.168.157.26/24
```

Meaning In the output of the **show virtual-chassis status** command, if all four members appear, the Virtual Chassis is operational.

In the output of the **show interfaces terse** command, if all interfaces that connect to the QFabric system devices are listed as up (such as ge-0/0/39, ge-1/0/39, ge-2/0/39, and ge-3/0/39 for the Interconnect devices; ge-0/0/40, ge-1/0/40, and ge-2/0/40 for the Director devices; ge-0/0/0 through ge-0/0/7 for the Node devices; and xe-0/1/0, xe-0/1/2, xe-1/1/0, xe-1/1/2, xe-2/1/0, xe-2/1/2, xe-3/1/0, and xe-3/1/2 for the inter-Virtual Chassis connections), the control plane is properly connected.

Verifying the QFabric System Control Plane—Virtual Chassis VC1

Purpose Verify that your second Virtual Chassis is operational.

Action Connect to the Junos OS CLI of Virtual Chassis VC1, either from your management network or from the console port of the master Virtual Chassis member. In operational mode, enter the **show virtual-chassis status** and **show interfaces terse** commands.

Sample Output

```
{master:0}
user@vc1> show virtual-chassis status

Virtual Chassis ID: c809.2c5d.9f8a
                                              Mastership            Neighbor List
Member ID  Status   Serial No    Model        priority    Role      ID  Interface
0 (FPC 0)  Prsnt    BP0210471477 ex4200-48t        128    Master*    1  vcp-1
1 (FPC 1)  Prsnt    BP0210460182 ex4200-48t        128    Backup     0  vcp-0
                                                                     2  vcp-1
2 (FPC 2)  Prsnt    BP0210458725 ex4200-48t        128    Linecard   1  vcp-0
                                                                     3  vcp-1
3 (FPC 3)  Prsnt    BP0210477180 ex4200-48t        128    Linecard   2  vcp-0

Member ID for next new member: 4 (FPC 4)

{master:0}
user@vc1> show interfaces terse
Interface               Admin Link Proto    Local                 Remote
ge-0/0/0                up    up
```



```
ge-0/0/0.0              up    up   eth-switch
ge-0/0/1                up    up
ge-0/0/1.0              up    up   eth-switch
ge-0/0/2                up    up
ge-0/0/2.0              up    up   eth-switch
ge-0/0/3                up    up
ge-0/0/3.0              up    up   eth-switch
ge-0/0/4                up    up
ge-0/0/4.0              up    up   eth-switch
ge-0/0/5                up    up
ge-0/0/5.0              up    up   eth-switch
ge-0/0/6                up    up
ge-0/0/6.0              up    up   eth-switch
ge-0/0/7                up    up
ge-0/0/7.0              up    up   eth-switch
ge-0/0/8                up    down
ge-0/0/8.0              up    down eth-switch
ge-0/0/9                up    down
ge-0/0/9.0              up    down eth-switch
ge-0/0/10               up    down
ge-0/0/10.0             up    down eth-switch
ge-0/0/11               up    down
ge-0/0/11.0             up    down eth-switch
ge-0/0/12               up    down
ge-0/0/12.0             up    down eth-switch
ge-0/0/13               up    down
ge-0/0/13.0             up    down eth-switch
ge-0/0/14               up    down
ge-0/0/14.0             up    down eth-switch
ge-0/0/15               up    down
ge-0/0/15.0             up    down eth-switch
ge-0/0/16               up    down
ge-0/0/16.0             up    down eth-switch
ge-0/0/17               up    down
ge-0/0/17.0             up    down eth-switch
ge-0/0/18               up    down
ge-0/0/18.0             up    down eth-switch
ge-0/0/19               up    down
ge-0/0/19.0             up    down eth-switch
ge-0/0/20               up    down
ge-0/0/20.0             up    down eth-switch
ge-0/0/21               up    down
ge-0/0/21.0             up    down eth-switch
ge-0/0/22               up    down
ge-0/0/22.0             up    down eth-switch
ge-0/0/23               up    down
ge-0/0/23.0             up    down eth-switch
ge-0/0/24               up    down
ge-0/0/24.0             up    down eth-switch
ge-0/0/25               up    down
ge-0/0/25.0             up    down eth-switch
ge-0/0/26               up    down
ge-0/0/26.0             up    down eth-switch
ge-0/0/27               up    down
ge-0/0/27.0             up    down eth-switch
ge-0/0/28               up    down
ge-0/0/28.0             up    down eth-switch
ge-0/0/29               up    down
ge-0/0/29.0             up    down eth-switch
ge-0/0/30               up    down
ge-0/0/30.0             up    down eth-switch
```



```
ge-0/0/31             up    down
ge-0/0/31.0           up    down eth-switch
ge-0/0/32             up    down
ge-0/0/33             up    down
ge-0/0/34             up    down
ge-0/0/35             up    down
ge-0/0/36             up    down
ge-0/0/36.0           up    down eth-switch
ge-0/0/37             up    down
ge-0/0/37.0           up    down eth-switch
ge-0/0/38             up    down
ge-0/0/38.0           up    down eth-switch
ge-0/0/39             up    up
ge-0/0/39.0           up    up   eth-switch
ge-0/0/40             up    up
ge-0/0/40.0           up    up   aenet    --> ae0.0
ge-0/0/41             up    up
ge-0/0/41.0           up    up   aenet    --> ae1.0
ge-0/0/42             up    down
ge-0/0/42.0           up    down aenet    --> ae2.0
ge-0/0/43             up    down
ge-0/0/43.0           up    down aenet    --> ae3.0
ge-0/0/44             up    down
ge-0/0/44.0           up    down aenet    --> ae4.0
ge-0/0/45             up    down
ge-0/0/45.0           up    down aenet    --> ae5.0
ge-0/0/46             up    down
ge-0/0/46.0           up    down aenet    --> ae6.0
ge-0/0/47             up    down
ge-0/0/47.0           up    down aenet    --> ae7.0
xe-0/1/0              up    up
xe-0/1/0.0            up    up   aenet    --> ae8.0
xe-0/1/1              up    down
xe-0/1/2              up    up
xe-0/1/2.0            up    up   aenet    --> ae8.0
xe-0/1/3              up    down
ge-1/0/0              up    down
ge-1/0/0.0            up    down eth-switch
ge-1/0/1              up    down
ge-1/0/1.0            up    down eth-switch
ge-1/0/2              up    down
ge-1/0/2.0            up    down eth-switch
ge-1/0/3              up    down
ge-1/0/3.0            up    down eth-switch
ge-1/0/4              up    down
ge-1/0/4.0            up    down eth-switch
ge-1/0/5              up    down
ge-1/0/5.0            up    down eth-switch
ge-1/0/6              up    down
ge-1/0/6.0            up    down eth-switch
ge-1/0/7              up    down
ge-1/0/7.0            up    down eth-switch
ge-1/0/8              up    down
ge-1/0/8.0            up    down eth-switch
ge-1/0/9              up    down
ge-1/0/9.0            up    down eth-switch
ge-1/0/10             up    down
ge-1/0/10.0           up    down eth-switch
ge-1/0/11             up    down
ge-1/0/11.0           up    down eth-switch
ge-1/0/12             up    down
```



```
ge-1/0/12.0             up    down eth-switch
ge-1/0/13               up    down
ge-1/0/13.0             up    down eth-switch
ge-1/0/14               up    down
ge-1/0/14.0             up    down eth-switch
ge-1/0/15               up    down
ge-1/0/15.0             up    down eth-switch
ge-1/0/16               up    down
ge-1/0/16.0             up    down eth-switch
ge-1/0/17               up    down
ge-1/0/17.0             up    down eth-switch
ge-1/0/18               up    down
ge-1/0/18.0             up    down eth-switch
ge-1/0/19               up    down
ge-1/0/19.0             up    down eth-switch
ge-1/0/20               up    down
ge-1/0/20.0             up    down eth-switch
ge-1/0/21               up    down
ge-1/0/21.0             up    down eth-switch
ge-1/0/22               up    down
ge-1/0/22.0             up    down eth-switch
ge-1/0/23               up    down
ge-1/0/23.0             up    down eth-switch
ge-1/0/24               up    down
ge-1/0/24.0             up    down eth-switch
ge-1/0/25               up    down
ge-1/0/25.0             up    down eth-switch
ge-1/0/26               up    down
ge-1/0/26.0             up    down eth-switch
ge-1/0/27               up    down
ge-1/0/27.0             up    down eth-switch
ge-1/0/28               up    down
ge-1/0/28.0             up    down eth-switch
ge-1/0/29               up    down
ge-1/0/29.0             up    down eth-switch
ge-1/0/30               up    down
ge-1/0/30.0             up    down eth-switch
ge-1/0/31               up    down
ge-1/0/31.0             up    down eth-switch
ge-1/0/32               up    down
ge-1/0/33               up    down
ge-1/0/34               up    down
ge-1/0/35               up    down
ge-1/0/36               up    down
ge-1/0/36.0             up    down eth-switch
ge-1/0/37               up    down
ge-1/0/37.0             up    down eth-switch
ge-1/0/38               up    down
ge-1/0/38.0             up    down eth-switch
ge-1/0/39               up    up
ge-1/0/39.0             up    up   eth-switch
ge-1/0/40               up    up
ge-1/0/40.0             up    up   aenet    --> ae0.0
ge-1/0/41               up    up
ge-1/0/41.0             up    up   aenet    --> ae1.0
ge-1/0/42               up    down
ge-1/0/42.0             up    down aenet    --> ae2.0
ge-1/0/43               up    down
ge-1/0/43.0             up    down aenet    --> ae3.0
ge-1/0/44               up    down
ge-1/0/44.0             up    down aenet    --> ae4.0
```

```
ge-1/0/45               up    down
ge-1/0/45.0             up    down aenet    --> ae5.0
ge-1/0/46               up    down
ge-1/0/46.0             up    down aenet    --> ae6.0
ge-1/0/47               up    down
ge-1/0/47.0             up    down aenet    --> ae7.0
xe-1/1/0                up    up
xe-1/1/0.0              up    up   aenet    --> ae8.0
xe-1/1/1                up    down
xe-1/1/2                up    up
xe-1/1/2.0              up    up   aenet    --> ae8.0
xe-1/1/3                up    down
ge-2/0/0                up    down
ge-2/0/0.0              up    down eth-switch
ge-2/0/1                up    down
ge-2/0/1.0              up    down eth-switch
ge-2/0/2                up    down
ge-2/0/2.0              up    down eth-switch
ge-2/0/3                up    down
ge-2/0/3.0              up    down eth-switch
ge-2/0/4                up    down
ge-2/0/4.0              up    down eth-switch
ge-2/0/5                up    down
ge-2/0/5.0              up    down eth-switch
ge-2/0/6                up    down
ge-2/0/6.0              up    down eth-switch
ge-2/0/7                up    down
ge-2/0/7.0              up    down eth-switch
ge-2/0/8                up    down
ge-2/0/8.0              up    down eth-switch
ge-2/0/9                up    down
ge-2/0/9.0              up    down eth-switch
ge-2/0/10               up    down
ge-2/0/10.0             up    down eth-switch
ge-2/0/11               up    down
ge-2/0/11.0             up    down eth-switch
ge-2/0/12               up    down
ge-2/0/12.0             up    down eth-switch
ge-2/0/13               up    down
ge-2/0/13.0             up    down eth-switch
ge-2/0/14               up    down
ge-2/0/14.0             up    down eth-switch
ge-2/0/15               up    down
ge-2/0/15.0             up    down eth-switch
ge-2/0/16               up    down
ge-2/0/16.0             up    down eth-switch
ge-2/0/17               up    down
ge-2/0/17.0             up    down eth-switch
ge-2/0/18               up    down
ge-2/0/18.0             up    down eth-switch
ge-2/0/19               up    down
ge-2/0/19.0             up    down eth-switch
ge-2/0/20               up    down
ge-2/0/20.0             up    down eth-switch
ge-2/0/21               up    down
ge-2/0/21.0             up    down eth-switch
ge-2/0/22               up    down
ge-2/0/22.0             up    down eth-switch
ge-2/0/23               up    down
ge-2/0/23.0             up    down eth-switch
ge-2/0/24               up    down
```



```
ge-2/0/24.0             up    down eth-switch
ge-2/0/25               up    down
ge-2/0/25.0             up    down eth-switch
ge-2/0/26               up    down
ge-2/0/26.0             up    down eth-switch
ge-2/0/27               up    down
ge-2/0/27.0             up    down eth-switch
ge-2/0/28               up    down
ge-2/0/28.0             up    down eth-switch
ge-2/0/29               up    down
ge-2/0/29.0             up    down eth-switch
ge-2/0/30               up    down
ge-2/0/30.0             up    down eth-switch
ge-2/0/31               up    down
ge-2/0/31.0             up    down eth-switch
ge-2/0/32               up    down
ge-2/0/33               up    down
ge-2/0/34               up    down
ge-2/0/35               up    down
ge-2/0/36               up    down
ge-2/0/36.0             up    down eth-switch
ge-2/0/37               up    down
ge-2/0/37.0             up    down eth-switch
ge-2/0/38               up    down
ge-2/0/38.0             up    down eth-switch
ge-2/0/39               up    up
ge-2/0/39.0             up    up   eth-switch
ge-2/0/40               up    up
ge-2/0/40.0             up    up   aenet    --> ae0.0
ge-2/0/41               up    up
ge-2/0/41.0             up    up   aenet    --> ae1.0
ge-2/0/42               up    down
ge-2/0/42.0             up    down aenet    --> ae2.0
ge-2/0/43               up    down
ge-2/0/43.0             up    down aenet    --> ae3.0
ge-2/0/44               up    down
ge-2/0/44.0             up    down aenet    --> ae4.0
ge-2/0/45               up    down
ge-2/0/45.0             up    down aenet    --> ae5.0
ge-2/0/46               up    down
ge-2/0/46.0             up    down aenet    --> ae6.0
ge-2/0/47               up    down
ge-2/0/47.0             up    down aenet    --> ae7.0
xe-2/1/0                up    up
xe-2/1/0.0              up    up   aenet    --> ae8.0
xe-2/1/1                up    down
xe-2/1/2                up    up
xe-2/1/2.0              up    up   aenet    --> ae8.0
xe-2/1/3                up    down
ge-3/0/0                up    down
ge-3/0/0.0              up    down eth-switch
ge-3/0/1                up    down
ge-3/0/1.0              up    down eth-switch
ge-3/0/2                up    down
ge-3/0/2.0              up    down eth-switch
ge-3/0/3                up    down
ge-3/0/3.0              up    down eth-switch
ge-3/0/4                up    down
ge-3/0/4.0              up    down eth-switch
ge-3/0/5                up    down
ge-3/0/5.0              up    down eth-switch
```



```
ge-3/0/6                up    down
ge-3/0/6.0              up    down eth-switch
ge-3/0/7                up    down
ge-3/0/7.0              up    down eth-switch
ge-3/0/8                up    down
ge-3/0/8.0              up    down eth-switch
ge-3/0/9                up    down
ge-3/0/9.0              up    down eth-switch
ge-3/0/10               up    down
ge-3/0/10.0             up    down eth-switch
ge-3/0/11               up    down
ge-3/0/11.0             up    down eth-switch
ge-3/0/12               up    down
ge-3/0/12.0             up    down eth-switch
ge-3/0/13               up    down
ge-3/0/13.0             up    down eth-switch
ge-3/0/14               up    down
ge-3/0/14.0             up    down eth-switch
ge-3/0/15               up    down
ge-3/0/15.0             up    down eth-switch
ge-3/0/16               up    down
ge-3/0/16.0             up    down eth-switch
ge-3/0/17               up    down
ge-3/0/17.0             up    down eth-switch
ge-3/0/18               up    down
ge-3/0/18.0             up    down eth-switch
ge-3/0/19               up    down
ge-3/0/19.0             up    down eth-switch
ge-3/0/20               up    down
ge-3/0/20.0             up    down eth-switch
ge-3/0/21               up    down
ge-3/0/21.0             up    down eth-switch
ge-3/0/22               up    down
ge-3/0/22.0             up    down eth-switch
ge-3/0/23               up    down
ge-3/0/23.0             up    down eth-switch
ge-3/0/24               up    down
ge-3/0/24.0             up    down eth-switch
ge-3/0/25               up    down
ge-3/0/25.0             up    down eth-switch
ge-3/0/26               up    down
ge-3/0/26.0             up    down eth-switch
ge-3/0/27               up    down
ge-3/0/27.0             up    down eth-switch
ge-3/0/28               up    down
ge-3/0/28.0             up    down eth-switch
ge-3/0/29               up    down
ge-3/0/29.0             up    down eth-switch
ge-3/0/30               up    down
ge-3/0/30.0             up    down eth-switch
ge-3/0/31               up    down
ge-3/0/31.0             up    down eth-switch
ge-3/0/32               up    down
ge-3/0/33               up    down
ge-3/0/34               up    down
ge-3/0/35               up    down
ge-3/0/36               up    down
ge-3/0/36.0             up    down eth-switch
ge-3/0/37               up    down
ge-3/0/37.0             up    down eth-switch
ge-3/0/38               up    down
```



```
ge-3/0/38.0             up    down eth-switch
ge-3/0/39               up    up
ge-3/0/39.0             up    up   eth-switch
ge-3/0/40               up    down
ge-3/0/40.0             up    down aenet    --> ae0.0
ge-3/0/41               up    down
ge-3/0/41.0             up    down aenet    --> ae1.0
ge-3/0/42               up    down
ge-3/0/42.0             up    down aenet    --> ae2.0
ge-3/0/43               up    down
ge-3/0/43.0             up    down aenet    --> ae3.0
ge-3/0/44               up    down
ge-3/0/44.0             up    down aenet    --> ae4.0
ge-3/0/45               up    down
ge-3/0/45.0             up    down aenet    --> ae5.0
ge-3/0/46               up    down
ge-3/0/46.0             up    down aenet    --> ae6.0
ge-3/0/47               up    down
ge-3/0/47.0             up    down aenet    --> ae7.0
xe-3/1/0                up    up
xe-3/1/0.0              up    up   aenet    --> ae8.0
xe-3/1/1                up    down
xe-3/1/2                up    up
xe-3/1/2.0              up    up   aenet    --> ae8.0
xe-3/1/3                up    down
vcp-0                   up    down
vcp-0.32768             up    down
vcp-1                   up    up
vcp-1.32768             up    up
ae0                     up    down
ae0.0                   up    down eth-switch
ae1                     up    down
ae1.0                   up    down eth-switch
ae2                     up    down
ae2.0                   up    down eth-switch
ae3                     up    down
ae3.0                   up    down eth-switch
ae4                     up    down
ae4.0                   up    down eth-switch
ae5                     up    down
ae5.0                   up    down eth-switch
ae6                     up    down
ae6.0                   up    down eth-switch
ae7                     up    down
ae7.0                   up    down eth-switch
ae8                     up    up
ae8.0                   up    up   eth-switch
ae9                     up    down
bme0                    up    up
bme0.32768              up    up   inet     128.0.0.1/2
                                            128.0.0.16/2
                                            128.0.0.32/2
                                   tnp      0x10
bme0.32770              up    up   eth-switch
bme0.32771              down  up   eth-switch
bme0.32772              down  up   eth-switch
dsc                     up    up
gre                     up    up
ipip                    up    up
jsrv                    up    up
jsrv.1                  up    up   inet     128.0.0.127/2
```

```
lo0                     up    up
lo0.0                   up    up   inet     10.255.195.97       --> 0/0
                                   iso
47.0005.80ff.f800.0000.0108.0001.0102.5519.5097
                                   inet6    abcd::10:255:195:97
                                            fe80::2ac0:da0f:fc31:1e81
lsi                     up    up
me0                     up    up
me0.0                   up    up   inet     10.94.195.97/24
mtun                    up    up
pimd                    up    up
pime                    up    up
tap                     up    up
vlan                    up    up
vme                     up    up   inet     192.168.157.27/24
```

Meaning In the output of the **show virtual-chassis status** command, if all four members appear, the Virtual Chassis is operational.

In the output of the **show interfaces terse** command, if all interfaces that connect to the QFabric system devices are listed as up (such as ge-0/0/39, ge-1/0/39, ge-2/0/39, and ge-3/0/39 for the Interconnect devices; ge-0/0/40, ge-1/0/40, and ge-2/0/40 for the Director devices; ge-0/0/0 through ge-0/0/7 for the Node devices; and xe-0/1/0, xe-0/1/2, xe-1/1/0, xe-1/1/2, xe-2/1/0, xe-2/1/2, xe-3/1/0, and xe-3/1/2 for the inter-Virtual Chassis connections), the control plane is properly connected.

Related Documentation

- QFX3000-G QFabric System Installation Overview on page 95
- Installing and Connecting a QFX3100 Director Device on page 173
- Installing and Connecting a QFX3008-I Interconnect Device on page 185
- Installing and Connecting a QFX3500 Device on page 241
- *Installing and Connecting an EX4200 Switch*
- *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*
- Understanding the QFabric System Control Plane on page 39

Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System

Supported Platforms QFabric System

This example shows you how to connect components and configure switches used by a fiber-based QFX3000-G QFabric system control plane network. Proper wiring of Director devices, Interconnect devices, and Node devices to the control plane switches, combined with a standard configuration, enables you to bring up the internal QFabric system management network and prepare your QFabric system for full operation.

- Requirements on page 379
- Overview on page 379
- Configuration on page 388
- Verification on page 403

Requirements

This example uses the following hardware and software components:

- One QFX3000-G QFabric system containing:
  - Two QFX3100 Director devices
  - Two QFX3008-I Interconnect devices
  - Eight QFX3500 Node devices
- Sixteen EX4200-24F switches, used to make two redundant Virtual Chassis with eight members apiece
- Junos OS Release 12.3R6.6 for the EX Series switches used in the Virtual Chassis
- Junos OS Release 13.2X52-D10 for the QFabric system devices

Before you begin:

- Rack, mount, and install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see "Installing and Connecting a QFX3100 Director Device" on page 173, "Installing and Connecting a QFX3008-I Interconnect Device" on page 185, "Installing and Connecting a QFX3500 Device" on page 241, and "Installing and Connecting a QFX3600 or QFX3600-I Device" on page 223.
- Rack, mount, and install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis of eight members each. For more information, see *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*.

Overview

The QFX3000-G QFabric system control plane network connects the Director group, Interconnect devices, and Node devices in a QFabric system across a pair of redundant Virtual Chassis. By separating the management control plane from the data plane, the QFabric system can scale efficiently. The control plane network uses Gigabit Ethernet cabling and connections between components, and a 10-Gigabit Ethernet backbone between the redundant Virtual Chassis.

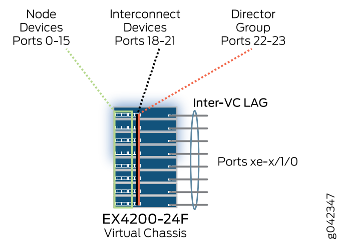
Specific ports have been reserved on the Virtual Chassis to connect to each of the QFabric system device types. Such design simplifies installation and facilitates timely deployment of a QFabric system. It also permits the use of a standard Virtual Chassis configuration included as part of this example. The standard configuration can scale from the minimum topology of eight Node devices shown in this example to the maximum topology of 128 Node devices for a fully implemented QFX3000-G QFabric system.

Topology

Figure 106 on page 380 shows the general port ranges where QFabric system devices must be connected to the Virtual Chassis. For each Virtual Chassis member, connect ports 0 through 15 to Node devices, ports 18 through 21 to Interconnect devices, and ports 22 and

23 to Director devices. Table 97 on page 380 shows the details of the QFabric system device-to-Virtual Chassis port mappings for a fiber-based control plane network.

Figure 106: QFX3000-G QFabric System Fiber-Based Control Plane—Virtual Chassis Port Ranges



CAUTION:

- The control plane network within a QFabric system is a critical component of the system that should not be shared with other network traffic. In order to scale efficiently, the control plane network must be reserved for the QFabric system and its components. As a result, do not use the ports of the QFabric system control plane for any purpose other than to transport QFabric system control plane traffic. We neither recommend nor support the connection of other devices to the QFabric system control plane network.
- Do not install Junos Space and AI-Scripts (AIS) on the control plane network Virtual Chassis in a QFX3000-G QFabric system.

NOTE: Not all port numbers are represented in Table 97 on page 380, and ports 16 and 17 are reserved for future uses.

Table 97 on page 380 shows the specific mappings of QFabric system control plane network ports from the Virtual Chassis to the QFabric system components.

Table 97: QFX3000-G QFabric System Virtual Chassis Fiber-Based Control Plane Port Assignments

Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7	Member Port Number	QFabric System Component
Node0 ge-0/0/0	Node16 ge-1/0/0	Node32 ge-2/0/0	Node48 ge-3/0/0	Node64 ge-4/0/0	Node80 ge-5/0/0	Node96 ge-6/0/0	Node112 ge-7/0/0	ge-*X*/0/0	Node devices
Node1 ge-0/0/1	Node17 ge-1/0/1	Node33 ge-2/0/1	Node49 ge-3/0/1	Node65 ge-4/0/1	Node81 ge-5/0/1	Node97 ge-6/0/1	Node113 ge-7/0/1	ge-*X*/0/1	Node devices

Table 97: QFX3000-G QFabric System Virtual Chassis Fiber-Based Control Plane Port Assignments *(continued)*

Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7	Member Port Number	QFabric System Component
Node2 ge-0/0/2	Node18 ge-1/0/2	Node34 ge-2/0/2	Node50 ge-3/0/2	Node66 ge-4/0/2	Node82 ge-5/0/2	Node98 ge-6/0/2	Node114 ge-7/0/2	ge-*X*/0/2	Node devices
Node3 ge-0/0/3	Node19 ge-1/0/3	Node35 ge-2/0/3	Node51 ge-3/0/3	Node67 ge-4/0/3	Node83 ge-5/0/3	Node99 ge-6/0/3	Node115 ge-7/0/3	ge-*X*/0/3	Node devices
Node4 ge-0/0/4	Node20 ge-1/0/4	Node36 ge-2/0/4	Node52 ge-3/0/4	Node68 ge-4/0/4	Node84 ge-5/0/4	Node100 ge-6/0/4	Node116 ge-7/0/4	ge-*X*/0/4	Node devices
Node5 ge-0/0/5	Node21 ge-1/0/5	Node37 ge-2/0/5	Node53 ge-3/0/5	Node69 ge-4/0/5	Node85 ge-5/0/5	Node101 ge-6/0/5	Node117 ge-7/0/5	ge-*X*/0/5	Node devices
Node6 ge-0/0/6	Node22 ge-1/0/6	Node38 ge-2/0/6	Node54 ge-3/0/6	Node70 ge-4/0/6	Node86 ge-5/0/6	Node102 ge-6/0/6	Node118 ge-7/0/6	ge-*X*/0/6	Node devices
Node7 ge-0/0/7	Node23 ge-1/0/7	Node39 ge-2/0/7	Node55 ge-3/0/7	Node71 ge-4/0/7	Node87 ge-5/0/7	Node103 ge-6/0/7	Node119 ge-7/0/7	ge-*X*/0/7	Node devices
Node8 ge-0/0/8	Node24 ge-1/0/8	Node40 ge-2/0/8	Node56 ge-3/0/8	Node72 ge-4/0/8	Node88 ge-5/0/8	Node104 ge-6/0/8	Node120 ge-7/0/8	ge-*X*/0/8	Node devices
Node9 ge-0/0/9	Node25 ge-1/0/9	Node41 ge-2/0/9	Node57 ge-3/0/9	Node73 ge-4/0/9	Node89 ge-5/0/9	Node105 ge-6/0/9	Node121 ge-7/0/9	ge-*X*/0/9	Node devices
Node10 ge-0/0/10	Node26 ge-1/0/10	Node42 ge-2/0/10	Node58 ge-3/0/10	Node74 ge-4/0/10	Node90 ge-5/0/10	Node106 ge-6/0/10	Node122 ge-7/0/10	ge-*X*/0/10	Node devices
Node11 ge-0/0/11	Node27 ge-1/0/11	Node43 ge-2/0/11	Node59 ge-3/0/11	Node75 ge-4/0/11	Node91 ge-5/0/11	Node107 ge-6/0/11	Node123 ge-7/0/11	ge-*X*/0/11	Node devices
Node12 ge-0/0/12	Node28 ge-1/0/12	Node44 ge-2/0/12	Node60 ge-3/0/12	Node76 ge-4/0/12	Node92 ge-5/0/12	Node108 ge-6/0/12	Node124 ge-7/0/12	ge-*X*/0/12	Node devices
Node13 ge-0/0/13	Node29 ge-1/0/13	Node45 ge-2/0/13	Node61 ge-3/0/13	Node77 ge-4/0/13	Node93 ge-5/0/13	Node109 ge-6/0/13	Node125 ge-7/0/13	ge-*X*/0/13	Node devices

Table 97: QFX3000-G QFabric System Virtual Chassis Fiber-Based Control Plane Port Assignments *(continued)*

Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7	Member Port Number	QFabric System Component
Node14 ge-0/0/14	Node30 ge-1/0/14	Node46 ge-2/0/14	Node62 ge-3/0/14	Node78 ge-4/0/14	Node94 ge-5/0/14	Node110 ge-6/0/14	Node126 ge-7/0/14	ge-*X*/0/14	Node devices
Node15 ge-0/0/15	Node31 ge-1/0/15	Node47 ge-2/0/15	Node63 ge-3/0/15	Node79 ge-4/0/15	Node95 ge-5/0/15	Node111 ge-6/0/15	Node127 ge-7/0/15	ge-*X*/0/15	Node devices
Reserved ge-0/0/16	Reserved ge-1/0/16	Reserved ge-2/0/16	Reserved ge-3/0/16	Reserved ge-4/0/16	Reserved ge-5/0/16	Reserved ge-6/0/16	Reserved ge-7/0/16	ge-*X*/0/16	Future use
Reserved ge-0/0/17	Reserved ge-1/0/17	Reserved ge-2/0/17	Reserved ge-3/0/17	Reserved ge-4/0/17	Reserved ge-5/0/17	Reserved ge-6/0/17	Reserved ge-7/0/17	ge-*X*/0/17	Future use
IC2 CB0 ge-0/0/18	IC2 CB1 ge-1/0/18	IC3 CB0 ge-2/0/18	IC3 CB1 ge-3/0/18	Reserved ge-4/0/18	Reserved ge-5/0/18	Reserved ge-6/0/18	Reserved ge-7/0/18	ge-*X*/0/18	Interconnect devices NOTE: On both Control Boards, use port 0 to connect to VC0, and port 1 to connect to VC1.
IC0 CB0 ge-0/0/19	IC0 CB1 ge-1/0/19	IC1 CB0 ge-2/0/19	IC1 CB1 ge-3/0/19	Reserved ge-4/0/19	Reserved ge-5/0/19	Reserved ge-6/0/19	Reserved ge-7/0/19	ge-*X*/0/19	Interconnect devices NOTE: On both Control Boards, use port 0 to connect to VC0, and port 1 to connect to VC1.
Reserved ge-0/0/20	Reserved ge-1/0/20	Reserved ge-2/0/20	Reserved ge-3/0/20	Reserved ge-4/0/20	Reserved ge-5/0/20	Reserved ge-6/0/20	Reserved ge-7/0/20	ge-*X*/0/20	Interconnect devices

Table 97: QFX3000-G QFabric System Virtual Chassis Fiber-Based Control Plane Port Assignments *(continued)*

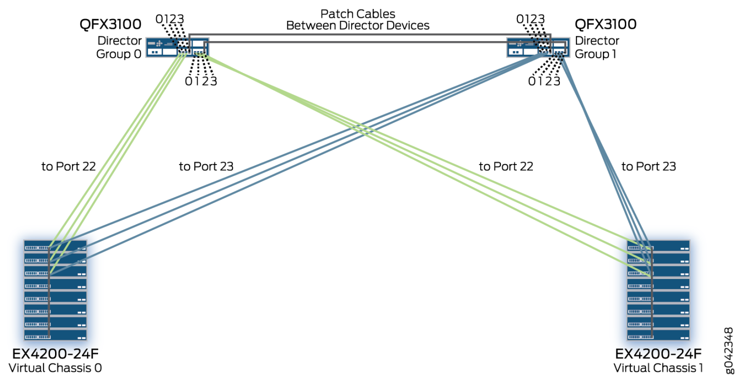
Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7	Member Port Number	QFabric System Component
Reserved ge-0/0/21	Reserved ge-1/0/21	Reserved ge-2/0/21	Reserved ge-3/0/21	Reserved ge-4/0/21	Reserved ge-5/0/21	Reserved ge-6/0/21	Reserved ge-7/0/21	ge-*X*/0/21	Interconnect devices
DG0 port 0 ge-0/0/22	DG0 port 1 ge-1/0/22	DG0 port 2 ge-2/0/22	Reserved ge-3/0/22	Reserved ge-4/0/22	Reserved ge-5/0/22	Reserved ge-6/0/22	Reserved ge-7/0/22	ge-*X*/0/22	Director device 0
DG1 port 0 ge-0/0/23	DG1 port 1 ge-1/0/23	DG1 port 2 ge-2/0/23	Reserved ge-3/0/23	Reserved ge-4/0/23	Reserved ge-5/0/23	Reserved ge-6/0/23	Reserved ge-7/0/23	ge-*X*/0/23	Director device 1
Inter-VC xe-0/1/0	Inter-VC xe-1/1/0	Inter-VC xe-2/1/0	Inter-VC xe-3/1/0	Inter-VC xe-4/1/0	Inter-VC xe-5/1/0	Inter-VC xe-6/1/0	Inter-VC xe-7/1/0	Inter-VC xe-*X*/1/0	Inter-Virtual Chassis LAG
Inter-VC xe-0/1/2	Inter-VC xe-1/1/2	Inter-VC xe-2/1/2	Inter-VC xe-3/1/2	Inter-VC xe-4/1/2	Inter-VC xe-5/1/2	Inter-VC xe-6/1/2	Inter-VC xe-7/1/2	Inter-VC xe-*X*/1/2	Inter-Virtual Chassis LAG

Next, connect the Director devices to the Virtual Chassis. In general, you want to accomplish the following:

- Connect three ports from one network module in a Director device to the first Virtual Chassis, and three ports from the second network module to the second Virtual Chassis. You need to repeat these connections from the second Director device to both Virtual Chassis to provide resiliency for the system.
- Connect the Director devices to each other and create a Director group. Connect one port from each network module on the first Director device to one port in each network module on the second Director device.

Figure 107 on page 384 shows the specific ports on the Director group that you must connect to the Virtual Chassis and interconnect between the Director devices.

Figure 107: QFX3000-G QFabric System Fiber-Based Control Plane—Director Group to Virtual Chassis Connections



In this specific example, connect ports 0, 1, and 2 from module 0 on Director device DG0 to port 22 on Virtual Chassis VC0 (ge-0/0/22, ge-1/0/22, and ge-2/0/22), and connect ports 0, 1, and 2 from module 1 to port 22 on Virtual Chassis VC1 (ge-0/0/22, ge-1/0/22, and ge-2/0/22).

For Director device DG1, connect ports 0, 1, and 2 from module 0 to port 23 on Virtual Chassis VC0 (ge-0/0/23, ge-1/0/23, and ge-2/0/23), and connect ports 0, 1, and 2 from module 1 to port 23 on Virtual Chassis VC1 (ge-0/0/23, ge-1/0/23, and ge-2/0/23).

To form the Director group, connect module 0, port 3 on Director device DG0 to module 0, port 3 on Director device DG1. Similarly, connect module 1, port 3 on Director device DG0 to module 1, port 3 on Director device DG1. Table 98 on page 384 shows the port mappings for the Director group in this example.

Table 98: Director Group Port Mappings

Director Device	Virtual Chassis VC0	Virtual Chassis VC1
DG0	• Module 0, port 0 to ge-0/0/22 on VC0 • Module 0, port 1 to ge-1/0/22 on VC0 • Module 0, port 2 to ge-2/0/22 on VC0 • Module 0, port 3 to module 0, port 3 on DG1	• Module 1, port 0 to ge-0/0/22 on VC1 • Module 1, port 1 to ge-1/0/22 on VC1 • Module 1, port 2 to ge-2/0/22 on VC1 • Module 1, port 3 to module 1, port 3 on DG1
DG1	• Module 0, port 0 to ge-0/0/23 on VC0 • Module 0, port 1 to ge-1/0/23 on VC0 • Module 0, port 2 to ge-2/0/23 on VC0 • Module 0, port 3 to module 0, port 3 on DG0	• Module 1, port 0 to ge-0/0/23 on VC1 • Module 1, port 1 to ge-1/0/23 on VC1 • Module 1, port 2 to ge-2/0/23 on VC1 • Module 1, port 3 to module 1, port 3 on DG0

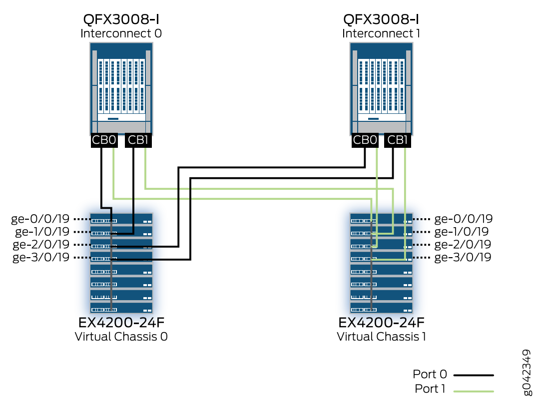
In the software, the ports of each network module are reversed, numbered from right to left, and incremented sequentially across modules. If you issue interface operational commands directly on the Director device, please note the following port mappings as shown in Table 92 on page 343:

Table 99: Hardware to Software Port Mappings for Director Device Network Modules

Network Module	Port 0	Port 1	Port 2	Port 3
Module 0	eth5	eth4	eth3	eth2
Module 1	eth9	eth8	eth7	eth6

Figure 108 on page 385 shows the specific ports on the Interconnect devices that you must connect to the Virtual Chassis. In general, connect one port from each Control Board module in an Interconnect device to the first Virtual Chassis, and a second port from each Control Board module to the second Virtual Chassis.

Figure 108: QFX3000-G QFabric System Fiber-Based Control Plane—Interconnect Device to Virtual Chassis Connections



In this specific example, for both Interconnect devices IC0 and IC1, connect port 0 from CB0 and CB1 to Virtual Chassis VC0 and port 1 from CB0 and CB1 to Virtual Chassis VC1. Connect the port 0 cables to port 19 on Virtual Chassis VC0 (ge-0/0/19, ge-1/0/19, ge-2/0/19, and ge-3/0/19), and connect the port 1 cables to port 19 on Virtual Chassis VC1 (ge-0/0/19, ge-1/0/19, ge-2/0/19, and ge-3/0/19). Table 100 on page 385 shows the port mappings for the Interconnect devices in this example.

Table 100: Interconnect Device Port Mappings

Interconnect Device	Virtual Chassis VC0	Virtual Chassis VC1
IC0	• CB0, port 0 to ge-0/0/19 • CB1, port 0 to ge-1/0/19	• CB0, port 1 to ge-0/0/19 • CB1, port 1 to ge-1/0/19
IC1	• CB0, port 0 to ge-2/0/19 • CB1, port 0 to ge-3/0/19	• CB0, port 1 to ge-2/0/19 • CB1, port 1 to ge-3/0/19

As required, you can extend the number of Interconnect devices from two to four. For additional Interconnect devices IC2 and IC3, connect port 0 from CB0 and CB1 to Virtual Chassis VC0 and port 1 from CB0 and CB1 to Virtual Chassis VC1. Connect the port 0 cables to port 18 on Virtual Chassis VC0 (ge-0/0/18, ge-1/0/18, ge-2/0/18, and ge-3/0/18), and connect the port 1 cables to port 18 on Virtual Chassis VC1 (ge-0/0/18, ge-1/0/18, ge-2/0/18, and ge-3/0/18). Table 101 on page 386 shows the port mappings needed to extend the number of Interconnect devices in this example to four devices.

Table 101: Interconnect Device Port Mappings for Two Additional Devices

Interconnect Device	Virtual Chassis VC0	Virtual Chassis VC1
IC2	• CB0, port 0 to ge-0/0/18 • CB1, port 0 to ge-1/0/18	• CB0, port 1 to ge-0/0/18 • CB1, port 1 to ge-1/0/18
IC3	• CB0, port 0 to ge-2/0/18 • CB1, port 0 to ge-3/0/18	• CB0, port 1 to ge-2/0/18 • CB1, port 1 to ge-3/0/18

Figure 109 on page 386, Figure 110 on page 386, and Figure 111 on page 386 show the specific ports on the Node devices that you must connect to the Virtual Chassis. In general, connect the first management port from a Node device to the first Virtual Chassis, and the second management port to the second Virtual Chassis.

Figure 109: QFX3000-G QFabric System Fiber-Based Control Plane—QFX3500 Node Device to Virtual Chassis Connections

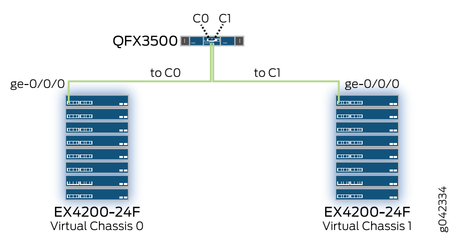


Figure 110: QFX3000-G QFabric System Fiber-Based Control Plane—QFX3600 Node Device to Virtual Chassis Connections

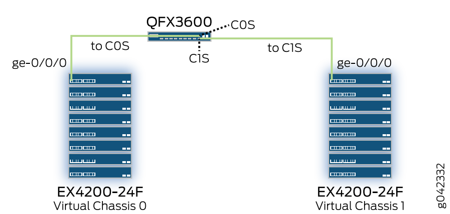
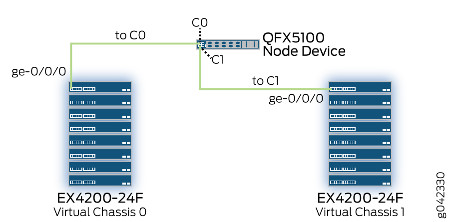


Figure 111: QFX3000-G QFabric System Fiber-Based Control Plane—QFX5100 Node Device to Virtual Chassis Connections



In this specific example, for Node device Node0, connect port C0 (also known as me0) to Virtual Chassis 0 port ge-0/0/0, and connect port C1 (also known as me1) to Virtual Chassis 1 port ge-0/0/0.

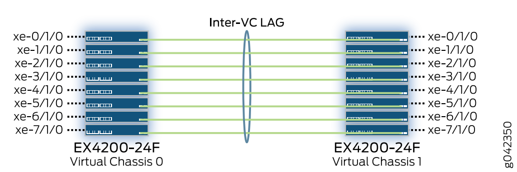
For the remaining seven Node devices, connect port C0 to the ge-0/0/*X* port on Virtual Chassis 0 that matches the Node device number. Similarly, connect port C1 to the port on Virtual Chassis 1 that matches the Node device number. For example, you would connect Node device Node5 to port ge-0/0/5. Table 95 on page 345 shows the full set of port mappings for the Node devices in this example.

Table 102: Node Device Port Mappings

Node Device	Virtual Chassis 0	Virtual Chassis 1
Node0	C0 to ge-0/0/0	C1 to ge-0/0/0
Node1	C0 to ge-0/0/1	C1 to ge-0/0/1
Node2	C0 to ge-0/0/2	C1 to ge-0/0/2
Node3	C0 to ge-0/0/3	C1 to ge-0/0/3
Node4	C0 to ge-0/0/4	C1 to ge-0/0/4
Node5	C0 to ge-0/0/5	C1 to ge-0/0/5
Node6	C0 to ge-0/0/6	C1 to ge-0/0/6
Node7	C0 to ge-0/0/7	C1 to ge-0/0/7

Figure 112 on page 387 shows the specific ports on the members of the first Virtual Chassis that you must connect to the members of the second Virtual Chassis. These connections create a link aggregation bundle (LAG) that provides redundancy and resiliency for the Virtual Chassis portion of the control plane. In general, connect each 10-Gigabit Ethernet uplink port from the first Virtual Chassis to the corresponding 10-Gigabit Ethernet uplink port on the second Virtual Chassis.

Figure 112: QFX3000-G QFabric System Fiber-Based Control Plane—Inter-Virtual Chassis LAG Connections



In this specific example, for Virtual Chassis VC0, connect port xe-0/1/0 to Virtual Chassis VC1 port xe-0/1/0. For the remaining seven 10-Gigabit Ethernet uplink ports, connect each port from VC0 to the corresponding port on VC1. For example, you would connect the xe-1/1/0 port on VC0 to port xe-1/1/0 on VC1, and so on.

Table 96 on page 346 shows the full set of port mappings for the Virtual Chassis LAG connections in this example.

Table 103: Virtual Chassis LAG Port Mappings

VC0 and VC1	Member 0	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7
Uplink port 0	xe-0/1/0 to xe-0/1/0	xe-1/1/0 to xe-1/1/0	xe-2/1/0 to xe-2/1/0	xe-3/1/0 to xe-3/1/0	xe-4/1/0 to xe-4/1/0	xe-5/1/0 to xe-5/1/0	xe-6/1/0 to xe-6/1/0	xe-7/1/0 to xe-7/1/0

Configuration

CLI Quick Configuration

To quickly configure the QFabric system control plane Virtual Chassis, copy the following commands, paste them in a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

NOTE:

- The control plane network configuration is identical for both Virtual Chassis described in this example. Load and commit the same configuration into both VC0 and VC1.

The configuration files for a QFabric system control plane network are also available for download from the QFX Series section of the Junos OS software download page at https://www.juniper.net/support/downloads/junos.html.

```
set groups qfabric system commit synchronize
set groups qfabric chassis redundancy graceful-switchover
set groups qfabric chassis aggregated-devices ethernet device-count 10
set groups qfabric chassis alarm management-ethernet link-down ignore
set groups qfabric chassis fpc 0 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis fpc 1 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis fpc 2 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis fpc 3 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis fpc 4 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis fpc 5 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis fpc 6 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis fpc 7 pic 1 sfpplus pic-mode 10g
set groups qfabric chassis lcd-menu fpc 0 menu-item maintenance-menu disable
set groups qfabric chassis lcd-menu fpc 1 menu-item maintenance-menu disable
set groups qfabric chassis lcd-menu fpc 2 menu-item maintenance-menu disable
set groups qfabric chassis lcd-menu fpc 3 menu-item maintenance-menu disable
set groups qfabric chassis lcd-menu fpc 4 menu-item maintenance-menu disable
set groups qfabric chassis lcd-menu fpc 5 menu-item maintenance-menu disable
set groups qfabric chassis lcd-menu fpc 6 menu-item maintenance-menu disable
set groups qfabric chassis lcd-menu fpc 7 menu-item maintenance-menu disable
set groups qfabric protocols rstp interface ae8.0 mode point-to-point
set groups qfabric protocols rstp interface all edge
set groups qfabric protocols rstp interface all no-root-port
set groups qfabric protocols rstp bpdu-block-on-edge
```



```
set groups qfabric protocols lldp interface all
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_3 loss-priority low code-points 110
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_3 loss-priority low code-points 111
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_2 loss-priority low code-points 100
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_2 loss-priority high code-points 101
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_0 loss-priority low code-points 010
set groups qfabric class-of-service classifiers ieee-802.1 onep_qfabric_classifier
  forwarding-class class_0 loss-priority high code-points 001
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_3 loss-priority low code-points 110
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_3 loss-priority low code-points 111
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_2 loss-priority low code-points 100
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_2 loss-priority high code-points 101
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_0 loss-priority low code-points 010
set groups qfabric class-of-service classifiers inet-precedence IP_qfabric_classifier
  forwarding-class class_0 loss-priority high code-points 001
set groups qfabric class-of-service forwarding-classes class class_3 queue-num 7
set groups qfabric class-of-service forwarding-classes class class_2 queue-num 2
set groups qfabric class-of-service forwarding-classes class class_0 queue-num 0
set groups qfabric class-of-service interfaces ge-*/0/* scheduler-map cpe_network_smap
set groups qfabric class-of-service interfaces ge-*/0/* unit 0 classifiers ieee-802.1
  onep_qfabric_classifier
set groups qfabric class-of-service interfaces ge-*/0/* unit 0 classifiers inet-precedence
  IP_qfabric_classifier
set groups qfabric class-of-service interfaces ae* scheduler-map cpe_network_smap
set groups qfabric class-of-service interfaces ae* unit 0 classifiers ieee-802.1
  onep_qfabric_classifier
set groups qfabric class-of-service interfaces ae* unit 0 classifiers inet-precedence
  IP_qfabric_classifier
set groups qfabric class-of-service scheduler-maps cpe_network_smap forwarding-class
  class_3 scheduler scheduler_3
set groups qfabric class-of-service scheduler-maps cpe_network_smap forwarding-class
  class_2 scheduler scheduler_2
set groups qfabric class-of-service scheduler-maps cpe_network_smap forwarding-class
  class_0 scheduler scheduler_0
set groups qfabric class-of-service schedulers scheduler_3 buffer-size percent 30
set groups qfabric class-of-service schedulers scheduler_3 priority strict-high
set groups qfabric class-of-service schedulers scheduler_2 transmit-rate percent 75
set groups qfabric class-of-service schedulers scheduler_2 buffer-size percent 30
set groups qfabric class-of-service schedulers scheduler_2 priority low
set groups qfabric class-of-service schedulers scheduler_0 transmit-rate percent 25
set groups qfabric class-of-service schedulers scheduler_0 buffer-size percent 40
set groups qfabric class-of-service schedulers scheduler_0 priority low
set groups qfabric ethernet-switching-options nonstop-bridging
set groups qfabric ethernet-switching-options storm-control interface all bandwidth
  10000
set groups qfabric vlans qfabric vlan-id 100
```

```
set groups qfabric vlans qfabric dot1q-tunneling
set groups qfabric-int interfaces <*> mtu 9216
set groups qfabric-int interfaces <*> unit 0 family ethernet-switching port-mode access
set groups qfabric-int interfaces <*> unit 0 family ethernet-switching vlan members qfabric
set groups qfabric-ae interfaces <*> aggregated-ether-options link-speed 1g
set groups qfabric-ae interfaces <*> aggregated-ether-options lacp active
set apply-groups qfabric
set interfaces interface-range Node_Device_Interfaces member "ge-[0-7]/0/[0-15]"
set interfaces interface-range Node_Device_Interfaces apply-groups qfabric-int
set interfaces interface-range Node_Device_Interfaces description "QFabric Node Device"
set interfaces interface-range Interconnect_Device_Interfaces member "ge-[0-7]/0/[18-21]"
set interfaces interface-range Interconnect_Device_Interfaces apply-groups qfabric-int
set interfaces interface-range Interconnect_Device_Interfaces description "QFabric Interconnect Device"
set interfaces interface-range Director_Device_DG0_LAG_Interfaces member "ge-[0-7]/0/22"
set interfaces interface-range Director_Device_DG0_LAG_Interfaces description "QFabric Director Device - DG0"
set interfaces interface-range Director_Device_DG0_LAG_Interfaces ether-options 802.3ad ae0
set interfaces interface-range Director_Device_DG1_LAG_Interfaces member "ge-[0-7]/0/23"
set interfaces interface-range Director_Device_DG1_LAG_Interfaces description "QFabric Director Device - DG1"
set interfaces interface-range Director_Device_DG1_LAG_Interfaces ether-options 802.3ad ae1
set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces member "xe-[0-7]/1/0"
set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces description "QFabric Control Plane (Inter-VC LAG)"
set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces ether-options 802.3ad ae8
set interfaces ae0 apply-groups qfabric-int
set interfaces ae0 apply-groups qfabric-ae
set interfaces ae0 description "QFabric Director Device - DG0"
set interfaces ae1 apply-groups qfabric-int
set interfaces ae1 apply-groups qfabric-ae
set interfaces ae1 description "QFabric Director Device - DG1"
set interfaces ae8 description "QFabric Control Plane (Inter-VC LAG)"
set interfaces ae8 mtu 9216
set interfaces ae8 aggregated-ether-options link-speed 10g
set interfaces ae8 aggregated-ether-options lacp active
set interfaces ae8 unit 0 family ethernet-switching vlan members qfabric
set system host-name qfabric-control-plane
set system services ssh
set system services telnet
set system services web-management http
set system syslog user * any emergency
set system syslog file messages any notice
set system syslog file messages authorization info
set system syslog file messages archive world-readable
set system syslog file messages explicit-priority
set system syslog file interactive-commands interactive-commands any
set system syslog file secure authorization info
```



```
set system syslog file default-log-messages any any
set system syslog file default-log-messages structured-data
set system syslog file console any error
set system syslog time-format millisecond
set interfaces vme unit 0 family inet address 192.168.157.26/24
set routing-options static route 0.0.0.0/0 next-hop 192.168.157.1
set virtual-chassis preprovisioned
set virtual-chassis member 0 role routing-engine
set virtual-chassis member 0 serial-number abc123
set virtual-chassis member 1 role routing-engine
set virtual-chassis member 1 serial-number def456
set virtual-chassis member 2 role line-card
set virtual-chassis member 2 serial-number ghi789
set virtual-chassis member 3 role line-card
set virtual-chassis member 3 serial-number jkl012
set virtual-chassis member 4 role line-card
set virtual-chassis member 4 serial-number mno321
set virtual-chassis member 5 role line-card
set virtual-chassis member 5 serial-number pqr654
set virtual-chassis member 6 role line-card
set virtual-chassis member 6 serial-number stu987
set virtual-chassis member 7 role line-card
set virtual-chassis member 7 serial-number vwx210
```

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure a Virtual Chassis for the QFabric system control plane network:

1. Create a configuration group to define global QFabric system control plane properties. Enable commit synchronization and graceful switchover, set up the number of aggregated Ethernet devices, enable 10-Gigabit Ethernet mode on the inter-VC links, configure alarm and LCD management, activate loop prevention, nonstop bridging, and storm control, configure Link Layer Discovery Protocol (LLDP), specify a global VLAN (VLAN 100) and 802.1q tunneling, and define options for aggregated Ethernet interfaces.

   Enable class of service (CoS) for the QFabric system control plane network. Establish forwarding classes, priorities, scheduler maps, classifiers, and queues for three types of traffic: control traffic, interdevice traffic, and best-effort traffic. Apply the qfabric group settings to the configuration.

   ```
   [edit]
   user@switch# set groups qfabric system commit synchronize
   user@switch# set groups qfabric chassis redundancy graceful-switchover
   user@switch# set groups qfabric chassis aggregated-devices ethernet device-count
     10
   user@switch# set groups qfabric chassis alarm management-ethernet link-down
     ignore
   user@switch# set groups qfabric chassis fpc 0 pic 1 sfpplus pic-mode 10g
   user@switch# set groups qfabric chassis fpc 1 pic 1 sfpplus pic-mode 10g
   user@switch# set groups qfabric chassis fpc 2 pic 1 sfpplus pic-mode 10g
   user@switch# set groups qfabric chassis fpc 3 pic 1 sfpplus pic-mode 10g
   user@switch# set groups qfabric chassis fpc 4 pic 1 sfpplus pic-mode 10g
   ```



```
user@switch# set groups qfabric chassis fpc 5 pic 1 sfpplus pic-mode 10g
user@switch# set groups qfabric chassis fpc 6 pic 1 sfpplus pic-mode 10g
user@switch# set groups qfabric chassis fpc 7 pic 1 sfpplus pic-mode 10g
user@switch# set groups qfabric chassis lcd-menu fpc 0 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis lcd-menu fpc 1 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis lcd-menu fpc 2 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis lcd-menu fpc 3 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis lcd-menu fpc 4 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis lcd-menu fpc 5 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis lcd-menu fpc 6 menu-item
  maintenance-menu disable
user@switch# set groups qfabric chassis lcd-menu fpc 7 menu-item
  maintenance-menu disable
user@switch# set groups qfabric protocols rstp interface ae8.0 mode point-to-point
user@switch# set groups qfabric protocols rstp interface all edge
user@switch# set groups qfabric protocols rstp interface all no-root-port
user@switch# set groups qfabric protocols rstp bpdu-block-on-edge
user@switch# set groups qfabric protocols lldp interface all
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_3 loss-priority low code-points 110
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_3 loss-priority low code-points 111
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_2 loss-priority low code-points 100
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_2 loss-priority high code-points
  101
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_0 loss-priority low code-points
  010
user@switch# set groups qfabric class-of-service classifiers ieee-802.1
  onep_qfabric_classifier forwarding-class class_0 loss-priority high code-points
  001
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_3 loss-priority low code-points 110
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_3 loss-priority low code-points 111
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_2 loss-priority low code-points 100
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_2 loss-priority high code-points 101
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_0 loss-priority low code-points 010
user@switch# set groups qfabric class-of-service classifiers inet-precedence
  IP_qfabric_classifier forwarding-class class_0 loss-priority high code-points 001
user@switch# set groups qfabric class-of-service forwarding-classes class class_3
  queue-num 7
user@switch# set groups qfabric class-of-service forwarding-classes class class_2
  queue-num 2
```



```
user@switch# set groups qfabric class-of-service forwarding-classes class class_0
  queue-num 0
user@switch# set groups qfabric class-of-service interfaces ge-*/0/* scheduler-map
  cpe_network_smap
user@switch# set groups qfabric class-of-service interfaces ge-*/0/* unit 0
  classifiers ieee-802.1 onep_qfabric_classifier
user@switch# set groups qfabric class-of-service interfaces ge-*/0/* unit 0
  classifiers inet-precedence IP_qfabric_classifier
user@switch# set groups qfabric class-of-service interfaces ae* scheduler-map
  cpe_network_smap
user@switch# set groups qfabric class-of-service interfaces ae* unit 0 classifiers
  ieee-802.1 onep_qfabric_classifier
user@switch# set groups qfabric class-of-service interfaces ae* unit 0 classifiers
  inet-precedence IP_qfabric_classifier
user@switch# set groups qfabric class-of-service scheduler-maps
  cpe_network_smap forwarding-class class_3 scheduler scheduler_3
user@switch# set groups qfabric class-of-service scheduler-maps
  cpe_network_smap forwarding-class class_2 scheduler scheduler_2
user@switch# set groups qfabric class-of-service scheduler-maps
  cpe_network_smap forwarding-class class_0 scheduler scheduler_0
user@switch# set groups qfabric class-of-service schedulers scheduler_3 buffer-size
  percent 30
user@switch# set groups qfabric class-of-service schedulers scheduler_3 priority
  strict-high
user@switch# set groups qfabric class-of-service schedulers scheduler_2
  transmit-rate percent 75
user@switch# set groups qfabric class-of-service schedulers scheduler_2 buffer-size
  percent 30
user@switch# set groups qfabric class-of-service schedulers scheduler_2 priority
  low
user@switch# set groups qfabric class-of-service schedulers scheduler_0
  transmit-rate percent 25
user@switch# set groups qfabric class-of-service schedulers scheduler_0 buffer-size
  percent 40
user@switch# set groups qfabric class-of-service schedulers scheduler_0 priority
  low
user@switch# set groups qfabric ethernet-switching-options nonstop-bridging
user@switch# set groups qfabric ethernet-switching-options storm-control interface
  all bandwidth 10000
user@switch# set groups qfabric vlans qfabric vlan-id 100
user@switch# set groups qfabric vlans qfabric dot1q-tunneling
user@switch# set groups qfabric-int interfaces <*> mtu 9216
user@switch# set groups qfabric-int interfaces <*> unit 0 family ethernet-switching
  port-mode access
user@switch# set groups qfabric-int interfaces <*> unit 0 family ethernet-switching
  vlan members qfabric
user@switch# set groups qfabric-ae interfaces <*> aggregated-ether-options
  link-speed 1g
user@switch# set groups qfabric-ae interfaces <*> aggregated-ether-options lacp
  active
user@switch# set apply-groups qfabric
```

2. Configure interfaces for the QFabric system control plane network. Set the interface ranges where Node devices (0 through 15), Interconnect devices (18 and 19), and Director devices (22 and 23) connect to the control plane network through the Virtual Chassis. Configure the inter-Virtual Chassis LAG connections for the ae8

interface and apply the ae-interfaces configuration group to the Director group aggregated Ethernet interfaces (ae0 and ae1).

