



QFX3000-M QFabric System Deployment Guide

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About the Documentation

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- Using the Examples in This Manual on page xxv
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- Documentation Feedback on page xxix
- Requesting Technical Support on page xxix

Documentation and Release Notes

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <http://www.juniper.net/techpubs/>.

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

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

Supported Platforms

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

- QFabric System
- QFX3000-M

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.xml;
    }
  }
}
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.xml; }
```

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 [CLI Explorer](#).

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
<i>Italic text like this</i>	<ul style="list-style-type: none">Introduces or emphasizes important new terms.Identifies guide names.Identifies RFC and Internet draft titles.	<ul style="list-style-type: none">A policy <i>term</i> is a named structure that defines match conditions and actions.<i>Junos OS CLI User Guide</i>RFC 1997, <i>BGP Communities Attribute</i>
<i>Italic text like this</i>	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 <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none">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 <i>metric</i>>;
(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 (<i>string1</i> <i>string2</i> <i>string3</i>)
# (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 [<i>community-ids</i>]
Indentation and braces ({ })	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; 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.	<ul style="list-style-type: none">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 of the Juniper Networks TechLibrary 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.

Self-Help Online Tools and Resources

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

- [Before You Begin on page 3](#)
- [Hardware Architecture Overview on page 17](#)
- [Software Architecture Overview on page 37](#)
- [Software Features on page 47](#)
- [Licenses on page 87](#)

CHAPTER 1

Before You Begin

- [QFabric System Overview on page 3](#)
- [Understanding QFabric System Terminology on page 7](#)
- [Understanding Interfaces on the QFabric System on page 12](#)

QFabric System Overview

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

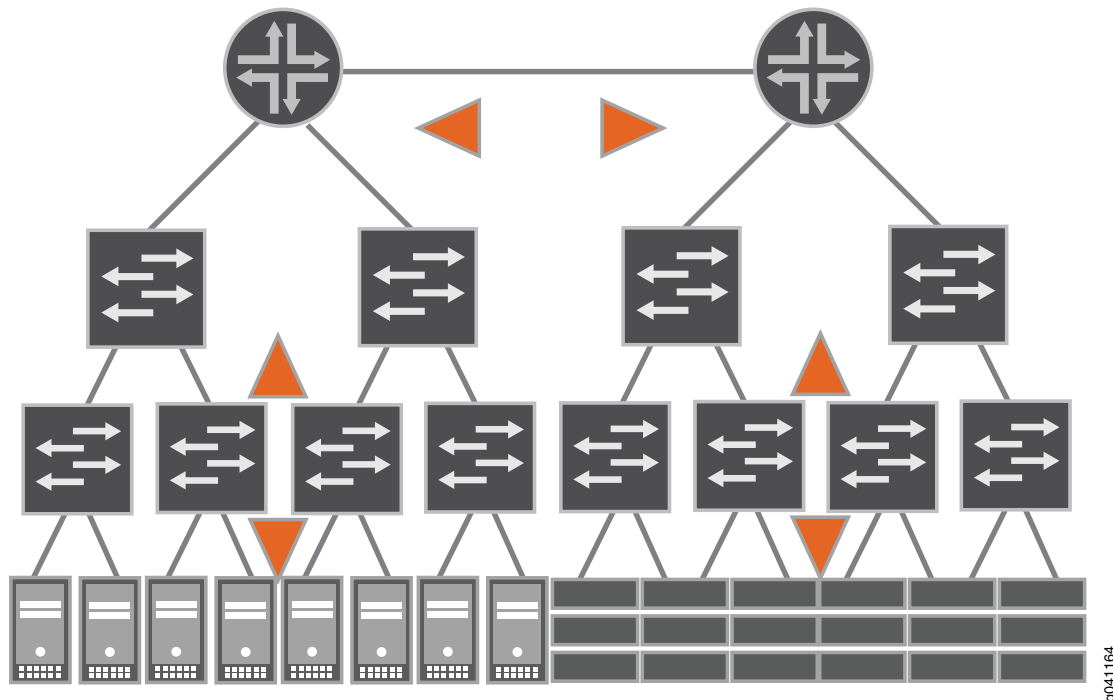
This topic covers:

- [Legacy Data Center Architecture on page 3](#)
- [QFX Series QFabric System Architecture on page 5](#)

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.

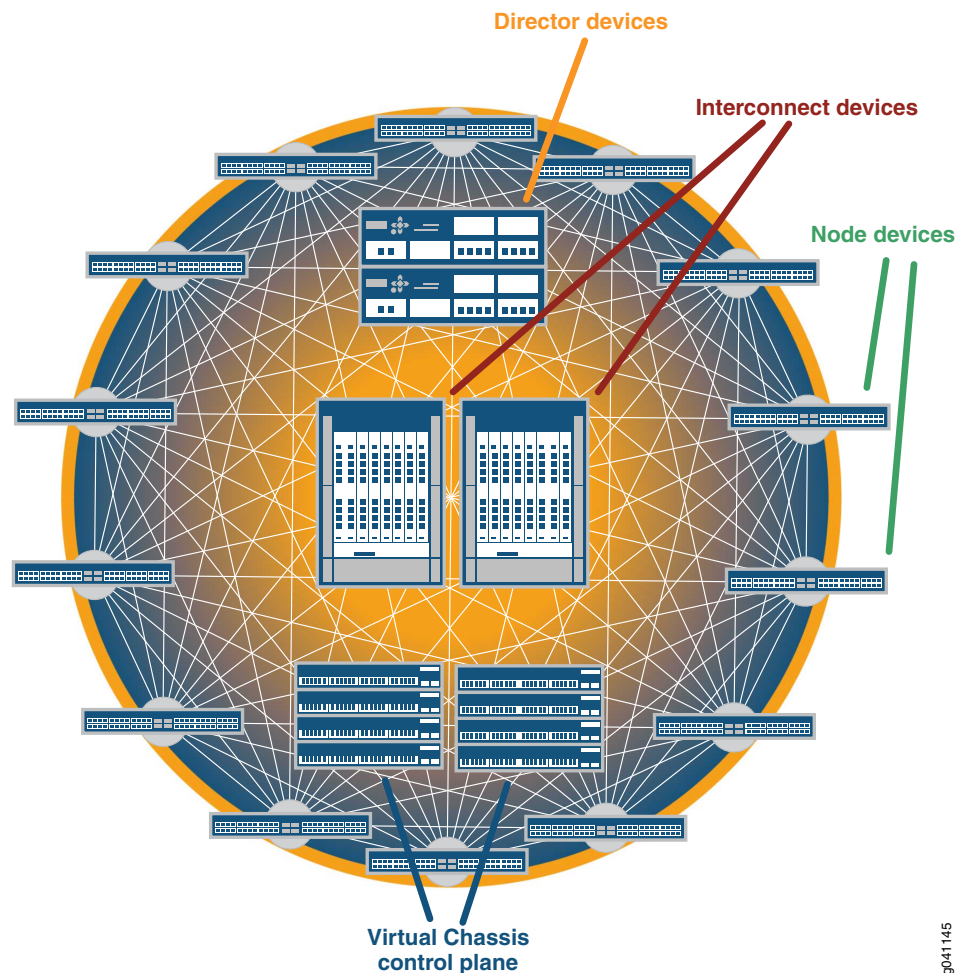
The problems that exist with the multi-tiered data center architecture include:

- **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



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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 37](#)

Understanding QFabric System Terminology