```
[edit]
user@switch# set interfaces interface-range Node_Device_Interfaces member
  "ge-[0-7]/0/[0-15]"
user@switch# set interfaces interface-range Node_Device_Interfaces apply-groups
  qfabric-int
user@switch# set interfaces interface-range Node_Device_Interfaces description
  "QFabric Node Device"
user@switch# set interfaces interface-range Interconnect_Device_Interfaces member
  "ge-[0-7]/0/[18-21]"
user@switch# set interfaces interface-range Interconnect_Device_Interfaces
  apply-groups qfabric-int
user@switch# set interfaces interface-range Interconnect_Device_Interfaces
  description "QFabric Interconnect Device"
user@switch# set interfaces interface-range Director_Device_DG0_LAG_Interfaces
  member "ge-[0-7]/0/22"
user@switch# set interfaces interface-range Director_Device_DG0_LAG_Interfaces
  description "QFabric Director Device - DG0"
user@switch# set interfaces interface-range Director_Device_DG0_LAG_Interfaces
  ether-options 802.3ad ae0
user@switch# set interfaces interface-range Director_Device_DG1_LAG_Interfaces
  member "ge-[0-7]/0/23"
user@switch# set interfaces interface-range Director_Device_DG1_LAG_Interfaces
  description "QFabric Director Device - DG1"
user@switch# set interfaces interface-range Director_Device_DG1_LAG_Interfaces
  ether-options 802.3ad ae1
user@switch# set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces
  member "xe-[0-7]/1/0"
user@switch# set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces
  description "QFabric Control Plane (Inter-VC LAG)"
user@switch# set interfaces interface-range Control_Plane_Inter_VC_LAG_Interfaces
  ether-options 802.3ad ae8
user@switch# set interfaces ae0 apply-groups qfabric-int
user@switch# set interfaces ae0 apply-groups qfabric-ae
user@switch# set interfaces ae0 description "QFabric Director Device - DG0"
user@switch# set interfaces ae1 apply-groups qfabric-int
user@switch# set interfaces ae1 apply-groups qfabric-ae
user@switch# set interfaces ae1 description "QFabric Director Device - DG1"
user@switch# set interfaces ae8 description "QFabric Control Plane (Inter-VC LAG)"
user@switch# set interfaces ae8 mtu 9216
user@switch# set interfaces ae8 aggregated-ether-options link-speed 10g
user@switch# set interfaces ae8 aggregated-ether-options lacp active
user@switch# set interfaces ae8 unit 0 family ethernet-switching vlan members
  qfabric
```

3. Configure settings to enable the Virtual Chassis to interoperate with your management network. Set a hostname, system services (such as Telnet and SSH), system log thresholds, management interface parameters, default routes, Virtual Chassis preprovisioning, and any additional preferences you might have.

```
[edit]
user@switch# set system host-name qfabric-control-plane
user@switch# set system services ssh
user@switch# set system services telnet
```



```
user@switch# set system services web-management http
user@switch# set system syslog user * any emergency
user@switch# set system syslog file messages any notice
user@switch# set system syslog file messages authorization info
user@switch# set system syslog file messages archive world-readable
user@switch# set system syslog file messages explicit-priority
user@switch# set system syslog file interactive-commands interactive-commands
  any
user@switch# set system syslog file secure authorization info
user@switch# set system syslog file default-log-messages any any
user@switch# set system syslog file default-log-messages structured-data
user@switch# set system syslog file console any error
user@switch# set system syslog time-format millisecond
user@switch# set interfaces vme unit 0 family inet address 192.168.157.26/24
user@switch# set routing-options static route 0.0.0.0/0 next-hop 192.168.157.1
user@switch# set virtual-chassis preprovisioned
user@switch# set virtual-chassis member 0 role routing-engine
user@switch# set virtual-chassis member 0 serial-number abc123
user@switch# set virtual-chassis member 1 role routing-engine
user@switch# set virtual-chassis member 1 serial-number def456
user@switch# set virtual-chassis member 2 role line-card
user@switch# set virtual-chassis member 2 serial-number ghi789
user@switch# set virtual-chassis member 3 role line-card
user@switch# set virtual-chassis member 3 serial-number jkl012
user@switch# set virtual-chassis member 4 role line-card
user@switch# set virtual-chassis member 4 serial-number mno321
user@switch# set virtual-chassis member 5 role line-card
user@switch# set virtual-chassis member 5 serial-number pqr654
user@switch# set virtual-chassis member 6 role line-card
user@switch# set virtual-chassis member 6 serial-number stu987
user@switch# set virtual-chassis member 7 role line-card
user@switch# set virtual-chassis member 7 serial-number vwx210
```

Results To view the configuration, issue the **show** command in configuration mode or the **show configuration** command in operational mode. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

The following configuration is the standard configuration that applies universally to both Virtual Chassis in your QFabric system control plane network.

```
groups {
  qfabric {
    system {
      commit {
        synchronize;
      }
    }
    chassis {
      redundancy {
        graceful-switchover;
      }
      aggregated-devices {
        ethernet {
          device-count 10;
        }
```

```
}
fpc 0 {
   pic 1 {
      sfpplus {
         pic-mode 10g;
      }
   }
}
fpc 1 {
   pic 1 {
      sfpplus {
         pic-mode 10g;
      }
   }
}
fpc 2 {
   pic 1 {
      sfpplus {
         pic-mode 10g;
      }
   }
}
fpc 3 {
   pic 1 {
      sfpplus {
         pic-mode 10g;
      }
   }
}
fpc 4 {
   pic 1 {
      sfpplus {
         pic-mode 10g;
      }
   }
}
fpc 5 {
   pic 1 {
      sfpplus {
         pic-mode 10g;
      }
   }
}
fpc 6 {
   pic 1 {
      sfpplus {
         pic-mode 10g;
      }
   }
}
fpc 7 {
   pic 1 {
      sfpplus {
         pic-mode 10g;
      }
   }
```

```
    }
    alarm {
      management-ethernet {
        link-down ignore;
      }
    }
    lcd-menu {
      fpc 0 {
        menu-item {
          maintenance-menu disable;
        }
      }
      fpc 1 {
        menu-item {
          maintenance-menu disable;
        }
      }
      fpc 2 {
        menu-item {
          maintenance-menu disable;
        }
      }
      fpc 3 {
        menu-item {
          maintenance-menu disable;
        }
      }
      fpc 4 {
        menu-item {
          maintenance-menu disable;
        }
      }
      fpc 5 {
        menu-item {
          maintenance-menu disable;
        }
      }
      fpc 6 {
        menu-item {
          maintenance-menu disable;
        }
      }
      fpc 7 {
        menu-item {
          maintenance-menu disable;
        }
      }
    }
  }
  protocols {
    rstp {
      interface ae8.0 {
        mode point-to-point;
      }
      interface all {
        edge;
```

```
            no-root-port;
        }
        bpdu-block-on-edge;
    }
    lldp {
        interface all;
    }
}
class-of-service {
    classifiers {
        ieee-802.1 onep_qfabric_classifier {
            forwarding-class class_3 {
                loss-priority low code-points [ 110 111 ];
            }
            forwarding-class class_2 {
                loss-priority low code-points 100;
                loss-priority high code-points 101;
            }
            forwarding-class class_0 {
                loss-priority low code-points 010;
                loss-priority high code-points 001;
            }
        }
        inet-precedence IP_qfabric_classifier {
            forwarding-class class_3 {
                loss-priority low code-points [ 110 111 ];
            }
            forwarding-class class_2 {
                loss-priority low code-points 100;
                loss-priority high code-points 101;
            }
            forwarding-class class_0 {
                loss-priority low code-points 010;
                loss-priority high code-points 001;
            }
        }
    }
    forwarding-classes {
        class class_3 queue-num 7;
        class class_2 queue-num 2;
        class class_0 queue-num 0;
    }
    interfaces {
        ge-*/0/* {
            scheduler-map cpe_network_smap;
            unit 0 {
                classifiers {
                    ieee-802.1 onep_qfabric_classifier;
                    inet-precedence IP_qfabric_classifier;
                }
            }
        }
        ae* {
            scheduler-map cpe_network_smap;
            unit 0 {
                classifiers {
```



```
                    ieee-802.1 onep_qfabric_classifier;
                    inet-precedence IP_qfabric_classifier;
                }
            }
        }
    }
    scheduler-maps {
        cpe_network_smap {
            forwarding-class class_3 scheduler scheduler_3;
            forwarding-class class_2 scheduler scheduler_2;
            forwarding-class class_0 scheduler scheduler_0;
        }
    }
    schedulers {
        scheduler_3 {
            buffer-size percent 30;
            priority strict-high;
        }
        scheduler_2 {
            transmit-rate percent 75;
            buffer-size percent 30;
            priority low;
        }
        scheduler_0 {
            transmit-rate percent 25;
            buffer-size percent 40;
            priority low;
        }
    }
}
ethernet-switching-options {
    nonstop-bridging;
    storm-control {
        interface all {
            bandwidth 10000;
        }
    }
}
vlans {
    qfabric {
        vlan-id 100;
        dot1q-tunneling;
    }
}
}
qfabric-int {
    interfaces {
        <*> {
            mtu 9216;
            unit 0 {
                family ethernet-switching {
                    port-mode access;
                    vlan {
                        members qfabric;
                    }
                }
```

```
            }
          }
        }
      }
      qfabric-ae {
        interfaces {
          <*> {
            aggregated-ether-options {
              link-speed 1g;
              lacp {
                active;
              }
            }
          }
        }
      }
    }
    apply-groups [qfabric];
    interfaces {
      interface-range Node_Device_Interfaces {
        member "ge-[0-7]/0/[0-15]";
        description "QFabric Node Device";
        apply-groups qfabric-int;
      }
      interface-range Interconnect_Device_Interfaces {
        member "ge-[0-7]/0/[18-21]";
        description "QFabric Interconnect Device";
        apply-groups qfabric-int;
      }
      interface-range Director_Device_DG0_LAG_Interfaces {
        member "ge-[0-7]/0/22";
        description "QFabric Director Device - DG0";
        ether-options {
          802.3ad ae0;
        }
      }
      interface-range Director_Device_DG1_LAG_Interfaces {
        member "ge-[0-7]/0/23";
        description "QFabric Director Device - DG1";
        ether-options {
          802.3ad ae1;
        }
      }
      interface-range Control_Plane_Inter_VC_LAG_Interfaces {
        member "xe-[0-7]/1/0";
        description "QFabric Control Plane (Inter-VC LAG)";
        ether-options {
          802.3ad ae8;
        }
      }
      ae0 {
        apply-groups [ qfabric-int qfabric-ae ];
        description "QFabric Director Device - DG0";
      }
      ae1 {
        apply-groups [ qfabric-int qfabric-ae ];
```



```
      description "QFabric Director Device - DG1";
    }
    ae8 {
      description "QFabric Control Plane (Inter-VC LAG)";
      mtu 9216;
      aggregated-ether-options {
        link-speed 10g;
        lacp {
          active;
        }
      }
      unit 0 {
        family ethernet-switching {
          vlan {
            members qfabric;
          }
        }
      }
    }
  }
```

The following portion of the configuration applies to the specific requirements of your management network. Modify this section to meet the needs of your network.

```
[edit]
system {
  host-name qfabric-control-plane;
  services {
    ssh;
    telnet;
    web-management {
      http;
    }
  }
  syslog {
    user * {
      any emergency;
    }
    file messages {
      any notice;
      authorization info;
      archive world-readable;
      explicit-priority;
    }
    file interactive-commands {
      interactive-commands any;
    }
    file secure {
      authorization info;
    }
    file default-log-messages {
      any any;
      structured-data;
    }
    file console {
      any error;
```

```
        }
        time-format millisecond;
    }
}
interfaces {
    vme {
        unit 0 {
            family inet {
                address 192.168.157.26/24;
            }
        }
    }
}
routing-options {
    static {
        route 0.0.0.0/0 next-hop 192.168.157.1;
    }
}
virtual-chassis {
    preprovisioned;
    member 0 {
        role routing-engine;
        serial-number abc123;
    }
    member 1 {
        role routing-engine;
        serial-number def456;
    }
    member 2 {
        role line-card;
        serial-number ghi789;
    }
    member 3 {
        role line-card;
        serial-number jkl012;
    }
    member 4 {
        role line-card;
        serial-number mno321;
    }
    member 5 {
        role line-card;
        serial-number pqr654;
    }
    member 6 {
        role line-card;
        serial-number stu987;
    }
    member 7 {
        role line-card;
        serial-number vwx210;
    }
}
```


To verify the syntax of your configuration before committing it, enter **commit check** from configuration mode. If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the Virtual Chassis configuration is working properly.

- Verifying the QFabric System Control Plane—Virtual Chassis VC0 on page 403
- Verifying the QFabric System Control Plane—Virtual Chassis VC1 on page 405

Verifying the QFabric System Control Plane—Virtual Chassis VC0

Purpose Verify that your first Virtual Chassis is operational.

Action Connect to the Junos OS CLI of Virtual Chassis VC0, either from your management network or from the console port of the master Virtual Chassis member. In operational mode, enter the **show virtual-chassis status** and **show interfaces terse** commands.

Sample Output

```
{master:0}
user@vc0> show virtual-chassis status

Preprovisioned Virtual Chassis
Virtual Chassis ID: c809.2c5d.9f7b
Virtual Chassis Mode: Enabled
                                          Mstr           Mixed Neighbor List
Member ID  Status   Serial No    Model    prio  Role      Mode  ID  Interface
0 (FPC 0)  Prsnt    BP0210471476 ex4200-24f 129  Master*      N  7  vcp-0
                                                                 1  vcp-1
1 (FPC 1)  Prsnt    BP0210460181 ex4200-24f 129  Backup       N  2  vcp-0
                                                                 0  vcp-1
2 (FPC 2)  Prsnt    BP0210458724 ex4200-24f   0  Linecard     N  3  vcp-0
                                                                 1  vcp-1
3 (FPC 3)  Prsnt    BP0210477189 ex4200-24f   0  Linecard     N  4  vcp-0
                                                                 2  vcp-1
4 (FPC 4)  Prsnt    BP0210471467 ex4200-24f   0  Linecard     N  5  vcp-0
                                                                 3  vcp-1
5 (FPC 5)  Prsnt    BP0210460118 ex4200-24f   0  Linecard     N  6  vcp-0
                                                                 4  vcp-1
6 (FPC 6)  Prsnt    BP0210458742 ex4200-24f   0  Linecard     N  7  vcp-0
                                                                 5  vcp-1
7 (FPC 7)  Prsnt    BP0210477198 ex4200-24f   0  Linecard     N  0  vcp-0
                                                                 6  vcp-1

{master:0}
user@vc0> show interfaces terse
Interface               Admin Link Proto    Local                 Remote
ge-0/0/0                up    up
ge-0/0/0.0              up    up   eth-switch
ge-0/0/1                up    up
ge-0/0/1.0              up    up   eth-switch
ge-0/0/2                up    up
ge-0/0/2.0              up    up   eth-switch
ge-0/0/3                up    up
ge-0/0/3.0              up    up   eth-switch
```

```
ge-0/0/4                up    up
ge-0/0/4.0              up    up    eth-switch
ge-0/0/5                up    up
ge-0/0/5.0              up    up    eth-switch
ge-0/0/6                up    up
ge-0/0/6.0              up    up    eth-switch
ge-0/0/7                up    up
ge-0/0/7.0              up    up    eth-switch
ge-0/0/19               up    up
ge-0/0/19.0             up    up    eth-switch
ge-0/0/22               up    up
ge-0/0/22.0             up    up    aenet     --> ae0.0
ge-0/0/23               up    up
ge-0/0/23.0             up    up    aenet     --> ae1.0
xe-0/1/0                up    up
xe-0/1/0.0              up    up    aenet     --> ae8.0
xe-0/1/2                up    up
ge-1/0/19               up    up
ge-1/0/19.0             up    up    eth-switch
ge-1/0/22               up    up
ge-1/0/22.0             up    up    aenet     --> ae0.0
ge-1/0/23               up    up
ge-1/0/23.0             up    up    aenet     --> ae1.0
xe-1/1/0                up    up
xe-1/1/0.0              up    up    aenet     --> ae8.0
xe-1/1/2                up    up
ge-2/0/19               up    up
ge-2/0/19.0             up    up    eth-switch
ge-2/0/22               up    up
ge-2/0/22.0             up    up    aenet     --> ae0.0
ge-2/0/23               up    up
ge-2/0/23.0             up    up    aenet     --> ae1.0
xe-2/1/0                up    up
xe-2/1/0.0              up    up    aenet     --> ae8.0
xe-2/1/2                up    up
ge-3/0/19               up    up
ge-3/0/19.0             up    up    eth-switch
xe-3/1/0                up    up
xe-3/1/0.0              up    up    aenet     --> ae8.0
xe-3/1/2                up    up
xe-4/1/0                up    up
xe-4/1/0.0              up    up    aenet     --> ae8.0
xe-4/1/2                up    up
xe-5/1/0                up    up
xe-5/1/0.0              up    up    aenet     --> ae8.0
xe-5/1/2                up    up
xe-6/1/0                up    up
xe-6/1/0.0              up    up    aenet     --> ae8.0
xe-6/1/2                up    up
xe-7/1/0                up    up
xe-7/1/0.0              up    up    aenet     --> ae8.0
xe-7/1/2                up    up
vcp-0                   up    up
vcp-0.32768             up    up
vcp-1                   up    up
vcp-1.32768             up    up
ae0                     up    up
ae0.0                   up    up    eth-switch
ae1                     up    up
ae1.0                   up    up    eth-switch
ae2                     up    down
```



```
ae3                     up    down
ae4                     up    down
ae5                     up    down
ae6                     up    down
ae7                     up    down
ae8                     up    up
ae8.0                   up    up   eth-switch
ae9                     up    down
bme0                    up    up
bme0.32768              up    up   inet     128.0.0.1/2
                                            128.0.0.16/2
                                            128.0.0.32/2
                                   tnp      0x10
bme0.32770              up    up   eth-switch
bme0.32771              down  up   eth-switch
bme0.32772              down  up   eth-switch
bme0.32773              down  up   eth-switch
bme0.32774              down  up   eth-switch
bme0.32775              down  up   eth-switch
bme0.32776              down  up   eth-switch
dsc                     up    up
gre                     up    up
ipip                    up    up
lo0                     up    up
lo0.0                   up    up   inet     10.255.195.96      --> 0/0
                                   iso
47.0005.80ff.f800.0000.0108.0001.0102.5519.5096
                                   inet6    abcd::10.255.195.96
                                            fe80::21f:120f:fc39:6d80
lsi                     up    up
me0                     up    up
mtun                    up    up
pimd                    up    up
pime                    up    up
tap                     up    up
vlan                    up    up
vme                     up    up
vme0.0                  up    up   inet     192.168.157.26/24
```

Meaning In the output of the **show virtual-chassis status** command, if all eight members appear, the Virtual Chassis is operational.

In the output of the **show interfaces terse** command, if all interfaces that connect to the QFabric system devices are listed as up (such as ge-0/0/0 through ge-0/0/7 for the Node devices; ge-0/0/19, ge-1/0/19, ge-2/0/19, and ge-3/0/19 for the Interconnect devices; ge-0/0/22, ge-0/0/23, ge-1/0/22, ge-1/0/23, ge-2/0/22, and ge-2/0/23 for the Director devices; and xe-0/1/0, xe-1/1/0, xe-2/1/0, xe-3/1/0, xe-4/1/0, xe-5/1/0, xe-6/1/0, and xe-7/1/0 for the inter-Virtual Chassis connections), the control plane is properly connected.

Verifying the QFabric System Control Plane—Virtual Chassis VC1

Purpose Verify that your second Virtual Chassis is operational.

Action Connect to the Junos OS CLI of Virtual Chassis VC1, either from your management network or from the console port of the master Virtual Chassis member. In operational mode, enter the **show virtual-chassis status** and **show interfaces terse** commands.

Sample Output

```
{master:0}
user@vc1> show virtual-chassis status

Preprovisioned Virtual Chassis
Virtual Chassis ID: c809.2c5d.9f8a
Virtual Chassis Mode: Enabled
                                          Mstr           Mixed Neighbor List
Member ID  Status   Serial No    Model    prio  Role      Mode  ID  Interface
0 (FPC 0)  Prsnt    BP0210471477 ex4200-24f 129  Master*      N  7  vcp-0
                                                                 1  vcp-1
1 (FPC 1)  Prsnt    BP0210460182 ex4200-24f 129  Backup       N  2  vcp-0
                                                                 0  vcp-1
2 (FPC 2)  Prsnt    BP0210458725 ex4200-24f   0  Linecard     N  3  vcp-0
                                                                 1  vcp-1
3 (FPC 3)  Prsnt    BP0210477180 ex4200-24f   0  Linecard     N  4  vcp-0
                                                                 2  vcp-1
4 (FPC 4)  Prsnt    BP0210471478 ex4200-24f   0  Linecard     N  5  vcp-0
                                                                 3  vcp-1
5 (FPC 5)  Prsnt    BP0210460128 ex4200-24f   0  Linecard     N  6  vcp-0
                                                                 4  vcp-1
6 (FPC 6)  Prsnt    BP0210458752 ex4200-24f   0  Linecard     N  7  vcp-0
                                                                 5  vcp-1
7 (FPC 7)  Prsnt    BP0210477108 ex4200-24f   0  Linecard     N  0  vcp-0
                                                                 6  vcp-1

{master:0}
user@vc1> show interfaces terse
Interface               Admin Link Proto    Local                 Remote
ge-0/0/0                up    up
ge-0/0/0.0              up    up   eth-switch
ge-0/0/1                up    up
ge-0/0/1.0              up    up   eth-switch
ge-0/0/2                up    up
ge-0/0/2.0              up    up   eth-switch
ge-0/0/3                up    up
ge-0/0/3.0              up    up   eth-switch
ge-0/0/4                up    up
ge-0/0/4.0              up    up   eth-switch
ge-0/0/5                up    up
ge-0/0/5.0              up    up   eth-switch
ge-0/0/6                up    up
ge-0/0/6.0              up    up   eth-switch
ge-0/0/7                up    up
ge-0/0/7.0              up    up   eth-switch
ge-0/0/19               up    up
ge-0/0/19.0             up    up   eth-switch
ge-0/0/22               up    up
ge-0/0/22.0             up    up   aenet    --> ae0.0
ge-0/0/23               up    up
ge-0/0/23.0             up    up   aenet    --> ae1.0
xe-0/1/0                up    up
xe-0/1/0.0              up    up   aenet    --> ae8.0
xe-0/1/2                up    up
ge-1/0/19               up    up
ge-1/0/19.0             up    up   eth-switch
ge-1/0/22               up    up
ge-1/0/22.0             up    up   aenet    --> ae0.0
ge-1/0/23               up    up
```



```
ge-1/0/23.0             up    up   aenet    --> ae1.0
xe-1/1/0                up    up
xe-1/1/0.0              up    up   aenet    --> ae8.0
xe-1/1/2                up    up
ge-2/0/19               up    up
ge-2/0/19.0             up    up   eth-switch
ge-2/0/22               up    up
ge-2/0/22.0             up    up   aenet    --> ae0.0
ge-2/0/23               up    up
ge-2/0/23.0             up    up   aenet    --> ae1.0
xe-2/1/0                up    up
xe-2/1/0.0              up    up   aenet    --> ae8.0
xe-2/1/2                up    up
ge-3/0/19               up    up
ge-3/0/19.0             up    up   eth-switch
xe-3/1/0                up    up
xe-3/1/0.0              up    up   aenet    --> ae8.0
xe-3/1/2                up    up
xe-4/1/0                up    up
xe-4/1/0.0              up    up   aenet    --> ae8.0
xe-4/1/2                up    up
xe-5/1/0                up    up
xe-5/1/0.0              up    up   aenet    --> ae8.0
xe-5/1/2                up    up
xe-6/1/0                up    up
xe-6/1/0.0              up    up   aenet    --> ae8.0
xe-6/1/2                up    up
xe-7/1/0                up    up
xe-7/1/0.0              up    up   aenet    --> ae8.0
xe-7/1/2                up    up
vcp-0                   up    up
vcp-0.32768             up    up
vcp-1                   up    up
vcp-1.32768             up    up
ae0                     up    down
ae0.0                   up    down eth-switch
ae1                     up    down
ae1.0                   up    down eth-switch
ae2                     up    down
ae3                     up    down
ae4                     up    down
ae5                     up    down
ae6                     up    down
ae7                     up    down
ae8                     up    up
ae8.0                   up    up   eth-switch
ae9                     up    down
bme0                    up    up
bme0.32768              up    up   inet     128.0.0.1/2
                                            128.0.0.16/2
                                            128.0.0.32/2
                                   tnp      0x10
bme0.32770              up    up   eth-switch
bme0.32771              down  up   eth-switch
bme0.32772              down  up   eth-switch
bme0.32773              down  up   eth-switch
bme0.32774              down  up   eth-switch
bme0.32775              down  up   eth-switch
bme0.32776              down  up   eth-switch
dsc                     up    up
gre                     up    up
```

```
ipip                    up    up
lo0                     up    up
lo0.0                   up    up   inet     10.255.195.97       --> 0/0
                                   iso
47.0005.80ff.f800.0000.0108.0001.0102.5519.5097
                                   inet6    abcd::10.255.195.97
                                            fe80::21f:120f:fc39:6d81
lsi                     up    up
me0                     up    up
mtun                    up    up
pimd                    up    up
pime                    up    up
tap                     up    up
vlan                    up    up
vme                     up    up
vme0.0                  up    up   inet     192.168.157.27/24
```

Meaning In the output of the **show virtual-chassis status** command, if all eight members appear, the Virtual Chassis is operational.

In the output of the **show interfaces terse** command, if all interfaces that connect to the QFabric system devices are listed as up (such as ge-0/0/0 through ge-0/0/7 for the Node devices; ge-0/0/19, ge-1/0/19, ge-2/0/19, and ge-3/0/19 for the Interconnect devices; ge-0/0/22, ge-0/0/23, ge-1/0/22, ge-1/0/23, ge-2/0/22, and ge-2/0/23 for the Director devices; and xe-0/1/0, xe-1/1/0, xe-2/1/0, xe-3/1/0, xe-4/1/0, xe-5/1/0, xe-6/1/0, and xe-7/1/0 for the inter-Virtual Chassis connections), the control plane is properly connected.

NOTE: The ae0 and ae1 LAG connections on Virtual Chassis VC1 appear as down in the output of the **show interfaces terse** command because they are the backup connections to the Director devices. The active, primary LAG connections are typically on Virtual Chassis VC0.

Related Documentation

- QFX3000-G QFabric System Installation Overview on page 95
- Installing and Connecting a QFX3100 Director Device on page 173
- Installing and Connecting a QFX3008-I Interconnect Device on page 185
- Installing and Connecting a QFX3500 Device on page 241
- Installing and Connecting a QFX3600 or QFX3600-I Device on page 223
- *Installing and Connecting an EX4200 Switch*
- *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*
- Understanding the QFabric System Control Plane on page 39

Importing a QFX3000-G QFabric System Control Plane Virtual Chassis Configuration with a USB Flash Drive

Supported Platforms QFabric System

There are two methods of importing the configuration file to the QFabric control plane Virtual Chassis. You can load the configuration file onto a USB flash drive from the Juniper Networks software download site before inserting the USB flash drive into the Virtual Chassis USB port, or you can copy and paste the configuration from the following example (see "Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane" on page 336).

Before you begin:

- Rack, mount, and install your QFabric system hardware (Director group, Interconnect devices, and Node devices). For more information, see "Installing and Connecting a QFX3100 Director Device" on page 173, "Installing and Connecting a QFX3008-I Interconnect Device" on page 185, and "Installing and Connecting a QFX3500 Device" on page 241.
- Rack, mount, and install your Virtual Chassis hardware (EX4200 switches). For more information, see *Installing and Connecting an EX4200 Switch*.
- Create two Virtual Chassis of four members each. For more information, see *Configuring an EX4200, EX4500, or EX4550 Virtual Chassis (CLI Procedure)*
- Select a USB flash drive that meets the QFabric control plane Virtual Chassis USB port specifications. See *USB Port Specifications for an EX Series Switch*.
- Use a computer or other device to load the configuration file from the Internet and copy it to the USB flash drive.

To import the Virtual Chassis configuration file into a USB flash drive:

1. In a browser, go to http://www.juniper.net/support/downloads/junos.html .

   The Junos Platforms Download Software page appears.

   NOTE: **To access the download site, you must have a service contract with Juniper Networks and an access account. If you need help obtaining an account, complete the registration form at the Juniper Networks website https://www.juniper.net/registration/Register.jsp .**

2. Click **QFX3100** in the **QFX Series** section.

   The QFX3100 Download Software page appears.

3. From the **Release** list, select the number of the software version for which you want to download the Virtual Chassis configuration file.
4. Select the **Software** tab and then click **QFX3000-G QFabric System - Control Plane Virtual Chassis Configuration** in the **QFabric System Install Package and Media** section.

   A login page appears.

5. Enter your user ID and password and press **Enter**.
6. Read the End User License Agreement, select the **I agree** option button, and then click **Proceed**.

7. Save the Virtual Chassis configuration file onto the USB flash drive using your computer or other device.
8. Remove the USB flash drive from the computer or other device.
9. Insert the USB flash drive into the USB port on the EX4200 switch.
10. Save the file to **/var/home/*username*** .
11. Load the configuration file into the switch.

    user@switch# **load override *filename***
12. Commit the configuration.

    user@switch# **commit**
    Load complete
13. Remove the USB flash drive from the switch.

Related Documentation

- Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane on page 336

Generating the MAC Address Range for a QFabric System

Supported Platforms QFabric System

Each QFabric system requires a range of reserved MAC addresses that is assigned by Juniper Networks. You must specify the MAC address range when you perform the initial setup of the QFX3100 Director group (see "Performing the QFabric System Initial Setup on a QFX3100 Director Group" on page 411). Additionally, refer to Activate Your QFabric System for more information.

When you purchase a QFabric system, you receive an e-mail containing a software serial number from Juniper Networks. You can use the software serial number to generate the MAC address range for your QFabric system.

To generate the MAC address range for a QFabric system:

1. In a browser, log in to the Juniper Networks License Management System at https://www.juniper.net/lcrs/license.do.

   The Manage Product Licenses page appears.

   NOTE: To access the licensing site, you must have a service contract with Juniper Networks and an access account. If you need help obtaining an account, complete the registration form at the Juniper Networks website https://www.juniper.net/registration/Register.jsp .
2. On the Generate Licenses tab, select **QFX Series Product** from the drop-down list, and click **Go**.

   The Generate Licenses - QFX Series Product page appears.

3. Select the **QFX Series Product Fabric** option button, and click **Continue**.

   The Generate Licenses - QFX Series Product Fabrics page appears.

4. In the **Software Serial No** field, enter the software serial number for your QFabric system, and press the Tab key.

   The starting MAC address and number of MAC addresses for your QFabric system are displayed.

5. (Optional) Click **Download/Email MAC Address** to download or e-mail the MAC address range.

   The Download/Email MAC Address page appears.

   To download the MAC address range:

   - Select the **Download to this computer** option button, and click **OK**.

   To e-mail the MAC address range:

   - Select the **Send e-mail to *e-mail ID*** option button, and click **OK**.

Related Documentation

- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411

Performing the QFabric System Initial Setup on a QFX3100 Director Group

Supported Platforms QFabric System

You must perform the initial setup of the QFX3100 Director group through the console port. (Before configuring the QFX3100 Director group, see "Installing and Connecting a QFX3100 Director Device" on page 173.)

Before you begin connecting and configuring a QFX3100 Director group, set the following parameter values on the console server or PC:

- Baud Rate—9600
- Flow Control—None
- Data—8
- Parity—None
- Stop Bits—1
- DCD State—Disregard

NOTE: When you use the SecureCRT client to connect to a Director device for the initial setup of a QFabric system, the backspace key does not work. As a workaround, use the Shift+Delete key combination in SecureCRT as a backspace key equivalent or use a different UNIX client to support the backspace key natively.

The initial setup requires that you specify certain values for your QFabric system. These include:

- Software serial number for your QFabric system (found in the e-mail containing the software serial number that you received from Juniper Networks when you purchased your QFabric system)
- IP addresses and a default gateway IP address for your QFabric system default partition
- IP addresses for your Director group device management ports
- Range of reserved MAC addresses for your QFabric system (see "Generating the MAC Address Range for a QFabric System" on page 410 or Activate Your QFabric System for this information)
- Root password for your Director group
- Root password for the QFabric system components such as the Node devices, Interconnect devices, and infrastructure

Performing an Initial Setup

The initial setup can be performed either manually or by using a previously saved backup configuration.

To connect and configure the QFX3100 Director group manually from the console:

1. Connect the console port of one of the Director devices to a laptop or PC using an RJ-45 to DB-9 rollover cable. An RJ-45 to DB-9 rollover cable is supplied with each QFX3100 Director device. The console (**CONSOLE**) port is located on the front panel of the device.
2. Log in as **root**. If the software booted before you connected to the console port, you might need to press the Enter key for the prompt to appear.

   ```
   dg0 login: root
   ```

   NOTE: **The prompt is either dg0 login or dg1 login depending on the Director device to which you connected your cable.**

3. For manual configuration or for initial installation, enter **no** when prompted to specify the backup file. The current Director device configuration is displayed.

   ```
   Initial Configuration
   Before you can access the QFabric system, you must complete the initial setup
   of the Director group by using the steps that follow. If the initial setup
   procedure does not complete successfully, log out of the Director device and
   then log back in to restart this setup menu.
   Continue? [y/n]: y
   You may enter the configuration manually or restore from a backup.
   Specify a backup file? [y/n]: n
   Existing local configuration:
   ```

4. Enter the IP addresses and prefixes for both Director devices.

   NOTE: The Director group devices and QFabric system default partition IP addresses must be on the same subnet as your management network.

   ```
   Please enter the Director Group 0 IP address and prefix: ip address/prefix
   Please enter the Director Group 1 IP address and prefix: ip address/prefix
   Please enter the Director Group Subnet Mask: subnet mask
   ```

5. Enter the gateway IP address for the Director group.

   ```
   Please enter the Director Group gateway IP address: gateway ip address
   ```

6. Enter the default partition IP address. (You will use this address to log in to the QFabric system on subsequent connections.)

   ```
   Please enter the QFabric default partition IP address: ip address
   ```

7. (Optional) Enter the IPv6 addresses for both Director devices and the gateway IPv6 address for the Director group.

   ```
   Would you like to input IPv6 addresses for Director Group nodes? (y/n): y
   Please enter the Director Group 0 IPv6 address or 'y' to use /0: IPv6 address
   Please enter the Director Group 1 IPv6 address or 'y' to use /0: IPv6 address
   Please enter the Director Group gateway IPv6 address or 'y' to use /0 : IPv6
   address
   ```

8. Enter the MAC address information.

   ```
   Please enter the starting MAC address: mac address
   Please enter the number of MAC addresses: number of mac addresses
   ```

   NOTE: The minimum number of MAC addresses accepted is 4000.

9. Enter the QFabric system software serial number.

   ```
   Please enter the QFabric serial ID: serial id
   ```

10. Create the Director device root password.

    ```
    Please enter a Director device root password: director-device-password
    Please re-enter password: director-device password
    ```

11. Create a password for the QFabric system components.

    NOTE: If you need to change the component password after the QFabric system is operational, issue the **device-authentication** statement at the **[edit system]** hierarchy level in the QFabric default partition CLI.

    ```
    Please enter a password for QFabric components (Node devices, Interconnect
    devices, and infrastructure): component-password
    Please re-enter password: component-password
    Note: please record your passwords for recovery purposes.
    ```

    CAUTION: Carefully save your passwords for future reference, because some cannot be recovered on a QFabric system.

12. Enter the QFabric system platform type.

```
Supported platform types:
1. QFX3000-G
2. QFX3000-M
Please select product type: number corresponding to platform type
```

13. Confirm the initial configuration. Ensure that the information is accurate before proceeding.

```
Does the following configuration appear correct?
    Director Group 0 IP/Prefix              [10.49.214.74/24]
    Director Group 1 IP/Prefix              [10.49.214.75/24]
    Director Group Gateway                  [10.49.214.254]
    Starting MAC address                    [00:11:00:00:00:00]
    Number of MAC addresses                 [4000]
    QFabric Default Partition IP            [10.49.214.150]
    QFabric serial ID                       [qfsn-123456789]
    Director Device Password                [********]
    QFabric component Password              [********]
    Product Type:                           [QFX3000-G]
```

14. Confirm the initial setup.

```
[y/n]: y
```

CAUTION: Resetting this initial configuration requires assistance from Juniper Networks customer support or "Performing a QFabric System Recovery Installation on the Director Group" on page 672. As a result, make sure you are certain the values you entered are correct before you enter **yes**.

15. The director device displays the configuration.

```
Saving temporary configuration...
Configuring peer...
Configuring local interfaces...
Configuring interface eth0 with [10.49.214.74/24:10.49.214.254]
Configured interface eth0 with [10.49.214.74/24:10.49.214.254]
Configuring QFabric software with an initial pool of 4000 MAC addresses
[00:11:00:00:00:00 - 00:11:00:00:0f:3b]
Configuring QFabric address [10.49.214.150]
Reconfiguring QFabric software static configuration
Applying the new Director device password
Applying the QFabric component password
First install initial configuration, generating and sharing SSH keys.
First install initial configuration, generating SSH keys.
Configuration complete. Director Group services will auto start within 30
seconds.
```


Restoring a Backup Configuration

Before you restore a backup configuration for the Director group:

- You must have a backup configuration file. You create the backup file with the **request system software configuration-backup** command and save it on an external USB flash drive.
- If you need to reinstall the system software, perform that operation first (see "Performing a QFabric System Recovery Installation on the Director Group" on page 672).

To connect and configure the Director group with a backup configuration:

1. Log in as **root**. If the software booted before you connected to the console port, you might need to press the Enter key for the prompt to appear.

   ```
   dg0 login: root
   ```

   NOTE: The prompt is either **dg0 login** or **dg1 login** depending on the Director device to which you connected your cable.

2. To use a previously saved backup configuration, enter **yes** when prompted to specify the backup file and then enter the path and filename of the backup configuration.

   ```
   Specify a back up file? [y/n]: y
   Please specify the full path of the configuration backup file: path/filename
   ```
3. Confirm the restoration of the configuration from the backup. Ensure that the information is accurate before proceeding.

   ```
   Does the following configuration appear correct?
       Director Group 0 IP/Prefix              [10.49.214.74/24]
       Director Group 1 IP/Prefix              [10.49.214.75/24]
       Director Group Gateway                  [10.49.214.254]
       Starting MAC address                    [00:11:00:00:00:00]
       Number of MAC addresses                 [4000]
       QFabric Default Partition IP            [10.49.214.150]
       QFabric serial ID                       [qfsn-123456789]
       Director Device Password                [********]
       QFabric component Password              [********]
       Product Type:                           [QFX3000-G]
   ```

4. Confirm the backup restoration.

   ```
   [y/n]: y
   ```

   The Director device displays the configuration.

   ```
   Saving temporary configuration...
   Configuring peer...
   Configuring local interfaces...
   Configuring interface eth0 with [10.49.214.74/24:10.49.214.254]
   Configured interface eth0 with [10.49.214.74/24:10.49.214.254]
   Configuring QFabric software with an initial pool of 4000 MAC addresses
   [00:11:00:00:00:00 - 00:11:00:00:0f:3b]
   Configuring QFabric address [10.49.214.150]
   Reconfiguring QFabric software static configuration
   Applying the new Director device password
   Applying the QFabric component password
   ```



```
Configuration complete. Director Group services will auto start within 30
seconds.
```

Related Documentation

- Generating the MAC Address Range for a QFabric System on page 410
- Gaining Access to the QFabric System Through the Default Partition on page 421
- QFabric System Initial and Default Configuration Information on page 327
- Installing and Connecting a QFX3100 Director Device on page 173
- Performing a QFabric System Recovery Installation on the Director Group on page 672
- *request system software configuration-backup*
- **device-authentication on page 472**

CHAPTER 18

QFabric System Configuration

Understanding QFabric System Administration Tasks and Utilities

Supported Platforms QFabric System

The following items describe QFabric system components, common administration tasks that you perform on the QFabric system, or utilities that help you to manage the QFabric system and its components.

- **Converting the device mode (QFX3500 and QFX3600 devices)**—Enables you to convert a QFX3500 or QFX3600 device into a Node device so it can be deployed within a QFabric system. By default, QFX3500 and QFX3600 devices operate in *standalone* mode. Before the devices can participate within a QFabric system environment, you must change the device mode for the switch to *node-device* mode. To convert a QFX3500 or QFX3600 device from standalone mode to Node device mode, connect to the console port of the device, issue the **request chassis device-mode node-device** command, verify the future device mode with the **show chassis device-mode** command, connect the management port of the device to the QFabric system control plane, and reboot the device.

  NOTE:
  - Before you convert the device mode, you must upgrade the software on your standalone device to a QFabric system Node and Interconnect device software package that matches the QFabric system complete software package used by your QFabric system. For example, if the complete software package for your QFabric system is named **jinstall-qfabric-11.3X30.6.rpm**, you need to install the **jinstall-qfx-11.3X30.6-domestic-signed.tgz** package on your standalone device. Matching the two software packages ensures a smooth and successful addition of the device to the QFabric system inventory.
  - Converting the device mode erases the switch configuration. We recommend that you save your configuration to an external server or USB flash drive before executing the device mode conversion commands and rebooting the switch.

- **QFabric system control plane Ethernet network (EX4200 switches to support the QFabric system)**—Provides a separate control plane network within the QFabric system to handle management traffic. This design enables the data plane network to focus on efficient, low-latency delivery of data, voice, and video traffic.
  - The QFX3000-G QFabric system control plane uses two sets of four EX4200 switches each, configured as a pair of Virtual Chassis to connect all components within the QFabric system. The dual Virtual Chassis architecture provides redundancy and high availability to ensure reliable QFabric system operation for the Director group, the Interconnect devices, and the Node devices.
  - The QFX3000-M QFabric system control plane uses two EX4200 switches to connect all components within the QFabric system. The two EX4200 switches provide redundancy and high availability to ensure reliable QFabric system operation for the Director group, the Interconnect devices, and the Node devices.

  Because the level of detail necessary to fully understand the control plane connections, cabling, topology, and configuration is beyond the scope of this topic, see:

  - "Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane" on page 336 for information about a QFX3000-G QFabric system with a copper-based control plane

  - *Example: Configuring EX4200 Switches for the QFX3000-M QFabric System Control Plane* for information about a QFX3000-M QFabric system with a copper or fiber-based control plane

- **QFabric system data plane network**—Provides a separate network to handle rapid delivery of data plane traffic. The data plane uses QSFP+ interfaces and fiber-optic cabling to connect QFabric system components at speeds of 40 Gbps. By creating a redundant set of connections between the Node devices and the backplane-like Interconnect devices, the data plane enables the Node devices to appear as if they are directly connected to one another in a single tier. To view the connection status of the QFabric system data plane, issue the **show chassis fabric connectivity** command.

- **Director group (QFX3100 Director devices within a QFabric system)**—Provides a redundant, resilient platform that manages the QFabric system components. Two QFX3100 Director devices work together to ensure high availability of the system and load-balance system processes, such as the command-line interface (CLI) and shared storage. To configure the Director group for operation, install and cable two Director devices as a Director group, connect to the console port of one of the Director devices, and perform the initial setup. The setup script starts automatically the first time you power on the Director device. For more information, see "Performing the QFabric System Initial Setup on a QFX3100 Director Group" on page 411. To monitor the status of the Director group, log in to the QFabric system default partition and issue the **show fabric administration inventory director-group status** command.

- **Automatic detection and configuration of QFabric system components**—Enables QFabric system components to join the QFabric system automatically. When you install the QFabric system, activate the control plane and Director group, and power on the Node and Interconnect devices, the Director group recognizes these devices, sends each device its own portion of the Junos OS configuration, and adds them to the QFabric system inventory. By default, each individual Node device is placed into a unique server Node group that contains only that single Node device. No configuration is required for the default assignments. The default settings can be overridden when you add Node devices into a redundant server Node group (containing a pair of Node devices) or a network Node group (that can contain up to eight Node devices, run routing protocols, and connect to external networks).

- **QFabric system Routing Engines**—Support the QFabric system by providing virtual, redundant instances of Junos OS that run on the Director group. The Routing Engines perform fabric management tasks, maintain control of the fabric, and host the operation of routing protocols for network Node groups. Because they are generated in pairs, the Routing Engines provide additional high availability for the QFabric system. No configuration is required. To view the status of the QFabric system Routing Engines, issue the **show fabric administration inventory infrastructure** command.

- **QFabric system command-line interface**—Enables you to configure all components of the QFabric system from a single location by using the Junos OS CLI. To access this central location, you need to log in to the QFabric system default partition (an IP address you specify during the initial setup of the Director group). For more information, see "Performing the QFabric System Initial Setup on a QFX3100 Director Group" on page 411.

Most existing Junos OS configuration statements and operational mode commands are supported (for example, interfaces, VLANs, protocols, and firewall filters).

To view QFabric system components and check connectivity of the system, issue the **show fabric administration inventory** commands.

- **Alias configuration for Director devices, Interconnect devices, and Node devices**—Enables you to set user-defined aliases for QFabric system Director devices, Interconnect devices, and Node devices to facilitate usability of the QFabric system as it scales. Aliased names appear in the output of many QFabric system operational commands, such as **show fabric administration inventory**. To map the hardware serial number of a Director device, Interconnect device or Node device to a user-defined name, see "Configuring Aliases for the QFabric System" on page 430.
- **Node group configuration**—Enables you to cluster several Node devices together to provide redundancy, resiliency, and high availability at the ingress and egress points of the QFabric system. There are two types of Node groups you can configure:
  - **Redundant server Node group**—Enables the grouped Node devices to connect the QFabric system to local servers and storage devices. A redundant server Node group can contain a maximum of two Node devices and supports LAG connections that can span both devices.

    NOTE: The Node devices in a redundant server Node group must be of the same type, either a QFX3500 Node or a QFX3600 Node. You cannot add a QFX3500 and a QFX3600 Node device to the same redundant server Node group.

  - **Network Node group**—Enables the grouped Node devices to connect the QFabric system to external networks and run routing protocols such as BGP and OSPF. A network Node group can contain up to eight Node devices and supports LAG connections.

    NOTE:
    - The name of the network Node group in the default partition, *NW-NG-0*, is preset. You must use this name when adding Node devices to the network Node group. You cannot specify a different name.
    - When you configure routing protocols on the QFabric system, you must use interfaces from the Node devices assigned to the network Node group. If you try to configure routing protocols on interfaces from the Node devices assigned to server Node groups, the configuration commit operation fails.

To configure a redundant server Node group, include two Node devices with the **node-device** ***node-device-name*** statement at the **[edit fabric resources node-group** ***node-group-name*****]** hierarchy level.

To configure a network Node group, include the **network-domain** statement at the **[edit fabric resources node-group NW-NG-0]** hierarchy level. In addition, include between two and eight Node devices with the **node-device** ***node-device-name*** statement at the **[edit fabric resources node-group NW-NG-0]** hierarchy level.

Related Documentation

- Converting the Device Mode for a QFabric System Component on page 329
- Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane on page 336
- *Example: Configuring EX4200 Switches for the QFX3000-M QFabric System Control Plane*
- **show chassis fabric connectivity on page 616**
- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411
- **show fabric administration inventory director-group status on page 645**
- **show fabric administration inventory infrastructure on page 650**
- **show fabric administration inventory on page 640**
- Configuring Aliases for the QFabric System on page 430
- Configuring Node Groups for the QFabric System on page 447

Gaining Access to the QFabric System Through the Default Partition

Supported Platforms QFabric System

This topic explains how to log in to the QFabric system default partition so you can access the Junos OS command-line interface (CLI) and configure the system.

Before you access the QFabric system default partition:

- Install the QFabric system hardware components, including connecting the network and power cables.
- Convert any QFX3500 and QFX3600 standalone devices to *node-device* mode.
- Connect all components to the control plane Ethernet network.
- Turn on the Director group and run the initial setup script. Remember to write down the IP address of the default partition, which must be on the same subnetwork as your management network.

To access the default partition:

1. Open an SSH connection to the QFabric default partition. Use the IP address you set for the default partition as part of the QFabric initial setup procedure. In your network, you can simplify access to the QFabric system by mapping the default partition IP address to a name.

```
[root@customer ~]# ssh root@192.168.1.49
Last login: Fri Sep  2 21:34:54 2011 from customer
Juniper QFabric Director 11.3.5043 2011-08-26 18:05:21 UTC
```



```
RUNNING ON DIRECTOR DEVICE : dg1
root@qfabric>
```

NOTE: The QFabric system is load balanced, so the CLI session might be hosted on either Director device DG0 or DG1.

2. Enter configuration mode (the default mode in the QFabric system is **configure private**), configure a root password and hostname for the default partition, and assign QFabric administrator privileges to the root user.

```
root@qfabric> configure
warning: Using private edit on QF/Director
warning: uncommitted changes will be discarded on exit
Entering configuration mode

[edit]
root@qfabric# set system root-authentication plain-text-password
New password: My-Password
Retype new password: My-Password

root@qfabric# set system root-authentication remote-debug-permission qfabric-admin
root@qfabric# set system host-name my-qfabric

[edit]
root@qfabric# commit
commit complete

[edit]
root@my-qfabric#
```

3. Configure your QFabric system as needed. You can configure routing protocols, interfaces, VLANs, and other features as needed. Keep in mind that interfaces require the four-level interface naming convention (device-name:*fpc/pic/port*).

Related Documentation

- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411
- QFabric System Initial and Default Configuration Information on page 327
- Understanding Interfaces on the QFabric System on page 11
-

Example: Configuring QFabric System Login Classes

Supported Platforms QFabric System

This example shows you how to assign the correct login class to users so they can access components within a QFabric system.

- Requirements on page 423
- Overview on page 423
- Configuration on page 424
- Verification on page 426

Requirements

This example uses the following hardware and software components:

- One QFX3000-G QFabric system containing:
  - Two QFX3100 Director devices
  - Two QFX3008-I Interconnect devices
  - Eight QFX3500 Node devices
  - Junos OS Release 12.2 for these QFX Series components
- Eight EX4200 switches, used to make two redundant Virtual Chassis with four members apiece
- Junos OS Release 12.1R1.9 for the EX Series switches used in the Virtual Chassis

Before you begin:

- Perform the initial setup of the QFabric system on the Director group, which includes the creation of a username and password for the QFabric system components. See "Performing the QFabric System Initial Setup on a QFX3100 Director Group" on page 411.

Overview

The QFabric system offers three special preset login classes that provide different levels of access to individual components within a QFabric system (such as Node devices and Interconnect devices). The *qfabric-admin* class provides the ability to log in to individual QFabric system components and manage them. The *qfabric-operator* class enables the user to log in to individual components and view component-level operations and configurations. The *qfabric-user* class prevents access to individual QFabric system components.

You include these classes in your configuration at the **[edit system login user *username* authentication remote-debug-permission]** hierarchy level. The key task is to decide which class you should apply to users based on their need to access QFabric system components.

NOTE: To set QFabric system login classes for a root user, include the remote-debug-permission statement at the [edit system root-authentication] hierarchy level and specify the qfabric-admin class.

If you assign the qfabric-admin or the qfabric-operator class to a user, the QFabric system maps the user to a list of authorized users who are permitted to access components. To facilitate ease of use, the QFabric system uses the component password you specified during the initial setup of the Director group. When users assigned the qfabric-admin or the qfabric-operator class log in to a component by issuing the **request component login** operational mode command, the QFabric system verifies the class and sends the username and password to the component. The component accepts these credentials and permits access.

NOTE:

- The three QFabric system login classes give access to the components only. To provide access to the QFabric system as a whole through the default partition command-line interface (CLI), you must configure the usual Junos OS login classes or permissions (such as the *super-user* class). For more information about login classes, see *Junos OS Login Classes Overview*.
- If you have completed the QFabric system initial setup and the system is operational, you can change the component password by issuing the **device-authentication** statement at the **[edit system]** hierarchy level in the QFabric default partition CLI.

Topology

This example defines three users: Adam, Oscar, and Ulf. Adam needs to manage QFabric system components, Oscar needs limited access, and Ulf should not have any access to the components. As a result, assign the qfabric-admin class to Adam, the qfabric-operator class to Oscar, and the qfabric-user class to Ulf. However, all three users should have all permissions to access the QFabric system CLI.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

```
set system login class all-qfabric permissions all
set system login user Adam class all-qfabric
set system login user Adam authentication encrypted-password
  "$1$aoYSFkvE$G/dYqsTV5iSvVW2sND69U."
set system login user Adam authentication remote-debug-permission qfabric-admin
set system login user Oscar class all-qfabric
set system login user Oscar authentication encrypted-password
  "$1$3e.3wJQ8$31SrzV0.efdRbk.ZJncKm0"
set system login user Oscar authentication remote-debug-permission qfabric-operator
set system login user Ulf class all-qfabric
set system login user Ulf authentication encrypted-password
  "$1$qt9Ncm0o$okNYSN8O4fVITE/SHBdYj0"
set system login user Ulf authentication remote-debug-permission qfabric-user
```

Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To provide the same access to the QFabric system CLI for all users, but different QFabric system component-level access to different users:

1. Define and provide all-qfabric access and passwords to all three users. This administrator-defined class provides full permissions, enabling the users to log in to the QFabric system default partition and use the CLI. Alternatively, you can assign the super-user class to these users to accomplish the same goal.

```
[edit]
user@qfabric# set system login class all-qfabric permissions all
user@qfabric# set system login user Adam class all-qfabric
user@qfabric# set system login user Adam authentication encrypted-password
  "$1$aoYSFkvE$G/dYqsTV5iSvVW2sND69U."
user@qfabric# set system login user Oscar class all-qfabric
user@qfabric# set system login user Oscar authentication encrypted-password
  "$1$3e.3wJQ8$31SrzV0.efdRbk.ZJncKm0"
user@qfabric# set system login user Ulf class all-qfabric
user@qfabric# set system login user Ulf authentication encrypted-password
  "$1$qt9Ncm0o$okNYSN8O4fVITE/SHBdYj0"
```

2. Provide qfabric-admin component access to Adam so he can manage QFabric system components.

```
[edit]
user@qfabric# set system login user Adam authentication remote-debug-permission
  qfabric-admin
```

3. Provide qfabric-operator component access to Oscar so he can view the CLI at the QFabric system components.

```
[edit]
user@qfabric# set system login user Oscar authentication remote-debug-permission
  qfabric-operator
```

4. Assign qfabric-user component restrictions to Ulf to prevent him from accessing the QFabric system components.

```
[edit]
user@qfabric# set system login user Ulf authentication remote-debug-permission
  qfabric-user
```

Results

From configuration mode, confirm your configuration by entering the **show** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, this **show** command output includes only the configuration that is relevant to this example.

```
[edit]
system {
  login {
    class all-qfabric {
```

```
            permissions all;
        }
        user Adam {
            class all-qfabric;
            authentication {
                encrypted-password "$1$aoYSFkvE$G/dYqsTV5iSvVW2sND69U."; ##
                    SECRET-DATA
                remote-debug-permission qfabric-admin;
            }
        }
        user Oscar {
            class all-qfabric;
            authentication {
                encrypted-password "$1$3e.3wJQ8$31SrzV0.efdRbk.ZJncKm0"; ## SECRET-DATA
                remote-debug-permission qfabric-operator;
            }
        }
        user Ulf {
            class all-qfabric;
            authentication {
                encrypted-password "$1$qt9Ncm0o$okNYSN8O4fVITE/SHBdYj0"; ##
                    SECRET-DATA
                remote-debug-permission qfabric-user;
            }
        }
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the QFabric system and component-level access configuration is working properly for all three users. Adam, Oscar, and Ulf should have equivalent, full-permission access to the QFabric system CLI. Adam should have management-level access to components. Oscar should have read-only access to components. Ulf should have no component-level access.

- Verifying qfabric-admin Access on page 426
- Verifying qfabric-operator Access on page 428
- Verifying qfabric-user Access on page 429

Verifying qfabric-admin Access

Purpose Verify that Adam can access the QFabric system CLI at the default partition and manage QFabric system components.

Action From a management station on your network, issue the **ssh *user*@qfabric** command and enter the password to open an SSH session for Adam to the QFabric system. Issue the **?** command to view the CLI operational mode commands that Adam has permission to use on the QFabric system default partition.

```
> ssh Adam@qfabric.network.net
Warning: Permanently added 'qfabric.network.net' (RSA) to the list of known hosts.
```



```
Adam@qfabric.network.net's password:
Last login: Sun Nov 20 14:12:29 2011 from 192.168.28.19
Juniper QFabric Director 11.3.5510 2011-10-21 16:31:44 UTC


RUNNING ON DIRECTOR DEVICE : dg0
Adam@qfabric>

Adam@qfabric> ?
Possible completions:
  clear                Clear information in the system
  configure            Manipulate software configuration information
  file                 Perform file operations
  help                 Provide help information
  load                 Load information from file
  op                   Invoke an operation script
  ping                 Ping remote target
  quit                 Exit the management session
  request              Make system-level requests
  restart              Restart software process
  save                 Save information to file
  set                  Set CLI properties, date/time, craft interface message
  show                 Show system information
  telnet               Telnet to another host
  test                 Perform diagnostic debugging
  traceroute           Trace route to remote host
```

Issue the **request component login ?** command to view the components that Adam can access. Next, issue the **request component login *component-name*** command to log in to a Node device without being prompted for a username or password.

```
Adam@qfabric> request component login ?
Possible completions:
  <[Enter]>            Execute this command
  <node-name>          Inventory name for the remote node
  BBAK0372             Node device
  BBAK0394             Node device
  DRE-0                Diagnostic routing engine
  EE3093               Node device
  FC-0                 Fabric control
  FC-1                 Fabric control
  FM-0                 Fabric manager
  NW-NG-0              Node group
  WS001/RE0            Interconnect device control board
  WS001/RE1            Interconnect device control board
  |                    Pipe through a command

Adam@qfabric> request component login EE3093
Warning: Permanently added 'qfnode-ee3093,169.254.128.14' (RSA) to the list of
known hosts.
--- JUNOS 11.3I built 2011-11-04 12:46:16 UTC
{master}
```

Finally, issue the **?** command to view the CLI operational mode commands that Adam has the permission to use on the Node device. Notice that the CLI prompt now indicates Adam's component access level (**qfabric-admin**) as the username and the Node device identifier (**EE3093**) as the host.

```
qfabric-admin@EE3093> ?
Possible completions:
  clear                Clear information in the system
```



```
  file                  Perform file operations
  help                  Provide help information
  load                  Load information from file
  monitor               Show real-time debugging information
  mtrace                Trace multicast path from source to receiver
  op                    Invoke an operation script
  ping                  Ping remote target
  quit                  Exit the management session
  request               Make system-level requests
  restart               Restart software process
  save                  Save information to file
  set                   Set CLI properties, date/time, craft interface message
  show                  Show system information
  ssh                   Start secure shell on another host
  start                 Start shell
  telnet                Telnet to another host
  test                  Perform diagnostic debugging
  traceroute            Trace route to remote host
```

Meaning The output shows that Adam has received the proper permissions to access the QFabric system CLI and log in to individual components with management-level access.

Verifying qfabric-operator Access

Purpose Verify that Oscar can access the QFabric system CLI at the default partition and view the CLI on the QFabric system components.