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 <i>Director group</i> , which provides redundancy and high availability by way of additional memory and processing power. (See also <i>Director group</i> .)
Director group	<p>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.</p> <p>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 <i>Director software</i> and <i>Director device</i>.)</p>
Director software	Software that handles QFabric system administration tasks, such as fabric management and configuration. The Junos OS-based Director software runs on the <i>Director group</i> , 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 <i>Director device</i> and <i>Director group</i> .)
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, the QFX5100-24Q configured as an Interconnect device, and the QFX3600-I Interconnect device in a QFX3000-M QFabric system. (See also <i>Node device</i> .)
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 <i>Interconnect device</i> and <i>network Node group</i> .)
partition	<p>Collection of physical or logical QFabric system hardware components (such as Node devices) that provides fault isolation, separation, and security.</p> <p>In their initial state, all QFabric system components belong to a <i>default partition</i>.</p>
QFabric system	<p>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.</p> <p>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 <i>Director group</i>, <i>Node device</i>, and <i>Interconnect device</i> functions and capabilities.</p>

Table 3: QFabric System Terms (*continued*)

Term	Definition
QFabric system control plane	<p>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:</p> <ul style="list-style-type: none"> • <i>Node devices</i>, such as the QFX3500 Node device. • <i>Interconnect devices</i>, such as the QFX3008-I Interconnect device. • <i>Director group</i> processes, such as management applications, provisioning, and topology discovery. • <i>Control plane Ethernet switches</i> 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. <p>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.</p>
QFabric system data plane	<p>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:</p> <ul style="list-style-type: none"> • 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. <p>To maintain high availability, the QFabric system data plane is separate from the QFabric system control plane.</p>
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	<p>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.</p> <p>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 <i>QFX3500 switch</i>.)</p>

Table 3: QFabric System Terms (*continued*)

Term	Definition
QFX3500 switch	<p>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.</p> <p>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 <i>QFX3500 Node device</i>.)</p>
QFX3600 Node device	<p>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.</p> <p>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 <i>QFX3600 switch</i>.)</p>
QFX3600 switch	<p>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.</p> <p>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 <i>QFX3600 Node device</i>.)</p>

Table 3: QFabric System Terms (*continued*)

Term	Definition
QFX5100 Node device	<p>QFabric system Node device that connects to either endpoint systems (such as servers and storage devices) or external networks. All three supported models are packaged in an industry-standard 1U, 19-inch rack-mounted enclosure. A QFX5100 Node device can be any of these models:</p> <ul style="list-style-type: none"> • QFX5100-48S By default, the QFX5100-48S Node device 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, of which four are uplinks (FTE). • QFX5100-48T By default, the QFX5100-48T Node device provides 48 10GBASE-T interfaces to connect to endpoints. There are also six 40-Gbps QSFP+ interfaces, of which four are uplinks (FTE) • QFX5100-24Q By default, the QFX5100-24Q Node device provides 24 40-Gigabit Ethernet QSFP+ interfaces to connect to the endpoints. The QFX5100-24Q has two expansion bays. The number of additional interfaces available depends on the expansion module and the System mode configured for the Node device. <p>By default, on the QFX5100-48S Node device and QFX5100-48T Node device, the first 4 ports (labeled fte-0/1/0 through fte-0/1/3) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 2 ports (labeled xle-0/1/4 and xle-0/1/5) 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-0/1/2 and xle-0/1/3) for additional connections to either endpoint systems or external networks.</p> <p>(See also <i>QFX3500 Node device</i> and <i>QFX3600 Node device</i>.)</p>
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	<p>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.</p> <p>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).</p>

Table 3: QFabric System Terms (*continued*)

Term	Definition
routing instance	<p>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.</p> <p>(See also <i>virtual private network</i>.)</p>
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 <i>routing instance</i> .
flow group	Force redundant multicast streams to flow through different interconnect devices to prevent a single interconnect device from potentially dropping both streams of multicast traffic during a failure.

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 37](#)
- [Understanding Fibre Channel Terminology](#)
- [Understanding QFabric Multicast Flow Groups](#)

Understanding Interfaces on the QFabric System

This topic describes:

- [Four-Level Interface Naming Convention on page 12](#)
- [QSFP+ Interfaces on page 13](#)
- [Link Aggregation on page 16](#)

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 474](#)). [Table 4 on page 13](#) 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
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

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)
Q4	xe-0/0/16	xle-0/1/4	fte-0/1/4
	xe-0/0/17		
	xe-0/0/18		
	xe-0/0/19		
Q5	xe-0/0/20	xle-0/1/5	fte-0/1/5
	xe-0/0/21		
	xe-0/0/22		
	xe-0/0/23		
Q6	xe-0/0/24	xle-0/1/6	fte-0/1/6
	xe-0/0/25		
	xe-0/0/26		
	xe-0/0/27		
Q7	xe-0/0/28	xle-0/1/7	fte-0/1/7
	xe-0/0/29		
	xe-0/0/30		
	xe-0/0/31		
Q8	xe-0/0/32	xle-0/1/8	Not supported on this port
	xe-0/0/33		
	xe-0/0/34		
	xe-0/0/35		
Q9	xe-0/0/36	xle-0/1/9	Not supported on this port
	xe-0/0/37		
	xe-0/0/38		
	xe-0/0/39		
Q10	xe-0/0/40	xle-0/1/10	Not supported on this port
	xe-0/0/41		
	xe-0/0/42		
	xe-0/0/43		

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)