Action From a management station on your network, issue the **ssh *user*@qfabric** command and enter the password to open an SSH session for Oscar to the QFabric system. Issue the **?** command to view the CLI operational mode commands that Oscar has permission to use on the QFabric system default partition. Notice that these permissions are the same as those given to Adam.

```
> ssh Oscar@qfabric.network.net
Warning: Permanently added 'qfabric.network.net' (RSA) to the list of known hosts.
Oscar@qfabric.network.net's password:
Last login: Sun Nov 19 19:21:29 2011 from 192.168.28.14
Juniper QFabric Director 11.3.5510 2011-10-22 18:33:41 UTC


RUNNING ON DIRECTOR DEVICE : dg1
Oscar@qfabric>

Oscar@qfabric> ?
Possible completions:
  clear                 Clear information in the system
  configure             Manipulate software configuration information
  file                  Perform file operations
  help                  Provide help information
  load                  Load information from file
  op                    Invoke an operation script
  ping                  Ping remote target
  quit                  Exit the management session
  request               Make system-level requests
  restart               Restart software process
  save                  Save information to file
  set                   Set CLI properties, date/time, craft interface message
  show                  Show system information
```



```
  telnet               Telnet to another host
  test                 Perform diagnostic debugging
  traceroute           Trace route to remote host
```

Issue the **request component login *component-name*** command to log in to a Node device without being prompted for a username or password.

```
Oscar@qfabric> request component login EE3093
Warning: Permanently added 'qfnode-ee3093,169.254.128.14' (RSA) to the list of
known hosts.
--- JUNOS 11.3I built 2011-11-04 12:46:16 UTC
{master}
```

Finally, issue the **?** command to view the CLI operational mode commands that Oscar has permission to use on the Node device. Notice that the CLI prompt now indicates Oscar's component access level (**qfabric-operator**) as the username and the Node device identifier (**EE3093**) as the host. Additionally, Oscar has fewer CLI commands available than Adam because of Oscar's read-only qfabric-operator login class.

```
qfabric-operator@EE3093> ?
Possible completions:
  file                 Perform file operations
  help                 Provide help information
  load                 Load information from file
  op                   Invoke an operation script
  quit                 Exit the management session
  request              Make system-level requests
  save                 Save information to file
  set                  Set CLI properties, date/time, craft interface message
  show                 Show system information
  start                Start shell
  test                 Perform diagnostic debugging
```

Meaning The output shows that Oscar has full permissions to access the QFabric system CLI, but only read-only access when he logs in to individual components. Oscar's permissions on the QFabric system are the same as Adam's, but Oscar has fewer permissions than Adam on the Node device.

Verifying qfabric-user Access

Purpose Verify that Ulf has full access to the QFabric system CLI at the default partition but cannot access the QFabric system components.

Action From a management station on your network, issue the **ssh *user*@qfabric** command and enter the password to open an SSH session for Ulf to the QFabric system. Issue the **?** command to view the CLI operational mode commands that Ulf has permission to use on the QFabric system default partition. Notice that these permissions are the same as those given to Adam and Oscar.

```
> ssh Ulf@qfabric.network.net
Warning: Permanently added 'qfabric.network.net' (RSA) to the list of known hosts.
Ulf@qfabric.network.net's password:
Last login: Sun Nov 17 17:12:24 2011 from 192.168.28.22
Juniper QFabric Director 11.3.5510 2011-10-23 19:23:31 UTC


RUNNING ON DIRECTOR DEVICE : dg0
```

```
Ulf@qfabric>

Ulf@qfabric> ?
Possible completions:
  clear                Clear information in the system
  configure            Manipulate software configuration information
  file                 Perform file operations
  help                 Provide help information
  load                 Load information from file
  op                   Invoke an operation script
  ping                 Ping remote target
  quit                 Exit the management session
  request              Make system-level requests
  restart              Restart software process
  save                 Save information to file
  set                  Set CLI properties, date/time, craft interface message
  show                 Show system information
  telnet               Telnet to another host
  test                 Perform diagnostic debugging
  traceroute           Trace route to remote host
```

When Ulf issues the **request component login *component-name*** command, the Node device denies his access attempt.

```
Ulf@qfabric> request component login EE3093
error: User Ulf does not have sufficient permissions to login to device EE3093
```

Meaning The output shows that Ulf has full permissions to access the QFabric system CLI in the same way as Adam and Oscar. However, unlike Adam and Oscar, Ulf cannot access individual components because of the qfabric-user login class assigned to him.

Related Documentation

- Understanding QFabric System Login Classes on page 59
- **remote-debug-permission on page 494**
- **request component login on page 542**
- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411

- *Junos OS Login Classes Overview*

Configuring Aliases for the QFabric System

Supported Platforms QFabric System

This topic explains how to configure aliases for components of the QFabric system, such as Director devices, Interconnect devices, and Node devices. Aliases replace the hardware serial numbers of components, making it easier to identify system devices and simplify configuration tasks.

Before you create aliases in a QFabric system:

- Issue one of the **show fabric administration inventory** commands to view the components that are available for aliasing and their hardware serial numbers.

NOTE: The following rules apply to QFabric component alias naming:

- Alias names must use alphabetic (A through Z and a through z), numeric (0 through 9), or dash (-) characters.
- The maximum length of an alias name is 30 characters.
- Alias names are case sensitive. For example, MY-NG-1 and my-ng-1 refer to different components.
- You cannot use the reserved names **all**, **fabric**, or **director-group** as an alias name.

To create an alias for a Node device:

1. Discover the serial number of the Node device you wish to rename by issuing the **set fabric aliases node-device ?** context-sensitive help command.

```
root@qfabric# set fabric aliases node-device ?
Possible completions:
  <aliasable-item-name>   The name of the item to be aliased
  BBAK8309               Node device
  BBAK8283               Node device
  BBAK8891               Node device
  BBAK8868               Node device
  BBAK8276               Node device
  BBAK8273               Node device
[edit]
```

   As an alternate way to discover the serial number for a Node device, issue the **show fabric administration inventory node-devices** command. In this case, the serial numbers for the Node devices are **BBAK8309BBAK8283BBAK8891BBAK8868BBAK8276** and **BBAK8273**.

```
root@qfabric> show fabric administration inventory node-devices
Item                    Identifier              Connection      Configuration
Node device
  BBAK8309                                      Connected
  BBAK8283                                      Connected
  BBAK8891                                      Connected
  BBAK8868                                      Connected
  BBAK8276                                      Connected
  BBAK8273                                      Connected
```

2. Specify the serial number of the Node device and the desired alias name by including the **node-device** statement at the **[edit fabric aliases]** hierarchy level.

```
[edit fabric aliases]
root@qfabric# set node-device BBAK8309 Node0
root@qfabric# set node-device BBAK8283 Node1
root@qfabric# set node-device BBAK8891 Node2
root@qfabric# set node-device BBAK8868 Node3
root@qfabric# set node-device BBAK8276 Node4
root@qfabric# set node-device BBAK8273 Node5
```

3. Review your configuration and issue the **commit** command.

```
[edit]
root@qfabric# show fabric
aliases {
    node-device BBAK8309 {
        Node0;
    }
    node-device BBAK8283 {
        Node1;
    }
    node-device BBAK8891 {
        Node2;
    }
    node-device BBAK8868 {
        Node3;
    }
    node-device BBAK8276 {
        Node4;
    }
    node-device BBAK8273 {
        Node5;
    }
}
[edit]
root@qfabric# commit
commit complete
```

4. To view that your aliases are operational, issue the **show fabric administration inventory node-devices** command.

```
root@qfabric> show fabric administration inventory node-devices
Item                    Identifier              Connection      Configuration
Node device
  node0                 BBAK8309                Connected
  node1                 BBAK8283                Connected
  node2                 BBAK8891                Connected
  node3                 BBAK8868                Connected
  node4                 BBAK8276                Connected
  node5                 BBAK8273                Connected
```

NOTE: If you attempt to commit all configuration settings for a new Node group (such as the Node group itself, aliasing, and other features) at the same time, the commit operation might appear to succeed when it actually has failed. For this reason, we recommend configuring and verifying Node groups and aliases first, followed by configuring and verifying other features. Establishing the Node groups and aliases first enables the QFabric system to reject any potentially unsupported configuration. The resulting commit errors indicate where the configuration problem lies. To verify the establishment of Node groups and aliases before configuring other features, issue the **show fabric administration inventory** command.

To create an alias for a Node group:

- Specify a name for the Node group when you include the **node-group** statement at the **[edit fabric resources]** hierarchy level.

NOTE: You cannot use the **aliases** statement at the **[edit fabric]** hierarchy level to create an aliased name for a Node group.

To create an alias for a Director device:

1. Discover the serial number of the Director device you wish to rename by issuing the **set fabric aliases director-device ?** context-sensitive help command.

```
root@qfabric# set fabric aliases director-device ?
Possible completions:
  <aliasable-item-name>   The name of the item to be aliased
  0281052011000001     Director device
  0281052011000032     Director device
[edit]
```

   As an alternate way to discover the serial number for a Director device, issue the **show fabric administration inventory director-group status** command. In this case, the serial number for Director device DG0 is **0281052011000001** and the serial number for Director device DG1 is **0281052011000032**.

```
root@qfabric> show fabric administration inventory director-group status
Director Group Status Tue Jun  5 15:11:26 UTC 2012

 Member Status Role     Mgmt Address    CPU Free Memory VMs Up Time
 ------ ------ -------- --------------- --- ----------- --- -------------
 dg0    online master   10.49.215.38    8%  17363152k   4   3 days, 20:55 hrs

 dg1    online backup   10.49.215.39    6%  20157440k   3   3 days, 20:55 hrs


 Member Device Id/Alias  Status  Role
 ------ ---------------- ------- ---------
 dg0    0281052011000001 online  master

  Master Services
  ---------------
  Database Server               online
  Load Balancer Director        online
  QFabric Partition Address     online

  Director Group Managed Services
  -------------------------------
  Shared File System            online
  Network File System           online
  Virtual Machine Server        online
  Load Balancer/DHCP            online

  Hard Drive Status
  ----------------
  Volume ID:4                   optimal
  Physical ID:1                 online
  Physical ID:0                 online
  SCSI ID:1                     100%
  SCSI ID:0                     100%


  Size  Used Avail Used% Mounted on
  ----  ---- ----- ----- ----------
  423G 5.4G 395G  2%   /
  99M  16M  79M   17%  /boot
  93G  7.3G 86G   8%   /pbdata

  Director Group Processes
  ------------------------
  Director Group Manager        online
  Partition Manager             online
```



```
 Software Mirroring             online
 Shared File System master      online
 Secure Shell Process           online
 Network File System            online
 DHCP Server master             online     master

 FTP Server                     online
 Syslog                         online
 Distributed Management         online
 SNMP Trap Forwarder            online
 SNMP Process                   online
 Platform Management            online

 Interface Link Status
 ---------------------
 Management Interface           up
 Control Plane Bridge           up
 Control Plane LAG              up
 CP Link [0/2]                  up
 CP Link [0/1]                  up
 CP Link [0/0]                  up
 CP Link [1/2]                  down
 CP Link [1/1]                  down
 CP Link [1/0]                  down
 Crossover LAG                  up
 CP Link [0/3]                  up
 CP Link [1/3]                  up

Member Device Id/Alias  Status  Role
------ ---------------- ------- ---------
dg1    0281052011000032 online  backup

 Director Group Managed Services
 -------------------------------
 Shared File System             online
 Network File System            online
 Virtual Machine Server         online
 Load Balancer/DHCP             online

 Hard Drive Status
 ----------------
 Volume ID:8                    optimal
 Physical ID:1                  online
 Physical ID:0                  online
 SCSI ID:1                      100%
 SCSI ID:0                      100%


 Size  Used Avail Used% Mounted on
 ----  ---- ----- ----- ----------
 423G 5.5G 395G  2%   /
 99M  16M  79M   17%  /boot
 93G  7.3G 86G   8%   /pbdata

 Director Group Processes
 ------------------------
 Director Group Manager         online
 Partition Manager              online
 Software Mirroring             online
 Shared File System master      online
 Secure Shell Process           online
```

```
Network File System           online
DHCP Server master            online     backup

FTP Server                    online
Syslog                        online
Distributed Management        online
SNMP Trap Forwarder           online
SNMP Process                  online
Platform Management           online

Interface Link Status
---------------------
Management Interface          up
Control Plane Bridge          up
Control Plane LAG             up
CP Link [0/2]                 up
CP Link [0/1]                 up
CP Link [0/0]                 up
CP Link [1/2]                 down
CP Link [1/1]                 down
CP Link [1/0]                 down
Crossover LAG                 up
CP Link [0/3]                 up
CP Link [1/3]                 up
```

2. Specify the serial number of the Director device and the desired alias name by including the **director-device** statement at the **[edit fabric aliases]** hierarchy level.

```
[edit fabric aliases]
root@qfabric# set director-device 0281052011000001 Director0
root@qfabric# set director-device 0281052011000032 Director1
```

3. Review your configuration and issue the **commit** command.

```
[edit]
root@qfabric# show fabric
aliases {
    director-device 0281052011000001 {
        Director0;
    }
    director-device 0281052011000032 {
        Director1;
    }
}

[edit]
root@qfabric# commit
commit complete
```

4. To view that your aliases are operational, issue the **show fabric administration inventory director-group status** command. In this case, the serial numbers in the **Device Id/Alias** field have been replaced with the **Director0** and **Director1** aliased names.

```
root@qfabric> show fabric administration inventory director-group status
Director Group Status Tue Jun  5 15:11:26 UTC 2012

 Member Status Role     Mgmt Address    CPU Free Memory VMs Up Time
 ------ ------ -------- --------------- --- ----------- --- -------------
 dg0    online master   10.49.215.38    8%  17363152k   4   3 days, 20:55 hrs
 dg1    online backup   10.49.215.39    6%  20157440k   3   3 days, 20:55 hrs

 Member Device Id/Alias  Status  Role
 ------ ---------------- ------- ---------
```



```
dg0    Director0        online  master

 Master Services
 ---------------
 Database Server               online
 Load Balancer Director        online
 QFabric Partition Address     online

 Director Group Managed Services
 -------------------------------
 Shared File System            online
 Network File System           online
 Virtual Machine Server        online
 Load Balancer/DHCP            online

 Hard Drive Status
 ----------------
 Volume ID:4                   optimal
 Physical ID:1                 online
 Physical ID:0                 online
 SCSI ID:1                     100%
 SCSI ID:0                     100%


 Size  Used Avail Used% Mounted on
 ----  ---- ----- ----- ----------
 423G 5.4G 395G  2%   /
 99M  16M  79M   17%  /boot
 93G  7.3G 86G   8%   /pbdata

 Director Group Processes
 ------------------------
 Director Group Manager        online
 Partition Manager             online
 Software Mirroring            online
 Shared File System master     online
 Secure Shell Process          online
 Network File System           online
 DHCP Server master            online     master
 FTP Server                    online
 Syslog                        online
 Distributed Management        online
 SNMP Trap Forwarder           online
 SNMP Process                  online
 Platform Management           online

 Interface Link Status
 ---------------------
 Management Interface          up
 Control Plane Bridge          up
 Control Plane LAG             up
 CP Link [0/2]                 up
 CP Link [0/1]                 up
 CP Link [0/0]                 up
 CP Link [1/2]                 down
 CP Link [1/1]                 down
 CP Link [1/0]                 down
 Crossover LAG                 up
 CP Link [0/3]                 up
 CP Link [1/3]                 up
```



```
Member Device Id/Alias  Status  Role
------ ---------------- ------- ---------
dg1    Director1        online  backup

 Director Group Managed Services
 -------------------------------
 Shared File System             online
 Network File System            online
 Virtual Machine Server         online
 Load Balancer/DHCP             online

 Hard Drive Status
 ----------------
 Volume ID:8                    optimal
 Physical ID:1                  online
 Physical ID:0                  online
 SCSI ID:1                      100%
 SCSI ID:0                      100%


 Size  Used Avail Used% Mounted on
 ----  ---- ----- ----- ----------
 423G 5.5G 395G  2%   /
 99M  16M  79M   17%  /boot
 93G  7.3G 86G   8%   /pbdata

 Director Group Processes
 ------------------------
 Director Group Manager         online
 Partition Manager              online
 Software Mirroring             online
 Shared File System master      online
 Secure Shell Process           online
 Network File System            online
 DHCP Server master             online     backup
 FTP Server                     online
 Syslog                         online
 Distributed Management         online
 SNMP Trap Forwarder            online
 SNMP Process                   online
 Platform Management            online

 Interface Link Status
 ---------------------
 Management Interface           up
 Control Plane Bridge           up
 Control Plane LAG              up
 CP Link [0/2]                  up
 CP Link [0/1]                  up
 CP Link [0/0]                  up
 CP Link [1/2]                  down
 CP Link [1/1]                  down
 CP Link [1/0]                  down
 Crossover LAG                  up
 CP Link [0/3]                  up
 CP Link [1/3]                  up
```


To create an alias for an Interconnect device:

1. Discover the serial number of the Interconnect device you wish to rename by issuing the **set fabric aliases interconnect-device ?** context-sensitive help command.

```
root@qfabric# set fabric aliases interconnect-device ?
Possible completions:
  <aliasable-item-name>   The name of the item to be aliased
  IC-F1249             Interconnect device
  IC-F4912             Interconnect device
[edit]
```

   As an alternate way to discover the serial number for an Interconnect device, issue the **show fabric administration inventory interconnect-devices** command. In this case, the serial numbers for the Interconnect devices are **IC-F1249** and **IC-F4912**.

```
root@qfabric> show fabric administration inventory interconnect-devices
Item                    Identifier              Connection      Configuration
Interconnect device
  IC-F1249                                      Connected       Configured

    F1249/RE0                                   Connected

  IC-F4912                                      Connected       Configured

    F4912/RE0                                   Connected
```

2. Specify the serial number of the Interconnect device and the desired alias name by including the **interconnect-device** statement at the **[edit fabric aliases]** hierarchy level.

```
[edit fabric aliases]
root@qfabric# set interconnect-device IC-F1249 Interconnect0
root@qfabric# set interconnect-device IC-F4912 Interconnect1
```

3. Review your configuration and issue the **commit** command.

```
[edit]
root@qfabric# show fabric
aliases {
    interconnect-device IC-F1249 {
        Interconnect0;
    }
    interconnect-device IC-F4912 {
        Interconnect1;
    }
}

[edit]
root@qfabric# commit
commit complete
```

4. To view that your aliases are operational, issue the **show fabric administration inventory interconnect-devices** command.

```
root@qfabric> show fabric administration inventory interconnect-devices
Item                    Identifier              Connection      Configuration
Interconnect device
  Interconnect0         IC-F1249                Connected       Configured
    F1249/RE0                                   Connected
  Interconnect1         IC-F4912                Connected       Configured
    F4912/RE0                                   Connected
```

Related Documentation

- aliases on page 468
- show fabric administration inventory on page 640
- show fabric administration inventory director-group status on page 645
- show fabric administration inventory interconnect-devices on page 653
- show fabric administration inventory node-devices on page 655
- Understanding the Director Group on page 20
- Understanding Interconnect Devices on page 23
- Understanding Node Devices on page 26

Configuring the Port Type on QFX3600 Node Devices

Supported Platforms QFabric System, QFX3600

The QFX3600 Node device provides 16 40-Gbps QSFP+ ports. By default, four ports (labeled **Q0** through **Q3**) operate as 40-gigabit data plane (*fte*) uplink ports for uplink connections between your Node device and your Interconnect devices. Twelve ports (labeled **Q4** through **Q15**) operate as 10-Gigabit Ethernet (*xe*) ports to support 48 10-Gigabit Ethernet interfaces for connections to either endpoint systems or external networks. Optionally, you can choose to configure ports Q0 through Q7 to operate as 40-gigabit data plane uplink ports, and ports Q2 through Q15 to operate as 10-Gigabit Ethernet or 40-Gigabit Ethernet (*xle*) ports.

NOTE: You can use QSFP+ to four SFP+ breakout cables or QSFP+ transceivers with fiber breakout cables to connect the 10-Gigabit Ethernet ports to other devices.

NOTE: When you delete the port type configuration for an individual port or a block of ports, the ports return to operating in their default port type. For example, when you delete the 40-Gigabit Ethernet (xle) port configuration for port Q4, the port returns to operating as a 10-Gigabit Ethernet (xe) port.

NOTE: When the 40-Gigabit Ethernet (xle) ports of a QFX3600 Node device carry traffic at the full line rate, loss of untagged Layer 2 or Layer 3 traffic going across the fabric might occur, as well as increased latency on the Node device. Such effects result from the addition of a 4-byte header to packets traversing the uplink ports on the Node device. The percentage of traffic loss depends on the size of the packets: the greater the packet size, the lower the traffic loss and vice versa. This problem does not affect tagged traffic.

This topic explains how to configure the port type on QFX3600 Node devices.

Before you configure the port type on QFX3600 Node devices:

- Make sure your QFabric system is operational.
- Issue the **show fabric administration inventory node-groups** command to display the existing Node groups and the Node devices in each Node group.

NOTE:

- Only ports Q0 through Q7 can be configured to operate as 40-gigabit data plane (fte) uplink ports.
- Only ports Q2 through Q15 can be configured to operate as 10-Gigabit Ethernet (xe) or 40-Gigabit Ethernet (xle) ports.

CAUTION: The Packet Forwarding Engine on the QFX3600 Node device is restarted when you commit the port type configuration changes. As a result, you might experience packet loss on the Node device.

The following message may be displayed in the system log file when the Packet Forwarding Engine is restarted. You can ignore this message.

Pipe write error: Broken pipe

flush operation failed

The following steps describe how to configure either a block of ports or an individual port to operate as 40-gigabit data plane uplink (fte) ports, as well as how to delete a 40-gigabit data plane uplink (fte) port configuration.

1. To configure a block of ports to operate as 40-gigabit data plane uplink (fte) ports, specify a port range:

   [edit chassis node-group *name* node-device *name* pic 1]
   root@qfabric# **set fte port-range** ***port-range-low port-range-high***

   For example, to configure ports Q4 through Q7 to operate as 40-gigabit data plane uplink ports:

   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 1]
   root@qfabric# **set fte port-range 4 7**

2. To configure an individual port to operate as a 40-gigabit data plane uplink (fte) port, specify a port number:

   [edit chassis node-group *name* node-device *name* pic 1]
   root@qfabric# **set fte port** ***port-number***

   For example, to configure port Q4 to operate as a 40-gigabit data plane uplink port:

   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 1]
   root@qfabric# **set fte port 4**

3. Review your configuration and issue the **commit** command.

   [edit]
   root@qfabric# **commit**
   commit complete

4. To delete the 40-gigabit data plane uplink (fte) port configuration for a block of ports, specify a port range:

   [edit chassis node-group *name* node-device *name* pic 1]
   root@qfabric# **delete fte port-range** ***port-range-low port-range-high***

   For example, to delete the 40-gigabit data plane uplink port configuration for ports Q4 through Q7:

   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 1]
   root@qfabric# **delete fte port-range 4 7**

5. To delete the 40-gigabit data plane uplink (fte) port configuration for an individual port, specify a port number:

   ```
   [edit chassis node-group name node-device name pic 1]
   root@qfabric# delete fte port port-number
   ```

   For example, to delete the 40-gigabit data plane uplink port configuration for port Q4:

   ```
   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 1]
   root@qfabric# delete fte port 4
   ```

The following steps describe how to configure either a block of ports or an individual port to operate as 10-Gigabit Ethernet (xe) ports, as well as how to delete a 10-Gigabit Ethernet (xe) port configuration.

1. To configure a block of ports to operate as 10-Gigabit Ethernet (xe) ports, specify a port range:

   ```
   [edit chassis node-group name node-device name pic 0]
   root@qfabric# set xe port-range port-range-low port-range-high
   ```

   For example, to configure ports Q4 through Q7 to operate as 10-Gigabit Ethernet ports:

   ```
   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 0]
   root@qfabric# set xe port-range 4 7
   ```

2. To configure an individual port to operate as a 10-Gigabit Ethernet port, specify a port number:

   ```
   [edit chassis node-group name node-device name pic 0]
   root@qfabric# set xe port port-number
   ```

   For example, to configure port Q4 to operate as a 10-Gigabit Ethernet port:

   ```
   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 0]
   root@qfabric# set xe port 4
   ```

3. Review your configuration and issue the **commit** command.

   ```
   [edit]
   root@qfabric# commit
   commit complete
   ```

4. To delete the 10-Gigabit Ethernet (xe) port configuration for a block of ports, specify a port range:

   ```
   [edit chassis node-group name node-device name pic 0]
   root@qfabric# delete xe port-range port-range-low port-range-high
   ```

   For example, to delete the 10-Gigabit Ethernet port configuration for ports Q4 through Q7:

   ```
   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 0]
   root@qfabric# delete xe port-range 4 7
   ```

5. To delete the 10-Gigabit Ethernet (xe) port configuration for an individual port, specify a port number:

   ```
   [edit chassis node-group name node-device name pic 0]
   root@qfabric# delete xe port port-number
   ```

For example, to delete the 10-Gigabit Ethernet port configuration for port Q4:

```
[edit chassis node-group BBAK8281 node-device BBAK8309 pic 0]
root@qfabric# delete xe port 4
```

The following steps describe how to configure either a block of ports or an individual port to operate as 40-Gigabit Ethernet (xle) ports, as well as how to delete a 40-Gigabit Ethernet (xle) port configuration.

1. To configure a block of ports to operate as 40-Gigabit Ethernet (xle) ports, specify a port range:

   ```
   [edit chassis node-group name node-device name pic 1]
   root@qfabric# set xle port-range port-range-low port-range-high
   ```

   For example, to configure ports Q4 through Q7 to operate as 40-Gigabit Ethernet ports:

   ```
   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 1]
   root@qfabric# set xle port-range 4 7
   ```

2. To configure an individual port to operate as a 40-Gigabit Ethernet (xle) port, specify a port number:

   ```
   [edit chassis node-group name node-device name pic 1]
   root@qfabric# set xle port port-number
   ```

   For example, to configure port Q4 to operate as a 40-Gigabit Ethernet port:

   ```
   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 1]
   root@qfabric# set xle port 4
   ```

3. Review your configuration and issue the **commit** command.

   ```
   [edit]
   root@qfabric# commit
   commit complete
   ```

4. To delete the 40-Gigabit Ethernet (xle) port configuration for block of ports, specify a port range:

   ```
   [edit chassis node-group name node-device name pic 1]
   root@qfabric# delete xle port-range port-range-low port-range-high
   ```

   For example, to delete the 40-Gigabit Ethernet port configuration for ports Q4 through Q7:

   ```
   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 1]
   root@qfabric# delete xle port-range 4 7
   ```

5. To delete the 40-Gigabit Ethernet (xle) port configuration for an individual port, specify a port number:

   ```
   [edit chassis node-group name node-device name pic 1]
   root@qfabric# delete xle port port-number
   ```

   For example, to delete the 40-Gigabit Ethernet port configuration for port Q4:

   ```
   [edit chassis node-group BBAK8281 node-device BBAK8309 pic 1]
   root@qfabric# delete xle port 4
   ```

Related Documentation

- Understanding Node Devices on page 26
- Understanding Interfaces on the QFabric System on page 11
- pic on page 492

Configuring the QSFP+ Port Type on QFX5100 Devices

Supported Platforms QFabric System, QFX Series standalone switches

You can convert default 40-Gigabit Ethernet data plane uplink interfaces (fte) to 40-Gigabit Ethernet access interfaces (xle) ports, and default 40-Gigabit Ethernet interfaces (xle) to 40-Gigabit Ethernet data plane uplink interfaces (fte). Ports Q0 and Q1 are fixed fte ports and cannot be changed. Ports Q2 and Q3 are fte ports by default but can be changed to xle ports. Ports Q4 and Q5 are xle ports by default but can be changed to fte ports.

NOTE: **You must configure xle ports in pairs, not individually, otherwise functionality is not guaranteed.**

CAUTION: **The Packet Forwarding Engine on a QFX5100 switch is restarted when you commit port type configuration changes (for example, configuring or deleting an fte or xle port). As a result, you might experience packet loss on the device.**

The following steps describe how to configure either a block of ports or an individual port, as well as how to delete these configurations.

1. To configure a block of ports to operate as 40-Gigabit Ethernet interfaces (xle) , specify a port range:

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **set xle port-range** ***port–range-low port-range-high***

   For example, to configure ports Q4 through Q5 to operate as 40-Gigabit Ethernet interfaces (xle):

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **set xle port-range 4 5**

2. To configure a block of ports to operate as 40-Gigabit Ethernet data plane uplink interfaces (fte), specify a port range:

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **set fte port-range** ***port–range-low port-range-high***

   For example, to configure ports Q4 through Q5 to operate as 40-Gigabit Ethernet data plane uplink interfaces (fte):

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **set fte port-range 4 5**

3. To configure an individual port to operate as a 40-Gigabit Ethernet data plane uplink interfaces (fte), specify a port number:

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **set fte port** ***port-number***

   For example, to configure port Q4 to operate as a 40-Gigabit Ethernet data plane uplink interfaces (fte):

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **set fte port 4**

4. Review your configuration and issue the **commit** command.

   [edit]
   user@switch# **commit**
   commit complete

5. To delete a block of ports configured as 40-Gigabit Ethernet (xle) ports, specify a port range:

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **delete xle port-range** ***port-range-low port-range-high***

   For example, to delete the 40-Gigabit Ethernet access interface (xle) port configuration for ports Q2 through Q3:

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **delete xle port-range 2 3**

6. To delete an individual port configured as a 40-Gigabit Ethernet (xle) interface:

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **delete xle port** ***port-number***

   For example, to delete the 40-Gigabit Ethernet interface (xle) for port Q2:

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **delete xle port 2**

7. To delete a block of ports configured as 40-Gigabit Ethernet data plane uplink interfaces (fte), specify a port range:

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **delete fte port-range** ***port-range-low port-range-high***

   For example, to delete the block of ports configured as 40-Gigabit Ethernet data plane uplink interfaces (fte) for ports Q4 through Q5:

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **delete fte port-range 4 5**

8. To delete an individual port configured as a 40-Gigabit Ethernet data plane uplink interfaces (fte):

   [edit chassis node-group *name* node-device *name* pic 1]
   user@switch# **delete fte port** ***port-number***

   For example, to delete the 40-Gigabit Ethernet data plane uplink interfaces (fte) for port Q4:

   [edit chassis node-group *name* node-device *name* pic 1]

```
user@switch# delete fte port 4
```

9. Review your configuration and issue the **commit** command.

```
[edit]
user@switch# commit
commit complete
```

Related Documentation

- *Understanding Interface Naming Conventions*
- *Understanding Port Ranges and System Modes*
- *pic*

Configuring Node Groups for the QFabric System

Supported Platforms QFabric System

This topic explains how to configure Node groups for Node devices within the QFabric system. Node groups provide redundancy for Node devices and make your QFabric system more resilient.

There are three types of Node groups in a QFabric system:

- **Automatically generated server Node groups**—By default, every Node device that joins the QFabric system is placed within an automatically generated server Node group that contains one Node device (the device itself). Server Node groups connect to servers and storage devices.
- **Network Node groups**—You can assign up to eight Node devices to a network Node group. When grouped together, the Node devices within a network Node group connect to other routers running routing protocols such as OSPF and BGP.
- **Redundant server Node groups**—You can assign two Node devices to a redundant server Node group. When grouped together, you can create link aggregation groups (LAGs) that span the interfaces on both Node devices to provide resiliency and redundancy.

Before you create Node groups in a QFabric system:

- Make sure your QFabric system is operational.
- Issue the **show fabric administration inventory node-devices** command to display the Node devices that are available to add to a Node group.
- Issue the **show fabric administration inventory node-groups** command to display the existing Node groups.

NOTE: The following rules apply to QFabric Node group naming:

- Node group names must use alphabetic (A through Z and a through z), numeric (0 through 9), or dash (-) characters.
- The maximum length of a Node group name is 30 characters.
- Node group names are case sensitive. For example, MY-NG-1 and my-ng-1 refer to different components.
- You cannot use the reserved names **all**, **fabric**, or **director-group** as a Node group name.

NOTE: If you attempt to commit all configuration settings for a new Node group (such as the Node group itself, aliasing, and other features) at the same time, the commit operation might appear to succeed when it actually has failed. For this reason, we recommend configuring and verifying Node groups and aliases first, followed by configuring and verifying other features. Establishing the Node groups and aliases first enables the QFabric system to reject any potentially unsupported configuration. The resulting commit errors indicate where the configuration problem lies. To verify the establishment of Node groups and aliases before configuring other features, issue the **show fabric administration inventory** command.

To display an automatically generated server Node group:

- Issue the **show fabric administration inventory node-groups** command and look for Node groups containing a single Node device that has the same name or serial number as the server Node group.

```
root@qfabric> show fabric administration inventory node-groups
Item                    Identifier              Connection      Configuration
Node group
  BBAK8281                                      Connected       Configured
    BBAK8281                                    Connected
  BBAK8835                                      Connected       Configured
    BBAK8835                                    Connected
  NW-NG-0                                       Connected       Configured
    Node0               BBAK8309                Connected
    Node1               BBAK8283                Connected
  S1                                            Connected       Configured
    Node2               BBAK8891                Connected
    Node3               BBAK8868                Connected
```

To create a network Node group:

1. Specify the Node devices you wish to add to the network Node group by including the **node-device** statement at the **[edit fabric resources node-group NW-NG-0]** hierarchy level.

   NOTE:
   - The network Node group must use the predefined name NW-NG-0. You must use this name when adding Node devices to the network Node group. You cannot specify a different name. Also, you can configure only one network Node group per partition.
   - When you configure routing protocols on the QFabric system, you must use interfaces from the Node devices assigned to the network Node group. If you try to configure routing protocols on interfaces from the Node devices assigned to server Node groups, the configuration commit operation fails.

   ```
   [edit]
   root@qfabric# set fabric resources node-group NW-NG-0 node-device Node0
   root@qfabric# set fabric resources node-group NW-NG-0 node-device Node1
   ```

2. To designate the Node group as a network Node group, include the **network-domain** statement at the **[edit fabric resources node-group NW-NG-0]** hierarchy level.

   ```
   [edit]
   root@qfabric# set fabric resources node-group NW-NG-0 network-domain
   ```

3. Review your configuration and issue the **commit** command.

   ```
   [edit]
   root@qfabric# show fabric
   resources {
       node-group NW-NG-0 {
           network-domain;
           node-device Node0;
           node-device Node1;
       }
   }
   [edit]
   root@qfabric# commit
   commit complete
   ```

   NOTE: When you add or delete Node devices from a Node group configuration, the corresponding Node devices reboot when you commit the configuration change.

4. To determine if your network Node group is operational, issue the **show fabric administration inventory node-groups** command in operational mode.

```
root@qfabric>show fabric administration inventory node-groups NW-NG-0
Item                    Identifier              Connection      Configuration
Node group
```

```
  NW-NG-0                                  Connected       Configured
    Node0               BBAK8309           Connected
    Node1               BBAK8283           Connected
```

To create a redundant server Node group:

1. Specify the two Node devices you wish to add to the redundant server Node group by including the **node-device** statement at the **[edit fabric resources node-group *node-group-name*]** hierarchy level.

   NOTE: Ensure that the two Node devices are of the same type, either two QFX3500 Node devices, two QFX3600 Node devices, or two QFX5100 Node devices. You cannot add different Node device types to the same redundant server Node group.

   ```
   [edit]
   root@qfabric# set fabric resources node-group S1 node-device Node2
   root@qfabric# set fabric resources node-group S1 node-device Node3
   ```

2. Review your configuration and issue the **commit** command.

   ```
   [edit]
   root@qfabric# show fabric
   resources {
       node-group S1 {
           node-device Node2;
           node-device Node3;
       }
   }
   [edit]
   root@qfabric# commit
   commit complete
   ```

   NOTE: When you add or delete Node devices from a Node group configuration, the corresponding Node devices reboot when you commit the configuration change.

3. To determine if your redundant server Node groups are operational, issue the **show fabric administration inventory node-groups *redundant-server-node-group-name*** command in operational mode.

```
root@qfabric> show fabric administration inventory node-groups S1
Item                    Identifier             Connection      Configuration
Node group
  S1                                           Connected       Configured
    Node2               BBAK8891               Connected
    Node3               BBAK8868               Connected
```

Related Documentation

- show fabric administration inventory node-groups on page 657
- show fabric administration inventory node-devices on page 655

- Understanding Node Groups on page 30
- **node-group (Resources) on page 491**

Example: Configuring SNMP

Supported Platforms QFabric System

By default, SNMP is disabled on devices running Junos OS. This example describes the steps for configuring SNMP on the QFabric system.

Requirements

This example uses the following hardware and software components:

- Junos OS Release 12.2
- Network management system (NMS) (running the SNMP manager)
- QFabric system (running the SNMP agent) with multiple Node devices

Overview

Because SNMP is disabled by default on devices running Junos OS, you must enable SNMP on your device by including configuration statements at the **[edit snmp]** hierarchy level. At a minimum, you must configure the **community public** statement. The community defined as public grants read-only access to MIB data to any client.

If no **clients** statement is configured, all clients are allowed. We recommend that you always include the **restrict** option to limit SNMP client access to the switch.

The network topology in this example includes an NMS, a QFabric system with four Node devices, and external SNMP servers that are configured for receiving traps.

Configuration

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

```
set snmp name “snmp qfabric” description “qfabric0 switch”
set snmp location “Lab 4 Row 11” contact “qfabric-admin@qfabric0”
set snmp community public authorization read-only
set snmp client-list list0 192.168.0.0/24
set snmp community public client-list-name list0
set snmp community public clients 192.170.0.0/24 restrict
set snmp trap-group “qf-traps” destination-port 155 targets 192.168.0.100
```


Step-by-Step Procedure

The following example requires that you navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure SNMP on the QFabric system:

NOTE: If the name, description, location, contact, or community name contains spaces, enclose the text in quotation marks (" ").

1. Configure the SNMP system name:

   [edit snmp]
   user@switch# **set name “snmp qfabric”**

2. Specify a description.

   [edit snmp]
   user@switch# **set description “qfabric0 system”**

   This string is placed into the MIB II sysDescription object.

3. Specify the physical location of the QFabric system.

   [edit snmp]
   user@switch# **set location “Lab 4 Row 11”**

   This string is placed into the MIB II sysLocation object.

4. Specify an administrative contact for the SNMP system.

   [edit snmp]
   user@switch# **set contact “qfabric-admin@qfabric0”**

   This name is placed into the MIB II sysContact object.

5. Specify a unique SNMP community name and the read-only authorization level.

   NOTE: The read-write option is not supported on the QFabric system.

   [edit snmp]
   user@switch# **set community public authorization read-only**

6. Create a client list with a set of IP addresses that can use the SNMP community.

   [edit snmp]
   user@switch# **set client-list list0 192.168.0.0/24**
   user@switch# **set community public client-list-name list0**

7. Specify IP addresses of clients that are restricted from using the community.

   [edit snmp]
   user@switch# **set community public clients 192.170.0.0/24 restrict**

8. Configure a trap group, destination port, and a target to receive the SNMP traps in the trap group.


```
[edit snmp]
user@switch# set trap-group "qf-traps" destination-port 155 targets 192.168.0.100
```

NOTE: You do not need to include the **destination-port** statement if you use the default port 162.

The trap group qf-traps is configured to send traps to 192.168.0.100.

Results

From configuration mode, confirm your configuration by entering the **show** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@switch# show
  snmp {
    name "snmp qfabric";
    description "qfabric0 system";
    location "Lab 4 Row 11";
    contact "qfabric-admin@qfabric0";
    client-list list0 {
      192.168.0.0/24;
    }
    community public {
      authorization read-only;
      clients {
        197.170.0.0/24 restrict;
      }
    }
    trap-group qf-traps {
      destination-port 155;
      targets {
        192.168.0.100;
      }
    }
  }
```

If you are done configuring the device, enter **commit** from configuration mode.

Related Documentation

- Understanding the Implementation of SNMP on the QFabric System on page 54
- *snmp*

Configuring Graceful Restart for QFabric Systems

Supported Platforms QFabric System

When you configure graceful restart in the QFabric CLI, the QFabric system applies the configuration to the network Node group to participate in graceful restart operations with devices external to the QFabric system. Such configuration preserves routing table state and helps neighboring routing devices to resume routing operations more quickly after a system restart. This also enables the network Node group to resume routing operations rapidly if there is a restart in the QFabric system (such as a software upgrade). As a result, we recommend enabling graceful restart for routing protocols in the QFabric CLI.

NOTE: The QFabric system also uses graceful restart internally within the fabric to facilitate interfabric resiliency and recovery. This internal feature is enabled by default with no configuration required.

- Enabling Graceful Restart on page 454
- Configuring Graceful Restart Options for BGP on page 455
- Configuring Graceful Restart Options for OSPF and OSPFv3 on page 456
- Tracking Graceful Restart Events on page 457

Enabling Graceful Restart

By default, graceful restart is disabled. To enable graceful restart, include the **graceful-restart** statement at the **[edit routing-instance *instance-name* routing-options]** or **[edit routing-options]** hierarchy level.

For example:

```
routing-options {
  graceful-restart;
}
```

To configure the duration of the graceful restart period, include the **restart-duration** at the **[edit routing-options graceful-restart]** hierarchy level.

NOTE: Helper mode (the ability to assist a neighboring router attempting a graceful restart) is enabled by default when you start the routing platform, even if graceful restart is not enabled. You can disable helper mode on a per-protocol basis.

```
[edit]
routing-options {
  graceful-restart {
    disable;
    restart-duration seconds;
  }
}
```

To disable graceful restart globally, include the **disable** statement at the **[edit routing-options graceful-restart]** hierarchy level.

When graceful restart is enabled for all routing protocols at the **[edit routing-options graceful-restart]** hierarchy level, you can disable graceful restart on a per-protocol basis.

NOTE: If you configure graceful restart after a BGP or LDP session has been established, the BGP or LDP session restarts and the peers negotiate graceful restart capabilities. Also, the BGP peer routing statistics are reset to zero.

Configuring Graceful Restart Options for BGP

To configure the duration of the BGP graceful restart period, include the **restart-time** statement at the **[edit protocols bgp graceful-restart]** hierarchy level. To set the length of time the router waits to receive messages from restarting neighbors before declaring them down, include the **stale-routes-time** statement at the **[edit protocols bgp graceful-restart]** hierarchy level.

```
[edit]
protocols {
  bgp {
    graceful-restart {
      disable;
      restart-time seconds;
      stale-routes-time seconds;
    }
  }
}
routing-options {
  graceful-restart;
}
```

To disable BGP graceful restart capability for all BGP sessions, include the **disable** statement at the **[edit protocols bgp graceful-restart]** hierarchy level.

NOTE: To set BGP graceful restart properties or disable them for a group, include the desired statements at the **[edit protocols bgp group *group-name* graceful-restart]** hierarchy level.

To set BGP graceful restart properties or disable them for a specific neighbor in a group, include the desired statements at the **[edit protocols bgp group *group-name* neighbor *ip-address* graceful-restart]** hierarchy level.

NOTE: Configuring graceful restart for BGP resets the BGP peer routing statistics to zero. Also, existing BGP sessions restart, and the peers negotiate graceful restart capabilities.

Configuring Graceful Restart Options for OSPF and OSPFv3

To configure the duration of the OSPF/OSPFv3 graceful restart period, include the **restart-duration** statement at the **[edit protocols (ospf | ospf3) graceful-restart]** hierarchy level. To specify the length of time for which the router notifies helper routers that it has completed graceful restart, include the **notify-duration** at the **[edit protocols (ospf | ospf3) graceful-restart]** hierarchy level. Strict OSPF link-state advertisement (LSA) checking results in the termination of graceful restart by a helping router. To disable strict LSA checking, include the **no-strict-lsa-checking** statement at the **[edit protocols (ospf | ospf3) graceful-restart]** hierarchy level.

```
[edit]
protocols {
  ospf | ospfv3{
    graceful-restart {
      disable;
      helper-disable
      no-strict-lsa-checking;
      notify-duration seconds;
      restart-duration seconds;
    }
  }
}
routing-options {
  graceful-restart;
}
```

To disable OSPF/OSPFv3 graceful restart, include the **disable** statement at the **[edit protocols (ospf | ospf3) graceful-restart]** hierarchy level.

Starting with Release 11.3, the Junos OS supports both the standard (based on RFC 3623, *Graceful OSPF Restart*) and the restart signaling-based (as specified in RFC 4811, RFC 4812, and RFC 4813) helper modes for OSPF version 2 graceful restart configurations. Both the standard and restart signaling-based helper modes are enabled by default. To disable the helper mode for OSPF version 2 graceful restart configurations, include the **helper-disable <both | restart-signaling | standard>** statement at the **[edit protocols ospf graceful-restart]** hierarchy level. Note that the last committed statement always takes precedence over the previous one.

```
[edit protocols ospf]
  graceful-restart {
    helper-disable <both | restart-signaling | standard>
  }
```

To reenable the helper mode, delete the **helper-disable** statement from the configuration by using the **delete protocols ospf graceful-restarthelper-disable <restart-signaling | standard | both>** command. In this case also, the last executed command takes precedence over the previous ones.

NOTE:

Restart signaling-based helper mode is not supported for OSPFv3 configurations. To disable helper mode for OSPFv3 configurations, include the ***helper-disable*** statement at the **[edit protocols ospfv3 graceful-restart]** hierarchy level.

TIP: You can also track graceful restart events with the **traceoptions** statement at the **[edit protocols (ospf | ospf3)]** hierarchy level. For more information, see "Tracking Graceful Restart Events" on page 457.

NOTE: If you configure BFD and graceful restart for OSPF, graceful restart might not work as expected.

Tracking Graceful Restart Events

To track the progress of a graceful restart event, you can configure graceful restart trace options flags for IS-IS and OSPF/OSPFv3. To configure graceful restart trace options, include the **graceful-restart** statement at the **[edit protocols *protocol* traceoptions flag]** hierarchy level:

```
[edit protocols]
isis {
  traceoptions {
    flag graceful-restart;
  }
}
(ospf | ospf3) {
  traceoptions {
    flag graceful-restart;
  }
}
```

Related Documentation

- *Graceful Restart Concepts*
- *Verifying Graceful Restart Operation*

Optimizing the Number of Multicast Flows on QFabric Systems

Supported Platforms QFabric System

Because of the distributed nature of QFabric systems, the default configuration does not allow the maximum number of supported Layer 3 multicast flows to be created. To allow a QFabric system to create the maximum number of supported flows, configure the following statement:

```
set fabric routing-options multicast fabric-optimized-distribution
```

After configuring this statement, you must reboot the QFabric Director group to make the change take effect.

Related Documentation

•

CHAPTER 19

QFabric System Licensing

Generating the License Keys for a QFabric System

Supported Platforms QFabric System

When you purchase a Junos OS software feature license for a QFabric system, you receive an e-mail containing an authorization code for the feature license from Juniper Networks. You can use the authorization code to generate a unique license key (a combination of the authorization code and the QFabric system ID) for the QFabric system, and then add the license key on the QFabric system.

Before generating the license keys for a QFabric system:

- Purchase the required licenses for the QFabric system. See "Software Features That Require Licenses on the QFX Series" on page 87.
- Note down the authorization code in the e-mail you received from Juniper Networks when you purchased the license.
- Perform the initial setup of the QFabric system on the Director group. See "Performing the QFabric System Initial Setup on a QFX3100 Director Group" on page 411.
- Log in to the QFabric system, issue the **show version** command, and note down the software serial number and QFabric system ID for the QFabric system.

```
user@qfabric> show version
Hostname: qfabric
Model: qfx3000-g
Serial Number: qfsn-0123456789
QFabric System ID: f158527a-f99e-11e0-9fbd-00e081c57cda
JUNOS Base Version [12.2I20111018_0215_dc-builder]
```

To generate the license keys for a QFabric system:

1. In a browser, log in to the Juniper Networks License Management System at https://www.juniper.net/lcrs/license.do.

   The Manage Product Licenses page appears.

   NOTE: **To access the licensing site, you must have a service contract with Juniper Networks and an access account. If you need help obtaining an account, complete the registration form at the Juniper Networks website** https://www.juniper.net/registration/Register.jsp **.**

2. On the Generate Licenses tab, select **QFX Series Product** from the drop-down list, and click **Go**.

   The Generate Licenses - QFX Series Product page appears.

3. Select the **QFX Series Product Fabric** option button, and then click **Continue**.

   The Generate Licenses - QFX Series Product Fabrics page appears.

4. In the **Software Serial No** field, enter the software serial number for the QFabric system.
5. In the **QFabric System ID** field, enter the QFabric system ID for the QFabric system.
6. In the **Authorization Code** field, enter the authorization code in the e-mail you received from Juniper Networks when you purchased the license.
7. (Optional) If you want to enter another authorization code for the same device, click **Enter More Authorization Codes** to display a new authorization code field. Enter the authorization code in this field.
8. Click **Confirm**.

   The Confirm License Information page appears, displaying a summary of the information you submitted to the License Management System.

9. Review the information to ensure everything is correct and then click **Generate License**.

   The Generate Licenses - QFX Series Product Fabrics page appears, displaying a summary of your license keys, including a link that displays the details of your new license keys.

10. Select the file format in which you want to obtain your new license keys.
11. Select the delivery method you want to use to obtain your new license keys.

To download the license keys:

- Select the **Download to this computer** option button, and click **OK**.

To e-mail the license keys:

- Select the **Send e-mail to *e-mail ID*** option button, and click **OK**.

Related Documentation

- Software Features That Require Licenses on the QFX Series on page 87
- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411
- Adding New Licenses (CLI Procedure) on page 461

- *show version*

Adding New Licenses (CLI Procedure)

Supported Platforms EX Series, J Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, SRX Series, T Series

Before adding new licenses, complete the following tasks:

- Purchase the required licenses.
- Establish basic network connectivity with the router or switch. For instructions on establishing basic connectivity, see the *Getting Started Guide* or *Quick Start Guide* for your device.

NOTE: On QFabric systems, install your licenses in the default partition of the QFabric system and not on the individual components (Node devices and Interconnect devices).

To add a new license key to the device using the CLI:

1. From the CLI operational mode, enter one of the following CLI commands:
   - To add a license key from a file or URL, enter the following command, specifying the filename or the URL where the key is located:

     user@host> **request system license add *filename* | *url***

   - To add a license key from the terminal, enter the following command:

     user@host> **request system license add terminal**

2. When prompted, enter the license key, separating multiple license keys with a blank line.

   If the license key you enter is invalid, an error appears in the CLI output when you press Ctrl+d to exit license entry mode.

3. Go on to "Verifying Junos OS License Installation" on page 464.

On routers that have Graceful Routing Engine switchover (GRES) enabled, after successfully adding the new license on the master Routing Engine, the license keys are automatically synchronized on the backup Routing Engine as well. However, in case GRES is not enabled, the new license is added on each Routing Engine separately. This ensures that the license key is enabled on the backup Routing Engine during changeover of mastership between the Routing Engines.

To add a new license key to a router with dual Routing Engines without GRES:

1. After adding the new license key on the master Routing Engine, use the **request chassis routing-engine master switch** command to have the backup Routing Engine become the master Routing Engine.
2. Log in to the active Routing Engine and add the new license key, repeating the same process.

NOTE: Adding a license key to the router or switch might be delayed if a kernel resynchronization operation is in progress at that time. The following message is displayed on the CLI when the license-adding operation is about to be delayed:
A kernel re-sync operation is in progress. License update may take several minutes to complete.

Related Documentation

- Deleting a License (CLI Procedure) on page 462
- Junos OS Feature Licenses on page 87
- Verifying Junos OS License Installation on page 464

- *request system license add*

Deleting a License (CLI Procedure)

Supported Platforms EX Series, J Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, SRX Series, T Series

Before deleting a license, establish basic network connectivity with the router or switch. For instructions on establishing basic connectivity, see the *Getting Started Guide* or *Quick Start Guide* for your router or switch.

You have the options to delete a single license, delete all licenses, or delete a list of licenses enclosed in brackets.

1. Display the licenses available to be deleted.

```
user@host> request system license delete license-identifier-list ?
Possible completions:
  E00468XXX4           License key identifier
  JUNOS10XXX1          License key identifier
  JUNOS10XXX2          License key identifier
  JUNOS10XXX3          License key identifier
```



```
JUNOS10XXX4          License key identifier
[                    Open a set of values
```

2. To delete a license key or keys from a device using the CLI operational mode, select one of the following methods:

   - Delete a single license by specifying the license ID. Using this option, you can delete only one license at a time.

     user@host> **request system license delete** ***license-identifier***

   - Delete all license keys from the current device.

     user@host> **request system license delete all**

   - Delete multiple license keys from the current device. Specify the license identifier for each key and enclose the list of identifiers in brackets.

     user@host> **request system license delete license-identifier-list [*JUNOS10XXX1 JUNOS10XXX3 JUNOS10XXX4 ...*]**

   ```
   Delete license(s) ?
    [yes,no] (no) yes
   ```

3. Go on to “Verifying Junos OS License Installation” on page 464.

NOTE: Deleting a license key from the router or switch might be delayed if a kernel resynchronization operation is in progress at that time. The following message is displayed on the CLI when the license-deleting operation is about to be delayed:
A kernel re-sync operation is in progress. License update may take several minutes to complete.

Related Documentation

- Adding New Licenses (CLI Procedure) on page 461
- Saving License Keys on page 463
- Junos OS Feature Licenses on page 87
- Verifying Junos OS License Installation on page 464

- *request system license delete*

Saving License Keys

Supported Platforms EX Series, J Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, SRX Series, T Series

Before saving a license, establish basic network connectivity with the router or switch. For instructions on establishing basic connectivity, see the *Getting Started Guide* or *Quick Start Guide* for your router or switch.

To save the licenses installed on a device to a file using the CLI:

1. From the CLI operational mode, enter one of the following CLI commands:

- To save the installed license keys to a file or URL, enter the following command:

  user@host> **request system license save *filename* | *url***

  For example, the following command saves the installed license keys to a file named **license.config**:

- To save a license key from the terminal, enter the following command:

  user@host> **request system license save ftp://user@host/license.config**

2. Go on to "Verifying Junos OS License Installation" on page 464.

Related Documentation

- Adding New Licenses (CLI Procedure) on page 461
- Deleting a License (CLI Procedure) on page 462
- Junos OS Feature Licenses on page 87
- Verifying Junos OS License Installation on page 464

Verifying Junos OS License Installation

Supported Platforms EX4600, J Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, SRX Series, T Series

To verify Junos OS license management, perform the following tasks:

- Displaying Installed Licenses on page 464
- Displaying License Usage on page 465

Displaying Installed Licenses

Supported Platforms EX4600, J Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, T Series

Purpose Verify that the expected licenses are installed and active on the router or switch.

Action From the CLI, enter the **show system license** command.

Sample Output

```
user@host> show system license
License usage:
                         Licenses     Licenses     Licenses      Expiry
  Feature name               used    installed       needed
  subscriber-acct               0            1            0      permanent
  subscriber-auth               0            1            0      permanent
  subscriber-addr               0            1            0      permanent
  subscriber-vlan               0            1            0      permanent
  subscriber-ip                 0            1            0      permanent
  scale-subscriber              0         1000            0      permanent
  scale-l2tp                    0         1000            0      permanent
  scale-mobile-ip               0         1000            0      permanent

Licenses installed:
  License identifier: E000185416
```



```
License version: 2
Features:
  subscriber-acct   - Per Subscriber Radius Accounting
    permanent
  subscriber-auth   - Per Subscriber Radius Authentication
    permanent
  subscriber-addr   - Address Pool Assignment
    permanent
  subscriber-vlan   - Dynamic Auto-sensed Vlan
    permanent
  subscriber-ip     - Dynamic and Static IP
    permanent
```

Meaning The output shows a list of the license usage and a list of the licenses installed on the router or switch. Verify the following information:

- Each license is present. Licenses are listed in ascending alphanumeric order by license ID.
- The state of each license is **permanent**.

NOTE: **A state of invalid indicates that the license key is not a valid license key. Either it was entered incorrectly or it is not valid for the specific device.**

- The feature for each license is the expected feature. The features enabled are listed by license. An all-inclusive license has all features listed.
- All configured features have the required licenses installed. The Licenses needed column must show that no licenses are required.

Displaying License Usage

Supported Platforms EX4600, J Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, T Series

Purpose Verify that the licenses fully cover the feature configuration on the router or switch.

Action From the CLI, enter the **show system license usage** command.

Sample Output

```
user@host> show system license usage
             Licenses    Licenses    Licenses    Expiry
  Feature name           used    installed      needed
  subscriber-addr           1           0           1    29 days
  scale-subscriber          0        1000           0    permanent
  scale-l2tp                0        1000           0    permanent
  scale-mobile-ip           0        1000           0    permanent
```

Meaning The output shows any licenses installed on the router or switch and how they are used. Verify the following information:

- Any configured licenses appear in the output. The output lists features in ascending alphabetical order by license name. The number of licenses appears in the third column. Verify that you have installed the appropriate number of licenses.
- The number of licenses used matches the number of configured features. If a licensed feature is configured, the feature is considered used. The sample output shows that the subscriber address pooling feature is configured.
- A license is installed on the router or switch for each configured feature. For every feature configured that does not have a license, one license is needed.

  For example, the sample output shows that the subscriber address feature is configured but that the license for the feature has not yet been installed. The license must be installed within the remaining grace period to be in compliance.

CHAPTER 20

Configuration Statements

- syslog (QFabric System) on page 498
- stale-routes-time (Fabric Control) on page 499

aliases

Supported Platforms QFabric System

Syntax

```
aliases {
  director-device director-device-name {
    assigned-director-device-name;
  }
  interconnect-device interconnect-device-name {
    assigned-interconnect-device-name;
  }
  node-device node-device-name {
    assigned-node-device-name;
  }
```

Hierarchy Level [edit fabric]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series. Options **director-group** and **interconnect-device** introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFabric systems only) Specify the mapping of user defined names to QFabric system components. You can reassign names for Director devices, Interconnect devices, and Node devices.

The remaining statements are explained separately.

NOTE: The following rules apply to QFabric component alias naming:

- Alias names must use alphabetic (A through Z and a through z), numeric (0 through 9), or dash (-) characters.
- The maximum length of an alias name is 30 characters.
- Alias names are case sensitive. For example, MY-NG-1 and my-ng-1 refer to different components.
- You cannot use the reserved names **all**, **fabric**, or **director-group** as an alias name.

Required Privilege Level admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Aliases for the QFabric System on page 430
- Understanding Node Devices on page 26

archive (QFabric System)

Supported Platforms QFabric System

Syntax

```
archive {
  size size;
}
```

Hierarchy Level [edit system syslog file *filename*]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description Configure the archiving properties for the system message log file.

Options **size** ***size***—Maximum amount of system log message data that the QFabric system stores in the log file.

Syntax: *x*k to specify the number of kilobytes, *x*m for the number of megabytes, or *x*g for the number of gigabytes

Range: 65 KB through 1 GB

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- syslog on page 498

chassis (QFabric System)

Supported Platforms QFabric System

Syntax

```
chassis {
  interconnect-device {
    alarm {
      (ethernet | management-ethernet) {
        link-down (red | yellow | ignore);
      }
    }
    container-devices {
      device-count number;
    }
    craft-lockout {
      alarm {
        interface-type {
          link-down (red | yellow | ignore);
        }
      }
      container-devices {
        device-count number;
      }
      fpc slot {
        power (on | off);
      }
      routing-engine {
        on-disk-failure {
          disk-failure-action (halt | reboot);
        }
      }
    }
    fpc slot {
      power (on | off);
    }
    routing-engine {
      on-disk-failure {
        disk-failure-action (halt | reboot);
      }
    }
  }
  node-group name {
    aggregated-devices {
      ethernet {
        device-count number;
      }
    }
    alarm {
      interface-type {
        link-down (ignore | red | yellow);
      }
    }
    container-devices {
      device-count number;
    }
```



```
        node-device name {
          fibre-channel {
            port-range {
              port-range-low port-range-high;
            }
          }
          pic pic-number {
            fte {
              port port-number;
              port-range port-range-low port-range-high;
            }
            xe {
              port port-number;
              port-range port-range-low port-range-high;
            }
            xle {
              port port-number;
              port-range port-range-low port-range-high;
            }
          }
        }
        routing-engine {
          on-disk-failure {
            disk-failure-action (halt | reboot);
          }
        }
      }
    }
```

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 11.1 for the QFX Series.

Description Configure chassis-specific properties for the switch.

The remaining statements are explained separately.

Required Privilege Level
interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

device-authentication

Supported Platforms QFabric System

Syntax

```
device-authentication {
  (encrypted-password "password" | plain-text-password);
}
```

Hierarchy Level [edit system]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.

Description Configure the authentication password used when accessing individual QFabric system components with the **request component login** command.

NOTE: **Configuring this statement overrides the password for individual QFabric system components that was set during the initial QFabric system setup procedure.**

Options **encrypted-password "*password*"**— Specify the MD5 or other encrypted authentication password. You can specify only one encrypted password.

You cannot configure a blank password for the **encrypted-password** option using blank quotation marks (" "). You must configure a password of 1 through 128 characters and enclose the password in quotation marks.

plain-text-password—Plain-text password. The CLI prompts you for the password and then encrypts it. The CLI displays the encrypted version, and the software places the encrypted version in its user database. You can specify only one plain-text password.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Example: Configuring QFabric System Login Classes on page 422
- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411

director-device (Aliases)

Supported Platforms QFabric System

Syntax

```
director-device director-device-name {
  assigned-director-device-name;
}
```

Hierarchy Level [edit fabric aliases]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFabric systems only) Specify the mapping of user-defined names to QFabric system Director devices.

NOTE: The following rules apply to QFabric component alias naming:

- Alias names must use alphabetic (A through Z and a through z), numeric (0 through 9), or dash (-) characters.
- The maximum length of an alias name is 30 characters.
- Alias names are case sensitive. For example, MY-NG-1 and my-ng-1 refer to different components.
- You cannot use the reserved names all, fabric, or director-group as an alias name.

Options *director-device-name*—Specify a user-defined name for a QFabric system Director device.

assigned-director-device-name—Specify the Director device identifier or name that has been provided. Identifiers are usually auto-generated by the Director software, and names are usually provided by the administrator of the default partition.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Aliases for the QFabric System on page 430
- Understanding the Director Group on page 20

fabric

Supported Platforms QFabric System

Syntax

```
fabric
  aliases {
    director-device director-device-name {
      assigned-director-device-name;
    }
    interconnect-device interconnect-device-name {
      assigned-interconnect-device-name;
    }
    node-device node-device-name {
      assigned-node-device-name;
    }
  }
  protocols {
    fabric-control {
      graceful-restart {
        restart-timeseconds;
        stale-routes-time seconds;
      }
    }
  }
  resources {
    node-group node-group-name {
      node-device node-device-name;
      network-domain;
    }
  }
}
```

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Define resources, routing options, fabric control protocol settings, and the mapping of user-defined names to QFabric system components.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- **show fabric administration inventory on page 640**
- Understanding QFabric System Administration Tasks and Utilities on page 417

fabric-control

Supported Platforms QFabric System

Syntax

```
fabric-control {
  graceful-restart {
    restart-timeseconds;
    stale-routes-time seconds;
  }
}
```

Hierarchy Level [edit fabric protocols]

Release Information Statement introduced in Junos OS Release 13.2X52-D10 for the QFX Series.

Description Specify attributes for the fabric control protocol.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Understanding Routing Engines in the QFabric System on page 21

file (QFabric System)

Supported Platforms QFabric System

Syntax

```
file filename {
  archive {
    size maximum-file-size;
  }
  explicit-priority;
  facility severity;
  match "regular-expression";
  structured-data {
    brief;
  }
}
```

Hierarchy Level [edit system syslog]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description Configure the logging of system messages to a file.

Options *facility*—Class of messages to log. To specify multiple classes, include multiple ***facility severity*** statements.

filename—Filename that you specify with the **show log** command.

Default: Filename **messages**

severity—Severity of the messages that belong to the facility specified by the paired *facility* name. Messages with severities at the specified level and higher are logged.

The remaining statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- syslog on page 498

graceful-restart (Enabling Globally)

Supported Platforms ACX Series, EX Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, SRX210, SRX3400, T1600, T640

Syntax

```
graceful-restart {
  disable;
  helper-disable;
  maximum-helper-recovery-time seconds;
  maximum-helper-restart-time seconds;
  notify-duration seconds;
  recovery-time seconds;
  restart-duration seconds;
  stale-routes-time seconds;
}
```

Hierarchy Level [edit logical-systems *logical-system-name* routing-options],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* routing-options],
[edit routing-options],
[edit routing-instances *routing-instance-name* routing-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Configure graceful restart globally to enable the feature. You cannot enable graceful restart for specific protocols unless graceful restart is also enabled globally. You can, optionally, modify the global settings at the individual protocol level.

For VPNs, the **graceful-restart** statement allows a router whose VPN control plane is undergoing a restart to continue to forward traffic while recovering its state from neighboring routers.

For BGP, if you configure graceful restart after a BGP session has been established, the BGP session restarts and the peers negotiate graceful restart capabilities.

Default Graceful restart is disabled by default.

Options The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- *Enabling Graceful Restart*
- *Configuring Routing Protocols Graceful Restart*
- *Configuring Graceful Restart for MPLS-Related Protocols*
- *Configuring VPN Graceful Restart*
- *Configuring Logical System Graceful Restart*

- *Graceful Restart Configuration Statements*
- Configuring Graceful Restart for QFabric Systems on page 453

graceful-restart (Fabric Control)

Supported Platforms QFabric System

Syntax

```
graceful-restart {
  restart-timeseconds;
  stale-routes-time seconds;
}
```

Hierarchy Level [edit fabric protocols fabric-control]

Release Information Statement introduced in Junos OS Release 13.2X52-D10 for the QFX Series.

Description Configure graceful restart parameters for the fabric control in a QFabric system.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Understanding Routing Engines in the QFabric System on page 21

graceful-restart (Protocols BGP)

Supported Platforms ACX Series, EX Series, M120, MX240, PTX Series, QFabric System, QFX Series standalone switches, SRX210, SRX240, SRX3400, T1600, T640

Syntax

```
graceful-restart {
  disable;
  restart-time seconds;
  stale-routes-time seconds;
}
```

Hierarchy Level [edit logical-systems *logical-system-name* protocols bgp],
[edit logical-systems *logical-system-name* protocols bgp group *group-name*],
[edit logical-systems *logical-system-name* protocols bgp group *group-name* neighbor *address*],
[edit protocols bgp],
[edit protocols bgp group *group-name*],
[edit protocols bgp group *group-name* neighbor *address*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Configure graceful restart for BGP. Graceful restart allows a routing device undergoing a restart to inform its adjacent neighbors and peers of its condition. Graceful restart is disabled by default.

To configure the duration of the BGP graceful restart period, include the **restart-time** statement at the **[edit protocols bgp graceful-restart]** hierarchy level. To set the length of time the router waits to receive messages from restarting neighbors before declaring them down, include the **stale-routes-time** statement at the **[edit protocols bgp graceful-restart]** hierarchy level.

NOTE: **If you configure graceful restart after a BGP session has been established, the BGP session restarts and the peers negotiate graceful restart capabilities.**

Configure graceful restart globally at the **[edit routing-options]** or **[edit routing-instances *instance-name* routing-options]** hierarchy level to enable the feature. You cannot enable graceful restart for specific protocols unless graceful restart is also enabled globally. You can, optionally, modify the global settings at the individual protocol level.

The remaining statements are explained separately.

Required Privilege Level routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- *Configuring Graceful Restart Options for BGP*
- Configuring Graceful Restart for QFabric Systems on page 453

- *Junos OS High Availability Library for Routing Devices*

graceful-restart (Protocols OSPF)

Supported Platforms ACX Series, EX Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, SRX210, SRX3400, T1600, T640

Syntax

```
graceful-restart {
  disable;
  helper-disable (standard | restart-signaling | both);
  no-strict-lsa-checking;
  notify-duration seconds;
  restart-duration seconds;
}
```

Hierarchy Level [edit logical-systems *logical-system-name* protocols (ospf | ospf3)],
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols (ospf | ospf3)],
[edit protocols (ospf | ospf3)],
[edit routing-instances *routing-instance-name* protocols ospf]

Release Information Statement introduced before Junos OS Release 7.4.
Support for the **no-strict-lsa-checking** statement introduced in Junos OS Release 8.5.
Statement introduced in Junos OS Release 9.0 for EX Series switches.
Support for the helper mode **standard**, **restart-signaling**, and **both** options introduced in Junos OS Release 11.4.
Statement introduced in Junos OS Release 12.1 for the QFX Series.

Description Configure graceful restart for OSPF.

Graceful restart allows a routing device to restart with minimal effects to the network, and is enabled for all routing protocols at the **[edit routing-options]** hierarchy level.

Options **disable**—Disable graceful restart for OSPF.

helper-disable (standard | restart-signaling| both)—Disable helper mode for graceful restart. When helper mode is disabled, a device cannot help a neighboring device that is attempting to restart. Beginning with Junos OS Release 11.4, you can configure restart signaling-based helper mode for OSPFv2 graceful restart configurations. The **standard**, **restart-signaling**, and **both** options are only supported for OSPFv2. Specify **standard** to disable helper mode for standard graceful restart (based on RFC 3623). Specify **restart-signaling** to disable helper mode for restart signaling-based graceful restart (based on RFC 4811, RFC 4812, and RFC 4813). Specify **both** to disable helper mode for both standard and restart signaling-based graceful restart. The last committed statement takes precedence over the previously configured statement.

Default: Helper mode is enabled by default. For OSPFv2, both standard and restart-signaling based helper modes are enabled by default.

no-strict-lsa-checking—Disable strict OSPF link-state advertisement (LSA) checking to prevent the termination of graceful restart by a helping router. LSA checking is enabled by default.

NOTE: The **helper-disable** statement and the **no-strict-lsa-checking** statement cannot be configured at the same time. If you attempt to configure both statements at the same time, the routing device displays a warning message when you enter the **show protocols (ospf | ospf3)** command.

notify-duration ***seconds***—Estimated time needed to send out purged grace LSAs over all the interfaces.

Range: 1 through 3600 seconds

Default: 30 seconds

restart-duration ***seconds***—Estimated time needed to reacquire a full OSPF neighbor from each area.

Range: 1 through 3600 seconds

Default: 180 seconds

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- *Example: Configuring Graceful Restart for OSPF*
- *Example: Configuring the Helper Capability Mode for OSPFv2 Graceful Restart*
- *Example: Configuring the Helper Capability Mode for OSPFv3 Graceful Restart*
- *Example: Disabling Strict LSA Checking for OSPF Graceful Restart*
- Configuring Graceful Restart for QFabric Systems on page 453
- *Junos OS High Availability Library for Routing Devices*

interconnect-device (Chassis)

Supported Platforms QFabric System

Syntax

```
interconnect-device {
  alarm {
    (ethernet | management-ethernet) {
      link-down (red | yellow | ignore);
    }
  }
  container-devices {
    device-count number;
  }
  craft-lockout {
    alarm {
      interface-type {
        link-down (red | yellow | ignore);
      }
    }
    container-devices {
      device-count number;
    }
    fpc slot {
      power (on | off);
    }
    routing-engine {
      on-disk-failure {
        disk-failure-action (halt | reboot);
      }
    }
  }
  fpc slot {
    power (on | off);
  }
  routing-engine {
    on-disk-failure {
      disk-failure-action (halt | reboot);
    }
  }
}
```

Hierarchy Level [edit chassis]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description Configure properties specific to a QFabric system Interconnect device.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Understanding Interconnect Devices on page 23

interconnect-device (Aliases)

Supported Platforms QFabric System

Syntax

```
interconnect-device interconnect-device-name {
  assigned-interconnect-device-name;
}
```

Hierarchy Level [edit fabric aliases]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFabric systems only) Specify the mapping of user-defined names to QFabric system Interconnect devices.

NOTE: The following rules apply to QFabric component alias naming:

- Alias names must use alphabetic (A through Z and a through z), numeric (0 through 9), or dash (-) characters.
- The maximum length of an alias name is 30 characters.
- Alias names are case sensitive. For example, MY-NG-1 and my-ng-1 refer to different components.
- You cannot use the reserved names all, fabric, or director-group as an alias name.

Options *interconnect-device-name*—Specify a user-defined name for a QFabric system Interconnect device.

assigned-interconnect-device-name—Specify the Interconnect device identifier or name that has been provided. Identifiers are usually auto-generated by the Interconnect software, and names are usually provided by the administrator of the default partition.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Aliases for the QFabric System on page 430
- Understanding Interconnect Devices on page 23

multicast (QFabric Routing Options)

Supported Platforms QFabric System

Syntax

```
multicast {
  fabric-optimized-distribution
  no-make-before-break;
}
```

Hierarchy Level [edit fabric routing-options]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFabric systems only) Set multicast routing options in a QFabric system, such as no-make-before-break.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Understanding the QFabric System Data Plane on page 42

network-domain

Supported Platforms QFabric System

Syntax network-domain;

Hierarchy Level [edit fabric resources node-group *node-group-name*]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Designate a Node group to become a *network Node group*, which is used to route traffic between a QFabric system and external networks. The absence of the **network-domain** configuration statement implies that the Node group is a *server Node group*, which is used to group sets of Node devices that are connected to servers or storage devices.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Node Groups for the QFabric System on page 447
- Understanding Node Groups on page 30

no-make-before-break

Supported Platforms QFabric System

Syntax no-make-before-break;

Hierarchy Level [edit fabric routing-options multicast]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFabric systems only) Disable the default *make-before-break* multicast feature on QFabric systems to prevent the duplication of system traffic. This feature increases the speed of data plane traffic, but carries the risk of minor traffic losses when compared with the default make-before-break method of creating new multicast fabric paths before tearing down the old paths. The absence of the **no-make-before-break** configuration statement implies that the make-before-break default system behavior is in effect.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Understanding the QFabric System Data Plane on page 42

node-device (Aliases)

Supported Platforms QFabric System

Syntax

```
node-device node-device-name {
  assigned-node-device-name;
}
```

Hierarchy Level [edit fabric aliases]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Specify the mapping of user-defined names to QFabric system Node devices.

NOTE: The following rules apply to QFabric component alias naming:

- Alias names must use alphabetic (A through Z and a through z), numeric (0 through 9), or dash (-) characters.
- The maximum length of an alias name is 30 characters.
- Alias names are case sensitive. For example, MY-NG-1 and my-ng-1 refer to different components.
- You cannot use the reserved names **all**, **fabric**, or **director-group** as an alias name.

Options ***node-device-name***—Specify a user-defined name for a QFabric system Node device.

assigned-node-device-name—Specify the Node device identifier or name that has been provided. Identifiers are usually autogenerated by the Director software, and names are usually provided by the administrator of the default partition.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Aliases for the QFabric System on page 430
- Understanding Node Devices on page 26

node-device (Chassis)

Supported Platforms QFabric System

Syntax

```
node-device name {
  fibre-channel {
    port-range {
      port-range-low port-range-high;
    }
  }
  pic pic-number {
    fte {
      port port-number;
      port-range port-range-low port-range-high;
    }
    xe {
      port port-number;
      port-range port-range-low port-range-high;
    }
  }
}
```

Hierarchy Level [edit chassis node-group]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description Configure properties specific to a Node device in a QFabric system.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Link Aggregation*

node-device (Resources)

Supported Platforms QFabric System

Syntax node-device *node-device-name*;

Hierarchy Level [edit fabric resources node-group *node-group-name*]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Assign Node devices to Node groups within a QFabric system.

NOTE: Ensure that the Node devices you assign to a redundant server Node group are of the same type, either two QFX3500 Node devices, two QFX3600 Node devices, or two QFX5100 Node devices. You cannot mix and match different Node device types in the same redundant server Node group.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Node Groups for the QFabric System on page 447
- Understanding Node Groups on page 30

node-group (Chassis)

Supported Platforms QFabric System

Syntax

```
node-group name {
  aggregated-devices {
    ethernet {
      device-count number;
    }
  }
  alarm {
    interface-type {
      link-down (ignore | red | yellow);
    }
  }
  container-devices {
    device-count number;
  }
  node-device name {
    fibre-channel {
      port-range {
        port-range-low port-range-high;
      }
    }
  }
  pic pic-number {
    fte {
      port port-number;
      port-range port-range-low port-range-high;
    }
    xe {
      port port-number;
      port-range port-range-low port-range-high;
    }
  }
  routing-engine {
    on-disk-failure {
      disk-failure-action (halt | reboot);
    }
  }
}
```

Hierarchy Level [edit chassis]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description Configure properties specific to a Node group.

The remaining statements are explained separately.

Required Privilege Level interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring Link Aggregation*

node-group (Resources)

Supported Platforms QFabric System

Syntax

```
node-group node-group-name {
  network-domain;
  node-device node-device-name;
}
```

Hierarchy Level [edit fabric resources]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Define Node groups within a QFabric system.

NOTE: The following rules apply to QFabric Node group naming:

- The network Node group must use the predefined name *NW-NG-0*. You must use this name when adding Node devices to the network Node group. You cannot specify a different name. Also, you can configure only one network Node group per partition.
- Node group names must use alphabetic (A through Z and a through z), numeric (0 through 9), or dash (-) characters.
- The maximum length of a Node group name is 30 characters.
- Node group names are case sensitive. For example, MY-NG-1 and my-ng-1 refer to different components.
- You cannot use the reserved names **all**, **fabric**, or **director-group** as a Node group name.

The remaining statements are explained separately.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Node Groups for the QFabric System on page 447
- Understanding Node Groups on page 30

pic (Port)

Supported Platforms QFabric System

Syntax

```
pic pic-number {
  fte {
    (port port-number | port-range port-range-low port-range-high);
  }
  xe {
    (port port-number | port-range port-range-low port-range-high);
  }
}
```

Hierarchy Level [edit chassis interconnect-device *name* fpc *slot*]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFX3600 Node device only) Configure port types on QFX3600 Node devices.

CAUTION: The Packet Forwarding Engine on the QFX3600 Node device is restarted when you commit the port type configuration changes. As a result, you might experience packet loss on the Node device.

Options pic *pic-number*—Number of the physical interface card (PIC) on which you want to configure port types. Specify **0** to configure *xe* (10-Gigabit Ethernet) type ports. Specify **1** to configure *fte* (40-gigabit data plane uplink) type ports.

fte—Configure a specific port or a range of ports to operate as 40-gigabit data plane uplink ports.

xe—Configure a specific port or a range of ports to operate as four 10-Gigabit Ethernet ports.

port-number—Port number on which you want to configure the port type. Valid values are 0 through 7 if the port type is **fte**, and 2 through 15 if the port type is **xe**.

port-range-low—Lowest-numbered port in the range of ports. The lowest possible value is 0 if the port type is **fte**. The lowest possible value is 2 if the port type is **xe**.

port-range-high—Highest-numbered port in the range of ports. The highest possible value is 7 if the port type is **fte**. The highest possible value is 15 if the port type is **xe**.

NOTE:

- By default, ports Q0 through Q3 operate as fte type ports, and ports Q4 through Q15 operate as xe type ports.
- Only ports Q0 through Q7 can be configured as fte type ports.

- Only ports Q2 through Q15 can be configured as xe type ports.

NOTE: When you delete the port type configuration for an individual port or a block of ports, the ports return to operating in their default port type.

Required Privilege Level
routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation
- Configuring the Port Type on QFX3600 Node Devices on page 440

protocols (Fabric)

Supported Platforms QFabric System

Syntax

```
protocols {
  fabric-control {
    graceful-restart {
      restart-timeseconds;
      stale-routes-time seconds;
    }
  }
}
```

Hierarchy Level [edit fabric]

Release Information Statement introduced in Junos OS Release 13.2X52-D10 for the QFX Series.

Description Specify attributes for the fabric control protocol.

The remaining statements are explained separately.

Required Privilege Level
admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Understanding Routing Engines in the QFabric System on page 21

remote-debug-permission

Supported Platforms QFabric System

Syntax remote-debug-permission (qfabric-admin | qfabric-operator | qfabric-user);

Hierarchy Level [edit system login user *username* authentication]
[edit system root-authentication]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Configure authentication classes that permit or deny user access to individual components of the QFabric system.

Default qfabric-user

Options **qfabric-admin**—Permits a user to log in to individual QFabric system components, view operations, and change component configurations.

qfabric-operator—Permits a user to log in to individual QFabric system components and view component operations.

qfabric-user—Prevents a user from logging in to individual QFabric system components.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Example: Configuring QFabric System Login Classes on page 422
- **request component login on page 542**
- Understanding QFabric System Login Classes on page 59

resources

Supported Platforms QFabric System

Syntax

```
resources {
  node-group node-group-name {
    network-domain;
    node-device node-device-name;
  }
}
```

Hierarchy Level [edit fabric]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Define resources within a QFabric system and handle a variety of component assignments.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Node Groups for the QFabric System on page 447
- Understanding Node Groups on page 30

restart-time (Fabric Control)

Supported Platforms QFabric System

Syntax restart-time *seconds*;

Hierarchy Level [edit fabric protocols fabric-control graceful-restart]

Release Information Statement introduced in Junos OS Release 13.2X52-D10 for the QFX Series.

Description Configure the duration of the graceful restart period for the fabric control Routing Engine.

The graceful restart resynchronization process takes longer when the QFabric system contains node groups that have a large number of VLANs. The graceful-restart duration should, therefore, be set higher when the QFabric system contains at least one node group with a large number of VLANs.

Configure a restart time of 600 seconds if the number of VLAN members (vmembers) exceeds 32k.

CAUTION: **Configuring the restart time restarts the session between the fabric control Routing Engine and the Node groups. Traffic is dropped as a result of this restart. Normal QFabric system operations should resume once the session has restarted without any further user actions.**

Options *seconds*—Duration of the graceful restart period.

Default: 300 seconds

Range: 300 to 900 seconds

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- *Understanding Bridging and VLANs*
- Understanding Routing Engines in the QFabric System on page 21

routing-options (QFabric System)

Supported Platforms QFabric System

Syntax

```
routing-options {
  multicast {
    no-make-before-break;
  }
}
```

Hierarchy Level [edit fabric]

Release Information Statement introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFabric systems only) Set routing options in a QFabric system.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Understanding the QFabric System Data Plane on page 42

syslog (QFabric System)

Supported Platforms QFabric System

Syntax

```
syslog {
  file filename {
    archive {
      size maximum-file-size;
    }
    explicit-priority;
    facility severity;
    match "regular-expression";
    structured-data;
  }
  filter all {
    facility severity;
    match "regular-expression";
  }
  host hostname {
    explicit-priority;
    facility severity;
    facility-override facility;
    log-prefix string;
    match "regular-expression";
    structured-data;
  }
}
```

Hierarchy Level [edit system]

Release Information Statement introduced in Junos OS Release 11.3 for the QFX Series.

Description Configure system log messages for the QFabric system.

The remaining statements are explained separately.

Required Privilege Level system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- Understanding the Implementation of System Log Messages on the QFabric System on page 57
- *Directing System Log Messages to a Remote Machine*

stale-routes-time (Fabric Control)

Supported Platforms QFabric System

Syntax stale-routes-time *seconds*;

Hierarchy Level [edit fabric protocols fabric-control graceful-restart]

Release Information Statement introduced in Junos OS Release 13.2X52-D10 for the QFX Series.

Description Set the length of time that the fabric control Routing Engine waits to receive messages from devices before declaring them down. Configure a stale routes time of 1800 seconds if the number of VLAN members (vmembers) exceeds 32k.

Options *seconds*—Amount of time that the fabric control Routing Engine waits to receive messages from other devices before declaring them down.

Default: 900 seconds

Range: 900 to 1800 seconds

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- *Understanding Bridging and VLANs*
- Understanding Routing Engines in the QFabric System on page 21

PART 4

Administration

CHAPTER 21

Software Upgrade and Recovery

Performing a Nonstop Software Upgrade on the QFabric System

Supported Platforms QFabric System

NOTE: Before you perform a nonstop software upgrade, contact JTAC to perform a pre-upgrade health check on the QFabric system.

NOTE: Before you can perform a nonstop software upgrade to Junos OS Release 13.1X50-D10, you must have Junos OS Release 12.2X50-D42 or later installed. You cannot perform a nonstop software upgrade with Junos OS Release 12.2X50-D41 or earlier. Contact the Juniper Technical Assistance Center for information on how to download Junos OS Release 12.2X50-D42. Performing a standard software upgrade (that is, issuing the **request system software add component all** command) does not require that you that you upgrade to an intermediate Junos OS software release.

To perform a nonstop software upgrade to Junos OS Release 13.1X50-D10:

1. First perform a nonstop software upgrade to Junos OS Release 12.2X50-D42.
2. Then perform a nonstop software upgrade to Junos OS Release 13.1X50-D10.

Nonstop software upgrade enables you to upgrade a QFabric system with minimal packet loss and maximum uptime. This feature introduces several high availability improvements to the QFabric system software upgrade process, including:

- Upgrading members of a Director group or Node group one at a time so that one device in the group is always operational
- Switching mastership of Routing Engine processes to the backup Director device before upgrading the master Director device
- Rebooting Interconnect devices and fabric control Routing Engines one at a time, so that one Interconnect device or one fabric control Routing Engine is always operational
- Switching mastership of a Node group to the backup Node device before upgrading the master Node device
- Specifying an upgrade group if you want all Node devices in a Node group to be upgraded in parallel (which shortens the time of the upgrade)
- Rebooting devices automatically as part of the nonstop upgrade process

When performing a nonstop upgrade, start with the Director group upgrade, then issue the fabric upgrade, and end with the Node group upgrades.

NOTE: Because there is no redundancy for Node groups containing a single Node device, traffic loss occurs when the device reboots during the upgrade. For node-groups defined with two node-devices, both must be online in order for upgrade to succeed.

NOTE: Before you install the software, we recommend that you back up your current configuration files by issuing the **request system software configuration-backup** command.

NOTE: Before you can perform a nonstop software upgrade in your QFabric system, you must first upgrade your system to Junos OS Release 12.2 by using a conventional upgrade method such as issuing the **request system software add component all** command.

This topic describes the following tasks:

Backing Up the Current Configuration Files

Supported Platforms QFX Series standalone switches

To back up your current configuration files:

`user@qfabric>` **request system software configuration-backup** ***path***

Back up the configuration files to a local directory, remote server, or removable drive (for example, an external USB flash drive).

For example:

`user@qfabric>` **request system software configuration-backup/media/USB/**

Downloading Software Files Using a Browser

Supported Platforms

NOTE: To access the download site, you must have a service contract with Juniper Networks and an access account. If you need help obtaining an account, complete the registration form at the Juniper Networks website https://www.juniper.net/registration/Register.jsp .

1. Using a Web browser, navigate to the http://www.juniper.net/support .
2. Click **Download Software**.
3. In the **Switching** box, click **Junos OS Platforms**.
4. In the **QFX Series** section, click the name of the platform for which you want to download software.
5. Click the **Software** tab and select the release number from the **Release** drop-down list.
6. Select the complete install package you want to download in the **QFabric System Install Package** section:
   - If you want to upgrade the entire QFabric system, select **QFabric System - Complete Install Package**.
   - If you want to upgrade either a single Node or Interconnect device for recovery purposes, select **Node and Interconnect Device Install Package**. For information on how to perform a recovery installation on either a Node or Interconnect device, see "Performing a Recovery Installation" on page 679.

   A login screen appears.
7. Enter your user ID and password and press **Enter**.
8. Read the End User License Agreement, select the **I agree** option button, and then click **Proceed**.
9. Save the **jinstall-qfabric-*version*.rpm** file on your computer.

Retrieving Software Files for Download

Supported Platforms

Retrieve the software from the location in which you downloaded it. To do this, issue the **request system software download** command. The software package is copied from where you downloaded it and is placed locally on the QFabric system.

- To retrieve the software:

  `user@qfabric>` **request system software download** ***/path/package-name***

  For example:

  `user@qfabric>` **request system software download ftp://server/files/jinstall-qfabric-12.2X50-D10.3.rpm**

Performing a Nonstop Software Upgrade for Director Devices in a Director Group

Supported Platforms

NOTE: If you reboot any Node groups or Interconnect devices after you perform a nonstop upgrade on the Director group, these devices are upgraded to the same version of software that is running on the Director group.

To upgrade the software on the Director devices in a Director group:

- Issue the **request system software nonstop-upgrade director-group** ***package-name*** command.

  For example:

  `user@qfabric>` **request system software nonstop-upgrade director-group jinstall-qfabric-12.2X50-D10.3.rpm**

Performing a Nonstop Software Upgrade for Interconnect Devices and Other Fabric-Related Components

Supported Platforms

Before you perform a nonstop upgrade on the Interconnect devices and other fabric-related components, verify that both Director devices in the Director group are online. Both Director devices must be online before you attempt to perform a nonstop upgrade. To do verify that both Director devices are online, issue the **show fabric administration inventory director-group status** command.

To install the software on the Interconnect device and other components in the fabric:

- Issue the **request system software nonstop-upgrade fabric** ***package-name*** command.

  For example:

  `user@qfabric>` **request system software nonstop-upgrade fabric jinstall-qfabric-12.2X50-D10.3.rpm**

(Optional) Creating Upgrade Groups for Node Groups

Supported Platforms

Upgrade groups enable two or more Node devices in a Node group, or an entire Node group, to be rebooted at the same time. If you do not create an upgrade group, the Node devices are upgraded one at a time. Before performing a nonstop upgrade on a Node group, create an upgrade group and include the devices you want to reboot at the same time.

NOTE: If you add Node devices that have links to the same link aggregation group (LAG), there might be traffic loss.

- Create the upgrade group by issuing the **set chassis node-group *node-group-name* nssu upgrade-group *upgrade-group-name* node-devices** command at the **[edit chassis]** hierarchy.

  For example:

  `user@qfabric#` **set chassis node-group nodegroup1 nssu upgrade-group upgrade1 node-devices [node1 node2]**

Performing a Nonstop Software Upgrade on a Node Group

Supported Platforms

When you perform a nonstop software upgrade on a network Node group, the Node devices in the network Node group are upgraded in a serial fashion except when upgrade groups are configured. If you perform a nonstop upgrade on a redundant server Node group, both Node devices must be online for a successful upgrade. If one of the Node devices is no longer available, remove it from the configuration before you perform the nonstop software upgrade. If you perform a nonstop upgrade on a Node group with only one Node device, traffic loss occurs while the Node device is rebooting.

NOTE: You can upgrade multiple Node groups with this command. However, if more than one Node group is specified, there may be traffic loss depending on the topology of the network.

To install software on a Node group:

- Issue the **request system software nonstop-upgrade node-group** ***node-group-name package-name*** command.

  To perform a nonstop upgrade on one Node group:

  `user@qfabric>` **request system software nonstop-upgrade node-group nodegroup1 jinstall-qfabric-12.2X50-D10.3.rpm**

  To perform a nonstop upgrade on more than one Node group:

  `user@qfabric>` **request system software nonstop-upgrade node-group [nodegroup1 nodegroup2 nodegroup3] jinstall-qfabric-12.2X50-D10.3.rpm**

Related Documentation

- *Nonstop Software Upgrade Checklist for QFabric Systems*
- Configuring Graceful Restart for QFabric Systems on page 453
- Understanding Nonstop Software Upgrade for QFabric Systems on page 47
- Verifying Nonstop Software Upgrade for QFabric Systems on page 508
- **request system software nonstop-upgrade on page 559**

Verifying Nonstop Software Upgrade for QFabric Systems

Supported Platforms QFabric System

NOTE: Before you perform a nonstop software upgrade, contact JTAC to perform a pre-upgrade health check on the QFabric system.

This topic discusses how you can monitor the progress of each of the three steps in a nonstop software upgrade. By identifying the key actions and events that define this process, you can track the status of the upgrade with confidence.

TIP: When performing a nonstop software upgrade, open two SSH sessions to the QFabric CLI. Use one session to monitor the upgrade itself and use a second session to verify that the QFabric system components respond to operational mode commands as expected.

Verifying a Director Group Nonstop Software Upgrade

Supported Platforms QFX Series standalone switches

Purpose During the Director group portion of a nonstop software upgrade, you should expect to see the Director device that hosts the CLI session selected as the master device. When mastership of all processes moves to the master, the QFabric system upgrades the backup Director device and this Director device reboots. After the backup Director device comes back online, the master Director device suspends CLI operations for 15 minutes, upgrades itself, and reboots. At this point, the backup becomes the new master Director device and you can issue CLI operational commands. Finally, the former master comes back online as a backup and both devices are operational once again. In addition to the steps below, you can issue the **show system software upgrade status** command to view the progress of the upgrade.

Action

1. In one SSH session to the QFabric CLI, verify the current status of the QFabric system by issuing the **show fabric administration inventory**, **show fabric administration inventory director-group status**, and **show fabric session-host** commands. In this case, Director device DG0 is the master device but DG1 hosts the CLI session.

   session1@qfabric> show fabric administration inventory

```
Item                    Identifier              Connection      Configuration
Node group
  NW-NG-0                                       Connected       Configured

    P1507-C                                     Connected

  RSNG                                          Connected       Configured

    P1550-C                                     Connected

    P1571-C                                     Connected

Interconnect device
  IC-F4912                                      Connected       Configured

    F4912/RE0                                   Connected

Fabric manager
  FM-0                                          Connected       Configured

Fabric control
  FC-0                                          Connected       Configured

  FC-1                                          Connected       Configured
```

```
Diagnostic routing engine
  DRE-0                                     Connected       Configured
```

session1@qfabric> show fabric administration inventory director-group status

```
Director Group Status Tue Jun  5 15:11:26 UTC 2012

 Member Status Role     Mgmt Address    CPU Free Memory VMs Up Time
 ------ ------ -------- --------------- --- ----------- --- -------------
 dg0    online master   10.49.215.38    8%  17363152k   4   3 days, 20:55 hrs

 dg1    online backup   10.49.215.39    6%  20157440k   3   3 days, 20:55 hrs


 Member Device Id/Alias  Status  Role
 ------ ---------------- ------- ---------
 dg0    0281052011000001 online  master

  Master Services
  ---------------
  Database Server               online
  Load Balancer Director        online
  QFabric Partition Address     online

  Director Group Managed Services
  -------------------------------
  Shared File System            online
  Network File System           online
  Virtual Machine Server        online
  Load Balancer/DHCP            online

  Hard Drive Status
  ----------------
  Volume ID:4                   optimal
  Physical ID:1                 online
  Physical ID:0                 online
  SCSI ID:1                     100%
  SCSI ID:0                     100%


  Size  Used Avail Used% Mounted on
  ----  ---- ----- ----- ----------
  423G 5.4G 395G  2%   /
  99M  16M  79M   17%  /boot
  93G  7.3G 86G   8%   /pbdata

  Director Group Processes
  ------------------------
  Director Group Manager        online
  Partition Manager             online
  Software Mirroring            online
  Shared File System master     online
  Secure Shell Process          online
  Network File System           online
  DHCP Server master            online     master

  FTP Server                    online
  Syslog                        online
  Distributed Management        online
  SNMP Trap Forwarder           online
  SNMP Process                  online
```



```
  Platform Management           online

  Interface Link Status
  ---------------------
  Management Interface          up
  Control Plane Bridge          up
  Control Plane LAG             up
  CP Link [0/2]                 up
  CP Link [0/1]                 up
  CP Link [0/0]                 up
  CP Link [1/2]                 down
  CP Link [1/1]                 down
  CP Link [1/0]                 down
  Crossover LAG                 up
  CP Link [0/3]                 up
  CP Link [1/3]                 up

 Member Device Id/Alias  Status  Role
 ------ ---------------- ------- ---------
 dg1    0281052011000032 online  backup

  Director Group Managed Services
  -------------------------------
  Shared File System            online
  Network File System           online
  Virtual Machine Server        online
  Load Balancer/DHCP            online

  Hard Drive Status
  ----------------
  Volume ID:8                   optimal
  Physical ID:1                 online
  Physical ID:0                 online
  SCSI ID:1                     100%
  SCSI ID:0                     100%


  Size  Used Avail Used% Mounted on
  ----  ---- ----- ----- ----------
  423G 5.5G 395G  2%   /
  99M  16M  79M   17%  /boot
  93G  7.3G 86G   8%   /pbdata

  Director Group Processes
  ------------------------
  Director Group Manager        online
  Partition Manager             online
  Software Mirroring            online
  Shared File System master     online
  Secure Shell Process          online
  Network File System           online
  DHCP Server master            online     backup

  FTP Server                    online
  Syslog                        online
  Distributed Management        online
  SNMP Trap Forwarder           online
  SNMP Process                  online
  Platform Management           online

  Interface Link Status
```

```
 ---------------------
 Management Interface          up
 Control Plane Bridge          up
 Control Plane LAG             up
 CP Link [0/2]                 up
 CP Link [0/1]                 up
 CP Link [0/0]                 up
 CP Link [1/2]                 down
 CP Link [1/1]                 down
 CP Link [1/0]                 down
 Crossover LAG                 up
 CP Link [0/3]                 up
 CP Link [1/3]                 up
```

session1@qfabric> show fabric session-host

```
Identifier: 0281052011000032
```

2. In a second SSH session to the QFabric CLI, issue the request for the Director group nonstop software upgrade.

   root@qfabric> request system software nonstop-upgrade director-group jinstall-qfabric-12.2X50-D10.3.rpm

3. If the CLI session is being hosted by the master Director device, skip to step 4. However, if the CLI session is hosted by the backup Director device, the Director group mastership switches to the backup device after you issue the nonstop software upgrade command. In this example, mastership switches to Director device DG1.

   session1@qfabric> show fabric administration inventory director-group status

```
Director Group Status Tue Jun  5 15:12:20 UTC 2012

 Member Status Role     Mgmt Address    CPU Free Memory VMs Up Time
 ------ ------ -------- --------------- --- ----------- --- -------------
 dg0    online backup   10.49.215.38    8%  31905924k   0   3 days, 21:16 hrs

 dg1    online master   10.49.215.39    6%  18010368k   3   3 days, 21:16 hrs


 Member Device Id/Alias  Status  Role
 ------ ---------------- ------- ---------
 dg0    0281052011000001 online  backup

  Director Group Managed Services
  -------------------------------
  Shared File System            offline
  Network File System           offline
  Virtual Machine Server        offline
  Load Balancer/DHCP            offline

  Hard Drive Status
  ----------------
  Volume ID:4                   optimal
  Physical ID:1                 online
  Physical ID:0                 online
  SCSI ID:1                     100%
  SCSI ID:0                     100%


  Size  Used Avail Used% Mounted on
  ----  ---- ----- ----- ----------
  423G 5.4G 395G  2%   /
  99M  16M  79M   17%  /boot
```



```
 Director Group Processes
 ------------------------
 Director Group Manager         online
 Partition Manager              online
 Software Mirroring             online
 Shared File System master      online
 Secure Shell Process           online
 Network File System            offline
 DHCP Server master             offline    backup

 FTP Server                     online
 Syslog                         online
 Distributed Management         offline
 SNMP Trap Forwarder            offline
 SNMP Process                   offline
 Platform Management            online

 Interface Link Status
 ---------------------
 Management Interface           up
 Control Plane Bridge           up
 Control Plane LAG              up
 CP Link [0/2]                  up
 CP Link [0/1]                  up
 CP Link [0/0]                  up
 CP Link [1/2]                  down
 CP Link [1/1]                  down
 CP Link [1/0]                  down
 Crossover LAG                  up
 CP Link [0/3]                  up
 CP Link [1/3]                  up

Member Device Id/Alias  Status  Role
------ ---------------- ------- ---------
dg1    0281052011000032 online  master

 Master Services
 ---------------
 Database Server                online
 Load Balancer Director         online
 QFabric Partition Address      online

 Director Group Managed Services
 -------------------------------
 Shared File System             online
 Network File System            online
 Virtual Machine Server         online
 Load Balancer/DHCP             online

 Hard Drive Status
 ----------------
 Volume ID:8                    optimal
 Physical ID:1                  online
 Physical ID:0                  online
 SCSI ID:1                      100%
 SCSI ID:0                      100%


 Size  Used Avail Used% Mounted on
 ----  ---- ----- ----- ----------
```

```
423G 6.0G 395G  2%   /
99M  16M  79M   17%  /boot
93G  7.3G 86G   8%   /pbdata

Director Group Processes
------------------------
Director Group Manager        online
Partition Manager             online
Software Mirroring            online
Shared File System master     online
Secure Shell Process          online
Network File System           online
DHCP Server master            online     master

FTP Server                    online
Syslog                        online
Distributed Management        online
SNMP Trap Forwarder           online
SNMP Process                  online
Platform Management           online

Interface Link Status
---------------------
Management Interface          up
Control Plane Bridge          up
Control Plane LAG             up
CP Link [0/2]                 up
CP Link [0/1]                 up
CP Link [0/0]                 up
CP Link [1/2]                 down
CP Link [1/1]                 down
CP Link [1/0]                 down
Crossover LAG                 up
CP Link [0/3]                 up
CP Link [1/3]                 up
```

session1@qfabric> show fabric session-host

```
Identifier: 0281052011000032
```

4. The Director group nonstop software upgrade process continues by downloading and installing software for the fabric manager Routing Engines and the Director devices.

root@qfabric>

```
Validating update package jinstall-qfabric-12.2X50-D10.3.rpm
Installing update package jinstall-qfabric-12.2X50-D10.3.rpm
Installing fabric images version 12.2X50-D10.3
Performing cleanup
Package install complete
Installing update package jinstall-qfabric-12.2X50-D10.3.rpm on peer
Triggering Initial Stage of Fabric Manager Upgrade
Updating CCIF default image to 12.2X50-D10.3
Updating FM-0 to Junos version 12.2X50-D10.3
[Status   2012-06-05 15:25:29]: Fabric Manager: Upgrade Initial Stage started
[FM-0     2012-06-05 15:25:38]: FM-0 Master already running on LOCAL DG
[NW-NG-0  2012-06-05 15:25:45]: NW-NG-0 Master already running on LOCAL DG
[FM-0     2012-06-05 15:26:12]: Retrieving package
[FM-0     2012-06-05 15:27:11]: Pushing bundle to re0
[Status   2012-06-05 15:29:06]: Load completed with 0 errors...
[Status   2012-06-05 15:29:06]: Reboot is required to complete upgrade ...
[Status   2012-06-05 15:29:07]: Trying to Connect to Node: FM-0
[Status   2012-06-05 15:29:13]: Rebooting FM-0
[FM-0     2012-06-05 15:29:13]: Waiting for FM-0 to terminate ...
```



```
Starting Peer upgrade

Initiating rolling upgrade of Director peer:  version 12.2X50-D10.3

Inform CCIF regarding rolling upgrade
[Peer Update Status]: Validating install package
jinstall-qfabric-12.2X50-D10.3.rpm
[Peer Update Status]: Cleaning up node for rolling phase one upgrade
[Peer Update Status]: Director group upgrade complete
[Peer Update Status]: COMPLETED
[Peer Update Status]: Waiting for peer to reboot and start phase one of rolling
 upgrade
[Peer Update Status]: Waiting for peer to reboot and start phase one of rolling
 upgrade
[Peer Update Status]: Waiting for peer to reboot and start phase one of rolling
 upgrade
[Peer Update Status]: Waiting for peer to reboot and start phase one of rolling
 upgrade
[Peer Update Status]: Waiting for peer to reboot and start phase one of rolling
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 one of rolling upgrade
[Peer Update Status]: Waiting for peer to return after reboot and start phase
 one of rolling upgrade
[Peer Update Status]: Waiting for peer to return after reboot and start phase
 one of rolling upgrade
[Peer Update Status]: Waiting for peer to return after reboot and start phase
 one of rolling upgrade
[Peer Update Status]: Waiting for peer to complete phase one of rolling upgrade
[Peer Update Status]: Peer completed phase one of rolling upgrade
```

5. When the system upgrades and reboots the backup Director device DG0, notice how this device is not displayed in the output of the **show fabric administration inventory director-group status** command. Because Director device DG1 appears, this means that the DG1 is operational and acts as the master device.

NOTE: If your second SSH session is being hosted by the rebooting Director device, your session terminates and you need to log back in to establish a new session running on the active Director device.

session1@qfabric> show fabric administration inventory director-group status

```
Director Group Status Tue Jun  5 15:41:14 UTC 2012

 Member Status Role     Mgmt Address    CPU Free Memory VMs Up Time
 ------ ------ -------- --------------- --- ----------- --- -------------
 dg1    online master   10.49.215.39    6%  8372272k    4   3 days, 21:25 hrs


 Member Device Id/Alias  Status  Role
 ------ ---------------- ------- ---------
 dg1    0281052011000032 online  master

  Master Services
  ---------------
  Database Server               online
  Load Balancer Director        online
  QFabric Partition Address     online

  Director Group Managed Services
  -------------------------------
  Shared File System            online
  Network File System           online
  Virtual Machine Server        online
  Load Balancer/DHCP            online

  Hard Drive Status
  ----------------
  Volume ID:8                   optimal
  Physical ID:1                 online
  Physical ID:0                 online
  SCSI ID:1                     100%
  SCSI ID:0                     100%


  Size  Used Avail Used% Mounted on
  ----  ---- ----- ----- ----------
  423G 6.0G 395G  2%   /
  99M  16M  79M   17%  /boot
  93G  7.3G 86G   8%   /pbdata

  Director Group Processes
  ------------------------
  Director Group Manager        online
  Partition Manager             online
  Software Mirroring            online
  Shared File System master     online
  Secure Shell Process          online
  Network File System           online
  DHCP Server master            online     master

  FTP Server                    online
  Syslog                        online
  Distributed Management        online
```



```
SNMP Trap Forwarder           online
SNMP Process                  online
Platform Management           online

Interface Link Status
---------------------
Management Interface          up
Control Plane Bridge          up
Control Plane LAG             up
CP Link [0/2]                 up
CP Link [0/1]                 up
CP Link [0/0]                 up
CP Link [1/2]                 down
CP Link [1/1]                 down
CP Link [1/0]                 down
Crossover LAG                 up
CP Link [0/3]                 up
CP Link [1/3]                 up
```

6. The upgrade continues with master Director device DG1 suspending CLI services for 15 minutes, transferring mastership to Director device DG0, and then rebooting Director device DG1 (which terminates the CLI session).

   root@qfabric>

```
[Peer Update Status]: Setting peer DG node as the master SFC

Delaying start of local upgrade to allow peer services time to initialize [15
 minutes]
Delaying start of local upgrade to allow peer services time to initialize [15
 minutes]
Delaying start of local upgrade to allow peer services time to initialize [12
 minutes]
Delaying start of local upgrade to allow peer services time to initialize [9
minutes]
Delaying start of local upgrade to allow peer services time to initialize [6
minutes]
Delaying start of local upgrade to allow peer services time to initialize [3
minutes]
[Peer Update Status]: Check for VMs on dg0
Triggering Final Stage of Fabric Manager Upgrade:
Updating FM-0 to Junos version 12.2X50-D10.3
[Status   2012-06-05 16:10:12]: Fabric Manager: Upgrade Final Stage started
[NW-NG-0  2012-06-05 16:10:22]: Transferring NW-NG-0 Mastership to REMOTE DG
[NW-NG-0  2012-06-05 16:11:44]: Finished NW-NG-0 Mastership switch
[Status  2012-06-05 16:11:45]: Upgrading FM-0 VM on worker DG to 12.2X50-D10.3
[DRE-0    2012-06-05 16:12:43]: Retrieving package
[DRE-0    2012-06-05 16:13:46]: ------- re0: -------
[Status   2012-06-05 16:15:17]: Load completed with 0 errors...
[Status   2012-06-05 16:15:17]: Reboot is required to complete upgrade ...
[DRE-0    2012-06-05 16:15:22]: Waiting for DRE-0 to terminate ...
[DRE-0    2012-06-05 16:15:34]: Waiting for DRE-0 to come back ...
[DRE-0    2012-06-05 16:18:44]: Running Uptime Test for DRE-0
[DRE-0    2012-06-05 16:18:51]: Uptime Test for DRE-0 Passed ...
[Status   2012-06-05 16:18:51]: DRE-0 booted successfully ...
Performing post install shutdown and cleanup

Broadcast message from root (Tue Jun  5 16:18:51 2012):

The system is going down for reboot NOW!
Director group upgrade complete
```



```
root@qfabric> Read from remote host qfabric-partition0: Connection reset by
peer
Connection to qfabric-partition0 closed.
```

7. Upon reopening the SSH session, notice that Director device DG0 is now the master device hosting the session and Director device DG1 does not appear in the QFabric system inventory while it is rebooting.

session1@qfabric> show fabric session-host

```
Identifier: 0281052011000001
```

session1@qfabric> show fabric administration inventory director-group status

```
Director Group Status Tue Jun  5 16:21:23 UTC 2012

 Member Status Role     Mgmt Address    CPU Free Memory VMs Up Time
 ------ ------ -------- --------------- --- ----------- --- -------------
 dg0    online master   10.49.215.38    13% 20739560k   3   36:29 mins


 Member Device Id/Alias  Status  Role
 ------ ---------------- ------- ---------
 dg0    0281052011000001 online  master

  Master Services
  ---------------
  Database Server               online
  Load Balancer Director        online
  QFabric Partition Address     online

  Director Group Managed Services
  -------------------------------
  Shared File System            online
  Network File System           online
  Virtual Machine Server        online
  Load Balancer/DHCP            online

  Hard Drive Status
  ----------------
  Volume ID:4                   optimal
  Physical ID:1                 online
  Physical ID:0                 online
  SCSI ID:1                     100%
  SCSI ID:0                     100%


  Size  Used Avail Used% Mounted on
  ----  ---- ----- ----- ----------
  423G 5.3G 396G  2%   /
  99M  16M  79M   17%  /boot
  93G  7.4G 86G   8%   /pbdata

  Director Group Processes
  ------------------------
  Director Group Manager        online
  Partition Manager             online
  Software Mirroring            online
  Shared File System master     online
  Secure Shell Process          online
  Network File System           online
  DHCP Server master            online     master

  FTP Server                    online
```



```
 Syslog                         online
 Distributed Management         online
 SNMP Trap Forwarder            online
 SNMP Process                   online
 Platform Management            online

 Interface Link Status
 ---------------------
 Management Interface           up
 Control Plane Bridge           up
 Control Plane LAG              up
 CP Link [0/2]                  up
 CP Link [0/1]                  up
 CP Link [0/0]                  up
 CP Link [1/2]                  down
 CP Link [1/1]                  down
 CP Link [1/0]                  down
 Crossover LAG                  up
 CP Link [0/3]                  up
 CP Link [1/3]                  up
```

8. When Director device DG1 comes back online, it returns to the QFabric system inventory as a backup Director device and hosts some of the Routing Engine processes (which should appear load balanced between the master and backup Director devices).

   session1@qfabric> show fabric administration inventory director-group status

```
root@qfabric> show fabric administration inventory director-group status
Director Group Status Tue Jun  5 16:41:02 UTC 2012

 Member Status Role     Mgmt Address    CPU Free Memory VMs Up Time
 ------ ------ -------- --------------- --- ----------- --- -------------
 dg0    online master   10.49.215.38    15% 14759920k   6   56:09 mins

 dg1    online backup   10.49.215.39    8%  31486680k   0   07:51 mins


 Member Device Id/Alias  Status  Role
 ------ ---------------- ------- ---------
 dg0    0281052011000001 online  master

  Master Services
  ---------------
  Database Server               online
  Load Balancer Director        online
  QFabric Partition Address     online

  Director Group Managed Services
  -------------------------------
  Shared File System            online
  Network File System           online
  Virtual Machine Server        online
  Load Balancer/DHCP            online

  Hard Drive Status
  ----------------
  Volume ID:4                   optimal
  Physical ID:1                 online
  Physical ID:0                 online
  SCSI ID:1                     100%
  SCSI ID:0                     100%
```

```
 Size  Used Avail Used% Mounted on
 ----  ---- ----- ----- ----------
 423G 5.3G 396G  2%   /
 99M  16M  79M   17%  /boot
 93G  7.4G 86G   8%   /pbdata

 Director Group Processes
 ------------------------
 Director Group Manager         online
 Partition Manager              online
 Software Mirroring             online
 Shared File System master      online
 Secure Shell Process           online
 Network File System            online
 DHCP Server master             online     master

 FTP Server                     online
 Syslog                         online
 Distributed Management         online
 SNMP Trap Forwarder            online
 SNMP Process                   online
 Platform Management            online

 Interface Link Status
 ---------------------
 Management Interface           up
 Control Plane Bridge           up
 Control Plane LAG              up
 CP Link [0/2]                  up
 CP Link [0/1]                  up
 CP Link [0/0]                  up
 CP Link [1/2]                  down
 CP Link [1/1]                  down
 CP Link [1/0]                  down
 Crossover LAG                  up
 CP Link [0/3]                  up
 CP Link [1/3]                  up

Member Device Id/Alias  Status  Role
------ ---------------- ------- ---------
dg1    0281052011000032 online  backup

 Director Group Managed Services
 -------------------------------
 Shared File System             online
 Network File System            online
 Virtual Machine Server         online
 Load Balancer/DHCP             online

 Hard Drive Status
 ----------------
 Volume ID:8                    optimal
 Physical ID:1                  online
 Physical ID:0                  online
 SCSI ID:1                      100%
 SCSI ID:0                      100%


 Size  Used Avail Used% Mounted on
```



```
  ----  ---- ----- ----- ----------
  423G 5.3G 396G  2%   /
  99M  16M  79M   17%  /boot
  93G  7.4G 86G   8%   /pbdata

  Director Group Processes
  ------------------------
  Director Group Manager        online
  Partition Manager             online
  Software Mirroring            online
  Shared File System master     online
  Secure Shell Process          online
  Network File System           online
  DHCP Server master            online     backup

  FTP Server                    online
  Syslog                        online
  Distributed Management        online
  SNMP Trap Forwarder           online
  SNMP Process                  online
  Platform Management           online

  Interface Link Status
  ---------------------
  Management Interface          up
  Control Plane Bridge          up
  Control Plane LAG             up
  CP Link [0/2]                 up
  CP Link [0/1]                 up
  CP Link [0/0]                 up
  CP Link [1/2]                 down
  CP Link [1/1]                 down
  CP Link [1/0]                 down
  Crossover LAG                 up
  CP Link [0/3]                 up
  CP Link [1/3]                 up
```

session1@qfabric> show fabric administration inventory infrastructure

```
dg0:
   Routing Engine Type                  Hostname              PID
CPU-Use(%)
------------------------ -------------------------------- ----------
-------------
 Fabric control             QFabric_default_FC-1_RE0         27906       2.5

 Network Node group         QFabric_default_NW-NG-1_RE1      20421       1.8

 Fabric manager             FM-0                             4211        1.8

 Debug Routing Engine       QFabric_DRE                      1575        3.3

dg1:
   Routing Engine Type                  Hostname              PID
CPU-Use(%)
------------------------ -------------------------------- ----------
-------------
 Fabric control             QFabric_default_FC-0_RE0         5686        2.3

 Network Node group         QFabric_default_NW-NG-0_RE0      5866        1.9

 Fabric manager             FM-1                             572         1.6
```

Verifying a Fabric Nonstop Software Upgrade

Supported Platforms

Purpose During the fabric portion of a nonstop software upgrade, you should expect to see both fabric control Routing Engines upgrade first, followed by the upgrade of each Interconnect device one at a time. In addition to the steps below, you can issue the **show system software upgrade status** command to view the progress of the upgrade.

Action

1. In an SSH session to the QFabric CLI, issue the request for the fabric nonstop software upgrade.

   root@qfabric> request system software nonstop-upgrade fabric jinstall-qfabric-12.2X50-D10.3.rpm

```
[FC-0      2012-06-05 16:48:53]: Retrieving package
[FC-1      2012-06-05 16:48:53]: Retrieving package
[IC-F4912 2012-06-05 16:48:59]: Retrieving package
[FC-0      2012-06-05 16:49:51]: ------- re0: -------
[FC-1      2012-06-05 16:49:52]: ------- re0: -------
[IC-F4912 2012-06-05 16:49:54]: ------- re0: -------
[IC-F4912 2012-06-05 16:50:42]: Step 1 of 20 Creating temporary file system
[IC-F4912 2012-06-05 16:50:42]: Step 2 of 20 Determining installation source
[IC-F4912 2012-06-05 16:50:43]: Step 3 of 20 Processing format options
[IC-F4912 2012-06-05 16:50:43]: Step 4 of 20 Determining installation slice
[IC-F4912 2012-06-05 16:50:43]: Step 5 of 20 Creating and labeling new slices
[IC-F4912 2012-06-05 16:50:44]: Step 6 of 20 Create and mount new file system
[IC-F4912 2012-06-05 16:50:53]: Step 7 of 20 Getting OS bundles
[IC-F4912 2012-06-05 16:50:53]: Step 8 of 20 Updating recovery media
[IC-F4912 2012-06-05 16:51:17]: Step 9 of 20 Extracting incoming image
[IC-F4912 2012-06-05 16:52:56]: Step 10 of 20 Unpacking OS packages
[IC-F4912 2012-06-05 16:52:59]: Step 11 of 20 Mounting jbase package
[IC-F4912 2012-06-05 16:53:28]: Step 12 of 20 Creating base OS symbolic links
[IC-F4912 2012-06-05 16:54:45]: Step 13 of 20 Creating fstab
[IC-F4912 2012-06-05 16:54:45]: Step 14 of 20 Creating new system files
[IC-F4912 2012-06-05 16:54:46]: Step 15 of 20 Adding jbundle package
[IC-F4912 2012-06-05 16:58:15]: Step 16 of 20 Backing up system data
[IC-F4912 2012-06-05 16:58:18]: Step 17 of 20 Setting up shared partition data
[IC-F4912 2012-06-05 16:58:18]: Step 18 of 20 Checking package sanity in
installation
[IC-F4912 2012-06-05 16:58:18]: Step 19 of 20 Unmounting and cleaning up
temporary file systems
[IC-F4912 2012-06-05 16:58:22]: Step 20 of 20 Setting da0s1 as new active
partition
[Status    2012-06-05 16:58:34]: Load completed with 0 errors...
[Status    2012-06-05 16:58:34]: Reboot is required to complete upgrade ...
[Status    2012-06-05 16:58:34]: Trying to Connect to Node: FC-0
[Status    2012-06-05 16:58:39]: Rebooting FC-0
[Status    2012-06-05 16:58:39]: Trying to Connect to Node: FC-1
[Status    2012-06-05 16:58:44]: Rebooting FC-1
[Status    2012-06-05 16:58:44]: Trying to Connect to Node: IC-F4912
[Status    2012-06-05 16:58:50]: Rebooting IC-F4912
Success
```

2. When the fabric components reboot, they appear as **Disconnected** in the output of the **show fabric administration inventory infrastructure fabric-controls** and **show fabric administration inventory interconnect-devices** commands.

   session1@qfabric> show fabric administration inventory infrastructure fabric-controls


```
Item                    Identifier              Connection      Configuration
Fabric control
  FC-0                                          Disconnected
  FC-1                                          Disconnected
```

session1@qfabric> show fabric administration inventory interconnect-devices IC-F4912

```
Item                    Identifier              Connection      Configuration
Interconnect device
  IC-F4912                                      Disconnected
    F4912/RE0                                   Disconnected
```

3. When the fabric components return to full service, they appear as **Connected** in the output of the **show fabric administration inventory** command.

   session1@qfabric> show fabric administration inventory

```
Item                    Identifier              Connection      Configuration
Node group
  NW-NG-0                                       Connected       Configured

    P1507-C                                     Connected

  RSNG                                          Connected       Configured

    P1550-C                                     Connected

    P1571-C                                     Connected

Interconnect device
  IC-F4912                                      Connected       Configured

    F4912/RE0                                   Connected

Fabric manager
  FM-0                                          Connected       Configured

Fabric control
  FC-0                                          Connected       Configured

  FC-1                                          Connected       Configured

Diagnostic routing engine
  DRE-0                                         Connected       Configured
```

Verifying a Redundant Server Node Group Nonstop Software Upgrade

Supported Platforms

Purpose During the redundant server Node group portion of a nonstop software upgrade, you should expect to see the backup Node device upgrade first, followed by the upgrade of the master Node device. Server Node groups with a single device upgrade the device in the same way as a standalone switch. In addition to the steps below, you can issue the **show system software upgrade status** command to view the progress of the upgrade.

Action

1. In an SSH session to the QFabric CLI, issue the request for the redundant server Node group nonstop software upgrade.

   root@qfabric> request system software nonstop-upgrade node-group RSNG jinstall-qfabric-12.2X50-D10.3.rpm

```
Upgrading target(s): RSNG

[RSNG     2012-06-05 17:26:44]: Starting with package
ftp://169.254.0.3/pub/images/12.2X50-D10.3/jinstall-qfx.tgz
[RSNG     2012-06-05 17:26:44]: Retrieving package
[RSNG     2012-06-05 17:28:56]: Pushing bundle to fpc1
[RSNG     2012-06-05 17:29:26]: fpc1: Validate package...
[RSNG     2012-06-05 17:35:22]: fpc0: Validate package...
[RSNG     2012-06-05 17:35:49]: ------- fpc1 -------
[RSNG     2012-06-05 17:36:25]: Step 1 of 20 Creating temporary file system
[RSNG     2012-06-05 17:36:26]: Step 2 of 20 Determining installation source
[RSNG     2012-06-05 17:36:26]: Step 3 of 20 Processing format options
[RSNG     2012-06-05 17:36:26]: Step 4 of 20 Determining installation slice
[RSNG     2012-06-05 17:36:27]: Step 5 of 20 Creating and labeling new slices
[RSNG     2012-06-05 17:36:27]: Step 6 of 20 Create and mount new file system
[RSNG     2012-06-05 17:36:35]: Step 7 of 20 Getting OS bundles
[RSNG     2012-06-05 17:36:35]: Step 8 of 20 Updating recovery media
[RSNG     2012-06-05 17:36:56]: Step 9 of 20 Extracting incoming image
[RSNG     2012-06-05 17:38:07]: Step 10 of 20 Unpacking OS packages
[RSNG     2012-06-05 17:38:16]: Step 11 of 20 Mounting jbase package
[RSNG     2012-06-05 17:38:41]: Step 12 of 20 Creating base OS symbolic links
[RSNG     2012-06-05 17:39:41]: Step 13 of 20 Creating fstab
[RSNG     2012-06-05 17:39:42]: Step 14 of 20 Creating new system files
[RSNG     2012-06-05 17:39:42]: Step 15 of 20 Adding jbundle package
[RSNG     2012-06-05 17:42:16]: Step 16 of 20 Backing up system data
[RSNG     2012-06-05 17:42:32]: Step 17 of 20 Setting up shared partition data
[RSNG     2012-06-05 17:42:33]: Step 18 of 20 Checking package sanity in
installation
[RSNG     2012-06-05 17:42:33]: Step 19 of 20 Unmounting and cleaning up
temporary file systems
[RSNG     2012-06-05 17:42:36]: Step 20 of 20 Setting da0s2 as new active
partition
[RSNG     2012-06-05 17:42:51]: ------- fpc0 - master -------
[RSNG     2012-06-05 17:42:51]: Step 1 of 20 Creating temporary file system
[RSNG     2012-06-05 17:42:51]: Step 2 of 20 Determining installation source
[RSNG     2012-06-05 17:42:51]: Step 3 of 20 Processing format options
[RSNG     2012-06-05 17:42:51]: Step 4 of 20 Determining installation slice
[RSNG     2012-06-05 17:42:51]: Step 5 of 20 Creating and labeling new slices
[RSNG     2012-06-05 17:42:51]: Step 6 of 20 Create and mount new file system
[RSNG     2012-06-05 17:42:51]: Step 7 of 20 Getting OS bundles
[RSNG     2012-06-05 17:42:51]: Step 8 of 20 Updating recovery media
[RSNG     2012-06-05 17:42:51]: Step 9 of 20 Extracting incoming image
[RSNG     2012-06-05 17:42:51]: Step 10 of 20 Unpacking OS packages
[RSNG     2012-06-05 17:42:51]: Step 11 of 20 Mounting jbase package
[RSNG     2012-06-05 17:42:51]: Step 12 of 20 Creating base OS symbolic links
[RSNG     2012-06-05 17:42:51]: Step 13 of 20 Creating fstab
[RSNG     2012-06-05 17:42:51]: Step 14 of 20 Creating new system files
[RSNG     2012-06-05 17:42:51]: Step 15 of 20 Adding jbundle package
[RSNG     2012-06-05 17:42:51]: Step 16 of 20 Backing up system data
[RSNG     2012-06-05 17:42:51]: Step 17 of 20 Setting up shared partition data
[RSNG     2012-06-05 17:42:51]: Step 18 of 20 Checking package sanity in
installation
[RSNG     2012-06-05 17:42:51]: Step 19 of 20 Unmounting and cleaning up
temporary file systems
[RSNG     2012-06-05 17:42:51]: Step 20 of 20 Setting da0s2 as new active
partition
[RSNG     2012-06-05 17:43:36]: Rebooting Backup RE
[RSNG     2012-06-05 17:43:36]: ------- Rebooting fpc1 -------
[RSNG     2012-06-05 17:50:12]: Initiating Chassis In-Service-Upgrade
[RSNG     2012-06-05 17:50:33]: Upgrading group: 0 fpc: 0
[RSNG     2012-06-05 17:52:38]: Upgrade complete for group:0
```



```
[RSNG     2012-06-05 17:52:38]: Upgrading group: 1 fpc: 1
[RSNG     2012-06-05 17:54:42]: Upgrade complete for group:1
[RSNG     2012-06-05 17:54:42]: Finished processing all upgrade groups, last
group :1
[RSNG     2012-06-05 17:54:48]: Preparing for Switchover
[RSNG     2012-06-05 17:55:38]: Switchover Completed
[Status   2012-06-05 17:55:41]: Upgrade completed with 0 errors
Success
```

2. Issue the **show system software upgrade status** command to view the status of the upgrade.

   root@qfabric> show system software upgrade status

```
Wed Jan 16 22:06:02 2013 Software nonstop upgrade on:
                         RSNG in progress
```

3. During the redundant server Node group upgrade, the backup Node device (in this case, P1571-C) is upgraded first and appears in the **Disconnected** state in the output of the **show fabric administration inventory** command.

   session1@qfabric> show fabric administration inventory

```
Item                    Identifier              Connection      Configuration
Node group
  NW-NG-0                                       Connected       Configured

    P1507-C                                     Connected

  RSNG                                          Connected       Configured

    P1550-C                                     Connected

    P1571-C                                     Disconnected
Interconnect device
  IC-F4912                                      Connected       Configured

    F4912/RE0                                   Connected

Fabric manager
  FM-0                                          Connected       Configured

Fabric control
  FC-0                                          Connected       Configured

  FC-1                                          Connected       Configured

Diagnostic routing engine
  DRE-0                                         Connected       Configured
```

4. After the backup Node device comes back online, the master Node device (in this case, P1550-C) appears in the **Disconnected** state in the output of the **show fabric administration inventory** command while the master Node device upgrades its software.

   session1@qfabric> show fabric administration inventory

```
Item                    Identifier              Connection      Configuration
Node group
  NW-NG-0                                       Connected       Configured

    P1507-C                                     Connected

  RSNG                                          Connected       Configured
```

```
      P1550-C                                     Disconnected
      P1571-C                                     Connected

  Interconnect device
    IC-F4912                                      Connected       Configured

      F4912/RE0                                   Connected

  Fabric manager
    FM-0                                          Connected       Configured

  Fabric control
    FC-0                                          Connected       Configured

    FC-1                                          Connected       Configured

  Diagnostic routing engine
    DRE-0                                         Connected       Configured
```

5. After both Node devices in the redundant server Node group come back online, both Node devices appear as **Connected** to indicate the successful completion of the Node group nonstop software upgrade step.

```
session1@qfabric> show fabric administration inventory
Item                    Identifier              Connection      Configuration
Node group
  NW-NG-0                                       Connected       Configured

    P1507-C                                     Connected

  RSNG                                          Connected       Configured

    P1550-C                                     Connected
    P1571-C                                     Connected

Interconnect device
  IC-F4912                                      Connected       Configured

    F4912/RE0                                   Connected

Fabric manager
  FM-0                                          Connected       Configured

Fabric control
  FC-0                                          Connected       Configured

  FC-1                                          Connected       Configured

Diagnostic routing engine
  DRE-0                                         Connected       Configured
```

Verifying a Network Node Group Nonstop Software Upgrade

Supported Platforms

Purpose During the network Node group portion of a nonstop software upgrade, you should expect to see the backup network Node group Routing Engine upgrade first, followed by the

Node devices within the network Node group upgrading one at a time, and ending with the upgrade of the master network Node group Routing Engine. In addition to the steps below, you can issue the **show system software upgrade status** command to view the progress of the upgrade.

NOTE: If you configure an upgrade group for Node groups containing 2 or more Node devices, all Node devices within the upgrade group reboot at the same time.

Action

1. In an SSH session to the QFabric CLI, issue the request for the network Node group nonstop software upgrade.

   root@qfabric> request system software nonstop-upgrade node-group NW-NG-0 jinstall-qfabric-12.2X50-D10.3.rpm

```
Upgrading target(s): NW-NG-0

[NW-NG-0  2012-06-01 09:45:06]: Starting with package
ftp://169.254.0.3/pub/images/12.2X50-D10.3/jinstall-qfx.tgz
[NW-NG-0  2012-06-01 09:45:06]: Retrieving package
[NW-NG-0  2012-06-01 09:46:18]: Pushing bundle to fpc0
[NW-NG-0  2012-06-01 09:46:52]: fpc0: Validate package...
[NW-NG-0  2012-06-01 09:53:26]: ------- fpc0 -------
[NW-NG-0  2012-06-01 09:54:01]: Step 1 of 20 Creating temporary file system
[NW-NG-0  2012-06-01 09:54:01]: Step 2 of 20 Determining installation source
[NW-NG-0  2012-06-01 09:54:02]: Step 3 of 20 Processing format options
[NW-NG-0  2012-06-01 09:54:02]: Step 4 of 20 Determining installation slice
[NW-NG-0  2012-06-01 09:54:02]: Step 5 of 20 Creating and labeling new slices
[NW-NG-0  2012-06-01 09:54:03]: Step 6 of 20 Create and mount new file system
[NW-NG-0  2012-06-01 09:54:10]: Step 7 of 20 Getting OS bundles
[NW-NG-0  2012-06-01 09:54:10]: Step 8 of 20 Updating recovery media
[NW-NG-0  2012-06-01 09:54:31]: Step 9 of 20 Extracting incoming image
[NW-NG-0  2012-06-01 09:55:43]: Step 10 of 20 Unpacking OS packages
[NW-NG-0  2012-06-01 09:55:46]: Step 11 of 20 Mounting jbase package
[NW-NG-0  2012-06-01 09:56:09]: Step 12 of 20 Creating base OS symbolic links
[NW-NG-0  2012-06-01 09:57:05]: Step 13 of 20 Creating fstab
[NW-NG-0  2012-06-01 09:57:05]: Step 14 of 20 Creating new system files
[NW-NG-0  2012-06-01 09:57:05]: Step 15 of 20 Adding jbundle package
[NW-NG-0  2012-06-01 09:59:30]: Step 16 of 20 Backing up system data
[NW-NG-0  2012-06-01 09:59:44]: Step 17 of 20 Setting up shared partition data
[NW-NG-0  2012-06-01 09:59:44]: Step 18 of 20 Checking package sanity in
installation
[NW-NG-0  2012-06-01 09:59:44]: Step 19 of 20 Unmounting and cleaning up
temporary file systems
[NW-NG-0  2012-06-01 09:59:47]: Step 20 of 20 Setting da0s1 as new active
partition
[NW-NG-0  2012-06-01 09:59:55]: Starting with package
ftp://169.254.0.3/pub/images/12.2X50-D10.3/jinstall-dc-re.tgz
[NW-NG-0  2012-06-01 09:59:55]: Retrieving package
[NW-NG-0  2012-06-01 10:01:04]: Pushing bundle to re1
[NW-NG-0  2012-06-01 10:01:35]: re1: Validate package...
[NW-NG-0  2012-06-01 10:02:56]: re0: Validate package...
[NW-NG-0  2012-06-01 10:04:45]: Rebooting Backup RE
[NW-NG-0  2012-06-01 10:08:31]: Initiating Chassis In-Service-Upgrade
[NW-NG-0  2012-06-01 10:08:52]: Upgrading group: 0 fpc: 0
[NW-NG-0  2012-06-01 10:18:33]: Upgrade complete for group:0
[NW-NG-0  2012-06-01 10:18:33]: Finished processing all upgrade groups, last
```



```
group :0
[NW-NG-0  2012-06-01 10:18:37]: Preparing for Switchover
[NW-NG-0  2012-06-01 10:18:55]: Switchover Completed
[Status   2012-06-01 10:18:58]: Upgrade completed with 0 errors
Success
```

2. Issue the **show system software upgrade status** command to view the status of the upgrade.

   ```
   root@qfabric> show system software upgrade status
   Wed Jan 16 22:06:02 2013 Software nonstop upgrade on:
                            NW-NG-0 in progress
   ```

3. Verify the progress of the upgrade by issuing the **show chassis nonstop-upgrade node-group**, **show fabric administration inventory**, **show fabric administration inventory infrastructure**, and **show fabric administration inventory node-groups NW-NG-0** commands. You should see the backup network Node group Routing Engine reboot first, followed by each Node device within the network Node group, and ending with the reboot of master network Node group Routing Engine. Restarting devices appear as **Disconnected** in the output of the **show fabric administration inventory** command and restarting Routing Engines do not appear in output of the **show fabric administration inventory infrastructure** command until they return to service.

Related Documentation

- *Nonstop Software Upgrade Checklist for QFabric Systems*
- Performing a Nonstop Software Upgrade on the QFabric System on page 503
- Understanding Nonstop Software Upgrade for QFabric Systems on page 47
- show chassis nonstop-upgrade node-group on page 639
- show fabric administration inventory on page 640
- show fabric administration inventory director-group status on page 645
- show fabric administration inventory infrastructure on page 650
- show fabric administration inventory interconnect-devices on page 653
- show fabric administration inventory node-groups on page 657

Upgrading Software on a QFabric System

Supported Platforms QFabric System

The QFabric system software package contains software for all of the different components in the QFabric system, such as the Director group, Interconnect devices, Node devices, and other QFabric system components. You can upgrade the software on all of the QFabric components at the same time using the **request system software add *package-name* component all reboot** command.

NOTE: Downgrading software on a QFabric system is not supported.

This topic describes the following tasks:

Backing Up the Current Configuration Files

Supported Platforms QFX Series standalone switches

To back up your current configuration files:

`user@switch>` **request system software configuration-backup *path***

Back up the configuration files to a local directory, remote server, or removable drive (for example, an external USB flash drive).

For example:

`user@switch>` **request system software configuration-backup /media/USB/**

Downloading Software Files Using a Browser

Supported Platforms

NOTE: **To access the download site, you must have a service contract with Juniper Networks and an access account. If you need help obtaining an account, complete the registration form at the Juniper Networks website** https://www.juniper.net/registration/Register.jsp **.**

1. Using a Web browser, navigate to the http://www.juniper.net/support .
2. Click **Download Software**.
3. In the **Switching** box, click **Junos OS Platforms**.
4. In the **QFX Series** section, click the name of the platform for which you want to download software.
5. Click the **Software** tab and select the release number from the **Release** drop-down list.
6. Select the complete install package you want to download in the **QFabric System Install Package** section:
   - If you want to upgrade the entire QFabric system, select **QFabric System - Complete Install Package**.
   - If you want to upgrade either a single Node or Interconnect device for recovery purposes, select **Node and Interconnect Device Install Package**. For information on how to perform a recovery installation on either a Node or Interconnect device, see “Performing a Recovery Installation” on page 679.

A login screen appears.

7. Enter your user ID and password and click **Login**.
8. Read the End User License Agreement, select the **I agree** option button, and then click **Proceed**.
9. Save the **jinstall-qfabric-*version*.rpm** file on your computer.

Retrieving Software Files for Download

Supported Platforms

Retrieve the software from the location in which you downloaded it. To do this, issue the **request system software download** command. The software package is copied from where you downloaded it and is placed locally on the QFabric system.

- To retrieve the software:

  `user@switch>` **request system software download** ***/path/package-name***

  For example:

  `user@switch>` **request system software download ftp://server/files/jinstall-qfabric-11.3X30.6.rpm**

Installing the Software Package on the Entire QFabric System

Supported Platforms

NOTE: On a QFabric system, a QFX3500 Node device or QFX3600 Node device might not be able to participate as a Node device in the QFabric system if the Node device is running a different version of software from that of the Director group. This mismatch of software versions between the Node device and the Director group can occur when the Node device is introduced into the setup, and both Director devices go offline before the Node device completes its auto-upgrade process to upgrade its software version to the same software version running on the Director group. The workaround is to reboot the QFX3500 or QFX3600 Node device once the Director group comes back online. The QFX3500 or QFX3600 Node device will initiate auto-upgrade and upgrade its software version from the Director group.

1. Issue the **request system software add *package-name* component all reboot** command.

   For example:

   `user@switch>` **request system software add jinstall-qfabric-11.3X30.6.rpm component all reboot**

NOTE: If you receive an error message after issuing the **request system software add *package-name* component all reboot** command that says that the configuration file cannot be loaded as is, you will need to enter configuration mode, make any necessary changes to the configuration file, and then commit the changes.

NOTE: The default value for a QFabric system software upgrade is **validate**. The validation step adds up to 10 minutes to the overall software upgrade. If the validation fails, the upgrade does not proceed and the QFabric system automatically issues the **request system software rollback** command to restore the current software image. If you upgrade more than one component (for example, by issuing the **component all** option), validation failure on one device stops the upgrade process for the other devices. If you do not want to validate the software package against the current configuration, issue the **no-validate** option.

2. After the reboot has finished, verify that the new version of software has been properly installed by issuing the **show version component all** command.

```
user@switch> show version component all
dg1:
-
Hostname: qfabric
Model: qfx3100
JUNOS Base Version [11.3X30.6]

dg0:
-
Hostname: qfabric
Model: qfx3100
JUNOS Base Version [11.3X30.6]

NW-NG-0:
-
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

FC-0:
-
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
```



```
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

FC-1:
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

DRE-0:
-
Hostname: dre-0
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

FM-0:
-
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

nodedevice1:
-
Hostname: qfabric
Model: QFX3500
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

interconnectdevice1:
-
Hostname: qfabric
Model: QFX3108
JUNOS Base OS boot [11.3X30.6]
```



```
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```

Related Documentation

- *Software Installation Overview*
- Performing a QFabric System Recovery Installation on the Director Group on page 672
- *Upgrading Jloader Software on QFX Series Devices*
- *request system software add*
- *Installation and Upgrade Guide*

Performing System Backup and Recovery for a QFabric System

Supported Platforms QFabric System

Many routers and switches require an administrator to recover the software package and the configuration file for the device separately. In the case of a device failure, this means the administrator might need to perform two separate tasks (if neither the software package nor the configuration file can be recovered).

In contrast, the QFabric system uses a unique mechanism that saves the backup and recovery files for both the Junos OS software and the system configuration into a single collection. The following QFabric system backup and recovery mechanism simplifies and streamlines the recovery process so you can return to normal operations as quickly as possible.

To backup and recover your QFabric system:

1. (First time only) Implement the following one-time procedure to prepare your QFabric system to use the system backup and recovery feature:

   - Insert a Juniper Networks software installation USB flash drive into the master Director device. (This drive was provided to you as one of the components of your QFabric system shipment.)
   - Issue the **request system software format-qfabric-backup** command. The contents and format of the USB flash drive are copied to the Director group shared directory and are used as the basis for all future backup and recovery operations.

     ```
     user@qfabric> request system software format-qfabric-backup
     Copying QFabric USB template image from /dev/sdb(Unigen,PQS4000,4009 MB)......
     ```

   - Remove the Juniper Networks software installation USB drive from the master Director device.

2. Issue the **request system software system-backup** command to backup the software package and configuration file. This command saves the current files necessary to

recover the QFabric system. The files are saved to a shared memory directory in the Director group.

NOTE: As you upgrade your system with new software and change the system configuration over time, remember to reissue this command periodically to save the newest files for recovery purposes.

```
user@qfabric> request system software system-backup

user@qfabric>
```

3. Insert a 4 GB or larger USB flash drive into the master Director device for your Director group, and issue the **request system software system-backup usb-create** command. This command copies the recovery files that have been backed up in the Director group and transfers them to the USB flash drive to create a recovery USB drive.

   NOTE: Issuing this command overwrites the contents of the USB flash drive with the QFabric system recovery files.

   ```
   user@qfabric> request system software system-backup usb-create /dev/sdb
   Issuing this command will overwrite the contents of the USB drive.
   Continue? [yes,no] (no) yes

   This operation will access the USB drive on 0281042010000013.
   Are you sure you want to continue? [yes,no] (no) yes

   Copying QFabric recovery media to /dev/sdb...
   Successfully copied QFabric recovery media to /dev/sdb
   ```

4. Remove the recovery USB drive from the Director device, and store it securely in a known location that you will remember when you need to use the recovery USB drive.

5. If the QFabric system fails, power off the Director group, insert the recovery USB drive into the master Director device of your Director group, turn on power to the Director device, and follow the prompts to recover your system. This step restores the software package and the configuration file for your QFabric system.

Related Documentation

- request system software format-qfabric-backup on page 558
- request system software system-backup on page 566

CHAPTER 22

Operational Mode Commands

- show fabric administration system mac-pool
- show fabric inventory
- show fabric session-host
- show log
- show system software upgrade status

QFabric System Operational Mode Commands

Supported Platforms QFabric System

Table 104 on page 536 summarizes the command line interface (CLI) commands that you can use to monitor and troubleshoot the QFabric system operations.

Table 104: QFabric System Operational Mode Commands

Task	Command
Select the operating mode for the device.	request chassis device-mode
Set the Interconnect device Flexible PIC Concentrator (FPC) offline or online for the QFabric system.	request chassis fabric fpc
Log in to individual QFabric system components for device level troubleshooting.	request component login
Select a Director device to become the new primary device within a Director group.	request fabric administration director-group change-master
Remove a disconnected component from the QFabric system inventory.	request fabric administration remove
Add a MAC range to the MAC pool assigned to the QFabric system.	request fabric administration system mac-pool add
Delete a MAC range from the MAC block assigned to the QFabric system.	request fabric administration system mac-pool delete
Halt a Director device.	request system halt director-device
Reboot QFabric system components.	request system reboot
Upgrade the software version of the QFabric system by using the nonstop software upgrade method (which preserves forwarding functionality during the upgrade and enables components to upgrade on a rotating basis).	request system software nonstop-upgrade
Save the software package and system configuration files to be able to recover the QFabric system in the case of a system failure.	request system software system-backup
Specify information to be displayed on the LCD panel of a QFabric system device.	set chassis display message

Table 104: QFabric System Operational Mode Commands *(continued)*

Task	Command
Display information about the operating mode of the device.	show chassis device-mode
Display the status of Ethernet switching in the Control Board of an Interconnect device.	show chassis ethernet-switch interconnect-device cb
Display the status of Ethernet switching in the Flexible PIC Controller (FPC) of an Interconnect device.	show chassis ethernet-switch interconnect-device fpc
Display the status of the data plane connections in the QFabric system.	show chassis fabric connectivity
Display the fabric management status of devices in your QFabric system.	show chassis fabric device
Display information shown on the LCD screen of a QFabric system device.	show chassis lcd
Display the status of a nonstop software upgrade for a Node group.	show chassis nonstop-upgrade node-group
Display all devices that belong to the QFabric system.	show fabric administration inventory
Display the Director devices that belong to a QFabric system Director group.	show fabric administration inventory director-group status
Display the services running on the Director group for the QFabric system.	show fabric administration inventory infrastructure
Display the Interconnect devices that belong to a QFabric system.	show fabric administration inventory interconnect-devices
Display the Node devices that belong to the QFabric system.	show fabric administration inventory node-devices
Display the Node groups and the corresponding Node devices that belong to the QFabric system.	show fabric administration inventory node-groups
Display all devices that belong to the QFabric system.	show fabric inventory
Display the MAC addresses that belong to a QFabric system Director group.	show fabric administration system mac-pool
Display the Director device that hosts the QFabric CLI session.	show fabric session-host
Display the system log messages in the specified file.	show log
Display the status of a QFabric system software upgrade.	show system software upgrade status

Filtering Operational Mode Command Output in a QFabric System

Supported Platforms QFabric System

When you issue an operational mode command in a QFabric system, the output generated can be fairly extensive because of the number of components contained within the system. To make the output more accessible, you can filter the output by appending the **| filter** option to the end of most Junos OS commands.

1. To filter operational mode command output and limit it to a Node group, include the **| filter node-group *node-group-name*** option at the end of your Junos OS operational mode command.

   root@qfabric> **show interfaces terse | filter node-group NW-NG-0**

```
Interface               Admin Link Proto    Local                 Remote
NW-NG-0:dsc             up    up
NW-NG-0:em0             up    up
NW-NG-0:em1             up    up
NW-NG-0:gre             up    up
NW-NG-0:ipip            up    up
NW-NG-0:lo0             up    up
NW-NG-0:lo0.16384       up    up   inet     127.0.0.1           --> 0/0
NW-NG-0:lo0.16385       up    up   inet
NW-NG-0:lsi             up    up
NW-NG-0:mtun            up    up
NW-NG-0:pimd            up    up
NW-NG-0:pime            up    up
NW-NG-0:tap             up    up
Node01:ge-0/0/10        up    up
Node01:ge-0/0/40        up    up
Node01:ge-0/0/41        up    up
vlan                    up    up
```

2. To filter operational mode command output and limit it to a set of Node groups, include the **| filter node-group** option at the end of your Junos OS operational mode command and specify the list of Node group names in brackets.

   root@qfabric> **show ethernet-switching interfaces | filter node-group [NW-NG-0 RSNG-1]**

```
Interface     State  VLAN members        Tag   Tagging  Blocking
NW-NG-0:ae0.0 up     v200                200   tagged   unblocked
                     v50                 50    tagged   unblocked
                     v51                 51    tagged   unblocked
                     v52                 52    tagged   unblocked
                     v53                 53    tagged   unblocked
RSNG-1:ae0.0  up     v200                200   untagged unblocked
RSNG-1:ae47.0 up     v50                 50    tagged   unblocked
                     v51                 51    tagged   unblocked
                     v52                 52    tagged   unblocked
                     v53                 53    tagged   unblocked
```

Related Documentation

- QFabric System Operational Mode Commands on page 536
- *Using the Pipe (|) Symbol to Filter Junos Command Output*

request chassis device-mode

Supported Platforms QFabric System, QFX Series standalone switches, QFX3500, QFX3600, QFX5100

Syntax request chassis device-mode (interconnect-device | node-device | standalone)

Release Information Command introduced in Junos OS Release 11.2 for the QFX Series.
interconnect-device option introduced in Junos OS Release 13.1 for the QFX Series.

Description Select the operating mode for the device, which acts either as a device within a QFabric system or as a standalone switch.

NOTE:

- Issue the **request chassis device-mode** command only when your management station is connected directly to the device over a console port connection.
- Changing the device mode erases all configuration data on the device. When you convert a device to a different device mode, we recommend that you back up your device configuration to an external location before issuing the **request chassis device-mode** command.

Options **interconnect-device**—Set the device to operate as an Interconnect device within a QFabric system. To complete the Interconnect device mode conversion process, you must connect the device to the QFabric system management control plane and reboot the device.

node-device—Set the device to operate as a Node device within a QFabric system. To complete the Node device mode conversion process, you must connect the device to the QFabric system management control plane and reboot the device.

standalone—Set the device to operate as a standalone switch. If the device starts in Node device or Interconnect device mode, you must reboot the device to return to standalone mode. Standalone mode is the factory default setting.

Required Privilege Level admin

Related Documentation

- Converting the Device Mode for a QFabric System Component on page 329
- **show chassis device-mode on page 571**
- Understanding Interconnect Devices on page 23
- Understanding Node Devices on page 26
- Understanding the QFabric System Hardware Architecture on page 17

List of Sample Output

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

request chassis device-mode interconnect-device (Starting in Node Device or Standalone Mode)

```
user@switch> request chassis device-mode interconnect-device
Device mode set to 'interconnect-device' mode.
Please reboot the system to complete the process.
```

request chassis device-mode node-device (Starting in Interconnect Device or Standalone Mode)

```
user@switch> request chassis device-mode node-device
Device mode set to 'node-device' mode.
Please reboot the system to complete the process.
```

request chassis device-mode standalone (Starting in Interconnect Device or Node Device Mode)

```
user@switch> request chassis device-mode standalone
Device mode set to 'standalone' mode.
Please reboot the system to complete the process.
```

request chassis device-mode standalone (Starting in Standalone Mode)

```
user@switch> request chassis device-mode standalone
Device mode set to 'standalone' mode.
No reboot required.
```


request chassis fabric fpc

Supported Platforms QFabric System

Syntax request chassis fabric fpc interconnect-device *interconnect-device-name* slot *slot-number* (offline | online)

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Set the Interconnect device Flexible PIC Concentrator (FPC) offline or online for the QFabric system. When the FPC is offline, traffic is redirected to other FPCs and is not lost while you remove or install an FPC. After issuing this command, you must issue the **request chassis fpc** command.

Options **interconnect-device *interconnect-device-name***—Set the Interconnect device containing the FPC you want to bring either offline or online.

slot *slot-number*—Set the specific FPC slot on the Interconnect device.

offline—Set the Interconnect device FPC to offline for removal.

online—Set the Interconnect device FPC to online after installation.

Required Privilege Level admin

Related Documentation

- *request chassis fpc*
- show chassis fabric connectivity on page 616
- show chassis fabric device on page 623
- Understanding Interconnect Devices on page 23

List of Sample Output request chassis fabric fpc online on page 541
request chassis fabric fpc offline on page 541

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

request chassis fabric fpc online

```
user@qfabric> request chassis fabric fpc interconnect-device IC-YW3781 offline slot 15
Graceful offline of the fabric card has been initiated. Please wait 20 seconds
before offlining or removing the card.
```

request chassis fabric fpc offline

```
user@qfabric> request chassis fabric fpc interconnect-device IC-YW3781 online slot 15
Bring the FPC online by issuing the "request chassis fpc online" command.
```


request component login

Supported Platforms QFabric System

Syntax request component login *component-name*

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Log in to a QFabric system component. To gain access to individual components by way of the **request component login** command, you must first provide the **qfabric-admin** or **qfabric-operator** class privilege to your user (for more information, see: **remote-debug-permission**).

Options ***component-name***—Specify the QFabric system component to which you wish to log in.

Required Privilege Level admin

Related Documentation

- Example: Configuring QFabric System Login Classes on page 422
- **remote-debug-permission on page 494**
- Understanding QFabric System Login Classes on page 59

List of Sample Output

Sample Output

The three sample output displays show the results of attempts to log in to Node device EE3093. The results differ depending on the privilege level assigned to the user.

request component login (with qfabric-admin Privileges)

```
admin@qfabric> request component login EE3093
Warning: Permanently added 'qfabric-node-ee3093,169.254.128.41' (RSA) to the list
 of known hosts.
--- JUNOS 11.3I built 2011-11-04 12:46:16 UTC
{master}
qfabric-admin@node-ee3093> ?
Possible completions:
  clear                Clear information in the system
  file                 Perform file operations
  help                 Provide help information
  load                 Load information from file
  monitor              Show real-time debugging information
  mtrace               Trace multicast path from source to receiver
  op                   Invoke an operation script
  ping                 Ping remote target
  quit                 Exit the management session
  request              Make system-level requests
  restart              Restart software process
  save                 Save information to file
  set                  Set CLI properties, date/time, craft interface message
  show                 Show system information
```



```
  ssh                    Start secure shell on another host
  start                  Start shell
  telnet                 Telnet to another host
  test                   Perform diagnostic debugging
  traceroute             Trace route to remote host{master}
qfabric-admin@node-ee3093>
```

request component login (with qfabric-operator Privileges)

```
operator@qfabric> request component login EE3093
Warning: Permanently added 'qfabric-node-ee3093,169.254.128.41' (RSA) to the list
 of known hosts.
--- JUNOS 11.3I built 2011-11-04 12:46:16 UTC
{master}
qfabric-operator@node-ee3093> ?
Possible completions:
  file                   Perform file operations
  help                   Provide help information
  load                   Load information from file
  op                     Invoke an operation script
  quit                   Exit the management session
  request                Make system-level requests
  save                   Save information to file
  set                    Set CLI properties, date/time, craft interface message
  show                   Show system information
  start                  Start shell
  test                   Perform diagnostic debugging
{master}
qfabric-operator@node-ee3093>
```

request component login (with qfabric-user Privileges)

```
user0@qfabric> request component login EE3093
error: User user0 does not have sufficient permissions to login to device ee3093
```


request fabric administration director-group change-master

Supported Platforms QFabric System

Syntax request fabric administration director-group change-master (director-device *director-device-name*)

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Select a Director device to become the new primary device within a Director group. The specified device becomes the new master Director device, and the previous master Director device becomes a backup Director device.

Options **none**—Change the device that controls the Director group. Assign the current backup Director device as the new master and the current master Director device as the backup.

director-device ***director-device-name***—Specify which Director device should become the primary device within the Director group.

Required Privilege Level admin

Related Documentation

- **show fabric administration inventory director-group status on page 645**
- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411
- Understanding the Director Group on page 20

List of Sample Output **request fabric administration director-group change-master on page 544**

Sample Output

request fabric administration director-group change-master

```
user@qfabric> request fabric administration director-group change-master
Do you intend to switchover mastership? [yes,no] (no) yes

Cluster master successfully switched
```


request fabric administration remove

Supported Platforms QFabric System

Syntax request fabric administration remove (interconnect-device *interconnect-device-name* | node-device *node-device-name*)

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Remove a disconnected Interconnect or Node device from the QFabric system inventory so that it does not appear in the output of the **show fabric administration inventory** command.

NOTE:

- You cannot remove any devices that appear in the **Connected** state in the output of the **show fabric administration inventory** command.
- For Node devices, you can only remove a device if it belongs to an autogenerated server Node group that contains a single Node device. Node devices contained within redundant server Node groups or network Node groups cannot be removed directly. To remove a Node device that is part of a group, delete the device from the Node group configuration first before attempting to remove the device from the inventory.

Options interconnect-device *interconnect-device-name*—Remove a disconnected Interconnect device from the QFabric system inventory.

node-device *node-device-name*—Remove a disconnected Node device from the QFabric system inventory.

Required Privilege Level admin

Related Documentation

- show fabric administration inventory on page 640
- show fabric administration inventory interconnect-devices on page 653
- show fabric administration inventory node-devices on page 655
- show fabric administration inventory node-groups on page 657

List of Sample Output

request fabric administration remove interconnect-device on page 545
request fabric administration remove node-device on page 546

Sample Output

request fabric administration remove interconnect-device

```
user@qfabric> request fabric administration remove interconnect-device IC1
Device successfully removed
```

Sample Output

request fabric administration remove node-device

```
user@qfabric> request fabric administration remove node-device node5
Device successfully removed
```


request fabric administration system mac-pool add

Supported Platforms QFabric System

Syntax request fabric administration system mac-pool add mac-base *starting-mac-address* count *number-of-mac-address*

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Add a MAC address pool to expand the initial set of MAC addresses assigned to the QFabric system.

Options **mac-base *starting-mac-address***—Set the starting MAC address for a pool of addresses assigned to the QFabric system.

count *number-of-mac-address*—Set the total number of MAC addresses in the specified address pool assigned to the QFabric system.

Required Privilege Level admin

Related Documentation

- request fabric administration system mac-pool delete on page 548
- show fabric administration system mac-pool on page 659

List of Sample Output request fabric administration system mac-pool add mac-base starting-mac-address count on page 547

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

request fabric administration system mac-pool add mac-base starting-mac-address count

```
user@switch> request fabric administration system mac-pool add mac-base 02:00:00:11:22:00
count 10
```

request fabric administration system mac-pool delete

Supported Platforms QFabric System

Syntax request fabric administration system mac-pool delete mac-base *starting-mac-address*

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Delete a range of MAC addresses assigned manually to the QFabric system.

NOTE: You cannot delete the MAC address range assigned during the initial setup of the QFabric system. Also, you cannot delete a MAC address range if the MAC address block is still in use.

Options **mac-base** ***starting-mac-address***—Specify the starting MAC address for a pool of addresses you wish to remove from the QFabric system.

Additional Information After you issue the **request fabric administration system mac-pool delete** command, issue the show fabric administration system mac-pool command to verify that the MAC address range has been deleted.

Required Privilege Level admin

Related Documentation

- request fabric administration system mac-pool add on page 547
- show fabric administration system mac-pool on page 659

List of Sample Output request fabric administration system mac-pool delete mac-base on page 548

Sample Output

request fabric administration system mac-pool delete mac-base

```
user@switch> request fabric administration system mac-pool delete mac-base 02:00:00:11:22:00
```


request system halt

Supported Platforms EX Series, J Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, T Series

List of Syntax

Syntax on page 549
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Syntax

request system halt
<at *time*>
<backup-routing-engine>
<both-routing-engines>
<other-routing-engine>
<in *minutes*>
<media (compact-flash | disk | removable-compact-flash | usb)>
<message "*text*">

Syntax (EX Series Switches)

request system halt
<all-members>
<at *time*>
<backup-routing-engine>
<both-routing-engines>
<in *minutes*>
<local>
<media (external | internal)>
<member *member-id*>
<message "*text*">
<other-routing-engine>
<slice *slice*>

Syntax (PTX Series)

request system halt
<at *time*>
<backup-routing-engine>
<both-routing-engines>
<other-routing-engine>
<in *minutes*>
<media (compact-flash | disk)>
<message "*text*">

Syntax (TX Matrix Router)

request system halt
<all-lcc | lcc *number* | scc>
<at *time*>
<backup-routing-engine>
<both-routing-engines>
<other-routing-engine>
<in *minutes*>
<media (compact-flash | disk)>
<message "*text*">

Syntax (TX Matrix Plus Router)

request system halt
<all-chassis | all-lcc | lcc *number* | sfc *number*>
<at *time*>
<backup-routing-engine>
<both-routing-engines>
<other-routing-engine>
<in *minutes*>
<media (compact-flash | disk)>
<message "*text*">

Syntax (MX Series Router)

request system halt
<all-members>
<at *time*>
<backup-routing-engine>
<both-routing-engines>
<in *minutes*>
<local>
<media (external | internal)>
<member *member-id*>
<message "*text*">
<other-routing-engine>

Syntax (QFX Series)

request system halt
<all-members>
<at *time*>
<both-routing-engines>
<director-device *director-device-id*>
<in *minutes*>
<local>
<media >
<member *member-id*>
<message "*text*">
<other-routing-engine>
<slice *slice*>

Release Information

Command introduced before Junos OS Release 7.4.
other-routing-engine option introduced in Junos OS Release 8.0.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc option introduced for the TX Matrix Plus router in Junos OS Release 9.6.
Command introduced in Junos OS Release 11.1 for the QFX Series.
director-device option introduced for QFabric systems in Junos OS Release 12.2.
backup-routing-engine option introduced in Junos OS Release 13.1.

Description

Stop the router or switch software.

NOTE: When you issue this command on an individual component in a QFabric system, you will receive a warning that says "Hardware-based members will halt, Virtual Junos Routing Engines will reboot." If you want to halt only one member of a Node group, use the **member** option from the Node group CLI. You cannot issue this command from the QFabric CLI.

When you issue this command on a QFX5100 switch, you are not prompted to reboot. You must power cycle the switch to reboot.

Options **none**—Stop the router or switch software immediately.

all-chassis—(TX Matrix routers and TX Matrix Plus routers only) (Optional) Halt all chassis.

all-lcc—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, halt all T640 routers (or line-card chassis) connected to the TX Matrix router. On a TX Matrix Plus router, halt all T1600 or T4000 routers connected to the TX Matrix Plus router.

all-members—(EX4200 switches and MX Series routers only) (Optional) Halt all members of the Virtual Chassis configuration.

at *time* —(Optional) Time at which to stop the software, specified in one of the following ways:

- **now**—Stop the software immediately. This is the default.
- ***+minutes***—Number of minutes from now to stop the software.
- ***yymmddhhmm***—Absolute time at which to stop the software, specified as year, month, day, hour, and minute.
- ***hh:mm***—Absolute time on the current day at which to stop the software.

backup-routing-engine—(Optional) Halt the backup Routing Engine. This command halts the backup Routing Engine, regardless from which Routing Engine the command is executed. For example, if you issue the command from the master Routing Engine, the backup Routing Engine is halted. If you issue the command from the backup Routing Engine, the backup Routing Engine is halted.

both-routing-engines—(Optional) Halt both Routing Engines at the same time.

director-device *director-device-id*—(QFabric systems only) Halt a specific Director device.

lcc *number*—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, halt a specific T640 router that is connected to the TX Matrix router. On a TX Matrix Plus router, halt a specific router that is connected to the TX Matrix Plus router.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

local—(EX4200 switches and MX Series routers only) (Optional) Halt the local Virtual Chassis member.

in *minutes*—(Optional) Number of minutes from now to stop the software. This option is an alias for the at +*minutes* option.

media (compact-flash | disk | removable-compact-flash | usb)—(Optional) Boot medium for the next boot. (The options **removable-compact-flash** and **usb** pertain to J Series routers only.)

media (external | internal)—(EX Series and QFX Series switches and MX Series routers only) (Optional) Halt the boot media:

- **external**—Halt the external mass storage device.
- **internal**—Halt the internal flash device.

member *member-id*—(EX4200 switches and MX Series routers only) (Optional) Halt the specified member of the Virtual Chassis configuration. For EX4200 switches, replace ***member-id*** with a value from 0 through 9. For an MX Series Virtual Chassis, replace ***member-id*** with a value of 0 or 1.

message "*text*"—(Optional) Message to display to all system users before stopping the software.

other-routing-engine—(Optional) Halt the other Routing Engine from which the command is issued. For example, if you issue the command from the master Routing Engine, the backup Routing Engine is halted. Similarly, if you issue the command from the backup Routing Engine, the master Routing Engine is halted.

scc—(TX Matrix routers only) (Optional) Halt the TX Matrix router (or switch-card chassis).

sfc *number*—(TX Matrix Plus routers only) (Optional) Halt the TX Matrix Plus router (or switch-fabric chassis). Replace *number* with 0.

slice *slice*—(EX Series and QFX Series switches only) (Optional) Halt a partition on the boot media. This option has the following suboptions:

- 1—Halt partition 1.
- 2—Halt partition 2.

- **alternate**—Reboot from the alternate partition.

Additional Information

On the M7i router, the **request system halt** command does not immediately power down the Packet Forwarding Engine. The power-down process can take as long as 5 minutes.

On a TX Matrix router and TX Matrix Plus router if you issue the **request system halt** command on the master Routing Engine, all the master Routing Engines connected to the routing matrix are halted. If you issue this command on the backup Routing Engine, all the backup Routing Engines connected to the routing matrix are halted.

NOTE: If you have a router or switch with two Routing Engines and you want to shut the power off to the router or switch or remove a Routing Engine, you must first halt the backup Routing Engine (if it has been upgraded), and then halt the master Routing Engine. To halt a Routing Engine, issue the **request system halt** command. You can also halt both Routing Engines at the same time by issuing the **request system halt both-routing-engines** command.

Required Privilege Level

maintenance

Related Documentation

- *clear system reboot*
- *request system power-off*
- *Rebooting and Halting a Device*
- *Routing Matrix with a TX Matrix Plus Router Solutions Page*

List of Sample Output

request system halt on page 554
request system halt (In 2 Hours) on page 554
request system halt (Immediately) on page 554
request system halt (At 1:20 AM) on page 554

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system halt

```
user@host> request system halt
Halt the system ? [yes,no] (no) yes

*** FINAL System shutdown message from root@section2 ***
System going down IMMEDIATELY
Terminated
...
syncing disks... 11 8 done
The operating system has halted.
Please press any key to reboot.
```

request system halt (In 2 Hours)

The following example, which assumes that the time is 5 PM (1700), illustrates three different ways to request that the system stop 2 hours from now:

```
user@host> request system halt at +120
user@host> request system halt in 120
user@host> request system halt at 19:00
```

request system halt (Immediately)

```
user@host> request system halt at now
```

request system halt (At 1:20 AM)

To stop the system at 1:20 AM, enter the following command. Because 1:20 AM is the next day, you must specify the absolute time.

```
user@host> request system halt at yymmdd120
request system halt at 120
Halt the system at 120? [yes,no] (no) yes
```


request system reboot

Supported Platforms EX4600, QFabric System, QFX Series standalone switches

Syntax (QFX Series)

request system reboot
<all <graceful>>
<at **time**>
<director-device *name*>
<director-group <graceful>>
<fabric <graceful>>
<in **minutes**>
<hypervisor>
<media >
<message "**text**">
<node-group *name*>
<slice (1 | 2 | alternate)>

Release Information Command introduced in Junos OS Release 11.1 for the QFX Series.

Description Reboot the Junos OS.

NOTE: **On a QFabric system, to avoid traffic loss on the network Node group, switch mastership of the Routing Engine to the backup Routing Engine, and then reboot.**

Reboot requests are recorded in the system log files, which you can view with the **show log messages** command. You can view the process names with the **show system processes** command.

Options **none**—Reboots the software immediately.

all—(QFabric systems only) (Optional) Reboots the software on the Director group, fabric control Routing Engines, fabric manager Routing Engines, Interconnect devices, and network and server Node groups.

at time—(Optional) Time at which to reboot the software, specified in one of the following ways:

- ***+minutes***—Number of minutes from now to reboot the software.
- ***hh:mm***—Absolute time on the current day at which to reboot the software, specified in 24-hour time.
- **now**—Stop or reboot the software immediately. This is the default.
- ***yymmddhhmm***—Absolute time at which to reboot the software, specified as year, month, day, hour, and minute.

director-device *name*—(QFabric systems only) (Optional) Reboots the software on the Director device and the default partition (QFabric CLI).

director-group—(QFabric systems only) (Optional) Reboots the software on the Director group and the default partition (QFabric CLI).

fabric—(QFabric systems only) (Optional) Reboots the fabric control Routing Engines and the Interconnect devices.

graceful—(QFabric systems only) (Optional) Allows the QFabric component to reboot with minimal impact to network traffic. This option is only available for the **all**, **fabric**, and **director-group** options.

in minutes—(Optional) Number of minutes from now to reboot the software. This option is an alias for the **at +*minutes*** option.

hypervisor—(Optional)Reboot Junos OS, host OS, and any installed guest VMs.

media (external | internal)—(Optional) Boot medium for the next boot. The external option reboots the switch using a software package stored on an external boot source, such as a USB flash drive. The internal option reboots the switch using a software package stored in an internal memory source.

message "text"—(Optional) Message to display to all system users before rebooting the software.

node-group *name*—(QFabric systems only) (Optional) Reboots the software on a server Node group or a network Node group.

routing-engine—(Optional) Reboot the Routing Engine.

slice (1 | 2 | alternate)—(Optional) Reboot using the specified partition on the boot media. This option has the following suboptions:

NOTE: The slice option is not supported on the QFX5100 switch, because there is no alternate slice when Junos OS boots as a Virtual Machine (VM). To switch to previous version of Junos OS, issue the **request system software rollback** command.

- **1**—Reboot from partition 1.
- **2**—Reboot from partition 2.
- **alternate**—Reboot from the alternate partition, which is the partition that did not boot the switch at the last bootup.

Required Privilege Level

maintenance

Related Documentation

- *clear system reboot*
- *Rebooting and Halting a Device*

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system reboot

```
user@switch> request system reboot
Reboot the system ? [yes,no] (no)
```

request system reboot (At 2300)

```
user@switch> request system reboot at 2300 message ?Maintenance time!?
Reboot the system ? [yes,no] (no) yes

shutdown: [pid 186]
*** System shutdown message from root@berry.network.net ***
System going down at 23:00
```

request system reboot (In 2 Hours)

The following example, which assumes that the time is 5 PM (1700), illustrates three different ways to request the system to reboot in 2 hours:

```
user@switch> request system reboot at +120
user@switch> request system reboot in 120
user@switch> request system reboot at 19:00
```

request system reboot (Immediately)

```
user@switch> request system reboot at now
```

request system reboot (At 1:20 AM)

To reboot the system at 1:20 AM, enter the following command. Because 1:20 AM is the next day, you must specify the absolute time.

```
user@switch> request system reboot at 06060120
request system reboot at 120
Reboot the system at 120? [yes,no] (no) yes
```

request system reboot director-device

```
user@switch> request system reboot director-device Node1
Issuing this command may interrupt traffic forwarding.
Continue? [yes,no] (no)
```

request system reboot director-group

```
user@switch> request system reboot director-group
Issuing this command may interrupt traffic forwarding.
Continue? [yes,no] (no)
```

request system reboot director-group graceful

```
user@switch> request system reboot director-group graceful
Issuing this command may interrupt traffic forwarding.
Continue? [yes,no] (no)
```

request system software format-qfabric-backup

Supported Platforms QFabric System

Syntax request system software format-qfabric-backup

Release Information Command introduced in Junos OS Release 13.1 for the QFX Series.

Description (QFabric systems only) Copy the install media files from a USB flash drive to your QFabric system recovery directory on the Director group. You must issue this command before you can use the **request system software system-backup** and **request system software system-backup copy-to-usb** commands.

Options **none**—Copy the install media files from a USB flash drive to a Director group recovery directory.

Required Privilege Level maintenance

Related Documentation

- Performing System Backup and Recovery for a QFabric System on page 533
- **request system software system-backup on page 566**
- Performing a QFabric System Recovery Installation on the Director Group on page 672

List of Sample Output request system software format-qfabric-backup on page 558

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software format-qfabric-backup

```
user@qfabric> request system software format-qfabric-backup
Copying QFabric USB template image from /dev/sdb(Unigen,PQS4000,4009 MB)......
```

request system software nonstop-upgrade

Supported Platforms QFabric System

Syntax

request system software nonstop-upgrade *package-name*
<fabric >
<director-group>
<node-group *name*>

Release Information Command introduced in Junos OS Release 12.2 for the QFX Series.

Description Nonstop software upgrade enables you to upgrade a QFabric system with minimal packet loss and maximum uptime. You should upgrade the devices in the following order: Director group, fabric controls and Interconnect devices, and network and server Node groups.

NOTE: **Before you perform a nonstop software upgrade, contact JTAC to perform a pre-upgrade health check on the QFabric system.**

Options *package-name*—Location from which the software is to be installed. For example:

- ***protocol*://*hostname/pathname/package-name***—For a software package or bundle that is to be downloaded and installed from a remote location. Replace ***protocol*** with one of the following:
  - **ftp**—File Transfer Protocol.
    Use **ftp://*hostname/pathname/package-name***. To specify authentication credentials, use
    ftp://<*username*>:<*password*>@*hostname/pathname/package-name*. To have the system prompt you for the password, specify **prompt** in place of the password. If a password is required, and you do not specify the password or **prompt**, an error message is displayed.
  - **http**—Hypertext Transfer Protocol.
    Use **http://*hostname/pathname/package-name***. To specify authentication credentials, use
    http://<*username*>:<*password*>@*hostname/pathname/package-name*. If a password is required and you omit it, you are prompted for it.
  - **scp**—Secure copy (available only for Canada and U.S. version).

Use **scp://*hostname/pathname/package-name***. To specify authentication credentials, use **scp://<*username*>:<*password*>@*hostname/pathname/package-name***.

NOTE:

- The *pathname* in the protocol is the relative path to the user's home directory on the remote system and not the root directory.

director-group—Install software package on the Director group and Fabric managers.

fabric—Install software package on the Interconnect devices and Fabric controls.

node-group *name* —Install software package on the redundant server Node group, server Node group, or network Node group.

Required Privilege Level maintenance

Related Documentation

- *Nonstop Software Upgrade Checklist for QFabric Systems*
- Performing a Nonstop Software Upgrade on the QFabric System on page 503
- Verifying Nonstop Software Upgrade for QFabric Systems on page 508
- show chassis nonstop-upgrade node-group on page 639

List of Sample Output

request system software nonstop-upgrade director-group on page 560
request system software nonstop-upgrade fabric on page 562
request system software nonstop-upgrade node-group (Redundant Server Node Group) on page 563
request system software nonstop-upgrade node-group (Server Node Group) on page 564

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software nonstop-upgrade director-group

```
user@qfabric> request system software nonstop-upgrade director-group
jinstall-qfabric-12.2X50-D10.3.rpm
Validating update package jinstall-qfabric-12.2X50-D10.3.rpm
Installing update package jinstall-qfabric-12.2X50-D10.3.rpm
Installing fabric images version 12.2X50-D10.3
Performing cleanup
Package install complete
Installing update package jinstall-qfabric-12.2X50-D10.3.rpm on peer
Triggering Initial Stage of Fabric Manager Upgrade
Updating CCIF default image to 12.2X50-D10.3
Updating FM-0 to Junos version 12.2X50-D10.3
[Status   2012-06-05 15:25:29]: Fabric Manager: Upgrade Initial Stage started
[FM-0     2012-06-05 15:25:38]: FM-0 Master already running on LOCAL DG
```



```
[NW-NG-0  2012-06-05 15:25:45]: NW-NG-0 Master already running on LOCAL DG
[FM-0     2012-06-05 15:26:12]: Retrieving package
[FM-0     2012-06-05 15:27:11]: Pushing bundle to re0
[Status   2012-06-05 15:29:06]: Load completed with 0 errors...
[Status   2012-06-05 15:29:06]: Reboot is required to complete upgrade ...
[Status   2012-06-05 15:29:07]: Trying to Connect to Node: FM-0
[Status   2012-06-05 15:29:13]: Rebooting FM-0
[FM-0     2012-06-05 15:29:13]: Waiting for FM-0 to terminate ...
Starting Peer upgrade

Initiating rolling upgrade of Director peer:  version 12.2X50-D10.3

Inform CCIF regarding rolling upgrade
[Peer Update Status]: Validating install package jinstall-qfabric-12.2X50-D10.3.rpm
[Peer Update Status]: Cleaning up node for rolling phase one upgrade
[Peer Update Status]: Director group upgrade complete
[Peer Update Status]: COMPLETED
[Peer Update Status]: Waiting for peer to reboot and start phase one of rolling
upgrade
[Peer Update Status]: Waiting for peer to reboot and start phase one of rolling
upgrade
[Peer Update Status]: Waiting for peer to reboot and start phase one of rolling
upgrade
[Peer Update Status]: Waiting for peer to reboot and start phase one of rolling
upgrade
[Peer Update Status]: Waiting for peer to reboot and start phase one of rolling
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[Peer Update Status]: Waiting for peer to return after reboot and start phase one
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 of rolling upgrade
[Peer Update Status]: Waiting for peer to return after reboot and start phase one
 of rolling upgrade
[Peer Update Status]: Waiting for peer to return after reboot and start phase one
 of rolling upgrade
[Peer Update Status]: Waiting for peer to return after reboot and start phase one
 of rolling upgrade
[Peer Update Status]: Waiting for peer to complete phase one of rolling upgrade
[Peer Update Status]: Peer completed phase one of rolling upgrade
Setting peer DG node as the master SFC

Delaying start of local upgrade to allow peer services time to initialize [15
minutes]
```



```
Delaying start of local upgrade to allow peer services time to initialize [15
minutes]
Delaying start of local upgrade to allow peer services time to initialize [12
minutes]
Delaying start of local upgrade to allow peer services time to initialize [9
minutes]
Delaying start of local upgrade to allow peer services time to initialize [6
minutes]
Delaying start of local upgrade to allow peer services time to initialize [3
minutes]
[Peer Update Status]: Check for VMs on dg0
Triggering Final Stage of Fabric Manager Upgrade:
Updating FM-0 to Junos version 12.2X50-D10.3
[Status   2012-06-05 16:10:12]: Fabric Manager: Upgrade Final Stage started
[NW-NG-0  2012-06-05 16:10:22]: Transferring NW-NG-0 Mastership to REMOTE DG
[NW-NG-0  2012-06-05 16:11:44]: Finished NW-NG-0 Mastership switch
[Status   2012-06-05 16:11:45]: Upgrading FM-0 VM on worker DG to 12.2X50-D10.3
[DRE-0    2012-06-05 16:12:43]: Retrieving package
[DRE-0    2012-06-05 16:13:46]: ------- re0: -------
[Status   2012-06-05 16:15:17]: Load completed with 0 errors...
[Status   2012-06-05 16:15:17]: Reboot is required to complete upgrade ...
[DRE-0    2012-06-05 16:15:22]: Waiting for DRE-0 to terminate ...
[DRE-0    2012-06-05 16:15:34]: Waiting for DRE-0 to come back ...
[DRE-0    2012-06-05 16:18:44]: Running Uptime Test for DRE-0
[DRE-0    2012-06-05 16:18:51]: Uptime Test for DRE-0 Passed ...
[Status   2012-06-05 16:18:51]: DRE-0 booted successfully ...
Performing post install shutdown and cleanup

Broadcast message from root (Tue Jun  5 16:18:51 2012):

The system is going down for reboot NOW!
Director group upgrade complete

root@qfabric> Read from remote host qfabric-partition0: Connection reset by peer
Connection to qfabric-partition0 closed.
```

request system software nonstop-upgrade fabric

user@qfabric> **request system software nonstop-upgrade fabric jinstall-qfabric-12.2X50-D10.3.rpm**

```
[FC-0     2012-06-05 16:48:53]: Retrieving package
[FC-1     2012-06-05 16:48:53]: Retrieving package
[IC-F4912 2012-06-05 16:48:59]: Retrieving package
[FC-0     2012-06-05 16:49:51]: ------- re0: -------
[FC-1     2012-06-05 16:49:52]: ------- re0: -------
[IC-F4912 2012-06-05 16:49:54]: ------- re0: -------
[IC-F4912 2012-06-05 16:50:42]: Step 1 of 20 Creating temporary file system
[IC-F4912 2012-06-05 16:50:42]: Step 2 of 20 Determining installation source
[IC-F4912 2012-06-05 16:50:43]: Step 3 of 20 Processing format options
[IC-F4912 2012-06-05 16:50:43]: Step 4 of 20 Determining installation slice
[IC-F4912 2012-06-05 16:50:43]: Step 5 of 20 Creating and labeling new slices
[IC-F4912 2012-06-05 16:50:44]: Step 6 of 20 Create and mount new file system
[IC-F4912 2012-06-05 16:50:53]: Step 7 of 20 Getting OS bundles
[IC-F4912 2012-06-05 16:50:53]: Step 8 of 20 Updating recovery media
[IC-F4912 2012-06-05 16:51:17]: Step 9 of 20 Extracting incoming image
[IC-F4912 2012-06-05 16:52:56]: Step 10 of 20 Unpacking OS packages
[IC-F4912 2012-06-05 16:52:59]: Step 11 of 20 Mounting jbase package
[IC-F4912 2012-06-05 16:53:28]: Step 12 of 20 Creating base OS symbolic links
[IC-F4912 2012-06-05 16:54:45]: Step 13 of 20 Creating fstab
[IC-F4912 2012-06-05 16:54:45]: Step 14 of 20 Creating new system files
[IC-F4912 2012-06-05 16:54:46]: Step 15 of 20 Adding jbundle package
```



```
[IC-F4912 2012-06-05 16:58:15]: Step 16 of 20 Backing up system data
[IC-F4912 2012-06-05 16:58:18]: Step 17 of 20 Setting up shared partition data
[IC-F4912 2012-06-05 16:58:18]: Step 18 of 20 Checking package sanity in
installation
[IC-F4912 2012-06-05 16:58:18]: Step 19 of 20 Unmounting and cleaning up temporary
 file systems
[IC-F4912 2012-06-05 16:58:22]: Step 20 of 20 Setting da0s1 as new active partition
[Status   2012-06-05 16:58:34]: Load completed with 0 errors...
[Status   2012-06-05 16:58:34]: Reboot is required to complete upgrade ...
[Status   2012-06-05 16:58:34]: Trying to Connect to Node: FC-0
[Status   2012-06-05 16:58:39]: Rebooting FC-0
[Status   2012-06-05 16:58:39]: Trying to Connect to Node: FC-1
[Status   2012-06-05 16:58:44]: Rebooting FC-1
[Status   2012-06-05 16:58:44]: Trying to Connect to Node: IC-F4912
[Status   2012-06-05 16:58:50]: Rebooting IC-F4912
Success
```

request system software nonstop-upgrade node-group (Redundant Server Node Group)

```
user@qfabric> request system software nonstop-upgrade node-group RSNG
jinstall-qfabric-12.2X50-D10.3.rpm
Upgrading target(s): RSNG

[RSNG     2012-06-05 17:26:44]: Starting with package
ftp://169.254.0.3/pub/images/12.2X50-D10.3/jinstall-qfx.tgz
[RSNG     2012-06-05 17:26:44]: Retrieving package
[RSNG     2012-06-05 17:28:56]: Pushing bundle to fpc1
[RSNG     2012-06-05 17:29:26]: fpc1: Validate package...
[RSNG     2012-06-05 17:35:22]: fpc0: Validate package...
[RSNG     2012-06-05 17:35:49]: ------- fpc1 -------
[RSNG     2012-06-05 17:36:25]: Step 1 of 20 Creating temporary file system
[RSNG     2012-06-05 17:36:26]: Step 2 of 20 Determining installation source
[RSNG     2012-06-05 17:36:26]: Step 3 of 20 Processing format options
[RSNG     2012-06-05 17:36:26]: Step 4 of 20 Determining installation slice
[RSNG     2012-06-05 17:36:27]: Step 5 of 20 Creating and labeling new slices
[RSNG     2012-06-05 17:36:27]: Step 6 of 20 Create and mount new file system
[RSNG     2012-06-05 17:36:35]: Step 7 of 20 Getting OS bundles
[RSNG     2012-06-05 17:36:35]: Step 8 of 20 Updating recovery media
[RSNG     2012-06-05 17:36:56]: Step 9 of 20 Extracting incoming image
[RSNG     2012-06-05 17:38:07]: Step 10 of 20 Unpacking OS packages
[RSNG     2012-06-05 17:38:16]: Step 11 of 20 Mounting jbase package
[RSNG     2012-06-05 17:38:41]: Step 12 of 20 Creating base OS symbolic links
[RSNG     2012-06-05 17:39:41]: Step 13 of 20 Creating fstab
[RSNG     2012-06-05 17:39:42]: Step 14 of 20 Creating new system files
[RSNG     2012-06-05 17:39:42]: Step 15 of 20 Adding jbundle package
[RSNG     2012-06-05 17:42:16]: Step 16 of 20 Backing up system data
[RSNG     2012-06-05 17:42:32]: Step 17 of 20 Setting up shared partition data
[RSNG     2012-06-05 17:42:33]: Step 18 of 20 Checking package sanity in
installation
[RSNG    2012-06-05 17:42:33]: Step 19 of 20 Unmounting and cleaning up temporary
 file systems
[RSNG    2012-06-05 17:42:36]: Step 20 of 20 Setting da0s2 as new active partition
[RSNG     2012-06-05 17:42:51]: ------- fpc0 - master -------
[RSNG     2012-06-05 17:42:51]: Step 1 of 20 Creating temporary file system
[RSNG     2012-06-05 17:42:51]: Step 2 of 20 Determining installation source
[RSNG     2012-06-05 17:42:51]: Step 3 of 20 Processing format options
[RSNG     2012-06-05 17:42:51]: Step 4 of 20 Determining installation slice
[RSNG     2012-06-05 17:42:51]: Step 5 of 20 Creating and labeling new slices
[RSNG     2012-06-05 17:42:51]: Step 6 of 20 Create and mount new file system
[RSNG     2012-06-05 17:42:51]: Step 7 of 20 Getting OS bundles
[RSNG     2012-06-05 17:42:51]: Step 8 of 20 Updating recovery media
```

```
[RSNG     2012-06-05 17:42:51]: Step 9 of 20 Extracting incoming image
[RSNG     2012-06-05 17:42:51]: Step 10 of 20 Unpacking OS packages
[RSNG     2012-06-05 17:42:51]: Step 11 of 20 Mounting jbase package
[RSNG     2012-06-05 17:42:51]: Step 12 of 20 Creating base OS symbolic links
[RSNG     2012-06-05 17:42:51]: Step 13 of 20 Creating fstab
[RSNG     2012-06-05 17:42:51]: Step 14 of 20 Creating new system files
[RSNG     2012-06-05 17:42:51]: Step 15 of 20 Adding jbundle package
[RSNG     2012-06-05 17:42:51]: Step 16 of 20 Backing up system data
[RSNG     2012-06-05 17:42:51]: Step 17 of 20 Setting up shared partition data
[RSNG     2012-06-05 17:42:51]: Step 18 of 20 Checking package sanity in
installation
[RSNG    2012-06-05 17:42:51]: Step 19 of 20 Unmounting and cleaning up temporary
 file systems
[RSNG    2012-06-05 17:42:51]: Step 20 of 20 Setting da0s2 as new active partition
[RSNG     2012-06-05 17:43:36]: Rebooting Backup RE
[RSNG     2012-06-05 17:43:36]: ------- Rebooting fpc1 -------
[RSNG     2012-06-05 17:50:12]: Initiating Chassis In-Service-Upgrade
[RSNG     2012-06-05 17:50:33]: Upgrading group: 0 fpc: 0
[RSNG     2012-06-05 17:52:38]: Upgrade complete for group:0
[RSNG     2012-06-05 17:52:38]: Upgrading group: 1 fpc: 1
[RSNG     2012-06-05 17:54:42]: Upgrade complete for group:1
[RSNG    2012-06-05 17:54:42]: Finished processing all upgrade groups, last group
 :1
[RSNG     2012-06-05 17:54:48]: Preparing for Switchover
[RSNG     2012-06-05 17:55:38]: Switchover Completed
[Status   2012-06-05 17:55:41]: Upgrade completed with 0 errors
Success
```

request system software nonstop-upgrade node-group (Server Node Group)

```
user@qfabric> request system software nonstop-upgrade node-group P1507-C
jinstall-qfabric-12.2X50-D10.3.rpm
Upgrading target(s): P1507-C

[P1507-C  2012-06-26 14:02:44]: Retrieving package
[P1507-C  2012-06-26 14:03:21]: ------- P1507-C: -------
[P1507-C  2012-06-26 14:03:59]: Step 1 of 20 Creating temporary file system
[P1507-C  2012-06-26 14:03:59]: Step 2 of 20 Determining installation source
[P1507-C  2012-06-26 14:03:59]: Step 3 of 20 Processing format options
[P1507-C  2012-06-26 14:03:59]: Step 4 of 20 Determining installation slice
[P1507-C  2012-06-26 14:04:00]: Step 5 of 20 Creating and labeling new slices
[P1507-C  2012-06-26 14:04:00]: Step 6 of 20 Create and mount new file system
[P1507-C  2012-06-26 14:04:08]: Step 7 of 20 Getting OS bundles
[P1507-C  2012-06-26 14:04:09]: Step 8 of 20 Updating recovery media
[P1507-C  2012-06-26 14:04:29]: Step 9 of 20 Extracting incoming image
[P1507-C  2012-06-26 14:05:42]: Step 10 of 20 Unpacking OS packages
[P1507-C  2012-06-26 14:05:49]: Step 11 of 20 Mounting jbase package
[P1507-C  2012-06-26 14:06:14]: Step 12 of 20 Creating base OS symbolic links
[P1507-C  2012-06-26 14:07:15]: Step 13 of 20 Creating fstab
[P1507-C  2012-06-26 14:07:15]: Step 14 of 20 Creating new system files
[P1507-C  2012-06-26 14:07:16]: Step 15 of 20 Adding jbundle package
[P1507-C  2012-06-26 14:09:52]: Step 16 of 20 Backing up system data
[P1507-C  2012-06-26 14:10:07]: Step 17 of 20 Setting up shared partition data
[P1507-C  2012-06-26 14:10:07]: Step 18 of 20 Checking package sanity in
installation
[P1507-C  2012-06-26 14:10:08]: Step 19 of 20 Unmounting and cleaning up temporary
 file systems
[P1507-C  2012-06-26 14:10:11]: Step 20 of 20 Setting da0s2 as new active partition
[Status   2012-06-26 14:10:25]: Trying to Connect to Node: P1507-C
[Status   2012-06-26 14:10:32]: Rebooting P1507-C
```



```
[Status   2012-06-26 14:10:32]: Upgrade completed with 0 errors
Success
```

request system software system-backup

Supported Platforms QFabric System

Syntax

```
request system software system-backup
<usb-create>
```

Release Information Command introduced in Junos OS Release 13.1 for the QFX Series.

Description (QFabric systems only) Save a copy of the current QFabric system configuration file and the current software package for recovery purposes. You can use these saved files to restore your QFabric system to full operation after a system failure or shutdown.

Options **none**—Copy the QFabric system software package and system configuration file to a Director group recovery directory.

NOTE: If this command fails, insert a Juniper Networks software installation USB flash drive into the master Director device and issue the **request system software format-qfabric-backup** command. For more details about this prerequisite procedure that is required before you can use the QFabric system backup and recovery feature, see “Performing System Backup and Recovery for a QFabric System” on page 533.

usb-create—Copy the QFabric system software package and system configuration file from the Director group recovery directory to a USB flash drive. When the files have been copied, you can use the USB flash drive to help your QFabric system recover from a failure condition.

NOTE: You must issue the **request system software system-backup** command (which saves the files to the Director group) before you can issue the **request system software system-backup usb-create** command.

Required Privilege Level maintenance

Related Documentation

- Performing System Backup and Recovery for a QFabric System on page 533
- **request system software format-qfabric-backup on page 558**
- *save*
- *request system software configuration-backup*
- Performing a QFabric System Recovery Installation on the Director Group on page 672

List of Sample Output **request system software system-backup on page 567**

request system software system-backup usb-create on page 567

Output Fields When you enter these commands, you are provided feedback on the status of your request.

Sample Output

request system software system-backup

```
user@qfabric> request system software system-backup

user@qfabric>
```

request system software system-backup usb-create

```
user@qfabric> request system software system-backup usb-create /dev/sdb
Issuing this command will overwrite the contents of the USB drive.
Continue? [yes,no] (no) yes

This operation will access the USB drive on 0281042010000013.
Are you sure you want to continue? [yes,no] (no) yes

Copying QFabric recovery media to /dev/sdb...
Successfully copied QFabric recovery media to /dev/sdb
```


set chassis display message

Supported Platforms EX Series, J Series, M Series, MX Series, PTX Series, QFabric System, T Series

List of Syntax
Syntax on page 568
Syntax (TX Matrix Router) on page 568
Syntax (TX Matrix Plus Router) on page 568

Syntax

set chassis display message "*message*"
<permanent>

Syntax (TX Matrix Router)

set chassis display message "*message*" (lcc *number* | scc)
<permanent>

Syntax (TX Matrix Plus Router)

set chassis display message “*message* ” (fpc-slot *slot-number* | lcc *number* | sfc *number*)
<permanent>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc option for TX Matrix Plus router introduced in Junos OS Release 9.6.

Description

Display or stop a text message on the craft interface display, which is on the front of the router, or on the LCD panel display on the switch. The craft interface alternates the display of text messages with standard craft interface messages three times, switching between messages every 60 seconds.

NOTE: On T Series routers, when this command is executed with the permanent option, the display of the text message alternates with that of the standard craft interface message continuously every 60 seconds.

By default, on both the router and the switch, the text message is displayed for 5 minutes. The craft interface display has four 20-character lines. The LCD panel display has two 16-character lines, and text messages appear only on the second line.

Options

"*message*"—Message to display. On the craft interface display, if the message is longer than 20 characters, it wraps onto the next line. If a word does not fit on one line, the entire word moves down to the next line. Any portion of the message that does not fit on the display is truncated. An empty pair of quotation marks (“ ”) deletes the text message from the craft interface display. On the LCD panel display, the message is limited to 16 characters.

fpc-slot *slot-number*—(TX Matrix Plus routers and EX4200 and QFX Series only) On the router or switch, display the text message on the craft interface for a specific Flexible PIC Concentrator (FPC). Replace ***slot-number*** with a value from **0** through **31**. On the switch, display the text message for a specific member of a Virtual Chassis, where **fpc-slot *slot-number*** corresponds to the member ID. Replace ***slot-number*** with a value from **0** through **9**. On the QFX Series, the ***slot-number*** is always **0**. On a TX Matrix Plus router with 3D SIBs replace *slot-number* with a value from **0** through **63**.

lcc *number*—(TX Matrix router and TX Matrix Plus router only) (Optional) Line-card chassis number.

Replace *number* with the following values depending on the LCC configuration:

- 0 through 3, when T640 routers are connected to a TX Matrix router in a routing matrix.
- 0 through 3, when T1600 routers are connected to a TX Matrix Plus router in a routing matrix.
- 0 through 7, when T1600 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.
- 0, 2, 4, or 6, when T4000 routers are connected to a TX Matrix Plus router with 3D SIBs in a routing matrix.

permanent—(Optional) Display a text message on the craft interface display or LCD panel display permanently.

scc—(TX Matrix routers only) Display the text message on the craft interface display of the TX Matrix router (switch-card chassis).

sfc *number*—(TX Matrix Plus routers only) Display the text message on the craft interface display of the TX Matrix Plus router (or switch-fabric chassis).

Required Privilege Level clear

Related Documentation

- *Configuring the LCD Panel on EX Series Switches (CLI Procedure)*
- *clear chassis display message*
- *show chassis craft-interface*
- Understanding the Implementation of System Log Messages on the QFabric System on page 57

List of Sample Output

set chassis display message (Creating) on page 569
set chassis display message (Deleting) on page 570

Output Fields See *show chassis craft-interface* for an explanation of output fields.

Sample Output

set chassis display message (Creating)

The following example shows how to set the display message and verify the result:

```
user@host> set chassis display message "NOC contact Dusty (888) 555-1234"
message sent
```

```
user@host> show chassis craft-interface
Red alarm:     LED off, relay off
Yellow alarm:  LED off, relay off
Host OK LED:   On
Host fail LED: Off
```



```
FPCs     0  1  2  3  4  5  6  7
-------------------------------
Green  ..  *..  *  *.
Red    ........
LCD screen:
     +--------------------+
     |NOC contact Dusty   |
     |(888) 555-1234      |
     +--------------------+
```

set chassis display message (Deleting)

The following example shows how to delete the display message and verify that the message is removed:

```
user@host> set chassis display message ""
message sent
```

```
user@host> show chassis craft-interface
Red alarm:     LED off, relay off
Yellow alarm:  LED off, relay off
Host OK LED:   On
Host fail LED: Off
FPCs     0  1  2  3  4  5  6  7
-------------------------------
Green  ..  *..  *  *.
Red    ........
LCD screen:
     +--------------------+
     |host                |
     |Up: 0+17:05:47      |
     |                    |
     |Temperature OK      |
     +--------------------+
```


show chassis device-mode

Supported Platforms QFabric System

Syntax show chassis device-mode

Release Information Command introduced in Junos OS Release 11.2 for the QFX Series.

Description Display information about the operating mode of the device. For example, QFX3500 devices operate either as a single switch in standalone mode or as a QFabric system Node device in node-device mode.

NOTE: Issue the **show chassis device-mode** command only when your management station is connected directly to the device over a console port connection.

Options There are no options for this command.

Required Privilege Level admin

Related Documentation

- Converting the Device Mode for a QFabric System Component on page 329
- **request chassis device-mode on page 539**
- Understanding Interconnect Devices on page 23
- Understanding Node Devices on page 26

List of Sample Output

show chassis device-mode (Interconnect Device Mode) on page 572
show chassis device-mode (Interconnect Device Mode, but Node Device-Ready) on page 572
show chassis device-mode (Interconnect Device Mode, but Standalone-Ready) on page 572
show chassis device-mode (Node Device Mode) on page 572
show chassis device-mode (Node Device Mode, but Interconnect Device-Ready) on page 572
show chassis device-mode (Node Device Mode, but Standalone-Ready) on page 572
show chassis device-mode (Standalone Mode) on page 572
show chassis device-mode (Standalone Mode, but Interconnect Device-Ready) on page 572
show chassis device-mode (Standalone Mode, but Node Device-Ready) on page 573

Output Fields Table 105 on page 572 lists the output fields for the **show chassis device-mode** command. Output fields are listed in the approximate order in which they appear.

Table 105: show chassis device-mode Output Fields

Field Name	Field Description
Current device-mode	Existing operational mode for the device. The device can be in Interconnect device mode, Node device mode, or standalone mode.
Future device-mode after reboot	Future operational mode for the device after you reboot it. The device can be set to enter Interconnect device mode, Node device mode, or standalone mode. NOTE: To set the future mode of the device, issue the **request chassis device-mode** command.

Sample Output

show chassis device-mode (Interconnect Device Mode)

```
user@switch> show chassis device-mode
Current device-mode : Interconnect-device
Future device-mode after reboot : Interconnect-device
```

show chassis device-mode (Interconnect Device Mode, but Node Device-Ready)

```
user@switch> show chassis device-mode
Current device-mode : Interconnect-device
Future device-mode after reboot : Node-device
```

show chassis device-mode (Interconnect Device Mode, but Standalone-Ready)

```
user@switch> show chassis device-mode
Current device-mode : Interconnect-device
Future device-mode after reboot : Standalone
```

show chassis device-mode (Node Device Mode)

```
user@switch> show chassis device-mode
Current device-mode : Node-device
Future device-mode after reboot : Node-device
```

show chassis device-mode (Node Device Mode, but Interconnect Device-Ready)

```
user@switch> show chassis device-mode
Current device-mode : Node-device
Future device-mode after reboot : Interconnect-device
```

show chassis device-mode (Node Device Mode, but Standalone-Ready)

```
user@switch> show chassis device-mode
Current device-mode : Node-device
Future device-mode after reboot : Standalone
```

show chassis device-mode (Standalone Mode)

```
user@switch> show chassis device-mode
Current device-mode : Standalone
Future device-mode after reboot : Standalone
```

show chassis device-mode (Standalone Mode, but Interconnect Device-Ready)

```
user@switch> show chassis device-mode
```



```
Current device-mode : Standalone
Future device-mode after reboot : Interconnect-device
```

show chassis device-mode (Standalone Mode, but Node Device-Ready)

```
user@switch> show chassis device-mode
Current device-mode : Standalone
Future device-mode after reboot : Node-device
```

show chassis ethernet-switch interconnect-device cb

Supported Platforms QFabric System

Syntax

show chassis ethernet-switch interconnect-device *name* cb
<detail>
<port *number*>
<slot*number*>

Release Information Command introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFX3000-G QFabric systems only) Display Ethernet switch information for the Control Board (CB) ports in an Interconnect device.

Options

none—Display Ethernet switch information about each connected port on each online CB in the Interconnect device.

detail—(Optional) Display detailed status information for all CBs or for the CB in the specified slot in the Interconnect device.

port *number*—(Optional) Display Ethernet switch information about a specific port on a CB in the Interconnect device.

slot *number*—(Optional) Display Ethernet switch information about a CB in a specific slot in the Interconnect device.

Required Privilege Level view

Related Documentation

- chassis on page 470
- *show chassis environment cb*
- show chassis ethernet-switch interconnect-device fpc on page 591

List of Sample Output

show chassis ethernet-switch interconnect-device cb on page 578
show chassis ethernet-switch interconnect-device cb detail on page 579
show chassis ethernet-switch interconnect-device cb detail slot port on page 585

Output Fields Table 106 on page 575 lists the output fields for the **show chassis ethernet-switch interconnect-device cb** command. Output fields are listed in the approximate order in which they appear.

Table 106: show chassis ethernet-switch interconnect-device fpc Output Fields

Field Name	Field Description
Link is good on port n connected to device	Information about the link between each port on the FPC's Ethernet switch and one of the following devices: • FWD-SWITCH-0 • FWD-SWITCH-1 • CB0 • CB1
Speed is	Speed at which the Ethernet link is running: **10 Mb**When the device is **RE** or **Other RE** on the TX Matrix router, the speed is **1000 Mb**.
Duplex is	Duplex type of the Ethernet link: **full** or **half**.
Autonegotiate is Enabled (or Disabled)	By default, built-in Fast Ethernet ports on a PIC autonegotiate whether to operate at 10 Mbps or 100 Mbps. All other interfaces automatically choose the correct speed based on the PIC type and whether the PIC is configured to operate in multiplexed mode (using the **no-concatenate** statement at the **[edit chassis]** hierarchy level, as described in the *Junos OS System Basics Configuration Guide*).
Flow Control TX is Enabled (or Disabled)	Flow control in the transmit direction is enabled (or disabled). Flow control regulates the flow of packets from the switch to the remote side of the connection.
Flow Control RX is Enabled (or Disabled)	Flow control in the receive direction is enabled (or disabled). Flow control regulates the flow of packets from the remote side of the connection to the switch.
TX Octets	Number of octets sent.
TX Packets 64 Octets	Number of transmitted packets of size 64 octets.
TX Packets 65-127 Octets	Number of transmitted frames of size 65 through 127 octets.
TX Packets 128-255 Octets	Number of transmitted frames of size 128 through 255 octets.
TX Packets 256-511 Octets	Number of transmitted frames of size 256 through 511 octets.
TX Packets 512-1023 Octets	Number of transmitted frames of size 512 through 1023 octets.
TX Packets 1024-1518 Octets	Number of transmitted frames of size 1024 through 1518 octets.
TX Packets 1519-2047 Octets	Number of transmitted frames of size 1519 through 2047 octets.
TX Packets 2048-4095 Octets	Number of transmitted frames of size 2048 through 4095 octets.

Table 106: show chassis ethernet-switch interconnect-device fpc Output Fields *(continued)*

Field Name	Field Description
TX Packets 4096-9216 Octets	Number of transmitted frames of size 4096 through 9216 octets.
TX Packets 9217-16383 Octets	Number of transmitted frames of size 9217 through 16383 octets.
TX Multicast packets	Number of multicast packets sent.
TX Broadcast packets	Number of broadcast packets sent.
TX Single Collision frames	Number of packets sent after one collision.
TX Mult. Collision frames	Number of packets sent after multiple collisions.
TX Late Collision Frames	Number of packets aborted during sending because of collisions after 64 bytes.
TX Excessive collisions	Number of packets not sent because of too many collisions.
TX Collision frames	Number of collision packets sent.
TX PAUSEMAC Ctrl Frames	Number of Media Access Control (MAC) frames containing PAUSE commands sent.
TX MAC ctrl frames	Number of MAC control packets sent.
TX Frame deferred Xmns	Number of frames deferred in *x* milliseconds.
TX Oversize Packets	Number of oversized packets sent.
TX Jabbers	Total number of frames sent that exceed the maximum byte count and contain CRC errors .
TX FCS Error Counter	Number of packets discarded because of frame check sequence errors.
TX Fragment Counter	Number of fragmented packets sent.
TX Byte Counter	Number of bytes sent.
RX Octets	Number of octets received.
RX Packets 64 Octets	Number of received packets of size 64 octets.
RX Packets 65-127 Octets	Number of received packets of size 65 through 127 octets.

Table 106: show chassis ethernet-switch interconnect-device fpc Output Fields *(continued)*

Field Name	Field Description
RX Packets 128-255 Octets	Number of received packets of size 128 through 255 octets.
RX Packets 256-511 Octets	Number of received packets of size 256 through 511 octets.
RX Packets 512-1023 Octets	Number of received packets of size 512 through 1023 octets.
RX Packets 1024-1518 Octets	Number of received packets of size 65 through 127 octets.
RX Packets 1519-2047 Octets	Number of received packets of size 1519 through 2047 octets.
RX Packets 2048-4095 Octets	Number of received packets of size 2048 through 4095 octets.
RX Packets 4096-9216 Octets	Number of received packets of size 4096 through 9216 octets.
RX Multicast Packets	Number of multicast packets received.
RX Broadcast Packets	Number of broadcast packets received.
RX FCS Errors	Number of packets discarded because of frame check sequence errors.
RX Align Errors	Number of incomplete octets received.
RX Fragments	Number of fragmented packets received.
RX Symbol errors	Number of symbols received that the router did not correctly decode.
RX Unsupported opcodes	Number of packets received with unsupported op codes.
RX Out of Range Length	Number of packets received with an out of range length.
RX False Carrier Errors	Number of packets received with false carrier errors.
RX Undersize Packets	Number of undersized packets received.
RX Oversize Packets	Number of oversized packets received.
RX Jabbers	Total number of frames received that exceed the maximum byte count and contain CRC errors .
RX 1519-1522 Good Vlan frms	

Table 106: show chassis ethernet-switch interconnect-device fpc Output Fields *(continued)*

Field Name	Field Description
RX MTU Exceed Counter	Number of packets received that exceed the MTU.
RX Control Frame Counter	Number of control frames received.
RX Pause Frame Counter	Number of pause frames received.
RX Byte Counter	Number of bytes received.

Sample Output

show chassis ethernet-switch interconnect-device cb

```
user@switch> show chassis ethernet-switch interconnect-device IC-WS001 cb
Displaying summary for switch 0
Link is down on XE port 1 connected to device: FPC7
  Flow Control TX is Disabled
  Flow Control RX is Disabled

Link is down on XE port 2 connected to device: FPC6
  Flow Control TX is Disabled
  Flow Control RX is Disabled

Link is down on XE port 3 connected to device: FPC5
  Flow Control TX is Disabled
  Flow Control RX is Disabled

Link is down on XE port 5 connected to device: FPC4
  Flow Control TX is Disabled
  Flow Control RX is Disabled

Link is down on XE port 7 connected to device: FPC3
  Flow Control TX is Disabled
  Flow Control RX is Disabled

Link is down on XE port 9 connected to device: FPC2
  Flow Control TX is Disabled
  Flow Control RX is Disabled

Link is good on XE port 10 connected to device: FPC1
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  TX Octets                    326358
  RX Octets                    237947

Link is good on XE port 11 connected to device: FPC0
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  TX Octets                    548249
  RX Octets                    386013
```

```
Link is down on XE port 20 connected to device: SFP3
  Flow Control TX is Disabled
  Flow Control RX is Disabled

Link is down on XE port 21 connected to device: SFP2
  Flow Control TX is Disabled
  Flow Control RX is Disabled

Link is good on XE port 22 connected to device: SFP1
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Enabled
  TX Octets                   1
  RX Octets                   11704758

Link is good on XE port 23 connected to device: SFP0
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Enabled
  TX Octets                   1500022
  RX Octets                   11629453

Link is good on XE port 24 connected to device: VCCPD
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  TX Octets                   23332467
  RX Octets                   1500023

Link is good on GE port 25 connected to device: SFI
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  TX Octets                   643918
  RX Octets                   894548
```

show chassis ethernet-switch interconnect-device cb detail

```
user@qfabric> show chassis ethernet-switch interconnect-device IC-WS001 cb detail
Port statistics for CB switch

Link is down on XE port 1 connected to device: FPC7

Link is down on XE port 2 connected to device: FPC6

Link is down on XE port 3 connected to device: FPC5

Link is down on XE port 5 connected to device: FPC4

Link is down on XE port 7 connected to device: FPC3

Link is down on XE port 9 connected to device: FPC2
Statistics for port 10 connected to device FPC1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   319293
  TX Packets 256-511 Octets   5043
  TX Packets 512-1023 Octets  2072
  TX Packets 1024-1518 Octets  6
  TX Packets 1519-2047 Octets  0
```

```
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   326415
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             71659246
  TX Packet OK Counter        326415
  TX Pause Packet Counter     0
  TX Unicast Counter          326414
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   235428
  RX Packets 256-511 Octets   2134
  RX Packets 512-1023 Octets  420
  RX Packets 1024-1518 Octets  6
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                   237988
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             55821504
  RX Unicast Frame Count      237988
  RX Packet OK Count          237988
Statistics for port 11 connected to device FPC0:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   535483
  TX Packets 256-511 Octets   9289
  TX Packets 512-1023 Octets  3564
  TX Packets 1024-1518 Octets  5
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   548342
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             120498414
  TX Packet OK Counter        548342
  TX Pause Packet Counter     0
  TX Unicast Counter          548341
```



```
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   382931
  RX Packets 256-511 Octets   2762
  RX Packets 512-1023 Octets  386
  RX Packets 1024-1518 Octets  3
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                   386082
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             90717369
  RX Unicast Frame Count      386082
  RX Packet OK Count          386082

Link is down on XE port 20 connected to device: SFP3

Link is down on XE port 21 connected to device: SFP2
Statistics for port 22 connected to device SFP1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    0
  TX Packets 128-255 Octets   0
  TX Packets 256-511 Octets   0
  TX Packets 512-1023 Octets  0
  TX Packets 1024-1518 Octets  1
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan Frms  0
  TX Octets                   1
  TX Multicast Packets        1
  TX Broadcast Packets        0
  TX Single Collision Frames  0
  TX Mult. Collision Frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision Frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC Ctrl Frames          0
  TX Frame Deferred Xmns      0
  TX Frame Excessive Deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             1422
  RX Packet OK Count          1
  RX Packets 64 Octets        230013
  RX Packets 65-127 Octets    174529
  RX Packets 128-255 Octets   286735
```



```
  RX Packets 256-511 Octets   343412
  RX Packets 512-1023 Octets  172152
  RX Packets 1024-1518 Octets  10500065
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                  11706906
  RX Multicast Packets       11672320
  RX Broadcast Packets       34460
  RX FCS Errors              0
  RX Align Errors            0
  RX Fragments               0
  RX Symbol Errors           0
  RX Unsupported Opcodes     0
  RX Out of Range Length     0
  RX False Carrier Errors    0
  RX Undersize Packets       0
  RX Oversize Packets        0
  RX Jabbers                 0
  RX 1519-1522 Good Vlan Frms 0
  RX MTU Exceed Counter      0
  RX Control Frame Counter   0
  RX Pause Frame Counter     0
  RX Byte Counter            2379464164
  RX Packet OK Count         11706906
Statistics for port 23 connected to device SFP0:
  TX Packets 64 Octets       3
  TX Packets 65-127 Octets   484733
  TX Packets 128-255 Octets  219112
  TX Packets 256-511 Octets  129014
  TX Packets 512-1023 Octets  503
  TX Packets 1024-1518 Octets  666958
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan Frms  0
  TX Octets                  1500323
  TX Multicast Packets       794098
  TX Broadcast Packets       1040
  TX Single Collision Frames  0
  TX Mult. Collision Frames  0
  TX Late Collisions         0
  TX Excessive Collisions    0
  TX Collision Frames        0
  TX PAUSEMAC Ctrl Frames    0
  TX MAC Ctrl Frames         0
  TX Frame Deferred Xmns     0
  TX Frame Excessive Deferl  0
  TX Oversize Packets        0
  TX Jabbers                 0
  TX FCS Error Counter       0
  TX Fragment Counter        0
  TX Byte Counter            1065466891
  RX Packet OK Count         1500323
  RX Packets 64 Octets       341563
  RX Packets 65-127 Octets   430810
  RX Packets 128-255 Octets  318279
  RX Packets 256-511 Octets  347147
  RX Packets 512-1023 Octets  184798
  RX Packets 1024-1518 Octets  10008993
  RX Packets 1519-2047 Octets  0
```



```
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   11631590
  RX Multicast Packets        10878484
  RX Broadcast Packets        33420
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol Errors            0
  RX Unsupported Opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan Frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             1720484325
  RX Packet OK Count          11631591
Statistics for port 24 connected to device VCCPD:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1176546
  TX Packets 128-255 Octets   604988
  TX Packets 256-511 Octets   690561
  TX Packets 512-1023 Octets  356942
  TX Packets 1024-1518 Octets  20507438
  TX Packets 1519-2047 Octets  278
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan Frms  278
  TX Octets                   23336753
  TX Multicast Packets        22549383
  TX Broadcast Packets        67862
  TX Single Collision Frames  0
  TX Mult. Collision Frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision Frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC Ctrl Frames          0
  TX Frame Deferred Xmns      0
  TX Frame Excessive Deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             4191296788
  RX Packet OK Count          23336753
  RX Packets 64 Octets        3
  RX Packets 65-127 Octets    484673
  RX Packets 128-255 Octets   219074
  RX Packets 256-511 Octets   129100
  RX Packets 512-1023 Octets  516
  RX Packets 1024-1518 Octets  666959
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   1500325
  RX Multicast Packets        794099
```

```
  RX Broadcast Packets        1040
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol Errors            0
  RX Unsupported Opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan Frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             1071469739
  RX Packet OK Count          1500325
Statistics for port 25 connected to device SFI:
  TX Packets 64 Octets        12
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   618363
  TX Packets 256-511 Octets   4896
  TX Packets 512-1023 Octets  806
  TX Packets 1024-1518 Octets  19950
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan Frms  0
  TX Octets                   644028
  TX Multicast Packets        4
  TX Broadcast Packets        19954
  TX Single Collision Frames  0
  TX Mult. Collision Frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision Frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC Ctrl Frames          0
  TX Frame Deferred Xmns      0
  TX Frame Excessive Deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             167039705
  RX Packet OK Count          644028
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   854776
  RX Packets 256-511 Octets   14332
  RX Packets 512-1023 Octets  5636
  RX Packets 1024-1518 Octets  19954
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   894698
  RX Multicast Packets        0
  RX Broadcast Packets        19943
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
```



```
  RX Symbol Errors            0
  RX Unsupported Opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan Frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             212658920
  RX Packet OK Count          894698
```

show chassis ethernet-switch interconnect-device cb detail slot port

```
user@qfabric> show chassis ethernet-switch interconnect-device IC-WS001 cb slot 1 port 1
re0:
--------------------------------------------------------------------------
Port statistics for CB switch

Link is down on XE port 1 connected to device: FPC7

Link is down on XE port 2 connected to device: FPC6

Link is down on XE port 3 connected to device: FPC5

Link is down on XE port 5 connected to device: FPC4

Link is down on XE port 7 connected to device: FPC3

Link is down on XE port 9 connected to device: FPC2
Statistics for port 10 connected to device FPC1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   319366
  TX Packets 256-511 Octets   5043
  TX Packets 512-1023 Octets  2072
  TX Packets 1024-1518 Octets  6
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   326488
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             71675330
  TX Packet OK Counter        326488
  TX Pause Packet Counter     0
  TX Unicast Counter          326487
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   235481
  RX Packets 256-511 Octets   2134
  RX Packets 512-1023 Octets  420
  RX Packets 1024-1518 Octets  6
  RX Packets 1519-2047 Octets  0
```

```
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                   238041
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             55834224
  RX Unicast Frame Count      238041
  RX Packet OK Count          238041
Statistics for port 11 connected to device FPC0:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   535606
  TX Packets 256-511 Octets   9289
  TX Packets 512-1023 Octets  3564
  TX Packets 1024-1518 Octets  5
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   548465
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             120525524
  TX Packet OK Counter        548465
  TX Pause Packet Counter     0
  TX Unicast Counter          548464
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   383018
  RX Packets 256-511 Octets   2762
  RX Packets 512-1023 Octets  386
  RX Packets 1024-1518 Octets  3
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                   386169
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX Control Frame Counter    0
```



```
  RX Pause Frame Counter      0
  RX Byte Counter             90738249
  RX Unicast Frame Count      386169
  RX Packet OK Count          386169

Link is down on XE port 20 connected to device: SFP3

Link is down on XE port 21 connected to device: SFP2
Statistics for port 22 connected to device SFP1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    0
  TX Packets 128-255 Octets   0
  TX Packets 256-511 Octets   0
  TX Packets 512-1023 Octets  0
  TX Packets 1024-1518 Octets  1
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan Frms  0
  TX Octets                   1
  TX Multicast Packets        1
  TX Broadcast Packets        0
  TX Single Collision Frames  0
  TX Mult. Collision Frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision Frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC Ctrl Frames          0
  TX Frame Deferred Xmns      0
  TX Frame Excessive Deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             1422
  RX Packet OK Count          1
  RX Packets 64 Octets        230071
  RX Packets 65-127 Octets    174571
  RX Packets 128-255 Octets   286812
  RX Packets 256-511 Octets   343500
  RX Packets 512-1023 Octets  172203
  RX Packets 1024-1518 Octets  10502544
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   11709701
  RX Multicast Packets        11675110
  RX Broadcast Packets        34465
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol Errors            0
  RX Unsupported Opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan Frms 0
  RX MTU Exceed Counter       0
```

```
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             2383079858
  RX Packet OK Count          11709701
Statistics for port 23 connected to device SFP0:
  TX Packets 64 Octets        3
  TX Packets 65-127 Octets    485048
  TX Packets 128-255 Octets   219200
  TX Packets 256-511 Octets   129053
  TX Packets 512-1023 Octets  503
  TX Packets 1024-1518 Octets  667127
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan Frms  0
  TX Octets                   1500934
  TX Multicast Packets        794300
  TX Broadcast Packets        1040
  TX Single Collision Frames  0
  TX Mult. Collision Frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision Frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC Ctrl Frames          0
  TX Frame Deferred Xmns      0
  TX Frame Excessive Deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             1065764997
  RX Packet OK Count          1500934
  RX Packets 64 Octets        341648
  RX Packets 65-127 Octets    431183
  RX Packets 128-255 Octets   318367
  RX Packets 256-511 Octets   347225
  RX Packets 512-1023 Octets  184849
  RX Packets 1024-1518 Octets  10011311
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   11634583
  RX Multicast Packets        10881071
  RX Broadcast Packets        33425
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol Errors            0
  RX Unsupported Opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan Frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             1723893006
  RX Packet OK Count          11634583
```



```
Statistics for port 24 connected to device VCCPD:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1177102
  TX Packets 128-255 Octets   605153
  TX Packets 256-511 Octets   690727
  TX Packets 512-1023 Octets  357044
  TX Packets 1024-1518 Octets  20512235
  TX Packets 1519-2047 Octets  278
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan Frms  278
  TX Octets                   23342539
  TX Multicast Packets        22554760
  TX Broadcast Packets        67872
  TX Single Collision Frames  0
  TX Mult. Collision Frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision Frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC Ctrl Frames          0
  TX Frame Deferred Xmns      0
  TX Frame Excessive Deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             4198344167
  RX Packet OK Count          23342539
  RX Packets 64 Octets        3
  RX Packets 65-127 Octets    484985
  RX Packets 128-255 Octets   219164
  RX Packets 256-511 Octets   129139
  RX Packets 512-1023 Octets  516
  RX Packets 1024-1518 Octets  667128
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   1500935
  RX Multicast Packets        794301
  RX Broadcast Packets        1040
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol Errors            0
  RX Unsupported Opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan Frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             1071770147
  RX Packet OK Count          1500935
Statistics for port 25 connected to device SFI:
  TX Packets 64 Octets        12
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   618503
```

```
TX Packets 256-511 Octets   4896
TX Packets 512-1023 Octets  806
TX Packets 1024-1518 Octets  19950
TX Packets 1519-2047 Octets  0
TX Packets 2048-4095 Octets  0
TX Packets 4096-9216 Octets  0
TX 1519-1522 Good Vlan Frms  0
TX Octets                   644168
TX Multicast Packets        4
TX Broadcast Packets        19954
TX Single Collision Frames  0
TX Mult. Collision Frames   0
TX Late Collisions          0
TX Excessive Collisions     0
TX Collision Frames         0
TX PAUSEMAC Ctrl Frames     0
TX MAC Ctrl Frames          0
TX Frame Deferred Xmns      0
TX Frame Excessive Deferl   0
TX Oversize Packets         0
TX Jabbers                  0
TX FCS Error Counter        0
TX Fragment Counter         0
TX Byte Counter             167073305
RX Packet OK Count          644168
RX Packets 64 Octets        0
RX Packets 65-127 Octets    0
RX Packets 128-255 Octets   854972
RX Packets 256-511 Octets   14332
RX Packets 512-1023 Octets  5636
RX Packets 1024-1518 Octets  19954
RX Packets 1519-2047 Octets  0
RX Packets 2048-4095 Octets  0
RX Packets 4096-9216 Octets  0
RX Octets                   894894
RX Multicast Packets        0
RX Broadcast Packets        19943
RX FCS Errors               0
RX Align Errors             0
RX Fragments                0
RX Symbol Errors            0
RX Unsupported Opcodes      0
RX Out of Range Length      0
RX False Carrier Errors     0
RX Undersize Packets        0
RX Oversize Packets         0
RX Jabbers                  0
RX 1519-1522 Good Vlan Frms 0
RX MTU Exceed Counter       0
RX Control Frame Counter    0
RX Pause Frame Counter      0
RX Byte Counter             212702114
RX Packet OK Count          894894
```

show chassis ethernet-switch interconnect-device fpc

Supported Platforms QFabric System

Syntax

show chassis ethernet-switch interconnect-device *name* fpc
<detail>
<port *number*>
<slot *number*>

Release Information Command introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFX3000-G QFabric systems only) Display Ethernet switch information for the front card Flexible Port Concentrators (FPCs) in an Interconnect device.

Options

none—Display Ethernet switch information about each connected port on each online FPC in the Interconnect device.

detail—(Optional) Display detailed status information for all FPCs or for the FPC in the specified slot in the Interconnect device.

port *number*—(Optional) Display Ethernet switch information about a specific port on an FPC in the Interconnect device.

slot *number*—(Optional) Display Ethernet switch information about an FPC in a specific slot in the Interconnect device.

Required Privilege Level view

Related Documentation

- chassis on page 470
- *show chassis environment fpc*
- show chassis ethernet-switch interconnect-device cb on page 574

List of Sample Output

show chassis ethernet-switch interconnect-device fpc on page 595
show chassis ethernet-switch interconnect-device fpc detail on page 597
show chassis ethernet-switch fpc detail slot on page 604
show chassis ethernet-switch fpc interconnect-device port on page 611
show chassis ethernet-switch fpc interconnect-device detail port on page 612

Output Fields Table 106 on page 575 lists the output fields for the **show chassis ethernet-switch interconnect-device fpc** command. Output fields are listed in the approximate order in which they appear.

Table 107: show chassis ethernet-switch interconnect-device fpc Output Fields

Field Name	Field Description
Link is good on port n connected to device	Information about the link between each port on the FPC's Ethernet switch and one of the following devices: • FWD-SWITCH-0 • FWD-SWITCH-1 • CB0 • CB1
Speed is	Speed at which the Ethernet link is running: **10 Mb**When the device is **RE** or **Other RE** on the TX Matrix router, the speed is **1000 Mb**.
Duplex is	Duplex type of the Ethernet link: **full** or **half**.
Autonegotiate is Enabled (or Disabled)	By default, built-in Fast Ethernet ports on a PIC autonegotiate whether to operate at 10 Mbps or 100 Mbps. All other interfaces automatically choose the correct speed based on the PIC type and whether the PIC is configured to operate in multiplexed mode (using the **no-concatenate** statement at the **[edit chassis]** hierarchy level, as described in the *Junos OS System Basics Configuration Guide*).
TX Octets	Number of octets sent.
TX Packets 64 Octets	Number of transmitted frames of size 64 octets.
TX Packets 65-127 Octets	Number of transmitted frames of size 65 through 127 octets.
TX Packets 128-255 Octets	Number of transmitted frames of size 128 through 255 octets.
TX Packets 256-511 Octets	Number of transmitted frames of size 256 through 511 octets.
TX Packets 512-1023 Octets	Number of transmitted frames of size 512 through 1023 octets.
TX Packets 1024-1518 Octets	Number of transmitted frames of size 1024 through 1518 octets.
TX Packets 1519-2047 Octets	Number of transmitted frames of size 1519 through 2047 octets.
TX Packets 2048-4095 Octets	Number of transmitted frames of size 2048 through 4095 octets.
TX Packets 4096-9216 Octets	Number of transmitted frames of size 4096 through 9216 octets.
TX Packets 9217-16383 Octets	Number of transmitted frames of size 9217 through 16383 octets.
TX Multicast packets	Number of multicast packets sent.

Table 107: show chassis ethernet-switch interconnect-device fpc Output Fields *(continued)*

Field Name	Field Description
TX Broadcast packets	Number of broadcast packets sent.
TX Single Collision frames	Number of packets sent after one collision.
TX Mult. Collision frames	Number of packets sent after multiple collisions.
TX Late Collision Frames	Number of packets aborted during sending because of collisions after 64 bytes.
TX Excessive collisions	Number of packets not sent because of too many collisions.
TX Collision frames	Number of collision packets sent.
TX PAUSEMAC Ctrl Frames	Number of Media Access Control (MAC) frames containing PAUSE commands sent.
TX MAC ctrl frames	Number of MAC control packets sent.
TX Frame deferred Xmns	Number of frames deferred in *x* milliseconds.
TX Oversize Packets	Number of oversized packets sent.
TX Jabbers	Total number of frames sent that exceed the maximum byte count and contain CRC errors .
TX FCS Error Counter	Number of packets discarded because of frame check sequence errors.
TX Fragment Counter	Number of fragmented packets sent.
TX Byte Counter	Number of bytes sent.
RX Octets	Number of octets received.
RX Packets 64 Octets	Number of received packets of size 64 octets.
RX Packets 65-127 Octets	Number of received packets of size 65 through 127 octets.
RX Packets 128-255 Octets	Number of received packets of size 128 through 255 octets.
RX Packets 256-511 Octets	Number of received packets of size 256 through 511 octets.
RX Packets 512-1023 Octets	Number of received packets of size 512 through 1023 octets.

Table 107: show chassis ethernet-switch interconnect-device fpc Output Fields *(continued)*

Field Name	Field Description
RX Packets 1024-1518 Octets	Number of received packets of size 65 through 127 octets.
RX Packets 1519-2047 Octets	Number of received packets of size 1519 through 2047 octets.
RX Packets 2048-4095 Octets	Number of received packets of size 2048 through 4095 octets.
RX Packets 4096-9216 Octets	Number of received packets of size 4096 through 9216 octets.
RX Multicast Packets	Number of multicast packets received.
RX Broadcast Packets	Number of broadcast packets received.
RX FCS Errors	Number of packets discarded because of frame check sequence errors.
RX Align Errors	Number of incomplete octets received.
RX Fragments	Number of fragmented packets received.
RX Symbol errors	Number of symbols received that the router did not correctly decode.
RX Unsupported opcodes	Number of packets received with unsupported op codes.
RX Out of Range Length	Number of packets received with an out of range length.
RX False Carrier Errors	Number of packets received with false carrier errors.
RX Undersize Packets	Number of undersized packets received.
RX Oversize Packets	Number of oversized packets received.
RX Jabbers	Total number of frames received that exceed the maximum byte count and contain CRC errors .
RX 1519-1522 Good Vlan frms	Number of transmitted frames of size 1519 through 1522 octets that are good VLAN frames.
RX MTU Exceed Counter	Number of packets received that exceed the MTU.
RX Control Frame Counter	Number of control frames received.
RX Pause Frame Counter	Number of pause frames received.

Table 107: show chassis ethernet-switch interconnect-device fpc Output Fields *(continued)*

Field Name	Field Description
RX Byte Counter	Number of bytes received.

Sample Output

show chassis ethernet-switch interconnect-device fpc

```
user@qfabric> show chassis ethernet-switch interconnect-device IC-WS001 fpc
Summary for switch on FC0
Link is good on GE port 2 connected to device: FWD-SWITCH-0
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   124638
  RX Octets                   86496

Link is good on GE port 4 connected to device: FWD-SWITCH-1
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   82191
  RX Octets                   58979

Link is good on XE port 28 connected to device: CB0
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   145475
  RX Octets                   206828

Link is good on XE port 29 connected to device: CB1
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   1
  RX Octets                   0

Summary for switch on FC1
Link is good on GE port 2 connected to device: FWD-SWITCH-0
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   82290
  RX Octets                   59443

Link is good on GE port 4 connected to device: FWD-SWITCH-1
```



```
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   40900
  RX Octets                   30013

Link is good on XE port 28 connected to device: CB0
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   89456
  RX Octets                   123189

Link is good on XE port 29 connected to device: CB1
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   1
  RX Octets                   0

root@qfabric> show chassis ethernet-switch interconnect-device IC-WS001 fpc
Summary for switch on FC0
Link is good on GE port 2 connected to device: FWD-SWITCH-0
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   124697
  RX Octets                   86535

Link is good on GE port 4 connected to device: FWD-SWITCH-1
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   82229
  RX Octets                   59009

Link is good on XE port 28 connected to device: CB0
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   145544
  RX Octets                   206925

Link is good on XE port 29 connected to device: CB1
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
```



```
  TX Octets                   1
  RX Octets                   0

Summary for switch on FC1
Link is good on GE port 2 connected to device: FWD-SWITCH-0
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   82327
  RX Octets                   59472

Link is good on GE port 4 connected to device: FWD-SWITCH-1
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   40918
  RX Octets                   30028

Link is good on XE port 28 connected to device: CB0
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   89500
  RX Octets                   123244

Link is good on XE port 29 connected to device: CB1
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   1
  RX Octets                   0
```

show chassis ethernet-switch interconnect-device fpc detail

```
user@host> show chassis ethernet-switch interconnect-device IC-WS001 fpc detail
Port statistics for FC0 switch
Statistics for port 2 connected to device FWD-SWITCH-0:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   121716
  TX Packets 256-511 Octets   2200
  TX Packets 512-1023 Octets  823
  TX Packets 1024-1518 Octets  2
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan frms  0
  TX Octets                   124742
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX Single Collision frames  0
  TX Mult. Collision frames   0
  TX Late Collisions          0
```

```
  TX Excessive Collisions     0
  TX Collision frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC ctrl frames          0
  TX Frame deferred Xmns      0
  TX Frame excessive deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             27391588
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   85924
  RX Packets 256-511 Octets   555
  RX Packets 512-1023 Octets  86
  RX Packets 1024-1518 Octets  1
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   86566
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol errors            0
  RX Unsupported opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             20380581
Statistics for port 4 connected to device FWD-SWITCH-1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   80374
  TX Packets 256-511 Octets   1347
  TX Packets 512-1023 Octets  532
  TX Packets 1024-1518 Octets  3
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan frms  0
  TX Octets                   82257
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX Single Collision frames  0
  TX Mult. Collision frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC ctrl frames          0
  TX Frame deferred Xmns      0
  TX Frame excessive deferl   0
```



```
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             18146746
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   58410
  RX Packets 256-511 Octets   522
  RX Packets 512-1023 Octets  96
  RX Packets 1024-1518 Octets  2
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   59030
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol errors            0
  RX Unsupported opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             13882179
Statistics for port 28 connected to device CB0:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    0
  TX Packets 128-255 Octets   144334
  TX Packets 256-511 Octets   1077
  TX Packets 512-1023 Octets  182
  TX Packets 1024-1518 Octets  3
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   145596
  TX Multicast Packets        0
  TX Broadcast Packets        0
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             34262760
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    1
  RX Packets 128-255 Octets   202090
  RX Packets 256-511 Octets   3547
  RX Packets 512-1023 Octets  1355
  RX Packets 1024-1518 Octets  5
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
```



```
  RX Octets                   206998
  RX Multicast Packets        0
  RX Broadcast Packets        1
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             45538262
Statistics for port 29 connected to device CB1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   0
  TX Packets 256-511 Octets   0
  TX Packets 512-1023 Octets  0
  TX Packets 1024-1518 Octets  0
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   1
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             72
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   0
  RX Packets 256-511 Octets   0
  RX Packets 512-1023 Octets  0
  RX Packets 1024-1518 Octets  0
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                   0
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             0

Port statistics for FC1 switch
Statistics for port 2 connected to device FWD-SWITCH-0:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   80560
```



```
  TX Packets 256-511 Octets   1279
  TX Packets 512-1023 Octets  514
  TX Packets 1024-1518 Octets  3
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan frms  0
  TX Octets                   82357
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX Single Collision frames  0
  TX Mult. Collision frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC ctrl frames          0
  TX Frame deferred Xmns      0
  TX Frame excessive deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             18059906
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   58733
  RX Packets 256-511 Octets   639
  RX Packets 512-1023 Octets  119
  RX Packets 1024-1518 Octets  3
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   59494
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol errors            0
  RX Unsupported opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             13994432
Statistics for port 4 connected to device FWD-SWITCH-1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   39971
  TX Packets 256-511 Octets   668
  TX Packets 512-1023 Octets  290
  TX Packets 1024-1518 Octets  3
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
```

```
    TX 1519-1522 Good Vlan frms  0
    TX Octets                   40933
    TX Multicast Packets        0
    TX Broadcast Packets        1
    TX Single Collision frames  0
    TX Mult. Collision frames   0
    TX Late Collisions          0
    TX Excessive Collisions     0
    TX Collision frames         0
    TX PAUSEMAC Ctrl Frames     0
    TX MAC ctrl frames          0
    TX Frame deferred Xmns      0
    TX Frame excessive deferl   0
    TX Oversize Packets         0
    TX Jabbers                  0
    TX FCS Error Counter        0
    TX Fragment Counter         0
    TX Byte Counter             9050841
    RX Packets 64 Octets        0
    RX Packets 65-127 Octets    0
    RX Packets 128-255 Octets   29767
    RX Packets 256-511 Octets   225
    RX Packets 512-1023 Octets  44
    RX Packets 1024-1518 Octets  3
    RX Packets 1519-2047 Octets  0
    RX Packets 2048-4095 Octets  0
    RX Packets 4096-9216 Octets  0
    RX Octets                   30039
    RX Multicast Packets        0
    RX Broadcast Packets        0
    RX FCS Errors               0
    RX Align Errors             0
    RX Fragments                0
    RX Symbol errors            0
    RX Unsupported opcodes      0
    RX Out of Range Length      0
    RX False Carrier Errors     0
    RX Undersize Packets        0
    RX Oversize Packets         0
    RX Jabbers                  0
    RX 1519-1522 Good Vlan frms 0
    RX MTU Exceed Counter       0
    RX Control Frame Counter    0
    RX Pause Frame Counter      0
    RX Byte Counter             7043738
  Statistics for port 28 connected to device CB0:
    TX Packets 64 Octets        0
    TX Packets 65-127 Octets    0
    TX Packets 128-255 Octets   88500
    TX Packets 256-511 Octets   864
    TX Packets 512-1023 Octets  163
    TX Packets 1024-1518 Octets  6
    TX Packets 1519-2047 Octets  0
    TX Packets 2048-4095 Octets  0
    TX Packets 4096-9216 Octets  0
    TX Packets 9217-16383 Octets  0
    TX Octets                   89533
    TX Multicast Packets        0
    TX Broadcast Packets        0
    TX PAUSEMAC Ctrl Frames     0
    TX Oversize Packets         0
```



```
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             21038170
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    1
  RX Packets 128-255 Octets   120531
  RX Packets 256-511 Octets   1947
  RX Packets 512-1023 Octets  804
  RX Packets 1024-1518 Octets  6
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                   123289
  RX Multicast Packets        0
  RX Broadcast Packets        1
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             27110675
Statistics for port 29 connected to device CB1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   0
  TX Packets 256-511 Octets   0
  TX Packets 512-1023 Octets  0
  TX Packets 1024-1518 Octets  0
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   1
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             72
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   0
  RX Packets 256-511 Octets   0
  RX Packets 512-1023 Octets  0
  RX Packets 1024-1518 Octets  0
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                   0
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
```

```
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             0

Port statistics for FC2 switch
Empty fpc slot number 2

Port statistics for FC3 switch
Empty fpc slot number 3

Port statistics for FC4 switch
Empty fpc slot number 4

Port statistics for FC5 switch
Empty fpc slot number 5

Port statistics for FC6 switch
Empty fpc slot number 6

Port statistics for FC7 switch
Empty fpc slot number 7
```

show chassis ethernet-switch fpc detail slot

```
user@qfabric> show chassis ethernet-switch fpc detail 0
re0:
--------------------------------------------------------------------------
Port statistics for FC0 switch
Statistics for port 2 connected to device FWD-SWITCH-0:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   121823
  TX Packets 256-511 Octets   2200
  TX Packets 512-1023 Octets  823
  TX Packets 1024-1518 Octets  2
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan frms  0
  TX Octets                   124849
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX Single Collision frames  0
  TX Mult. Collision frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC ctrl frames          0
  TX Frame deferred Xmns      0
  TX Frame excessive deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             27414524
  RX Packets 64 Octets        0
```



```
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   85998
  RX Packets 256-511 Octets   557
  RX Packets 512-1023 Octets  86
  RX Packets 1024-1518 Octets  1
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   86642
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol errors            0
  RX Unsupported opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             20398564
Statistics for port 4 connected to device FWD-SWITCH-1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   80443
  TX Packets 256-511 Octets   1347
  TX Packets 512-1023 Octets  532
  TX Packets 1024-1518 Octets  3
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan frms  0
  TX Octets                   82326
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX Single Collision frames  0
  TX Mult. Collision frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC ctrl frames          0
  TX Frame deferred Xmns      0
  TX Frame excessive deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             18161734
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   58460
  RX Packets 256-511 Octets   523
  RX Packets 512-1023 Octets  96
  RX Packets 1024-1518 Octets  2
  RX Packets 1519-2047 Octets  0
```



```
    RX Packets 2048-4095 Octets  0
    RX Packets 4096-9216 Octets  0
    RX Octets                   59081
    RX Multicast Packets        0
    RX Broadcast Packets        0
    RX FCS Errors               0
    RX Align Errors             0
    RX Fragments                0
    RX Symbol errors            0
    RX Unsupported opcodes      0
    RX Out of Range Length      0
    RX False Carrier Errors     0
    RX Undersize Packets        0
    RX Oversize Packets         0
    RX Jabbers                  0
    RX 1519-1522 Good Vlan frms 0
    RX MTU Exceed Counter       0
    RX Control Frame Counter    0
    RX Pause Frame Counter      0
    RX Byte Counter             13894171
  Statistics for port 28 connected to device CB0:
    TX Packets 64 Octets        0
    TX Packets 65-127 Octets    0
    TX Packets 128-255 Octets   144458
    TX Packets 256-511 Octets   1080
    TX Packets 512-1023 Octets  182
    TX Packets 1024-1518 Octets  3
    TX Packets 1519-2047 Octets  0
    TX Packets 2048-4095 Octets  0
    TX Packets 4096-9216 Octets  0
    TX Packets 9217-16383 Octets  0
    TX Octets                   145723
    TX Multicast Packets        0
    TX Broadcast Packets        0
    TX PAUSEMAC Ctrl Frames     0
    TX Oversize Packets         0
    TX FCS Error Counter        0
    TX Fragment Counter         0
    TX Byte Counter             34292735
    RX Packets 64 Octets        0
    RX Packets 65-127 Octets    1
    RX Packets 128-255 Octets   202266
    RX Packets 256-511 Octets   3547
    RX Packets 512-1023 Octets  1355
    RX Packets 1024-1518 Octets  5
    RX Packets 1519-2047 Octets  0
    RX Packets 2048-4095 Octets  0
    RX Packets 4096-9216 Octets  0
    RX Packets 9217-16383 Octets  0
    RX Octets                   207174
    RX Multicast Packets        0
    RX Broadcast Packets        1
    RX FCS Errors               0
    RX Fragments                0
    RX MAC Control Packets      0
    RX Out of Range Length      0
    RX Undersize Packets        0
    RX Oversize Packets         0
    RX Jabbers                  0
    RX Control Frame Counter    0
    RX Pause Frame Counter      0
```



```
  RX Byte Counter             45576186
Statistics for port 29 connected to device CB1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   0
  TX Packets 256-511 Octets   0
  TX Packets 512-1023 Octets  0
  TX Packets 1024-1518 Octets  0
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   1
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             72
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   0
  RX Packets 256-511 Octets   0
  RX Packets 512-1023 Octets  0
  RX Packets 1024-1518 Octets  0
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                   0
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             0

Port statistics for FC1 switch
Statistics for port 2 connected to device FWD-SWITCH-0:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   80629
  TX Packets 256-511 Octets   1279
  TX Packets 512-1023 Octets  514
  TX Packets 1024-1518 Octets  3
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan frms  0
  TX Octets                   82426
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX Single Collision frames  0
  TX Mult. Collision frames   0
```



```
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC ctrl frames          0
  TX Frame deferred Xmns      0
  TX Frame excessive deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             18074790
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   58785
  RX Packets 256-511 Octets   640
  RX Packets 512-1023 Octets  119
  RX Packets 1024-1518 Octets  3
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   59547
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol errors            0
  RX Unsupported opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             14006842
Statistics for port 4 connected to device FWD-SWITCH-1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   40004
  TX Packets 256-511 Octets   668
  TX Packets 512-1023 Octets  290
  TX Packets 1024-1518 Octets  3
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan frms  0
  TX Octets                   40966
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX Single Collision frames  0
  TX Mult. Collision frames   0
  TX Late Collisions          0
  TX Excessive Collisions     0
  TX Collision frames         0
  TX PAUSEMAC Ctrl Frames     0
  TX MAC ctrl frames          0
  TX Frame deferred Xmns      0
```



```
  TX Frame excessive deferl   0
  TX Oversize Packets         0
  TX Jabbers                  0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             9058102
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   29794
  RX Packets 256-511 Octets   225
  RX Packets 512-1023 Octets  44
  RX Packets 1024-1518 Octets  3
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   30066
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol errors            0
  RX Unsupported opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             7050000
Statistics for port 28 connected to device CB0:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    0
  TX Packets 128-255 Octets   88579
  TX Packets 256-511 Octets   865
  TX Packets 512-1023 Octets  163
  TX Packets 1024-1518 Octets  6
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   89613
  TX Multicast Packets        0
  TX Broadcast Packets        0
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             21056842
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    1
  RX Packets 128-255 Octets   120633
  RX Packets 256-511 Octets   1947
  RX Packets 512-1023 Octets  804
  RX Packets 1024-1518 Octets  6
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
```



```
  RX Packets 9217-16383 Octets  0
  RX Octets                    123391
  RX Multicast Packets         0
  RX Broadcast Packets         1
  RX FCS Errors                0
  RX Fragments                 0
  RX MAC Control Packets       0
  RX Out of Range Length       0
  RX Undersize Packets         0
  RX Oversize Packets          0
  RX Jabbers                   0
  RX Control Frame Counter     0
  RX Pause Frame Counter       0
  RX Byte Counter              27132820
Statistics for port 29 connected to device CB1:
  TX Packets 64 Octets         0
  TX Packets 65-127 Octets     1
  TX Packets 128-255 Octets    0
  TX Packets 256-511 Octets    0
  TX Packets 512-1023 Octets   0
  TX Packets 1024-1518 Octets  0
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                    1
  TX Multicast Packets         0
  TX Broadcast Packets         1
  TX PAUSEMAC Ctrl Frames      0
  TX Oversize Packets          0
  TX FCS Error Counter         0
  TX Fragment Counter          0
  TX Byte Counter              72
  RX Packets 64 Octets         0
  RX Packets 65-127 Octets     0
  RX Packets 128-255 Octets    0
  RX Packets 256-511 Octets    0
  RX Packets 512-1023 Octets   0
  RX Packets 1024-1518 Octets  0
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                    0
  RX Multicast Packets         0
  RX Broadcast Packets         0
  RX FCS Errors                0
  RX Fragments                 0
  RX MAC Control Packets       0
  RX Out of Range Length       0
  RX Undersize Packets         0
  RX Oversize Packets          0
  RX Jabbers                   0
  RX Control Frame Counter     0
  RX Pause Frame Counter       0
  RX Byte Counter              0

Port statistics for FC2 switch
Empty fpc slot number 2

Port statistics for FC3 switch
```



```
Empty fpc slot number 3

Port statistics for FC4 switch
Empty fpc slot number 4

Port statistics for FC5 switch
Empty fpc slot number 5

Port statistics for FC6 switch
Empty fpc slot number 6

Port statistics for FC7 switch
Empty fpc slot number 7
```

show chassis ethernet-switch fpc interconnect-device port

```
user@qfabric> show chassis ethernet-switch fpc interconnect-device IC-WS001 port 2
Summary for switch on FC0
Link is good on GE port 2 connected to device: FWD-SWITCH-0
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   319466
  RX Octets                   221869

Link is good on GE port 4 connected to device: FWD-SWITCH-1
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   210295
  RX Octets                   151164

Link is good on XE port 28 connected to device: CB0
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   373033
  RX Octets                   529760

Link is good on XE port 29 connected to device: CB1
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                   1
  RX Octets                   0

Summary for switch on FC1
Link is good on GE port 2 connected to device: FWD-SWITCH-0
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
```

```
  TX Octets                  210760
  RX Octets                  152617

Link is good on GE port 4 connected to device: FWD-SWITCH-1
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Disabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                  104587
  RX Octets                  77315

Link is good on XE port 28 connected to device: CB0
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                  229932
  RX Octets                  315346

Link is good on XE port 29 connected to device: CB1
  Speed is 10000Mb
  Duplex is full
  Autonegotiate is Enabled
  Flow Control TX is Disabled
  Flow Control RX is Disabled
  TX Octets                  1
  RX Octets                  0
```

show chassis ethernet-switch fpc interconnect-device detail port

```
user@qfabric> show chassis ethernet-switch fpc interconnect-device IC-WS001 detail port 2
Port statistics for FC0 switch
Statistics for port 2 connected to device FWD-SWITCH-0:
  TX Packets 64 Octets       0
  TX Packets 65-127 Octets   1
  TX Packets 128-255 Octets  311974
  TX Packets 256-511 Octets  5552
  TX Packets 512-1023 Octets 2084
  TX Packets 1024-1518 Octets  2
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX 1519-1522 Good Vlan frms  0
  TX Octets                  319613
  TX Multicast Packets       0
  TX Broadcast Packets       1
  TX Single Collision frames 0
  TX Mult. Collision frames  0
  TX Late Collisions         0
  TX Excessive Collisions    0
  TX Collision frames        0
  TX PAUSEMAC Ctrl Frames    0
  TX MAC ctrl frames         0
  TX Frame deferred Xmns     0
  TX Frame excessive deferl  0
  TX Oversize Packets        0
  TX Jabbers                 0
  TX FCS Error Counter       0
  TX Fragment Counter        0
```



```
    TX Byte Counter             70091196
    RX Packets 64 Octets        0
    RX Packets 65-127 Octets    0
    RX Packets 128-255 Octets   220284
    RX Packets 256-511 Octets   1486
    RX Packets 512-1023 Octets  198
    RX Packets 1024-1518 Octets  1
    RX Packets 1519-2047 Octets  0
    RX Packets 2048-4095 Octets  0
    RX Packets 4096-9216 Octets  0
    RX Octets                   221969
    RX Multicast Packets        0
    RX Broadcast Packets        0
    RX FCS Errors               0
    RX Align Errors             0
    RX Fragments                0
    RX Symbol errors            0
    RX Unsupported opcodes      0
    RX Out of Range Length      0
    RX False Carrier Errors     0
    RX Undersize Packets        0
    RX Oversize Packets         0
    RX Jabbers                  0
    RX 1519-1522 Good Vlan frms 0
    RX MTU Exceed Counter       0
    RX Control Frame Counter    0
    RX Pause Frame Counter      0
    RX Byte Counter             52192002
  Statistics for port 4 connected to device FWD-SWITCH-1:
    TX Packets 64 Octets        0
    TX Packets 65-127 Octets    1
    TX Packets 128-255 Octets   205595
    TX Packets 256-511 Octets   3426
    TX Packets 512-1023 Octets  1366
    TX Packets 1024-1518 Octets  3
    TX Packets 1519-2047 Octets  0
    TX Packets 2048-4095 Octets  0
    TX Packets 4096-9216 Octets  0
    TX 1519-1522 Good Vlan frms  0
    TX Octets                   210391
    TX Multicast Packets        0
    TX Broadcast Packets        1
    TX Single Collision frames  0
    TX Mult. Collision frames   0
    TX Late Collisions          0
    TX Excessive Collisions     0
    TX Collision frames         0
    TX PAUSEMAC Ctrl Frames     0
    TX MAC ctrl frames          0
    TX Frame deferred Xmns      0
    TX Frame excessive deferl   0
    TX Oversize Packets         0
    TX Jabbers                  0
    TX FCS Error Counter        0
    TX Fragment Counter         0
    TX Byte Counter             46380018
    RX Packets 64 Octets        0
    RX Packets 65-127 Octets    0
    RX Packets 128-255 Octets   149866
    RX Packets 256-511 Octets   1194
    RX Packets 512-1023 Octets  173
```



```
  RX Packets 1024-1518 Octets  2
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Octets                   151235
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Align Errors             0
  RX Fragments                0
  RX Symbol errors            0
  RX Unsupported opcodes      0
  RX Out of Range Length      0
  RX False Carrier Errors     0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX 1519-1522 Good Vlan frms 0
  RX MTU Exceed Counter       0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             35496911
Statistics for port 28 connected to device CB0:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    0
  TX Packets 128-255 Octets   370150
  TX Packets 256-511 Octets   2680
  TX Packets 512-1023 Octets  371
  TX Packets 1024-1518 Octets  3
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   373204
  TX Multicast Packets        0
  TX Broadcast Packets        0
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             87688913
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    1
  RX Packets 128-255 Octets   517569
  RX Packets 256-511 Octets   8978
  RX Packets 512-1023 Octets  3450
  RX Packets 1024-1518 Octets  5
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                   530003
  RX Multicast Packets        0
  RX Broadcast Packets        1
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
```



```
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             116471142
Statistics for port 29 connected to device CB1:
  TX Packets 64 Octets        0
  TX Packets 65-127 Octets    1
  TX Packets 128-255 Octets   0
  TX Packets 256-511 Octets   0
  TX Packets 512-1023 Octets  0
  TX Packets 1024-1518 Octets  0
  TX Packets 1519-2047 Octets  0
  TX Packets 2048-4095 Octets  0
  TX Packets 4096-9216 Octets  0
  TX Packets 9217-16383 Octets  0
  TX Octets                   1
  TX Multicast Packets        0
  TX Broadcast Packets        1
  TX PAUSEMAC Ctrl Frames     0
  TX Oversize Packets         0
  TX FCS Error Counter        0
  TX Fragment Counter         0
  TX Byte Counter             72
  RX Packets 64 Octets        0
  RX Packets 65-127 Octets    0
  RX Packets 128-255 Octets   0
  RX Packets 256-511 Octets   0
  RX Packets 512-1023 Octets  0
  RX Packets 1024-1518 Octets  0
  RX Packets 1519-2047 Octets  0
  RX Packets 2048-4095 Octets  0
  RX Packets 4096-9216 Octets  0
  RX Packets 9217-16383 Octets  0
  RX Octets                   0
  RX Multicast Packets        0
  RX Broadcast Packets        0
  RX FCS Errors               0
  RX Fragments                0
  RX MAC Control Packets      0
  RX Out of Range Length      0
  RX Undersize Packets        0
  RX Oversize Packets         0
  RX Jabbers                  0
  RX Control Frame Counter    0
  RX Pause Frame Counter      0
  RX Byte Counter             0
```


show chassis fabric connectivity

Supported Platforms QFabric System

Syntax show chassis fabric connectivity (device | slot)

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Display the status of the data plane connections in your QFabric system.

Options **none**—Display the status of all data plane connections in your QFabric system.

device—Display the status of the data plane connections for a specific device.

slot—Display the status of the data plane connections for a specific Flexible PIC Concentrator (FPC) slot on a specific device.

Required Privilege Level admin

Related Documentation

- request chassis fabric fpc on page 541
- show chassis fabric device on page 623
- Understanding Interconnect Devices on page 23

List of Sample Output

show chassis fabric connectivity on page 617
show chassis fabric connectivity device on page 620
show chassis fabric connectivity device device-name slot on page 621

Output Fields Table 108 on page 616 lists the output fields for the **show chassis fabric connectivity** command. Output fields are listed in the approximate order in which they appear.

Table 108: show chassis fabric connectivity Output Fields

Field Name	Field Description
Device ID	Hardware serial identifier of the QFabric system component.
Type	Model number of the QFabric system component. Values include **qfxc08-3008** (QFX3008-I Interconnect device), **qfx3600-I** (QFX3600-I Interconnect device, **qfx3500** (QFX3500 Node device), and **qfx3600-16q** (QFX3600 Node device).
Fabric: Incoming links	Displays inbound data plane (fte-) connections between Node devices and Interconnect devices, and their status (such as **Ok**).
Fabric: Outgoing links	Displays outbound data plane (fte-) connections between Node devices and Interconnect devices, and their status (such as **Ok**).

Sample Output

show chassis fabric connectivity

```
user@qfabric> show chassis fabric connectivity
Device ID: ED1487, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-0/0/1                  -> ED1487:fte-0/1/2               Ok
  A0010:fte-3/0/1                  -> ED1487:fte-0/1/3               Ok
  Fabric: Outgoing links:
  ED1487:fte-0/1/2                 -> A0010:fte-0/0/1                Ok
  ED1487:fte-0/1/3                 -> A0010:fte-3/0/1                Ok
Device ID: ED3683, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-0/0/2                  -> ED3683:fte-0/1/2               Ok
  A0010:fte-3/0/2                  -> ED3683:fte-0/1/3               Ok
  Fabric: Outgoing links:
  ED3683:fte-0/1/2                 -> A0010:fte-0/0/2                Ok
  ED3683:fte-0/1/3                 -> A0010:fte-3/0/2                Ok
Device ID: ED3705, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-0/0/0                  -> ED3705:fte-0/1/2               Ok
  A0010:fte-3/0/0                  -> ED3705:fte-0/1/3               Ok
  Fabric: Outgoing links:
  ED3705:fte-0/1/2                 -> A0010:fte-0/0/0                Ok
  ED3705:fte-0/1/3                 -> A0010:fte-3/0/0                Ok
Device ID: ED3707, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-0/0/8                  -> ED3707:fte-0/1/2               Ok
  A0010:fte-3/0/8                  -> ED3707:fte-0/1/3               Ok
  Fabric: Outgoing links:
  ED3707:fte-0/1/2                 -> A0010:fte-0/0/8                Ok
  ED3707:fte-0/1/3                 -> A0010:fte-3/0/8                Ok
Device ID: ED3711, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-0/0/9                  -> ED3711:fte-0/1/2               Ok
  A0010:fte-3/0/9                  -> ED3711:fte-0/1/3               Ok
  Fabric: Outgoing links:
  ED3711:fte-0/1/2                 -> A0010:fte-0/0/9                Ok
  ED3711:fte-0/1/3                 -> A0010:fte-3/0/9                Ok
Device ID: ED3702, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-0/0/10                 -> ED3702:fte-0/1/2               Ok
  A0010:fte-3/0/10                 -> ED3702:fte-0/1/3               Ok
  Fabric: Outgoing links:
  ED3702:fte-0/1/2                 -> A0010:fte-0/0/10               Ok
  ED3702:fte-0/1/3                 -> A0010:fte-3/0/10               Ok
Device ID: BBAK8737, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-0/0/11                 -> BBAK8737:fte-0/1/1             Ok
  Fabric: Outgoing links:
  BBAK8737:fte-0/1/1               -> A0010:fte-0/0/11               Ok
Device ID: BBAK8777, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-0/0/5                  -> BBAK8777:fte-0/1/0             Ok
  A0010:fte-0/0/6                  -> BBAK8777:fte-0/1/1             Ok
  Fabric: Outgoing links:
  BBAK8777:fte-0/1/0               -> A0010:fte-0/0/5                Ok
  BBAK8777:fte-0/1/1               -> A0010:fte-0/0/6                Ok
Device ID: BBAK8866, Type: qfx3500
  Fabric: Incoming links:
```

```
  A0010:fte-0/0/3                -> BBAK8866:fte-0/1/0                Ok
  A0010:fte-0/0/4                -> BBAK8866:fte-0/1/1                Ok
  Fabric: Outgoing links:
  BBAK8866:fte-0/1/0             -> A0010:fte-0/0/3                   Ok
  BBAK8866:fte-0/1/1             -> A0010:fte-0/0/4                   Ok
Device ID: BBAK8810, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-3/0/5                -> BBAK8810:fte-0/1/0                Ok
  A0010:fte-3/0/6                -> BBAK8810:fte-0/1/1                Ok
  Fabric: Outgoing links:
  BBAK8810:fte-0/1/0             -> A0010:fte-3/0/5                   Ok
  BBAK8810:fte-0/1/1             -> A0010:fte-3/0/6                   Ok
Device ID: BBAK8854, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-3/0/3                -> BBAK8854:fte-0/1/0                Ok
  A0010:fte-3/0/4                -> BBAK8854:fte-0/1/1                Ok
  Fabric: Outgoing links:
  BBAK8854:fte-0/1/0             -> A0010:fte-3/0/3                   Ok
  BBAK8854:fte-0/1/1             -> A0010:fte-3/0/4                   Ok
Device ID: BBAK8885, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-0/0/14               -> BBAK8885:fte-0/1/0                Ok
  A0010:fte-0/0/15               -> BBAK8885:fte-0/1/1                Ok
  Fabric: Outgoing links:
  BBAK8885:fte-0/1/0             -> A0010:fte-0/0/14                  Ok
  BBAK8885:fte-0/1/1             -> A0010:fte-0/0/15                  Ok
Device ID: BBAK8864, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-3/0/7                -> BBAK8864:fte-0/1/0                Ok
  A0010:fte-3/0/11               -> BBAK8864:fte-0/1/1                Ok
  Fabric: Outgoing links:
  BBAK8864:fte-0/1/0             -> A0010:fte-3/0/7                   Ok
  BBAK8864:fte-0/1/1             -> A0010:fte-3/0/11                  Ok
Device ID: BBAK8759, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-3/0/12               -> BBAK8759:fte-0/1/0                Ok
  A0010:fte-3/0/13               -> BBAK8759:fte-0/1/1                Ok
  Fabric: Outgoing links:
  BBAK8759:fte-0/1/0             -> A0010:fte-3/0/12                  Ok
  BBAK8759:fte-0/1/1             -> A0010:fte-3/0/13                  Ok
Device ID: BBAK8704, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-0/0/12               -> BBAK8704:fte-0/1/0                Ok
  A0010:fte-0/0/13               -> BBAK8704:fte-0/1/1                Ok
  Fabric: Outgoing links:
  BBAK8704:fte-0/1/0             -> A0010:fte-0/0/12                  Ok
  BBAK8704:fte-0/1/1             -> A0010:fte-0/0/13                  Ok
Device ID: BBAK8714, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-3/0/14               -> BBAK8714:fte-0/1/0                Ok
  A0010:fte-3/0/15               -> BBAK8714:fte-0/1/1                Ok
  Fabric: Outgoing links:
  BBAK8714:fte-0/1/0             -> A0010:fte-3/0/14                  Ok
  BBAK8714:fte-0/1/1             -> A0010:fte-3/0/15                  Ok
Device ID: A0010, Type: qfxc08-3008
  Front  Card 0   : Incoming links:
  ED3705:fte-0/1/2               -> A0010:fte-0/0/0                   Ok
  ED1487:fte-0/1/2               -> A0010:fte-0/0/1                   Ok
  ED3683:fte-0/1/2               -> A0010:fte-0/0/2                   Ok
  BBAK8866:fte-0/1/0             -> A0010:fte-0/0/3                   Ok
  BBAK8866:fte-0/1/1             -> A0010:fte-0/0/4                   Ok
```

```
BBAK8777:fte-0/1/0              -> A0010:fte-0/0/5               Ok
BBAK8777:fte-0/1/1              -> A0010:fte-0/0/6               Ok
ED3707:fte-0/1/2                -> A0010:fte-0/0/8               Ok
ED3711:fte-0/1/2                -> A0010:fte-0/0/9               Ok
ED3702:fte-0/1/2                -> A0010:fte-0/0/10              Ok
BBAK8737:fte-0/1/1              -> A0010:fte-0/0/11              Ok
BBAK8704:fte-0/1/0              -> A0010:fte-0/0/12              Ok
BBAK8704:fte-0/1/1              -> A0010:fte-0/0/13              Ok
BBAK8885:fte-0/1/0              -> A0010:fte-0/0/14              Ok
BBAK8885:fte-0/1/1              -> A0010:fte-0/0/15              Ok
Front  Card 0   : Outgoing links:
A0010:fte-0/0/8                 -> ED3707:fte-0/1/2              Ok
A0010:fte-0/0/9                 -> ED3711:fte-0/1/2              Ok
A0010:fte-0/0/10                -> ED3702:fte-0/1/2              Ok
A0010:fte-0/0/11                -> BBAK8737:fte-0/1/1            Ok
A0010:fte-0/0/12                -> BBAK8704:fte-0/1/0            Ok
A0010:fte-0/0/13                -> BBAK8704:fte-0/1/1            Ok
A0010:fte-0/0/14                -> BBAK8885:fte-0/1/0            Ok
A0010:fte-0/0/15                -> BBAK8885:fte-0/1/1            Ok
A0010:fte-0/0/0                 -> ED3705:fte-0/1/2              Ok
A0010:fte-0/0/1                 -> ED1487:fte-0/1/2              Ok
A0010:fte-0/0/2                 -> ED3683:fte-0/1/2              Ok
A0010:fte-0/0/3                 -> BBAK8866:fte-0/1/0            Ok
A0010:fte-0/0/4                 -> BBAK8866:fte-0/1/1            Ok
A0010:fte-0/0/5                 -> BBAK8777:fte-0/1/0            Ok
A0010:fte-0/0/6                 -> BBAK8777:fte-0/1/1            Ok
Front  Card 3   : Incoming links:
ED3705:fte-0/1/3                -> A0010:fte-3/0/0               Ok
ED1487:fte-0/1/3                -> A0010:fte-3/0/1               Ok
ED3683:fte-0/1/3                -> A0010:fte-3/0/2               Ok
BBAK8854:fte-0/1/0              -> A0010:fte-3/0/3               Ok
BBAK8854:fte-0/1/1              -> A0010:fte-3/0/4               Ok
BBAK8810:fte-0/1/0              -> A0010:fte-3/0/5               Ok
BBAK8810:fte-0/1/1              -> A0010:fte-3/0/6               Ok
BBAK8864:fte-0/1/0              -> A0010:fte-3/0/7               Ok
ED3707:fte-0/1/3                -> A0010:fte-3/0/8               Ok
ED3711:fte-0/1/3                -> A0010:fte-3/0/9               Ok
ED3702:fte-0/1/3                -> A0010:fte-3/0/10              Ok
BBAK8864:fte-0/1/1              -> A0010:fte-3/0/11              Ok
BBAK8759:fte-0/1/0              -> A0010:fte-3/0/12              Ok
BBAK8759:fte-0/1/1              -> A0010:fte-3/0/13              Ok
BBAK8714:fte-0/1/0              -> A0010:fte-3/0/14              Ok
BBAK8714:fte-0/1/1              -> A0010:fte-3/0/15              Ok
Front  Card 3   : Outgoing links:
A0010:fte-3/0/8                 -> ED3707:fte-0/1/3              Ok
A0010:fte-3/0/9                 -> ED3711:fte-0/1/3              Ok
A0010:fte-3/0/10                -> ED3702:fte-0/1/3              Ok
A0010:fte-3/0/11                -> BBAK8864:fte-0/1/1            Ok
A0010:fte-3/0/12                -> BBAK8759:fte-0/1/0            Ok
A0010:fte-3/0/13                -> BBAK8759:fte-0/1/1            Ok
A0010:fte-3/0/14                -> BBAK8714:fte-0/1/0            Ok
A0010:fte-3/0/15                -> BBAK8714:fte-0/1/1            Ok
A0010:fte-3/0/0                 -> ED3705:fte-0/1/3              Ok
A0010:fte-3/0/1                 -> ED1487:fte-0/1/3              Ok
A0010:fte-3/0/2                 -> ED3683:fte-0/1/3              Ok
A0010:fte-3/0/3                 -> BBAK8854:fte-0/1/0            Ok
A0010:fte-3/0/4                 -> BBAK8854:fte-0/1/1            Ok
A0010:fte-3/0/5                 -> BBAK8810:fte-0/1/0            Ok
A0010:fte-3/0/6                 -> BBAK8810:fte-0/1/1            Ok
A0010:fte-3/0/7                 -> BBAK8864:fte-0/1/0            Ok
```


show chassis fabric connectivity device

```
user@qfabric> show chassis fabric connectivity device BBAK8714
Device ID: BBAK8714, Type: qfx3500
  Fabric: Incoming links:
  A0010:fte-3/0/14                 -> BBAK8714:fte-0/1/0                Ok
  A0010:fte-3/0/15                 -> BBAK8714:fte-0/1/1                Ok
  Fabric: Outgoing links:
  BBAK8714:fte-0/1/0               -> A0010:fte-3/0/14                  Ok
  BBAK8714:fte-0/1/1               -> A0010:fte-3/0/15                  Ok

user@qfabric> show chassis fabric connectivity device A0010
Device ID: A0010, Type: qfxc08-3008
  Front  Card 0   : Incoming links:
  ED3705:fte-0/1/2                 -> A0010:fte-0/0/0                   Ok
  ED1487:fte-0/1/2                 -> A0010:fte-0/0/1                   Ok
  ED3683:fte-0/1/2                 -> A0010:fte-0/0/2                   Ok
  BBAK8866:fte-0/1/0               -> A0010:fte-0/0/3                   Ok
  BBAK8866:fte-0/1/1               -> A0010:fte-0/0/4                   Ok
  BBAK8777:fte-0/1/0               -> A0010:fte-0/0/5                   Ok
  BBAK8777:fte-0/1/1               -> A0010:fte-0/0/6                   Ok
  ED3707:fte-0/1/2                 -> A0010:fte-0/0/8                   Ok
  ED3711:fte-0/1/2                 -> A0010:fte-0/0/9                   Ok
  ED3702:fte-0/1/2                 -> A0010:fte-0/0/10                  Ok
  BBAK8737:fte-0/1/1               -> A0010:fte-0/0/11                  Ok
  BBAK8704:fte-0/1/0               -> A0010:fte-0/0/12                  Ok
  BBAK8704:fte-0/1/1               -> A0010:fte-0/0/13                  Ok
  BBAK8885:fte-0/1/0               -> A0010:fte-0/0/14                  Ok
  BBAK8885:fte-0/1/1               -> A0010:fte-0/0/15                  Ok
  Front  Card 0   : Outgoing links:
  A0010:fte-0/0/8                  -> ED3707:fte-0/1/2                  Ok
  A0010:fte-0/0/9                  -> ED3711:fte-0/1/2                  Ok
  A0010:fte-0/0/10                 -> ED3702:fte-0/1/2                  Ok
  A0010:fte-0/0/11                 -> BBAK8737:fte-0/1/1                Ok
  A0010:fte-0/0/12                 -> BBAK8704:fte-0/1/0                Ok
  A0010:fte-0/0/13                 -> BBAK8704:fte-0/1/1                Ok
  A0010:fte-0/0/14                 -> BBAK8885:fte-0/1/0                Ok
  A0010:fte-0/0/15                 -> BBAK8885:fte-0/1/1                Ok
  A0010:fte-0/0/0                  -> ED3705:fte-0/1/2                  Ok
  A0010:fte-0/0/1                  -> ED1487:fte-0/1/2                  Ok
  A0010:fte-0/0/2                  -> ED3683:fte-0/1/2                  Ok
  A0010:fte-0/0/3                  -> BBAK8866:fte-0/1/0                Ok
  A0010:fte-0/0/4                  -> BBAK8866:fte-0/1/1                Ok
  A0010:fte-0/0/5                  -> BBAK8777:fte-0/1/0                Ok
  A0010:fte-0/0/6                  -> BBAK8777:fte-0/1/1                Ok
  Front  Card 3   : Incoming links:
  ED3705:fte-0/1/3                 -> A0010:fte-3/0/0                   Ok
  ED1487:fte-0/1/3                 -> A0010:fte-3/0/1                   Ok
  ED3683:fte-0/1/3                 -> A0010:fte-3/0/2                   Ok
  BBAK8854:fte-0/1/0               -> A0010:fte-3/0/3                   Ok
  BBAK8854:fte-0/1/1               -> A0010:fte-3/0/4                   Ok
  BBAK8810:fte-0/1/0               -> A0010:fte-3/0/5                   Ok
  BBAK8810:fte-0/1/1               -> A0010:fte-3/0/6                   Ok
  BBAK8864:fte-0/1/0               -> A0010:fte-3/0/7                   Ok
  ED3707:fte-0/1/3                 -> A0010:fte-3/0/8                   Ok
  ED3711:fte-0/1/3                 -> A0010:fte-3/0/9                   Ok
  ED3702:fte-0/1/3                 -> A0010:fte-3/0/10                  Ok
  BBAK8864:fte-0/1/1               -> A0010:fte-3/0/11                  Ok
  BBAK8759:fte-0/1/0               -> A0010:fte-3/0/12                  Ok
  BBAK8759:fte-0/1/1               -> A0010:fte-3/0/13                  Ok
  BBAK8714:fte-0/1/0               -> A0010:fte-3/0/14                  Ok
```



```
BBAK8714:fte-0/1/1              -> A0010:fte-3/0/15          Ok
Front  Card 3   : Outgoing links:
A0010:fte-3/0/8                 -> ED3707:fte-0/1/3          Ok
A0010:fte-3/0/9                 -> ED3711:fte-0/1/3          Ok
A0010:fte-3/0/10                -> ED3702:fte-0/1/3          Ok
A0010:fte-3/0/11                -> BBAK8864:fte-0/1/1        Ok
A0010:fte-3/0/12                -> BBAK8759:fte-0/1/0        Ok
A0010:fte-3/0/13                -> BBAK8759:fte-0/1/1        Ok
A0010:fte-3/0/14                -> BBAK8714:fte-0/1/0        Ok
A0010:fte-3/0/15                -> BBAK8714:fte-0/1/1        Ok
A0010:fte-3/0/0                 -> ED3705:fte-0/1/3          Ok
A0010:fte-3/0/1                 -> ED1487:fte-0/1/3          Ok
A0010:fte-3/0/2                 -> ED3683:fte-0/1/3          Ok
A0010:fte-3/0/3                 -> BBAK8854:fte-0/1/0        Ok
A0010:fte-3/0/4                 -> BBAK8854:fte-0/1/1        Ok
A0010:fte-3/0/5                 -> BBAK8810:fte-0/1/0        Ok
A0010:fte-3/0/6                 -> BBAK8810:fte-0/1/1        Ok
A0010:fte-3/0/7                 -> BBAK8864:fte-0/1/0        Ok
Ok
A0010:fte-3/0/3                 -> BBAK8854:fte-0/1/0        Ok
A0010:fte-3/0/4                 -> BBAK8854:fte-0/1/1        Ok
A0010:fte-3/0/5                 -> BBAK8810:fte-0/1/0        Ok
A0010:fte-3/0/6                 -> BBAK8810:fte-0/1/1        Ok
A0010:fte-3/0/7                 -> BBAK8864:fte-0/1/0        Ok
```

show chassis fabric connectivity device device-name slot

```
user@qfabric> show chassis fabric connectivity device A0010 slot 3
Device ID: A0010, Type: qfxc08-3008
  Front  Card 3   : Incoming links:
  ED3705:fte-0/1/3                -> A0010:fte-3/0/0           Ok
  ED1487:fte-0/1/3                -> A0010:fte-3/0/1           Ok
  ED3683:fte-0/1/3                -> A0010:fte-3/0/2           Ok
  BBAK8854:fte-0/1/0              -> A0010:fte-3/0/3           Ok
  BBAK8854:fte-0/1/1              -> A0010:fte-3/0/4           Ok
  BBAK8810:fte-0/1/0              -> A0010:fte-3/0/5           Ok
  BBAK8810:fte-0/1/1              -> A0010:fte-3/0/6           Ok
  BBAK8864:fte-0/1/0              -> A0010:fte-3/0/7           Ok
  ED3707:fte-0/1/3                -> A0010:fte-3/0/8           Ok
  ED3711:fte-0/1/3                -> A0010:fte-3/0/9           Ok
  ED3702:fte-0/1/3                -> A0010:fte-3/0/10          Ok
  BBAK8864:fte-0/1/1              -> A0010:fte-3/0/11          Ok
  BBAK8759:fte-0/1/0              -> A0010:fte-3/0/12          Ok
  BBAK8759:fte-0/1/1              -> A0010:fte-3/0/13          Ok
  BBAK8714:fte-0/1/0              -> A0010:fte-3/0/14          Ok
  BBAK8714:fte-0/1/1              -> A0010:fte-3/0/15          Ok
  Front  Card 3   : Outgoing links:
  A0010:fte-3/0/8                 -> ED3707:fte-0/1/3          Ok
  A0010:fte-3/0/9                 -> ED3711:fte-0/1/3          Ok
  A0010:fte-3/0/10                -> ED3702:fte-0/1/3          Ok
  A0010:fte-3/0/11                -> BBAK8864:fte-0/1/1        Ok
  A0010:fte-3/0/12                -> BBAK8759:fte-0/1/0        Ok
  A0010:fte-3/0/13                -> BBAK8759:fte-0/1/1        Ok
  A0010:fte-3/0/14                -> BBAK8714:fte-0/1/0        Ok
  A0010:fte-3/0/15                -> BBAK8714:fte-0/1/1        Ok
  A0010:fte-3/0/0                 -> ED3705:fte-0/1/3          Ok
  A0010:fte-3/0/1                 -> ED1487:fte-0/1/3          Ok
  A0010:fte-3/0/2                 -> ED3683:fte-0/1/3          Ok
  A0010:fte-3/0/3                 -> BBAK8854:fte-0/1/0        Ok
  A0010:fte-3/0/4                 -> BBAK8854:fte-0/1/1        Ok
  A0010:fte-3/0/5                 -> BBAK8810:fte-0/1/0        Ok
```



```
A0010:fte-3/0/6                    -> BBAK8810:fte-0/1/1           Ok
A0010:fte-3/0/7                    -> BBAK8864:fte-0/1/0           Ok
```


show chassis fabric device

Supported Platforms QFabric System

Syntax show chassis fabric device *device-name*

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Display the fabric management status of devices in your QFabric system.

Options **none**—Display the fabric management status for all devices in your QFabric system.

device-name—Display the fabric management status for a specific device in your QFabric system. You can enter either the alias name or the serial number of the device.

Required Privilege Level admin

Related Documentation

- request chassis fabric fpc on page 541
- show chassis fabric connectivity on page 616
- show fabric administration inventory on page 640
- Understanding Interconnect Devices on page 23

List of Sample Output show chassis fabric device on page 623

Output Fields Table 109 on page 623 lists the output fields for the **show chassis fabric device** command. Output fields are listed in the approximate order in which they appear.

Table 109: show chassis fabric device Output Fields

Field Name	Field Description
Device ID	Hardware serial identifier of the QFabric system component.
Type	Model number of the QFabric system component. Values include qfxc08-3008 (QFX3008-I Interconnect device), qfx3600-I (QFX3600-I Interconnect device, qfx3500 (QFX3500 Node device), and qfx3600-16q (QFX3600 Node device).
Management status	Displays keepalive status for fabric management processes on a specific device. Values include **On** and **Off**.
Hardware status	Displays operational status of the device participating in fabric management (such as **Ok**).

Sample Output

show chassis fabric device

`user@qfabric>` **show chassis fabric device**

```
Device ID: node2, Type: qfx3500
Management status: On, Hardware status: Ok

Device ID: node3, Type: qfx3500
Management status: On, Hardware status: Ok

Device ID: node0, Type: qfx3500
Management status: On, Hardware status: Ok

Device ID: node1, Type: qfx3500
Management status: On, Hardware status: Ok
```


show chassis lcd

Supported Platforms EX Series, QFabric System, QFX Series standalone switches

List of Syntax show chassis lcd (EX Series) on page 625
show chassis lcd (QFX Series and QFabric Systems) on page 625

show chassis lcd (EX Series)

```
show chassis lcd
<fpc-slot fpc-slot-number>
<menu <(all-members | local | member member-id)>>
```

show chassis lcd (QFX Series and QFabric Systems)

```
show chassis lcd
<fpc-slot fpc-slot-number>
<interconnect-device device-id>
<node-device device-id>
```

Release Information Command introduced in Junos OS Release 9.0 for EX Series switches.
menu option introduced in Junos OS Release 10.2 for EX Series switches.
Command introduced in Junos OS Release 11.1 for the QFX Series.
Command introduced in Junos OS Release 13.1 for QFabric systems.

Description Display the information that appears on the LCD panel of EX3200, EX3300, EX4200, EX4500, EX6200, and EX8200 switches, XRE200 External Routing Engines, QFX Series standalone switches, and Interconnect devices and Node devices within a QFabric system. Display the status of the currently selected port parameter of the Status LED for each network port on the device.

Options **none**—Display the information that appears on the LCD panel (for any EX Series member switch in a Virtual Chassis or for XRE200 External Routing Engines, display the information for all Virtual Chassis members). Display the status of the currently selected port parameter of the Status LED for each network port.

fpc-slot <*fpc-slot-number*>—(Optional) Display the information as follows:

- (EX3200, EX3300, EX4200, and EX4500 switches, or the QFX Series) Display the information that appears on the LCD panel for either an FPC slot with no ***fpc-slot-number*** value specified or for the FPC slot specified by **fpc-slot 0**. **fpc-slot** refers to the switch itself and **0** is the only valid value for ***fpc-slot-number***. Output for these options is the same as for the **none** option.

  Also display the status of the currently selected port parameter of the Status LED for each network port.

- (EX Series Virtual Chassis member switches or XRE200 External Routing Engines) If no ***fpc-slot-number*** value is specified, display the information that appears on the LCD panel for all members of the Virtual Chassis. Output for this option is the same as for the **none** option. If the ***fpc-slot-number*** value is specified (it equals the ***member-id*** value), display the information for the specified member.

  Also display the status of the currently selected port parameter of the Status LED for each network port.

- (EX6200 or EX8200 switches)—Display the information that appears on the LCD panel for the line card in the line-card slot specified by the ***fpc-slot-number*** value.

  Also display the status of the currently selected port parameter of the Status LED for each network port.

interconnect-device ***device-id***—(QFabric systems only) (Optional) Display the front panel contents and LED status of all the ports on the Interconnect device.

menu—(Optional) Display the names of the menus and menu options that are currently enabled on the LCD panel.

menu all-members—(EX Series Virtual Chassis member switches or XRE200 External Routing Engines) (Optional) Display the names of the menus and menu options that are currently enabled on the LCD panel for all Virtual Chassis members.

menu local—(EX Series Virtual Chassis member switches or XRE200 External Routing Engines) (Optional) Display the names of the menus and menu options that are currently enabled on the LCD panel for the Virtual Chassis member from which you issued the command.

menu member ***member-id***—(EX Series Virtual Chassis member switches or XRE200 External Routing Engines) (Optional) Display the names of the menus and menu options that are currently enabled on the LCD panel for the specified Virtual Chassis member.

node-device ***device-id***—(QFabric systems only) (Optional) Display the front panel contents and LED status of all the ports on the Node device.

Required Privilege Level

view

Related Documentation

- *LCD Panel in EX3200 Switches*
- *LCD Panel in EX4200 Switches*
- *LCD Panel in EX4500 Switches*
- *LCD Panel in an EX8200 Switch*
- *LCD Panel in an XRE200 External Routing Engine*
- *Configuring the LCD Panel on EX Series Switches (CLI Procedure)*
- set chassis display message on page 568

List of Sample Output

show chassis lcd (XRE200 External Routing Engine in EX8200 Virtual Chassis) on page 632
show chassis lcd interconnect-device (QFabric Systems) on page 635
show chassis lcd node-device (QFabric Systems) on page 637

Output Fields Table 110 on page 627 lists the output fields for the **show chassis lcd** command. Output fields are listed in the approximate order in which they appear.

Table 110: show chassis lcd Output Fields

Field Name	Field Description
member*number* (XRE200 External Routing Engine)	Member ID of the device whose content is being displayed.
Front panel contents for slot **Front panel contents** (EX6200, EX8200 switch, XRE200 External Routing Engine, and QFX Series)	FPC slot number of the switch whose content is being displayed. The number is always **0**, except for EX4200 switches in a Virtual Chassis, where it is the member ID value. On EX6200 switches, EX8200 switches, and XRE200 External Routing Engines, no slot number is displayed. On XRE200 External Routing Engines, this field appears under the **member** ***number*** field for each member device in the EX8200 Virtual Chassis.
LCD screen	The first line displays the hostname (for Virtual Chassis members, displays the member ID, the current role, and hostname; for EX8200 switches, displays **RE** and the hostname). The second line displays the currently selected port parameter of the Status LED and the alarms counter. The Status LED port parameters are: • **ADM**—Administrative • **SPD**—Speed • **DPX**—Duplex • **POE**—Power over Ethernet (EX3200 and EX4200 switches only)
LEDs status	Current state of the Alarms, System, and Master LEDs (chassis status LEDs).
Interface	Names of the interfaces on the switch.
LED (ADM/SPD/DPX/POE)	State of the currently selected port parameter of the Status LED for the interface. The Status LED port parameters are: NOTE: The XRE200 External Routing Engine always displays the **NA** parameter. The QFX Series products do not have any of the port parameters listed below. • **ADM**—Administrative • **SPD**—Speed • **DPX**—Duplex • **NA**—Not applicable. • **POE**—Power over Ethernet
fpc*x*	On standalone EX Series and QFX Series switches, always **0**. On EX Series Virtual Chassis member switches, member ID of the Virtual Chassis member whose LCD menu is displayed.

Sample Output

show chassis lcd (Two-Member EX4200 Virtual Chassis)

```
user@switch> show chassis lcd
Front panel contents for slot: 0
---------------------------------
LCD screen:
    00:BK switch1
    LED:SPD ALARM 00
LEDs status:
    Alarms LED: Off
    System LED: Green
    Master LED: Off
Interface       LED(ADM/SPD/DPX/POE)
-------------------------------------
ge-0/0/0        Off
ge-0/0/1        Off
ge-0/0/2        Off
ge-0/0/3        Off
ge-0/0/4        Off
ge-0/0/5        Off
ge-0/0/6        Off
ge-0/0/7        Off
ge-0/0/8        Off
ge-0/0/9        Off
ge-0/0/10       Off
ge-0/0/11       Off
ge-0/0/12       Off
ge-0/0/13       Off
ge-0/0/14       Off
ge-0/0/15       Off
ge-0/0/16       Off
ge-0/0/17       Off
ge-0/0/18       Off
ge-0/0/19       Off
ge-0/0/20       Off
ge-0/0/21       Off
ge-0/0/22       Off
ge-0/0/23       Off
Front panel contents for slot: 1
---------------------------------
LCD screen:
    01:RE switch2
    LED:SPD ALARM 01
LEDs status:
    Alarms LED: Yellow
    System LED: Green
    Master LED: Green
Interface       LED(ADM/SPD/DPX/POE)
-------------------------------------
ge-1/0/0        Off
ge-1/0/1        Off
ge-1/0/2        Off
ge-1/0/3        Off
ge-1/0/4        Off
ge-1/0/5        Off
ge-1/0/6        Off
ge-1/0/7        Off
ge-1/0/8        Off
ge-1/0/9        Off
```



```
ge-1/0/10       Off
ge-1/0/11       Off
ge-1/0/12       Off
ge-1/0/13       Off
ge-1/0/14       Off
ge-1/0/15       Off
ge-1/0/16       Off
ge-1/0/17       Off
ge-1/0/18       Off
ge-1/0/19       Off
ge-1/0/20       Off
ge-1/0/21       Off
ge-1/0/22       Off
ge-1/0/23       Off
```

The output for the **show chassis lcd fpc-slot** command is the same as the output for the **show chassis lcd** command.

show chassis lcd fpc-slot 1 (EX4200 Virtual Chassis)

```
user@switch> show chassis lcd fpc-slot 1
Front panel contents for slot: 1
---------------------------------
LCD screen:
    01:RE switch2
    LED:SPD ALARM 01
LEDs status:
    Alarms LED: Yellow
    System LED: Green
    Master LED: Green
Interface       LED(ADM/SPD/DPX/POE)
-------------------------------------
ge-1/0/0        Off
ge-1/0/1        Off
ge-1/0/2        Off
ge-1/0/3        Off
ge-1/0/4        Off
ge-1/0/5        Off
ge-1/0/6        Off
ge-1/0/7        Off
ge-1/0/8        Off
ge-1/0/9        Off
ge-1/0/10       Off
ge-1/0/11       Off
ge-1/0/12       Off
ge-1/0/13       Off
ge-1/0/14       Off
ge-1/0/15       Off
ge-1/0/16       Off
ge-1/0/17       Off
ge-1/0/18       Off
ge-1/0/19       Off
ge-1/0/20       Off
ge-1/0/21       Off
ge-1/0/22       Off
ge-1/0/23       Off
```

show chassis lcd (EX8200 Switch)

```
user@switch> show chassis lcd
```



```
Front panel contents:
---------------------
LCD screen:
    RE st-8200-r
    LED:ADM ALARM 01
LEDs status:
    Alarms LED: Yellow
    System LED: Yellow
    Master LED: Green
Interface       LED(ADM/SPD/DPX)
------------------------------------------
ge-0/0/0        Off
ge-0/0/1        Off
ge-0/0/2        Off
ge-0/0/3        Off
ge-0/0/4        Off
ge-0/0/5        Off
ge-0/0/6        Off
ge-0/0/7        Off
ge-0/0/8        Off
ge-0/0/9        Off
ge-0/0/10       Off
ge-0/0/11       Off
ge-0/0/12       Off
ge-0/0/13       Off
ge-0/0/14       Off
ge-0/0/15       Off
ge-0/0/16       Off
ge-0/0/17       Off
ge-0/0/18       Off
ge-0/0/19       Off
ge-0/0/20       Off
ge-0/0/21       Off
ge-0/0/22       Off
ge-0/0/23       Off
ge-0/0/24       Off
ge-0/0/25       Off
ge-0/0/26       Off
ge-0/0/27       Off
ge-0/0/28       Off
ge-0/0/29       Off
ge-0/0/30       Off
ge-0/0/31       Off
ge-0/0/32       Off
ge-0/0/33       Off
ge-0/0/34       Off
ge-0/0/35       Off
ge-0/0/36       Off
ge-0/0/37       Off
ge-0/0/38       Off
ge-0/0/39       Off
ge-0/0/40       Off
ge-0/0/41       Off
ge-0/0/42       Off
ge-0/0/43       Off
ge-0/0/44       Off
ge-0/0/45       Off
ge-0/0/46       Off
ge-0/0/47       Off
xe-2/0/0        Off
xe-2/0/1        Off
```

```
xe-2/0/2        Off
xe-2/0/3        Off
xe-2/0/4        Off
xe-2/0/5        Off
xe-2/0/6        Off
xe-2/0/7        Off
xe-3/0/0        Off
xe-3/0/1        Off
xe-3/0/2        Off
xe-3/0/3        Off
xe-3/0/4        Off
xe-3/0/5        Off
xe-3/0/6        Off
xe-3/0/7        Off
xe-5/0/0        Off
xe-5/0/1        Off
xe-5/0/2        Off
xe-5/0/3        Off
xe-5/0/4        Off
xe-5/0/5        Off
xe-5/0/6        On
xe-5/0/7        On
xe-7/0/5        Off
```

show chassis lcd fpc-slot 2 (EX8200 Switch)

show chassis lcd fpc-slot 2

```
Interface       LED(ADM/SPD/DPX)
------------------------------------------
xe-2/0/0        Off
xe-2/0/1        Off
xe-2/0/2        Off
xe-2/0/3        Off
xe-2/0/4        Off
xe-2/0/5        Off
xe-2/0/6        Off
xe-2/0/7        Off
```

show chassis lcd menu (EX4200 Switch)

```
user@switch> show chassis lcd menu
fpc0:
--------------------------------------------------------------------------
status-menu
status-menu vcp-status
status-menu power-status
status-menu environ-menu
status-menu show-version
maintenance-menu
maintenance-menu halt-menu
maintenance-menu system-reboot
maintenance-menu rescue-config
maintenance-menu vc-uplink-config
maintenance-menu factory-default
```

On an EX4200 switch in a Virtual Chassis, the output for the **show chassis lcd menu all-members** command is the same as the output for the **show chassis lcd menu** command.

show chassis lcd menu (EX8200 Switch)

```
user@switch> show chassis lcd menu
status-menu
status-menu sf-status1-menu
status-menu sf-status2-menu
status-menu psu-status1-menu
status-menu psu-status2-menu
status-menu environ-menu
status-menu show-version
maintenance-menu
maintenance-menu halt-menu
maintenance-menu system-reboot
maintenance-menu rescue-config
maintenance-menu factory-default
```

show chassis lcd (QFX3500 Switches)

```
user@switch> show chassis lcd
Front panel contents for slot: 0
---------------------------------
LCD screen:
00:RE switch
ALARM 01
LEDs status:
Status/Beacon LED: Yellow Blinking
Interface STATUS LED ACTIVITY LED
-------------------------------------------
fte-0/1/0 Off Off
```

show chassis lcd (XRE200 External Routing Engine in EX8200 Virtual Chassis)

```
user@external-routing-engine> show chassis lcd
member0:
--------------------------------------------------------------------------
Front panel contents:
---------------------
LCD screen:
    RE ex8200-member0
    LED:ADM ALARM 04
LEDs status:
    Alarms LED: Red
    System LED: Yellow
    Master LED: Green

member1:
--------------------------------------------------------------------------

member8:
--------------------------------------------------------------------------
Front panel contents:
---------------------
LCD screen:
    BACKUP

member9:
--------------------------------------------------------------------------
Front panel contents:
---------------------
LCD screen:
    09:RE xre200-member9
```



```
    LED: NA ALARM 01
Interface       LED(ADM/SPD/DPX/POE)
------------------------------------------
ge-0/0/0        On
ge-0/0/1        On
ge-0/0/2        On
ge-0/0/3        On
ge-0/0/4        Off
ge-0/0/5        Off
ge-0/0/6        Off
ge-0/0/7        Off
ge-0/0/8        Off
ge-0/0/9        Off
ge-0/0/10       On
ge-0/0/11       Off
ge-0/0/12       Off
ge-0/0/13       Off
ge-0/0/14       Off
ge-0/0/15       Off
ge-0/0/16       Off
ge-0/0/17       Off
ge-0/0/18       Off
ge-0/0/19       Off
ge-0/0/20       Off
ge-0/0/21       Off
ge-0/0/22       Off
ge-0/0/23       Off
ge-0/0/24       Off
ge-0/0/25       Off
ge-0/0/26       Off
ge-0/0/27       Off
ge-0/0/28       Off
ge-0/0/29       Off
ge-0/0/30       Off
ge-0/0/31       Off
ge-0/0/32       Off
ge-0/0/33       Off
ge-0/0/34       Off
ge-0/0/35       Off
ge-0/0/36       Off
ge-0/0/37       Off
ge-0/0/38       Off
ge-0/0/39       Off
ge-0/0/40       On
ge-0/0/41       On
ge-0/0/42       On
ge-0/0/43       On
ge-0/0/44       On
ge-0/0/45       On
ge-0/0/46       On
ge-0/0/47       On
ge-16/0/0       On
ge-16/0/1       Off
ge-16/0/2       On
ge-16/0/3       Off
ge-16/0/4       On
ge-16/0/5       Off
ge-16/0/6       On
ge-16/0/7       Off
ge-16/0/8       Off
ge-16/0/9       Off
```

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



```
ge-22/0/17       Off
ge-22/0/18       On
ge-22/0/19       Off
ge-22/0/20       On
ge-22/0/21       Off
ge-22/0/22       On
ge-22/0/23       Off
ge-22/0/24       On
ge-22/0/25       Off
ge-22/0/26       Off
ge-22/0/27       Off
ge-22/0/28       Off
ge-22/0/29       Off
ge-22/0/30       Off
ge-22/0/31       Off
ge-22/0/32       On
ge-22/0/33       Off
ge-22/0/34       On
ge-22/0/35       Off
ge-22/0/36       Off
ge-22/0/37       Off
ge-22/0/38       Off
ge-22/0/39       Off
ge-22/0/40       Off
ge-22/0/41       Off
ge-22/0/42       Off
ge-22/0/43       Off
ge-22/0/44       Off
ge-22/0/45       Off
ge-22/0/46       Off
ge-22/0/47       Off
```

show chassis lcd interconnect-device (QFabric Systems)

show chassis lcd interconnect-device IC-F1012

```
                Front Panel Module Information
                ---------------------------------
                LCD screen:
                IC-F1012        3 Alarms active
LEDs status:
    Status LED: Green
    Power LED : Green
    Major Alarm LED: off
    Minor Alarm LED: Yellow
    Fan 0 LED : Green
    Fan 1 LED : Green
    Fan 2 LED : Green
    Fan 3 LED : Green
    Fan 4 LED : Green
    Fan 5 LED : Green
    Fan 6 LED : Green
    Fan 7 LED : Green
    Fan 8 LED : Green
    Fan 9 LED : Green
    PEM 0 LED : Green
    PEM 1 LED : Green
    PEM 2 LED : Green
    PEM 3 LED : off
    PEM 4 LED : off
    PEM 5 LED : off
```

```
                LED info for: CB - 0
                --------------------------------
LEDs status:
    Status LED: Green
    Mastership LED: Green

Interface               STATUS LED      LINK/ACTIVITY LED
---------------------------------------------------------
IC-F1012:pme0 :         Green           N/A
IC-F1012:pme1 :         Green           N/A
IC-F1012:pme2 :         off             N/A
IC-F1012:pme3 :         off             N/A

                LED info for: CB - 1
                --------------------------------
LEDs status:
    Status LED: Green
    Mastership LED: Amber

Interface               STATUS LED      LINK/ACTIVITY LED
---------------------------------------------------------
IC-F1012:pme0 :         Green           N/A
IC-F1012:pme1 :         Green           N/A
IC-F1012:pme2 :         off             N/A
IC-F1012:pme3 :         off             N/A

                LED info for: FC 0 FPC - 0
                --------------------------------
LEDs status:
    Status LED: Green

Interface               STATUS LED      LINK/ACTIVITY LED
---------------------------------------------------------
IC-F1012:fte-0/0/0      Green           N/A
IC-F1012:fte-0/0/1      Green           N/A
IC-F1012:fte-0/0/2      Green           N/A
IC-F1012:fte-0/0/3      Green           N/A
IC-F1012:fte-0/0/4      Green           N/A

                LED info for: FC 1 FPC - 1
                --------------------------------
LEDs status:
    Status LED: Green

Interface               STATUS LED      LINK/ACTIVITY LED
---------------------------------------------------------
IC-F1012:fte-1/0/0      Green           N/A
IC-F1012:fte-1/0/1      Green           N/A
IC-F1012:fte-1/0/2      Green           N/A
IC-F1012:fte-1/0/3      Green           N/A
IC-F1012:fte-1/0/4      Green           N/A

                LED info for: RC 0 FPC - 8
                --------------------------------
LEDs status:
    Status LED: Green

                LED info for: RC 1 FPC - 9
                --------------------------------
LEDs status:
    Status LED: Green
```



```
                LED info for: RC 2 FPC - 10
                --------------------------------
LEDs status:
    Status LED: Green

                LED info for: RC 3 FPC - 11
                --------------------------------
LEDs status:
    Status LED: Green

                LED info for: RC 4 FPC - 12
                --------------------------------
LEDs status:
    Status LED: Green

                LED info for: RC 5 FPC - 13
                --------------------------------
LEDs status:
    Status LED: Green

                LED info for: RC 6 FPC - 14
                --------------------------------
LEDs status:
    Status LED: Green

                LED info for: RC 7 FPC - 15
                --------------------------------
LEDs status:
    Status LED: Green
```

show chassis lcd node-device (QFabric Systems)

show chassis lcd node-device P3774-C

```
                Front panel contents for: P3774-C
                -----------------------------------
                LCD screen:
                P3774-C
LEDs status:
    Status/Beacon LED: Yellow Blinking

Interface               STATUS LED      LINK/ACTIVITY LED
---------------------------------------------------------
P3774-C:xe-0/0/6        Green           Green
P3774-C:xe-0/0/7        Green           Green
P3774-C:ge-0/0/10       Green           Green
P3774-C:ge-0/0/11       Green           Green Blinking
P3774-C:ge-0/0/12       Green           Off
P3774-C:ge-0/0/13       Green           Green Blinking
P3774-C:ge-0/0/20       Green           Green
P3774-C:ge-0/0/21       Green           Green
P3774-C:ge-0/0/22       Green           Green Blinking
P3774-C:ge-0/0/23       Green           Off
P3774-C:ge-0/0/30       Green           Green
P3774-C:ge-0/0/31       Green           Green
P3774-C:ge-0/0/32       Green           Green Blinking
P3774-C:ge-0/0/33       Green           Green Blinking
P3774-C:fte-0/1/0       Green           Green
P3774-C:fte-0/1/1       Green           Green Blinking
P3774-C:fte-0/1/2       Green           Green Blinking
P3774-C:fte-0/1/3       Green           Green
```


show chassis nonstop-upgrade node-group

Supported Platforms QFabric System

Syntax **show chassis nonstop-upgrade node-group** ***node-group-name***

Release Information Command introduced in Junos OS Release 12.2 for the QFX Series.

Description Display the status of the Node group after the most recent nonstop software upgrade (NSSU).

Required Privilege Level view

Related Documentation

- Performing a Nonstop Software Upgrade on the QFabric System on page 503
- **request system software nonstop-upgrade on page 559**

List of Sample Output **show chassis nonstop-upgrade node-group on page 639**

Output Fields Table 111 on page 639 lists the output fields for the **show chassis nonstop-upgrade node-group** command. Output fields are listed in the approximate order in which they appear.

Table 111: show chassis nonstop-upgrade node-group Output Fields

Field Name	Field Description
Item	Node device slot number.
Status	State of Node device: • **Error**—Node device is in an error state. • **Offline**—Node device is powered down. • **Online**—Node device is online and running.
Reason	Reason for the state (if the line card is offline).

Sample Output

show chassis nonstop-upgrade node-group

```
user@qfabric> show chassis nonstop-upgrade node-group NW-NG-0
 Item           Status                  Reason
  P1550-C        Online
```

show fabric administration inventory

Supported Platforms QFabric System

Syntax

show fabric administration inventory
<brief | detail | summary | terse>
<director-group (status)>
<infrastructure (fabric-controls | fabric-managers | diagnostic-routing-engines)>
<interconnect-devices *interconnect-device-name*>
<node-devices *node-device-name*>
<node-groups *node-group-name*>
<summary>

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Display all devices that belong to the QFabric system. You can narrow the level of output by specifying a device type.

NOTE: **If your Node devices do not appear in the output of the show fabric administration inventory command, check the cabling of your system.**

Options

none—Display all devices within a QFabric system.

brief | detail | summary | terse—(Optional) Display the specified level of output.

director-group (status)—(Optional) Display the status for the Director group within a QFabric system.

infrastructure (fabric-controls | fabric-managers | diagnostic-routing-engines)—(Optional) Display information for the fabric control Routing Engine, fabric manager Routing Engine, and diagnostic Routing Engine running on the Director group for the QFabric system.

interconnect-devices *interconnect-device-name*—(Optional) Display a specific Interconnect device within a QFabric system.

node-devices *node-device-name*—(Optional) Display a specific Node device within a QFabric system.

node-groups *node-group-name*—(Optional) Display a specific Node group within a QFabric system.

Required Privilege Level admin

Related Documentation

- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411
- Configuring Aliases for the QFabric System on page 430
- Configuring Node Groups for the QFabric System on page 447

- show fabric administration inventory infrastructure on page 650
- show fabric administration inventory director-group status on page 645
- show fabric administration inventory node-devices on page 655
- show fabric administration inventory node-groups on page 657
- show fabric administration inventory interconnect-devices on page 653
- show fabric inventory on page 660

List of Sample Output

show fabric administration inventory on page 643
show fabric administration inventory detail on page 643
show fabric administration inventory summary on page 644

Output Fields

Table 112 on page 641 lists the output fields for the **show fabric administration inventory** command. Output fields are listed in the approximate order in which they appear.

Table 112: show fabric administration inventory Output Fields

Field Name	Field Description	Level of Output
Item	Type of QFabric system component being viewed. Possible values include **Node group**, **Interconnect device**, **Fabric control**, **Fabric manager**, **Diagnostic routing engine**, **Director group**, and **Ungrouped Node device**.	detail none
Identifier	Hardware serial identifier of a QFabric system component. When you configure an alias name for a component, the ID is displayed.	detail none
Connection	Status of a QFabric system component: either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for the listed component.	detail none
Configuration	Whether or not the configuration for a QFabric system component has been received and installed. The configuration can be **Configured**, **Failed** (with details about the failure), **Pending** (in the process of being written or retried), or **Unknown**.	detail none
Node group	Name of the Node groups associated with the QFabric system, and the Node devices assigned to each Node group. The group can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for the devices in the group. This field also displays the serial ID for the Node group and the status for the Node group.	detail none
Interconnect device	Name of the Interconnect devices associated with the Node group. The device can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for the device. This field also displays the serial ID and configuration status for the Interconnect device.	detail none
Fabric manager	Name of the primary virtual Junos Routing Engine associated with the QFabric system. The fabric manager Routing Engine can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for this virtual device. It also displays the identifier and configuration status for the fabric manager Routing Engine.	detail none

Table 112: show fabric administration inventory Output Fields *(continued)*

Field Name	Field Description	Level of Output
Fabric control	Name of the virtual Junos Routing Engines responsible for route selection within a QFabric system partition. The fabric control Routing Engine can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for this virtual device. It also displays the identifier and configuration status for the fabric control Routing Engine.	detail none
Diagnostic routing engine	Name of the virtual Junos Routing Engine responsible for troubleshooting and diagnostic utilities within a QFabric system partition. The diagnostic Routing Engine can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for this virtual device. It also displays the identifier and configuration status for the diagnostic Routing Engine.	detail none
Director group	Identifier for the Director devices that are part of the Director group in a QFabric system. Each Director device can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for the device.	detail none
Connection uptime	Length of time the component has been operational. The time is listed in days, hours, minutes, and seconds (**D+HH:MM:SS**).	detail
Network domain	Indicates whether a Node group is a network Node group (**Yes**) or a server Node group (**No**).	detail
Member id	Member identification number for a Node device within a Node group.	detail
Node group master	Indicates whether or not a Node device acts as a master device within a Node group. Values for this field are **Yes** or **No**.	detail
Configuration checkout failed	Provides troubleshooting details about a failed configuration on a component. This field includes the following output: • **Edit path**—Displays the configuration hierarchy level where the problem occurs. • **Statement**—Displays the configuration statement that causes the problem. • **Message**—Provides a suggested workaround to resolve the problem.	detail
Member	Name of a Routing Engine allocated to an Interconnect device.	detail
Master	Indicates whether or not a Routing Engine acts as a master device within an Interconnect device. Values are **Yes** or **No**.	detail
Total Node devices	Number of connected and disconnected Node devices in the QFabric system.	summary
Total connected Node devices	Number of available Node devices in the QFabric system.	summary
Total disconnected Node devices	Number of unavailable Node devices in the QFabric system.	summary
Total Interconnect devices	Number of Interconnect devices in the QFabric system.	summary

Sample Output

show fabric administration inventory

user@qfabric> **show fabric administration inventory**

```
Item                    Identifier              Connection      Configuration
Ungrouped Node device
  Node6                 BBAK8979                Disconnected
Node group
  P3359-C                                       Connected       Configured
    P3359-C                                     Connected
  P3865-C                                       Connected       Configured
    P3865-C                                     Connected
  RSNG-1                                        Connected       Configured
    Node-3              BBAK8276                Connected
    Node-4              BBAK8273                Connected
  NW-NG-0                                       Connected       Configured
    Node-0              BBAK8309                Connected
    Node-1              BBAK8283                Connected
Interconnect device
  IC-F1032                                      Connected       Configured
    F1032/RE0                                   Connected
    F1032/RE1                                   Connected
  IC-F1092                                      Connected       Configured
    F1092/RE0                                   Connected
    F1092/RE1                                   Connected
Fabric manager
  FM-0                                          Connected       Configured
Fabric control
  FC-0                                          Connected       Configured
  FC-1                                          Connected       Configured
Diagnostic routing engine
  DRE-0                                         Connected       Configured
Director group
  0281112011000023                              Connected
  0281112011000082                              Connected
```

show fabric administration inventory detail

user@qfabric> **show fabric administration inventory detail**

```
Node group: NW-NG-0, Connected, Configured
  Connection uptime: 2+22:40:46
  Network domain: Yes

  Node device: node01, Connected,
    Member id: 0

Node group: RSNG, Connected, Configured
  Connection uptime: 1:20:22

  Node device: node02, Connected,
    Member id: 0

  Node device: node03, Connected,
    Member id: 1
    Node group master: Yes

Node group: BBAK0423, Connected, Failed (invalid configuration)
  Connection uptime: 0:01:06
```

```
  Configuration checkout failed:
    Edit path: edit ethernet-switching-options
    Statement: analyzer
      Message: Vlan vlan1 which is configured as output vlan for analyzer session
 an1 contains untagged interface.
              The analyzer output vlan should only contain tagged interface.

  Node device: node0, Connected,
    Member id: 0
    Node group master: Yes

Interconnect device: IC-F4912, Connected, Configured
  Connection uptime: 0:08:05

  Member: F4912/RE0, Connected,
    Connection uptime: 0:08:05
    Master: Yes

Fabric manager: FM-0, Connected, Configured
  Connection uptime: 2+22:40:47

Fabric control: FC-0, Connected, Configured
  Connection uptime: 2+22:17:38

Fabric control: FC-1, Connected, Configured
  Connection uptime: 2+22:17:57

Diagnostic routing engine: DRE-0, Connected, Configured
  Connection uptime: 2+22:39:56
```

show fabric administration inventory summary

```
user@qfabric> show fabric administration inventory summary
Total Node devices: 3
Total connected Node devices: 3
Total disconnected Node devices: 0
Total Interconnect devices: 1
```


show fabric administration inventory director-group status

Supported Platforms QFabric System

Syntax show fabric administration inventory director-group status (target *director-device-name* | all)

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Display the status of Director devices that belong to a QFabric system Director group.

Options **none**—Display the status of all Director devices within a QFabric system.

all—Display the status of all Director devices within a QFabric system.

target *director-device-name*—Display the status of a specific Director device within a QFabric system.

Required Privilege Level admin

Related Documentation

- **request fabric administration director-group change-master on page 544**
- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411
- Understanding the Director Group on page 20

List of Sample Output **show fabric administration inventory director-group status on page 646**
show fabric administration inventory director-group status target on page 648

Output Fields Table 113 on page 645 lists the output fields for the **show fabric administration inventory director-group status** command. Output fields are listed in the approximate order in which they appear.

Table 113: show fabric administration inventory director-group status Output Fields

Field Name	Field Description
Director Group Status	Timestamp for the Director group status report.
Member	Name of the Director device.
Status	Current operational mode of the Director device: **online** or **offline**.
Role	High availability operational role of the Director device: **master** or **standby**.
Mgmt Address	Management IP address of the Director device.
CPU	Percentage of CPU processing memory being used by the Director device.
Free Memory	Available storage memory on the Director device.

Table 113: show fabric administration inventory director-group status Output Fields *(continued)*

Field Name	Field Description
VMs	Number of virtual machines operating on the Director device. A Routing Engine issue exists on a particular Director device when the system displays a star (*) in the **VMs** column along with the following message: **Error in retrieving VM Count in dg*X***.
Up Time	Length of time the Director device has been operating.
Device Id/Alias	Name or identifier of the Director device.
Master Services	Operational status of the database server, load balancer, and QFabric partition address.
Director Group Managed Services	Operational status of the shared file system, network file system, virtual machine server, and DHCP load balancer.
Hard Drive Status	Operational status of the Director device hard drive, including information about the volume identifier, physical identifiers, and SCSI identifiers. There is also status information for the drive partitions, including directory size, available and used drive space, utilization, and directory locations. A hard drive issue exists when the system displays one of the following messages: **Error in retrieving Hard disk status** or **Error in retrieving Hard disk storage status**.
Director Group Processes	Operational status of the Director group processes, such as device managers, SSH, NFS, FTP, system log messages, and SNMP.
Interface Link Status	Operational status of the Director device interfaces, such as the management interface, the control plane bridge interface, the control plane LAG, the control plane links (where the first number represents the Ethernet module [0 or 1] and the second number represents the port [0 - 3]), and the inter-Director crossover LAG. The state of the interfaces can be **up** or **down**. The **Active** designation indicates that a control plane link is active.

Sample Output

show fabric administration inventory director-group status

```
user@qfabric> show fabric administration inventory director-group status
Director Group Status Thu Aug  2 17:36:34 UTC 2012

 Member Status Role     Mgmt Address    CPU Free Memory VMs Up Time
 ------ ------ -------- --------------- --- ----------- --- -------------
 dg0    online master   10.94.215.38    8%  15191684k   4   6 days, 06:24 hrs
 dg1    online backup   10.94.215.39    7%  17733160k   3   6 days, 06:24 hrs

 Member Device Id/Alias  Status  Role
 ------ ---------------- ------- ---------
 dg0    0281052011000001 online  master

  Master Services
  ---------------
  Database Server               online
  Load Balancer Director        online
  QFabric Partition Address     online

  Director Group Managed Services
  -------------------------------
```



```
 Shared File System            online
 Network File System           online
 Virtual Machine Server        online
 Load Balancer/DHCP            online

 Hard Drive Status
 ----------------
 Physical ID:0                 online
 Physical ID:1                 online


 Size  Used Avail Used% Mounted on
 ----  ---- ----- ----- ----------
 423G 9.4G 391G  3%   /
 99M  16M  79M   17%  /boot
 93G  11G  83G   12%  /pbdata

 Director Group Processes
 ------------------------
 Director Group Manager        online
 Partition Manager             online
 Software Mirroring            online
 Shared File System master     online
 Secure Shell Process          online
 Network File System           online
 DHCP Server master            online     master
 FTP Server                    online
 Syslog                        online
 Distributed Management        online
 SNMP Trap Forwarder           online
 SNMP Process                  online
 Platform Management           online

 Interface Link Status
 ---------------------
 Management Interface          up
 Control Plane Bridge          up
 Control Plane LAG             up
 CP Link [0/2]                 up         Active
 CP Link [0/1]                 up         Active
 CP Link [0/0]                 up         Active
 CP Link [1/2]                 down
 CP Link [1/1]                 down
 CP Link [1/0]                 down
 Crossover LAG                 up
 CP Link [0/3]                 up
 CP Link [1/3]                 up

Member Device Id/Alias  Status  Role
------ ---------------- ------- ---------
dg1    0281052011000032 online  backup

 Director Group Managed Services
 -------------------------------
 Shared File System            online
 Network File System           online
 Virtual Machine Server        online
 Load Balancer/DHCP            online

 Hard Drive Status
 ----------------
```

```
 Physical ID:0                  online
 Physical ID:1                  online


 Size  Used Avail Used% Mounted on
 ----  ---- ----- ----- ----------
 423G 9.8G 391G  3%   /
 99M  16M  79M   17%  /boot
 93G  11G  83G   12%  /pbdata

 Director Group Processes
 ------------------------
 Director Group Manager         online
 Partition Manager              online
 Software Mirroring             online
 Shared File System master      online
 Secure Shell Process           online
 Network File System            online
 DHCP Server master             online     backup
 FTP Server                     online
 Syslog                         online
 Distributed Management         online
 SNMP Trap Forwarder            online
 SNMP Process                   online
 Platform Management            online

 Interface Link Status
 ---------------------
 Management Interface           up
 Control Plane Bridge           up
 Control Plane LAG              up
 CP Link [0/2]                  up         Active
 CP Link [0/1]                  up         Active
 CP Link [0/0]                  up         Active
 CP Link [1/2]                  down
 CP Link [1/1]                  down
 CP Link [1/0]                  down
 Crossover LAG                  up
 CP Link [0/3]                  up
 CP Link [1/3]                  up
```

show fabric administration inventory director-group status target

user@qfabric> **show fabric administration inventory director-group status target 0281052011000004**

```
Director Group Status Thu Aug 16 02:25:37 UTC 2012

 Member Status Role     Mgmt Address    CPU Free Memory VMs Up Time
 ------ ------ -------- --------------- --- ----------- --- -------------
 dg0    online backup   10.94.195.109   7%  10009364k   3   23:44 hrs
 dg1    online master   10.94.195.110   9%  6120712k    4   1 day, 33:17 mins

 Member Device Id/Alias  Status  Role
 ------ ---------------- ------- ---------
 dg1    0281052011000004 online  master

  Master Services
  ---------------
  Database Server               online
  Load Balancer Director        online
  QFabric Partition Address     online
```

```
Director Group Managed Services
-------------------------------
Shared File System            online
Network File System           online
Virtual Machine Server        online
Load Balancer/DHCP            online

Hard Drive Status
----------------
Physical ID:0                 online
Physical ID:1                 online


Size  Used Avail Used% Mounted on
----  ---- ----- ----- ----------
423G 7.2G 394G  2%   /
99M  20M  75M   21%  /boot
93G  8.8G 85G   10%  /pbdata

Director Group Processes
------------------------
Director Group Manager        online
Partition Manager             online
Software Mirroring            online
Shared File System master     online
Secure Shell Process          online
Network File System           online
DHCP Server master            online     master
FTP Server                    online
Syslog                        online
Distributed Management        online
SNMP Trap Forwarder           online
SNMP Process                  online
Platform Management           online

Interface Link Status
---------------------
Management Interface          up
Control Plane Bridge          up
Control Plane LAG             up
CP Link [0/2]                 up         Active
CP Link [0/1]                 up         Active
CP Link [0/0]                 up         Active
CP Link [1/2]                 up
CP Link [1/1]                 up
CP Link [1/0]                 up
Crossover LAG                 up
CP Link [0/3]                 up
CP Link [1/3]                 up
```

show fabric administration inventory infrastructure

Supported Platforms QFabric System

Syntax
show administrator inventory infrastructure
<brief | detail>
(fabric-controls | fabric-managers | diagnostic-routing-engines)

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Display the services running on the Director group for the QFabric system. These services can include external Routing Engines that are used to support QFabric system operations, such as partitioning and fabric control.

Options

none—Display all services running on the Director group, which are used to support the QFabric system.

brief | detail—(Optional) Display the specified level of output.

fabric-managers—Display information for the fabric manager Routing Engine running on the Director group, which is used to support all partitions in the QFabric system.

fabric-controls—Display information for the fabric control Routing Engine running on the Director group, which is used to support route information in the QFabric system.

diagnostic-routing-engines—Display information for the diagnostic Routing Engine running on the Director group, which is responsible for troubleshooting and diagnostic utilities within a QFabric system partition.

Required Privilege Level admin

Related Documentation

- show fabric administration inventory on page 640

List of Sample Output

show fabric administration inventory infrastructure on page 651
show fabric administration inventory infrastructure fabric-controls on page 652
show fabric administration inventory infrastructure fabric-managers on page 652
show fabric administration inventory infrastructure diagnostic-routing-engines on page 652

Output Fields Table 114 on page 650 lists the output fields for the **show fabric administration inventory infrastructure** command. Output fields are listed in the approximate order in which they appear.

Table 114: show fabric administration inventory infrastructure Output Fields

Field Name	Field Description
Routing Engine Type	Type of virtual Junos Routing Engine being viewed. Examples include the network Node group, fabric control, fabric manager, and diagnostic Routing Engines.

Table 114: show fabric administration inventory infrastructure Output Fields *(continued)*

Field Name	Field Description
Hostname	Name of the QFabric system component.
PID	Process identifier for the component.
CPU-Use (%)	Percentage of CPU processing memory being used by the component.
Fabric control	Name of the virtual Junos Routing Engines responsible for route selection within a QFabric system partition. With the **fabric-controls** option, the fabric control Routing Engine can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for this virtual device. This field also displays the identifier and configuration status for the fabric control Routing Engine.
Fabric manager	Name of the virtual Junos Routing Engine that manages the QFabric system. With the **fabric-managers** option, the fabric manager Routing Engine can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for this virtual device. This field also displays the identifier and configuration status for the fabric manager Routing Engine.
Network Node group	Name of the virtual Junos Routing Engine instance that handles routing processes for a network Node group.
Diagnostic	Name of the virtual Junos Routing Engine responsible for troubleshooting and diagnostic utilities within a QFabric system partition. With the **diagnostic-routing-engines** option, the diagnostic Routing Engine can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for this virtual device. It also displays the identifier and configuration status for the diagnostic Routing Engine.
Item	Type of QFabric system component being viewed.
Identifier	Hardware serial identifier of a QFabric system component.
Connection	Status of a QFabric system component: either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for the listed component.
Configuration	Whether or not the configuration for a QFabric system component has been received and installed. The configuration can be **Configured**, **Failed** (unsuccessful), **Pending** (in the process of being written or retried), or **Unknown**.

Sample Output

show fabric administration inventory infrastructure

```
user@qfabric> show fabric administration inventory infrastructure
dg0:
Routing Engine Type     Hostname                          PID       CPU-Use(%)
-----------------------------------------------------------------------------
```

```
Fabric manager         FM-0                          9832      1.0
Network Node group     QFabric_default_NW-NG-1_RE1   24633     4.2
Fabric control         QFabric_default_FC-1_RE0      25374     1.8
Diagnostic             QFabric_DRE                   6789      1.3

dg1:
Routing Engine Type    Hostname                      PID      CPU-Use(%)
--------------------------------------------------------------------------
Fabric manager         FM-1                          572       1.6
Network Node group     QFabric_default_NW-NG-0_RE0   19217     7.8
Fabric control         QFabric_default_FC-0_RE0      20071     1.9
```

show fabric administration inventory infrastructure fabric-controls

```
user@qfabric> show fabric administration inventory infrastructure fabric-controls fabric-controls
Item                   Identifier               Connection       Configuration
Fabric control
  FC-0                                          Connected        Configured
  FC-1                                          Connected        Configured
```

show fabric administration inventory infrastructure fabric-managers

```
user@qfabric> show fabric administration inventory infrastructure fabric-managers
Item                   Identifier               Connection       Configuration
Fabric manager
  FM-0                                          Connected        Configured
```

show fabric administration inventory infrastructure diagnostic-routing-engines

```
user@qfabric> show fabric administration inventory infrastructure diagnostic-routing-engines
Item                   Identifier               Connection       Configuration
Diagnostic routing engine
  DRE-0                                         Connected        Configured
```

show fabric administration inventory interconnect-devices

Supported Platforms QFabric System

Syntax show fabric administration inventory interconnect-devices *interconnect-device-name*

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Display the Interconnect devices that belong to a QFabric system.

Options **none**—Display all Interconnect devices within a QFabric system.

interconnect-device-name—Display a specific Interconnect device within a QFabric system.

Required Privilege Level admin

Related Documentation

- request chassis fabric fpc on page 541
- show chassis fabric connectivity on page 616
- show chassis fabric device on page 623
- show fabric administration inventory on page 640
- Understanding Interconnect Devices on page 23

List of Sample Output

show fabric administration inventory interconnect-devices on page 654
show fabric administration inventory interconnect-devices device-name on page 654

Output Fields Table 115 on page 653 lists the output fields for the **show fabric administration inventory interconnect-devices** command. Output fields are listed in the approximate order in which they appear.

Table 115: show fabric administration inventory interconnect-devices Output Fields

Field Name	Field Description
Interconnect device	Name of the Interconnect devices associated with the partition.
Item	Type of QFabric system component being viewed. Interconnect devices either display the alias name (if configured) or the hardware serial identifier and Control Board Routing Engine numbers.
Identifier	Hardware serial identifier of a QFabric system component. When you configure an alias name for a component, the ID is displayed.
Connection	Status of a QFabric system component: either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for the listed component.
Configuration	Whether or not the configuration for a QFabric system component has been received and installed. The configuration can be **Configured**, **Failed** (unsuccessful), **Pending** (in the process of being written or retried), or **Unknown**.

Sample Output

show fabric administration inventory interconnect-devices

```
user@qfabric> show fabric administration inventory interconnect-devices
Item                    Identifier              Connection       Configuration
Interconnect device
  IC-YW3781                                     Connected        Configured
    YW3781/RE0                                  Connected
    YW3781/RE1                                  Connected
  IC-YW3798                                     Connected        Configured
    YW3798/RE0                                  Connected
    YW3798/RE1                                  Connected
```

show fabric administration inventory interconnect-devices device-name

```
user@qfabric> show fabric administration inventory interconnect-devices IC-YW3781
Item                    Identifier              Connection       Configuration
Interconnect device
  IC-YW3781                                     Connected        Configured
    YW3781/RE0                                  Connected
    YW3781/RE1                                  Connected
```


show fabric administration inventory node-devices

Supported Platforms QFabric System

Syntax show fabric administration inventory node-devices *node-device-name*

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Display the Node devices that belong to the QFabric system.

NOTE: If your Node devices do not appear in the output of the **show fabric administration inventory node-devices** command, check the cabling of your system.

Options **none**—Display all Node devices within the QFabric system.

node-device-name—Display a specific Node device within the QFabric system.

Required Privilege Level admin

Related Documentation

- Configuring Aliases for the QFabric System on page 430
- Configuring Node Groups for the QFabric System on page 447
- show fabric administration inventory node-groups on page 657
- show fabric administration inventory on page 640
- Understanding Node Devices on page 26

List of Sample Output

show fabric administration inventory node-devices on page 656
show fabric administration inventory node-devices device-name on page 656

Output Fields Table 116 on page 655 lists the output fields for the **show fabric administration inventory node-devices** command. Output fields are listed in the approximate order in which they appear.

Table 116: show fabric administration inventory node-devices Output Fields

Field Name	Field Description
Item	Type of QFabric system component being viewed.
Identifier	Hardware serial identifier of a QFabric system component.
Connection	Status of a QFabric system component: either **Connected** or **Not Connected**, depending on whether or not the Director software has detected keepalive messages for the listed component.

Table 116: show fabric administration inventory node-devices Output Fields *(continued)*

Field Name	Field Description
Node device	Name of the Node devices associated with the Node group. The device can be either **Connected** or **Not Connected**, depending on whether or not the Director software has detected keepalive messages for the device. This field also displays the serial ID and configuration status for the Node device.

Sample Output

show fabric administration inventory node-devices

```
user@qfabric> show fabric administration inventory node-devices
Item                    Identifier              Connection
Node device
  node1                 P3749-C                 Connected
  node2                 P3767-C                 Connected
  node3                 P3850-C                 Connected
  node4                 P3947-C                 Connected
```

show fabric administration inventory node-devices device-name

```
user@qfabric> show fabric administration inventory node-devices node0
Item                    Identifier              Connection
Node device
  node1                 P3749-C                 Connected
```


show fabric administration inventory node-groups

Supported Platforms QFabric System

Syntax show fabric administration inventory node-groups *node-group-name*

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Display the Node groups and the corresponding Node devices that belong to the QFabric system.

Options **none**—Display all Node groups within the QFabric system.

node-group-name—Display information for a specific Node group within the QFabric system.

Required Privilege Level admin

Related Documentation

- Configuring Node Groups for the QFabric System on page 447
- show fabric administration inventory node-devices on page 655
- show fabric administration inventory on page 640

List of Sample Output
show fabric administration inventory node-groups on page 658
show fabric administration inventory node-groups node-group-name on page 658

Output Fields Table 117 on page 657 lists the output fields for the **show fabric administration inventory node-groups** command. Output fields are listed in the approximate order in which they appear.

Table 117: show fabric administration inventory node-groups Output Fields

Field Name	Field Description
Node group	Name of the Node groups associated with the partition.
Item	Type of QFabric system component being viewed. • Autogenerated Node groups display the hardware serial identifier for both the name of the Node group and the name of the included Node device. • User-configured Node groups either display the alias name (if configured) or the hardware serial identifier for each Node device contained in the Node group.
Identifier	Hardware serial identifier of a QFabric system component. When you configure an alias name for a component, the ID is displayed.
Connection	Status of a QFabric system component: either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for the listed component.

Table 117: show fabric administration inventory node-groups Output Fields *(continued)*

Field Name	Field Description
Configuration	Whether or not the configuration for a QFabric system component has been received and installed. The configuration can be **Configured**, **Failed** (unsuccessful), **Pending** (in the process of being written or retried), or **Unknown**.

Sample Output

show fabric administration inventory node-groups

```
user@qfabric> show fabric administration inventory node-groups
Item                    Identifier              Connection      Configuration
Node group
  BBAK8891                                      Connected       Configured
    BBAK8891                                    Connected
  BBAK8868                                      Connected       Configured
    BBAK8868                                    Connected
  RSNG-1                                        Connected       Configured
    Node-3              BBAK8276                Connected
    Node-4              BBAK8273                Connected
  NW-NG-0                                       Connected       Configured
    Node-0              BBAK8309                Connected
    Node-1              BBAK8283                Connected
```

show fabric administration inventory node-groups node-group-name

```
user@qfabric> show fabric administration inventory node-groups RSNG-1
Item                    Identifier              Connection      Configuration
Node group
  RSNG-1                                        Connected       Configured
    Node-3              BBAK8276                Connected
    Node-4              BBAK8273                Connected
```


show fabric administration system mac-pool

Supported Platforms QFabric System

Syntax show fabric administration system mac-pool

Release Information Command introduced in Junos OS Release 11.3 for the QFX Series.

Description (QFabric systems only) Display the MAC addresses that belong to a QFabric Director group.

Options There are no options for this command.

Required Privilege Level admin

Related Documentation

- request fabric administration system mac-pool add on page 547
- request fabric administration system mac-pool delete on page 548

List of Sample Output show fabric administration system mac-pool on page 659

Output Fields Table 118 on page 659 lists the output fields for the **show fabric administration system mac-pool** command. Output fields are listed in the approximate order in which they appear.

Table 118: show fabric administration system mac-pool Output Fields

Field Name	Field Description
MAC Block Base	Starting MAC address for the pool assigned to the QFabric system.
Total MACs	Total number of MAC addresses assigned to the QFabric system.
Available MACs	Number of available MAC addresses from the total.

Sample Output

show fabric administration system mac-pool

```
user@qfabric> show fabric administration system mac-pool
 Mac Block Base          Total MACs       Available MACs
         00:11:00:00:00:00       4096             4084
         02:00:00:11:22:00       10               10
```


show fabric inventory

Supported Platforms QFabric System

Syntax

show fabric inventory
<brief | detail | terse>
<infrastructure fabric-controls <FC-0 | FC-1>>
<node-devices *node-device-name*>
<node-groups *node-group-name*>

Release Information Command introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFabric systems only) Display Node devices, Node groups, and fabric control Routing Engines that belong to the QFabric system. You can narrow the level of output by specifying a device type.

NOTE:

- If you have administrator privileges, issue the **show fabric administration inventory** command to view all devices in your QFabric system (including Interconnect devices and Director devices).
- If your Node devices do not appear in the output of the **show fabric inventory** command, check the cabling of your system.

Options

none—Display all devices within a QFabric system.

brief | detail | terse—(Optional) Display the specified level of output.

infrastructure fabric-controls <FC-0 | FC-1>—(Optional) Display information for all fabric control Routing Engines running on the Director group within the QFabric system, or the individual fabric control Routing Engine you specify (either FC-0 or FC-1).

node-devices ***node-device-name***—(Optional) Display a specific Node device within a QFabric system.

node-groups ***node-group-name***—(Optional) Display a specific Node group within a QFabric system.

Required Privilege Level admin

Related Documentation

- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411
- Configuring Aliases for the QFabric System on page 430
- Configuring Node Groups for the QFabric System on page 447
- **show fabric administration inventory on page 640**

List of Sample Output

Output Fields

Table 119 on page 661 lists the output fields for the **show fabric inventory** command. Output fields are listed in the approximate order in which they appear.

Table 119: show fabric inventory Output Fields

Field Name	Field Description
Item	Type of QFabric system component being viewed. Possible values include **Node device**, **Node group**, **Fabric control**, and **Ungrouped Node device**.
Identifier	Hardware serial identifier of a QFabric system component.
Connection	Status of a QFabric system component: either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for the listed component.
Configuration	Whether or not the configuration for a QFabric system component has been received and installed. The configuration can be **Configured**, **Failed** (unsuccessful), **Pending** (in the process of being written or retried), or **Unknown**.
Node group	Name of the Node groups associated with the QFabric system, and the Node devices assigned to each Node group. The group can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for the devices in the group. This field also displays the serial ID for the Node group and the status for the Node group.
Node device	Name of the Node devices associated with the Node group. The device can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for the device. This field also displays the serial ID and configuration status for the Node device.
Fabric control	Name of the virtual Junos Routing Engines responsible for route selection within a QFabric system partition. The fabric control Routing Engine can be either **Connected** or **Disconnected**, depending on whether or not the Director software has detected keepalive messages for this virtual device. It also displays the identifier and configuration status for the fabric control Routing Engine.

Sample Output

show fabric inventory

```
user@qfabric> show fabric inventory

Item                    Identifier              Connection      Configuration
Ungrouped Node device
  P3747-C                                       Disconnected
Node group
  NW-NG-0                                       Connected       Configured
    Node-1              P4093-C                 Connected
  RSNG-1                                        Connected       Configured
    Node-2              P4514-C                 Connected
    Node-3              P3917-C                 Connected
Fabric control
  FC-0                                          Connected       Configured
  FC-1                                          Connected       Configured
```

show fabric inventory infrastructure fabric-controls

`user@qfabric>` **show fabric inventory infrastructure fabric-controls**

```
Item                    Identifier              Connection      Configuration
Fabric control
  FC-0                                          Connected       Configured
  FC-1                                          Connected       Configured
```

show fabric inventory node-devices

`user@qfabric>` **show fabric inventory node-devices**

```
Item                    Identifier              Connection      Configuration
Node device
  Node-1                P4093-C                 Connected
  Node-2                P4514-C                 Connected
  Node-3                P3917-C                 Connected
```

show fabric inventory node-groups

`user@qfabric>` **show fabric inventory node-groups**

```
Item                    Identifier              Connection      Configuration
Node group
  NW-NG-0                                       Connected       Configured
    Node-1              P4093-C                 Connected
  RSNG-1                                        Connected       Configured
    Node-2              P4514-C                 Connected
    Node-3              P3917-C                 Connected
```


show fabric session-host

Supported Platforms QFabric System

Syntax show fabric session-host

Release Information Command introduced in Junos OS Release 12.2 for the QFX Series.

Description (QFabric systems only) Display the Director device within the Director group that hosts the QFabric CLI session.

Options **none**—Display the Director device hosting the QFabric CLI session.

Required Privilege Level admin

Related Documentation

- Understanding the Director Group on page 20
- **show fabric administration inventory director-group status on page 645**

List of Sample Output **show fabric session-host on page 663**

Output Fields Table 120 on page 663 lists the output fields for the **show fabric session-host** command. Output fields are listed in the approximate order in which they appear.

Table 120: show fabric session-host Output Fields

Field Name	Field Description
Identifier	Hardware serial identifier of the Director device that hosts the SSH QFabric CLI session.

Sample Output

show fabric session-host

```
user@qfabric> show fabric session-host
Identifier: 0281052011000032
```


show log

Supported Platforms EX Series, J Series, M Series, MX Series, PTX Series, QFabric System, QFX Series standalone switches, T Series

List of Syntax
Syntax on page 664
Syntax (QFabric System) on page 664
Syntax (TX Matrix Routers) on page 664

Syntax

show log
<*filename* | user <*username*>>

Syntax (QFabric System)

show log *filename*
<*device-type (device-id* | *device-alias*)>

Syntax (TX Matrix Routers)

show log
<all-lcc | lcc *number* | scc>
<*filename* | user <*username*>>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 11.1 for the QFX Series.
Option *device-type (device-id* | *device-alias*) is introduced in Junos OS Release 13.1 for the QFX Series.

Description List log files, display log file contents, or display information about users who have logged in to the router or switch.

Options

none—List all log files.

<all-lcc | lcc *number* | scc>—(TX Matrix routers only) (Optional) Display logging information about all T640 routers (or line-card chassis) or a specific T640 router (replace ***number*** with a value from 0 through 3) connected to a TX Matrix router. Or, display logging information about the TX Matrix router (or switch-card chassis).

device-type—(QFabric system only) (Optional) Display log messages for only one of the following device types:

- **director-device**—Display logs for Director devices.
- **infrastructure-device**—Display logs for the logical components of the QFabric system infrastructure, including the diagnostic Routing Engine, fabric control Routing Engine, fabric manager Routing Engine, and the default network Node group and its backup (NW-NG-0 and NW-NG-0-backup).
- **interconnect-device**—Display logs for Interconnect devices.
- **node-device**—Display logs for Node devices.

NOTE: If you specify the **device-type** optional parameter, you must also specify either the **device-id** or **device-alias** optional parameter.

(***device-id*** **|** ***device-alias***)—If a device type is specified, display logs for a device of that type. Specify either the device ID or the device alias (if configured).

filename—(Optional) Display the log messages in the specified log file. For the routing matrix, the filename must include the chassis information.

NOTE: **The *filename* parameter is mandatory for the QFabric system. If you did not configure a syslog filename, specify the default filename of messages.**

user <*username*>—(Optional) Display logging information about users who have recently logged in to the router or switch. If you include ***username***, display logging information about the specified user.

Required Privilege Level trace

List of Sample Output

show log on page 665
show log filename on page 665
show log filename (QFabric System) on page 666
show log user on page 666

Sample Output

show log

```
user@host> show log
total 57518
-rw-r--r--  1 root  bin      211663 Oct  1 19:44 dcd
-rw-r--r--  1 root  bin      999947 Oct  1 19:41 dcd.0
-rw-r--r--  1 root  bin      999994 Oct  1 17:48 dcd.1
-rw-r--r--  1 root  bin      238815 Oct  1 19:44 rpd
-rw-r--r--  1 root  bin     1049098 Oct  1 18:00 rpd.0
-rw-r--r--  1 root  bin     1061095 Oct  1 12:13 rpd.1
-rw-r--r--  1 root  bin     1052026 Oct  1 06:08 rpd.2
-rw-r--r--  1 root  bin     1056309 Sep 30 18:21 rpd.3
-rw-r--r--  1 root  bin     1056371 Sep 30 14:36 rpd.4
-rw-r--r--  1 root  bin     1056301 Sep 30 10:50 rpd.5
-rw-r--r--  1 root  bin     1056350 Sep 30 07:04 rpd.6
-rw-r--r--  1 root  bin     1048876 Sep 30 03:21 rpd.7
-rw-rw-r--  1 root  bin       19656 Oct  1 19:37 wtmp
```

show log filename

```
user@host> show log rpd
Oct  1 18:00:18 trace_on: Tracing to ?/var/log/rpd? started
Oct  1 18:00:18 EVENT <MTU> ds-5/2/0.0 index 24 <Broadcast PointToPoint Multicast
Oct  1 18:00:18
Oct  1 18:00:19 KRT recv len 56 V9 seq 148 op add Type route/if af 2 addr
13.13.13.21 nhop type local nhop 13.13.13.21
Oct  1 18:00:19 KRT recv len 56 V9 seq 149 op add Type route/if af 2 addr
13.13.13.22 nhop type unicast nhop 13.13.13.22
Oct  1 18:00:19 KRT recv len 48 V9 seq 150 op add Type ifaddr index 24 devindex
43
Oct  1 18:00:19 KRT recv len 144 V9 seq 151 op chnge Type ifdev devindex 44
```

```
Oct  1 18:00:19 KRT recv len 144 V9 seq 152 op chnge Type ifdev devindex 45
Oct  1 18:00:19 KRT recv len 144 V9 seq 153 op chnge Type ifdev devindex 46
Oct  1 18:00:19 KRT recv len 1272 V9 seq 154 op chnge Type ifdev devindex 47
...
```

show log filename (QFabric System)

```
user@qfabric> show log messages
Mar 28 18:00:06 qfabric chassisd: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:06 ED1486
 chassisd: CHASSISD_SNMP_TRAP10: SNMP trap generated: FRU power on
(jnxFruContentsIndex 8, jnxFruL1Index 1, jnxFruL2Index 1, jnxFruL3Index 0,
jnxFruName PIC: 48x 10G-SFP+ @ 0/0/*, jnxFruType 11, jnxFruSlot 0,
jnxFruOfflineReason 2, jnxFruLastPowerOff 0, jnxFruLastPowerOn 2159)
Mar 28 18:00:07 qfabric chassisd: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:07 ED1486
 chassisd: CHASSISD_SNMP_TRAP10: SNMP trap generated: FRU power on
(jnxFruContentsIndex 8, jnxFruL1Index 1, jnxFruL2Index 2, jnxFruL3Index 0,
jnxFruName PIC:  @ 0/1/*, jnxFruType 11, jnxFruSlot 0, jnxFruOfflineReason 2,
jnxFruLastPowerOff 0, jnxFruLastPowerOn 2191)
Mar 28 18:00:07 qfabric chassisd: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:07 ED1492
 chassisd: CHASSISD_SNMP_TRAP10: SNMP trap generated: FRU power on
(jnxFruContentsIndex 8, jnxFruL1Index 1, jnxFruL2Index 1, jnxFruL3Index 0,
jnxFruName PIC: 48x 10G-SFP+ @ 0/0/*, jnxFruType 11, jnxFruSlot 0,
jnxFruOfflineReason 2, jnxFruLastPowerOff 0, jnxFruLastPowerOn 242726)
Mar 28 18:00:07 qfabric chassisd: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:07 ED1492
 chassisd: CHASSISD_SNMP_TRAP10: SNMP trap generated: FRU power on
(jnxFruContentsIndex 8, jnxFruL1Index 1, jnxFruL2Index 2, jnxFruL3Index 0,
jnxFruName PIC:  @ 0/1/*, jnxFruType 11, jnxFruSlot 0, jnxFruOfflineReason 2,
jnxFruLastPowerOff 0, jnxFruLastPowerOn 242757)
Mar 28 18:00:16 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:16 ED1486
file: UI_COMMIT: User 'root' requested 'commit' operation (comment: none)
Mar 28 18:00:27 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:27 ED1486
file: UI_COMMIT: User 'root' requested 'commit' operation (comment: none)
Mar 28 18:00:50 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:50
_DCF_default___NW-INE-0_RE0_ file: UI_COMMIT: User 'root' requested 'commit'
operation (comment: none)
Mar 28 18:00:50 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:50
_DCF_default___NW-INE-0_RE0_ file: UI_COMMIT: User 'root' requested 'commit'
operation (comment: none)
Mar 28 18:00:55 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:00:55 ED1492
file: UI_COMMIT: User 'root' requested 'commit' operation (comment: none)
Mar 28 18:01:10 qfabric file: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:01:10 ED1492
file: UI_COMMIT: User 'root' requested 'commit' operation (comment: none)
Mar 28 18:02:37 qfabric chassisd: QFABRIC_INTERNAL_SYSLOG: Mar 28 18:02:37 ED1491
 chassisd: CHASSISD_SNMP_TRAP10: SNMP trap generated: FRU power on
(jnxFruContentsIndex 8, jnxFruL1Index 1, jnxFruL2Index 1, jnxFruL3Index 0,
jnxFruName PIC: 48x 10G-SFP+ @ 0/0/*, jnxFruType 11, jnxFruSlot 0,
jnxFruOfflineReason 2, jnxFruLastPowerOff 0, jnxFruLastPowerOn 33809)
```

show log user

```
user@host> show log user
darius   mg2546                   Thu Oct  1 19:37   still logged in
darius   mg2529                   Thu Oct  1 19:08 - 19:36  (00:28)
darius   mg2518                   Thu Oct  1 18:53 - 18:58  (00:04)
root     mg1575                   Wed Sep 30 18:39 - 18:41  (00:02)
root     ttyp2    jun.site.per   Wed Sep 30 18:39 - 18:41  (00:02)
alex     ttyp1    192.168.1.2     Wed Sep 30 01:03 - 01:22  (00:19)
```


show system software upgrade status

Supported Platforms QFabric System

Syntax **show system software upgrade status**

Release Information Command introduced in Junos OS Release 13.1 for the QFX Series.

Description (QFabric systems only) Display the status of a software upgrade, including details for both nonstop software upgrades and *component all* style upgrades.

Required Privilege Level view

Related Documentation

- Performing a Nonstop Software Upgrade on the QFabric System on page 503
- Verifying Nonstop Software Upgrade for QFabric Systems on page 508
- Upgrading Software on a QFabric System on page 528
- **request system software nonstop-upgrade on page 559**

List of Sample Output **show system software upgrade status (Nonstop Software Upgrade) on page 667**
show system software upgrade status (Component All Upgrade) on page 668

Output Fields Table 121 on page 667 lists the output fields for the **show system software upgrade status** command. Output fields are listed in the approximate order in which they appear.

Table 121: show system software upgrade status Output Fields

Field Name	Field Description
Timestamp	Displays the day of the week, month, date, hour, minute, second, and year when you issue the **show system software upgrade status** command. An example of the timestamp format is as follows: Wed Jan 16 22:06:02 2013.
Software nonstop upgrade on:	Status of the upgrade: • **FM-0 in progress**—A Director group nonstop software upgrade is in process for the fabric manager Routing Engine. • **NW-NG-0 in progress**—A Node group nonstop software upgrade is in process for the network Node group. • **RSNG in progress**—A Node group nonstop software upgrade is in process for the redundant server Node group. • **all in progress**—A *component all* style upgrade is in process for the entire QFabric system.

Sample Output

show system software upgrade status (Nonstop Software Upgrade)

`user@qfabric>` **show system software upgrade status**


```
Wed Jan 16 22:06:02 2013 Software nonstop upgrade on:
                         NW-NG-0 in progress
                         RSNG in progress
```

show system software upgrade status (Component All Upgrade)

```
user@qfabric> show system software upgrade status
Wed Jan 16 22:37:48 2013 Software component upgrade on:
                         all in progress
```


PART 5

Troubleshooting

CHAPTER 23

QFabric System Troubleshooting

Performing System Backup and Recovery for a QFabric System

Supported Platforms QFabric System

Many routers and switches require an administrator to recover the software package and the configuration file for the device separately. In the case of a device failure, this means the administrator might need to perform two separate tasks (if neither the software package nor the configuration file can be recovered).

In contrast, the QFabric system uses a unique mechanism that saves the backup and recovery files for both the Junos OS software and the system configuration into a single collection. The following QFabric system backup and recovery mechanism simplifies and streamlines the recovery process so you can return to normal operations as quickly as possible.

To backup and recover your QFabric system:

1. (First time only) Implement the following one-time procedure to prepare your QFabric system to use the system backup and recovery feature:

   - Insert a Juniper Networks software installation USB flash drive into the master Director device. (This drive was provided to you as one of the components of your QFabric system shipment.)
   - Issue the **request system software format-qfabric-backup** command. The contents and format of the USB flash drive are copied to the Director group shared directory and are used as the basis for all future backup and recovery operations.

     ```
     user@qfabric> request system software format-qfabric-backup
     Copying QFabric USB template image from /dev/sdb(Unigen,PQS4000,4009 MB)......
     ```

- Remove the Juniper Networks software installation USB drive from the master Director device.

2. Issue the **request system software system-backup** command to backup the software package and configuration file. This command saves the current files necessary to recover the QFabric system. The files are saved to a shared memory directory in the Director group.

   NOTE: As you upgrade your system with new software and change the system configuration over time, remember to reissue this command periodically to save the newest files for recovery purposes.

   ```
   user@qfabric> request system software system-backup

   user@qfabric>
   ```

3. Insert a 4 GB or larger USB flash drive into the master Director device for your Director group, and issue the **request system software system-backup usb-create** command. This command copies the recovery files that have been backed up in the Director group and transfers them to the USB flash drive to create a recovery USB drive.

   NOTE: Issuing this command overwrites the contents of the USB flash drive with the QFabric system recovery files.

   ```
   user@qfabric> request system software system-backup usb-create /dev/sdb
   Issuing this command will overwrite the contents of the USB drive.
   Continue? [yes,no] (no) yes

   This operation will access the USB drive on 0281042010000013.
   Are you sure you want to continue? [yes,no] (no) yes

   Copying QFabric recovery media to /dev/sdb...
   Successfully copied QFabric recovery media to /dev/sdb
   ```

4. Remove the recovery USB drive from the Director device, and store it securely in a known location that you will remember when you need to use the recovery USB drive.

5. If the QFabric system fails, power off the Director group, insert the recovery USB drive into the master Director device of your Director group, turn on power to the Director device, and follow the prompts to recover your system. This step restores the software package and the configuration file for your QFabric system.

Related Documentation

- request system software format-qfabric-backup on page 558
- request system software system-backup on page 566

Performing a QFabric System Recovery Installation on the Director Group

Supported Platforms QFabric System

If the software on your QFabric system is damaged in some way that prevents the software from loading correctly, or you need to upgrade the software on your QFabric system, you may need to perform a recovery installation on the Director group.

If possible, perform the following steps before you perform the recovery installation:

1. Ensure that you have an emergency boot device (for example, an external USB flash drive) for each of your Director devices to use during the recovery installation.

   You can either use the external USB flash drive containing the software supplied by Juniper Networks, or you can use an external USB flash drive supplied by Juniper Networks on which you install the QFabric system install media.

2. Because the recovery installation process completely overwrites the entire contents of the Director device, make sure you back up any configuration files and initial setup information on a different external USB flash drive before you begin a recovery installation. You will need to restore this information as part of recovery process.

   Use the **request system software configuration-backup** command to back up your configuration files and initial setup information:

   `user@switch>` **request system software configuration-backup** ***path***

NOTE: To recover the Director group, you must upgrade both Director devices in parallel. If you are recovering only one Director device in a Director group, and the software version will remain the same between the two Director devices, make sure that the other Director device is powered on and operational. If the software version of the Director device you are recovering will be different, make sure that the other Director device is powered off and is not operational.

- (Optional) Creating an Emergency Boot Device Using a Juniper Networks External Blank USB Flash Drive on page 673
- Performing a Recovery Installation Using a Juniper Networks External USB Flash Drive with Preloaded Software on page 674

(Optional) Creating an Emergency Boot Device Using a Juniper Networks External Blank USB Flash Drive

Supported Platforms QFX Series standalone switches

If you do not have an external USB flash drive preloaded with the software from Juniper Networks to use as an emergency boot device, you can create your own, using a blank external USB flash drive provided by Juniper Networks. Download the install media from the Juniper Networks Support website onto your UNIX workstation, uncompress and untar the software, and then burn the software image onto your Juniper Networks external USB (4-gigabyte) flash drive. Make sure you create two emergency boot devices, one for each Director device, so you can perform a recovery installation in parallel.

1. Using a Web browser, navigate to the http://www.juniper.net/support .
2. Click **Download Software**.

3. In the *Switching*box, click *Junos OS Platforms*.
4. In the *QFX Series* section, click the name of the platform for which you want to download software.
5. Click the *Software* tab and select the release number from the *Release* drop-down list.
6. Select the complete install media you want to download in the *QFabric System Install Media* section.

   A login screen appears.
7. Enter your name and password and press **Enter**.
8. Read the End User License Agreement, click the **I agree** radio button, and then click **Proceed**.
9. Log in and save the install media file to your UNIX workstation.
10. Use FTP to access the UNIX workstation where the install media resides.

    ftp ftp:*//hostname/pathname install-media-qfabric-<version>*.img.tgz
11. When prompted, enter your username and password.
12. Make sure you are in binary mode by entering **binary** at the prompt.

    binary
13. Use the **get** command to transfer the installation package from the FTP host to your UNIX workstation.

    get *install-media-qfabric-<version>*.img.tgz
14. Close the FTP session:

    bye
15. Untar the *install-media-qfabric-<version>* .img.tgz file on your UNIX workstation.

    ```
    tar -xvzf install-media-qfabric-11.3X30.6.img.tgz
    ```
16. Insert a blank external USB (4-gigabyte) flash drive supplied by Juniper Networks into your UNIX workstation.
17. Burn the software image you just downloaded to your UNIX workstation onto your external USB flash drive using the **dd** command:

    dd if=install-media-qfabric-11.3X30.6.img of=/dev/sdb bs=16k
    ```
    250880+0 records in
    250880+0 records out
    4110417920 bytes (4.1 GB) copied, 5.10768 seconds, 805 MB/s
    ```
18. Perform the steps in “Performing a Recovery Installation Using a Juniper Networks External USB Flash Drive with Preloaded Software” on page 674 to continue with the recovery installation.

Performing a Recovery Installation Using a Juniper Networks External USB Flash Drive with Preloaded Software

Supported Platforms QFabric System, QFX Series standalone switches

This procedure describes how to perform a recovery installation using an external USB flash drive that contains Junos OS software.

NOTE: Since the recovery installation process completely overwrites the entire contents of the Director device, you will need to restore the required configuration files and initial setup information. The following procedure assumes you previously saved these backup files with the **request system software configuration-backup** command. Ensure that you have these backup files available on an external USB flash drive before you perform the following steps.

1. Insert the external USB flash drive into the Director device.
2. Perform one of the following tasks:
   - If you have access to the default partition, reboot the Director device by issuing the **request system reboot director-group** command.
   - If you do not have access to the default partition, power cycle the Director device.

   The following menu appears on the Director device console when the Director device boots up:

   ```
   Juniper Networks QFabric Director Install/Recovery Media
   -  To boot from the local disk, wait 10 seconds or press the Enter key.
   -  To reinstall the QFabric software on this Director device, type: install
   ```
3. Type **install** and then press **Enter** to install the software on the Director device.

   Once the installation process is complete, the Director device reboots, and the following menu appears on the Director device console:

   ```
   Juniper Networks QFabric Director Install/Recovery Media
   -  To boot from the local disk, wait 10 seconds or press the Enter key.
   -  To reinstall the QFabric software on this Director device, type: install
   ```
4. Press **Enter**.

   The Director device reboots from the local disk on which the software was just installed.
5. Log in as root on the Director device.

   The following menu appears on the Director device console:

   ```
   Before you can access the QFabric system, you must complete the initial setup
    of the Director group by using the steps that follow.
   If the initial setup procedure does not complete successfully, log out of the
    Director device and then log back in to restart
    this setup menu.

   Continue?[y/n]
   ```
6. Enter **n** to bypass the initial setup script and enter the Director device root directory, where you can mount the external USB flash drive containing the configuration files and initial setup information.
7. Issue the **ls /mnt** command to list the *mount* directory.


```
root@dg0 ~]# ls /mnt
```

8. Issue the **mkdir** command to create a directory within the mount directory.

```
root@dg0 ~]# mkdir /mnt/myusb
```

9. Issue the **mount /dev/sdb2 /mnt/myusb/** command to mount the external USB flash drive to the local drive of the Director device.

```
root@dg0 ~]# mount /dev/sdb2 /mnt/myusb/
```

10. Issue the **ls -la /mnt/myusb/** command to verify the contents of your mounted external USB flashdrive.

```
root@dg0 ~]# ls -la /mnt/myusb/
total 1770884
drwxr-xr-x 2 root root       4096 Sep  7 05:16 .
drwxr-xr-x 3 root root       4096 Sep  7 10:15 ..
-rw-r--r-- 1 root root       4249 Sep  7 03:52 mybackup-20110907
```

11. Exit the Director device and log back in as root on the Director device.

    The following menu appears:

```
Before you can access the QFabric system, you must complete the initial setup
 of the Director group by using the steps that follow.
If the initial setup procedure does not complete successfully, log out of the
 Director device and then log back in to restart
 this setup menu.

Continue?[y/n] y
Initial Configuration

You may enter the configuration manually or restore from a backup.

Specify a backup file? [y/n] : y
Please specify the full path of the configuration backup file. :
/mnt/myusb/mybackup-20110907
```

12. Enter **y** to continue.

13. Enter **y** and specify the path to the backup configuration file located on the external USB flash drive.

```
/mnt/myusb/mybackup-20110907
```

The following messages appear:

```
Saving temporary configuration...
Configuring peer...
connect error for 1.1.1.2:9001
Configuring local interfaces...
Configuring interface eth0 with [10.49.213.163/24:10.49.213.254]
Configured interface eth0 with [10.49.213.163/24:10.49.213.254]
Configuring QFabric software with initial pool of 4000 MAC addresses
[00:10:00:00:00:00 - 00:10:00:00:0f:3b]
Configuring QFabric address [10.49.213.50]
Reconfiguring QFabric software static configuration
Applying the new Director Device password
Applying the QFabric component password
First install initial configuration, generating and sharing SSH keys.
First install initial configuration, generating SSH keys.
connect error for 1.1.1.2:9001
Shared SSH keys.
Configuration complete. Director Group services will auto start within 30
seconds.
```


The Director device reboots from the local disk on which the software was just installed. Exit the Director device session and log in to the QFabric default partition CLI.

14. Issue the **request system software configuration-restore** command and specify the path to the backup configuration file located on the external USB flash drive to load the previously saved QFabric system configuration.

15. From the default partition, issue the **request system reboot node-group all** command to reboot all of the Node groups in the QFabric system to ensure that all Node devices are running the same version of software as the Director-group.

    `user@switch>` **request system reboot node-group all**

16. From the default partition, issue the **request system reboot fabric** command to reboot the Interconnect devices and the other components in the fabric in the QFabric system to ensure that Interconnect devices are running the same version of software as the Director group.

    `user@switch>` **request system reboot fabric**

17. Log in to the default partition and issue the **show version component all** command to verify that all components are running the same version of software.

```
user@switch> show version component all
dg1:
-
Hostname: qfabric
Model: qfx3100
JUNOS Base Version [11.3X30.6]

dg0:
-
Hostname: qfabric
Model: qfx3100
JUNOS Base Version [11.3X30.6]

NW-NG-0:
-
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

FC-0:
-
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
```



```
FC-1:
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

DRE-0:
-
Hostname: dre-0
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

FM-0:
-
Hostname: qfabric
Model: qfx-jvre
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

nodedevice1:
-
Hostname: qfabric
Model: QFX3500
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]

interconnectdevice1:
-
Hostname: qfabric
Model: QFX3108
JUNOS Base OS boot [11.3X30.6]
JUNOS Base OS Software Suite [11.3X30.6]
JUNOS Kernel Software Suite [11.3X30.6]
JUNOS Crypto Software Suite [11.3X30.6]
JUNOS Online Documentation [11.3X30.6]
JUNOS Enterprise Software Suite [11.3X30.6]
```



```
JUNOS Packet Forwarding Engine Support (QFX RE) [11.3X30.6]
JUNOS Routing Software Suite [11.3X30.6]
warning:  from interconnectdevice0: Disconnected
```

Related Documentation

- Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 411
- Upgrading Software on a QFabric System on page 528
- *request system software configuration-backup*
- *request system software configuration-restore*

Performing a Recovery Installation

Supported Platforms QFabric System, QFX Series standalone switches

If Junos OS on your device is damaged in some way that prevents the software from loading correctly, you may need to perform a recovery installation using an emergency boot device (for example, a USB flash drive) to restore the default factory installation. Once you have recovered the software, you need to restore the device configuration. You can either create a new configuration as you did when the device was shipped from the factory, or if you saved the previous configuration, you can simply restore that file to the device.

If at all possible, you should try to perform the following steps before you perform the recovery installation:

1. Ensure that you have an emergency boot device to use during the installation. See "Creating an Emergency Boot Device" on page 681 for information on how to create an emergency boot device.
2. Copy the existing configuration in the file **/config/juniper.conf.gz** from the device to a remote system, such as a server, or to an emergency boot device. For extra safety, you can also copy the backup configurations (the files named **/config/juniper.conf.*n***, where *n* is a number from 0 through 9) to a remote system or to an emergency boot device.

   WARNING: The recovery installation process completely overwrites the entire contents of the internal flash storage.

3. Copy any other stored files to a remote system as desired.

To reinstall Junos OS:

1. Insert the emergency boot device into the QFX Series device.
2. Reboot the QFX Series device.

   NOTE: Do not power off the device if it is already on.

[edit system]
user@device> **request system reboot**

If you do not have access to the CLI, power cycle the QFX Series device.

The emergency boot device (external USB install media) is detected. At this time, you can load the Junos OS from the emergency boot device onto the internal flash storage.

3. The software prompts you with the following options:

```
External USB install media detected.
You can load Junos from this media onto an internal drive.
Press 'y' to proceed, 'f' to format and install, or 'n' to abort.
Do you wish to continue ([y]/f/n)? f
```

4. Type **f** to format the internal flash storage and install the Junos OS on the emergency boot device onto the internal flash storage.

   If you do no want to format the internal flash storage, type **y**.

   The following messages are displayed:

```
Installing packages from external USB drive da1
Packages will be installed to da0, media size: 8G

Processing format options
Fri September  4 01:18:44 UTC 2012

-- IMPORTANT INFORMATION --
Installer has detected settings to format system boot media.
This operation will erase all data from your system.

Formatting installation disk .. this will take a while, please wait
Disabling platform watchdog - threshold 12 mins

Determining installation slice
Fri September  4 01:27:07 UTC 2012
```

5. The device copies the software from the emergency boot device, occasionally displaying status messages. Copying the software can take up to 12 minutes.

   When the device is finished copying the software, you are presented with the following prompt:

```
*** Fri September  4 01:19:00 UTC 2012***
Installation successful..
Please select one of the following options:
Reboot to installed Junos after removing install media (default) ... 1
Reboot to installed Junos by disabling install media .............. 2
Exit to installer debug shell ..................................... 3
Install Junos to alternate slice .................................. 4
Your choice: 4
NOTE: System installer will now install Junos to alternate slice
Do not power off or remove the external installer media or
interrupt the installation mechanism.
```

6. Select **4** to install Junos OS to the alternate slice of the partition, and then press Enter.

7. Remove the emergency boot device when prompted and then press Enter. The device then reboots from the internal flash storage on which the software was just installed. When the reboot is complete, the device displays the login prompt.
8. Create a new configuration as you did when the device was shipped from the factory, or restore the previously saved configuration file to the device.

Related Documentation

- Creating an Emergency Boot Device on page 681

Creating an Emergency Boot Device

Supported Platforms QFX Series standalone switches

If Junos OS on the device is damaged in some way that prevents the software from loading properly, you can use an emergency boot device to repartition the primary disk and load a fresh installation of Junos OS. Use the following procedure to create an emergency boot device.

Before you begin, you need to download the installation media image for your device and Junos OS release from http://www.juniper.net/customers/support/ .

NOTE: **In the following procedure, we assume that you are creating the emergency boot device on a QFX device or EX4600 device. You can create the emergency boot device on another Juniper Networks switch or router, or any PC or laptop that supports Linux. The steps you take to create the emergency boot device vary, depending on the device.**

To create an emergency boot device:

1. Use FTP to copy the installation media image into the **/var/tmp** directory on the device.
2. Insert a USB device into the USB port.
3. From the Junos OS command-line interface (CLI), start the shell:

   ```
   user@device> start shell
   %
   ```
4. Switch to the root account using the **su** command:

   ```
   % su
   Password: password
   ```

   NOTE: **The password is the root password for the device. If you logged in to the device as root, you do not need to perform this step.**

5. Enter the following command on the QFX3500, QFX3600, and QFX3600-I devices:

   ```
   root@device% dd if=/var/tmp/filename of=/dev/da1 bs=16k
   ```

   The device writes the installation media image to the USB device:

```
root@device% dd if=/var/tmp/install-media-qfx3500.junos_11.1 of=/dev/da1 bs=16k
11006+1 records in
11006+1 records out
180332544 bytes transferred in 71.764266 secs (2512846 bytes/sec)
```

6. Enter the following command on the QFX5100 and EX4600 devices:

   `root@device%` **dd if=/var/tmp/*filename* of=/dev/da0 bs=1048576**

   The device writes the installation media image to the USB device:

```
root@device% dd if=/var/tmp/jinstall-vjunos-usb-13.2.img of=/dev/da0 bs=1048576
11006+1 records in
11006+1 records out
180332544 bytes transferred in 71.764266 secs (2512846 bytes/sec)
```

7. Log out of the shell:

```
root@device% exit
% exit
user@device>
```

Related Documentation

- *USB Port Specifications for the QFX Series*
- Performing a Recovery Installation on page 679
- Performing a QFabric System Recovery Installation on the Director Group on page 672
- *Performing a Recovery Installation*