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 478](#)). [Table 5 on page 16](#) 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 474](#)
- [Configuring the QSFP+ Port Type on QFX5100 Devices on page 478](#)

CHAPTER 2

Hardware Architecture Overview

- [Understanding the QFabric System Hardware Architecture on page 17](#)
- [Understanding the Director Group on page 21](#)
- [Understanding Routing Engines in the QFabric System on page 22](#)
- [Understanding Interconnect Devices on page 23](#)
- [Understanding Node Devices on page 27](#)
- [Understanding Node Groups on page 31](#)
- [Understanding Port Oversubscription on Node Devices on page 32](#)

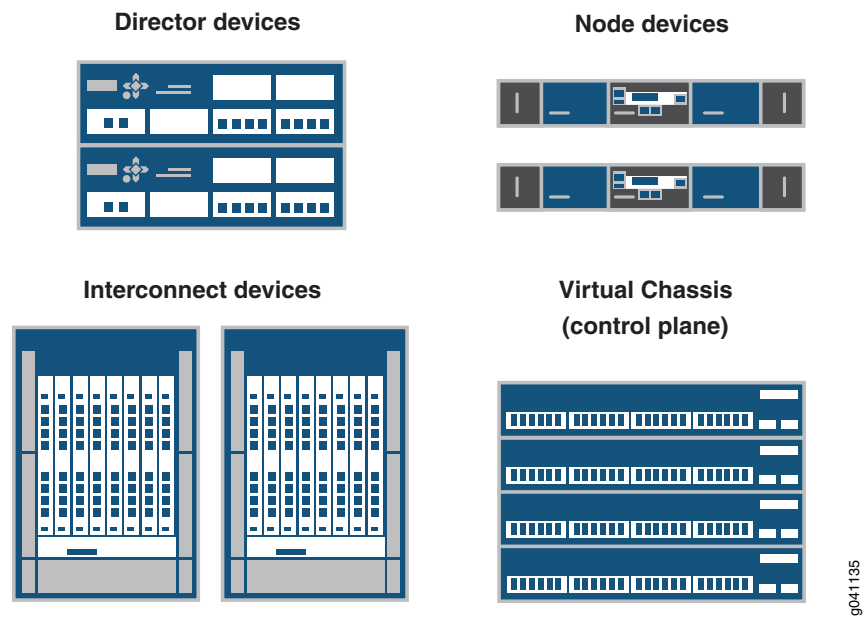
Understanding the QFabric System Hardware Architecture

- [QFabric System Hardware Architecture Overview on page 17](#)
- [QFX3000-G QFabric System Features on page 20](#)
- [QFX3000-M QFabric System Features on page 20](#)

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 or a group of EX4300 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 QFX5100-48S, QFX5100-48T, and QFX5100-24Q 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 or four EX4300-48T switches each (for a copper-based control plane) or eight EX4200-24F or four EX4300-48P 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 QFX5100-48S, QFX5100-48T, and QFX5100-24Q Node devices NOTE: <ul style="list-style-type: none">There can be a maximum of 16 Node devices in the QFX3000-M QFabric system using QFX3600-I as Interconnect devices and 32 Node devices using the QFX5100-24Q as Interconnect devices.NOTE: QFX5100-24Q Interconnect devices and QFX3600-I Interconnect devices cannot be mixed on the same 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 or two EX4300 switches NOTE: For a copper-based QFX3000-M QFabric system control plane network, use EX4200-24T or EX4300-48T switches with an SFP+ uplink module installed. For a fiber-based control plane network, use EX4200-24F or EX4300-48P 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 32 Node devices and 4 QFX5100-24Q Interconnect devices or 16 Node device and 4 QFX3600-I Interconnect devices.



NOTE: You may not mix QFX5100-24Q Interconnect devices with QFX3600-I Interconnect devices on the same QFX3000-M QFabric system.

- 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 37](#)
- [Understanding the Director Group on page 21](#)
- [Understanding Routing Engines in the QFabric System on page 22](#)
- [Understanding Interconnect Devices on page 23](#)
- [Understanding Node Devices on page 27](#)
- [Understanding Node Groups on page 31](#)
- [Understanding Partitions on page 39](#)

Understanding the Director Group

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 21](#)
- [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 441](#)
- [Understanding Routing Engines in the QFabric System on page 22](#)

- [Understanding the QFabric System Hardware Architecture on page 17](#)

Understanding Routing Engines in the 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

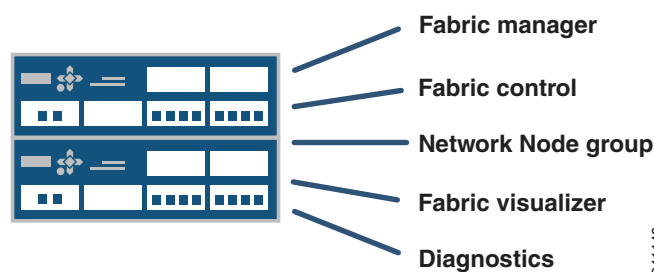
A traditional Juniper Networks Routing Engine is a hardware field-replaceable unit that runs routing protocols, builds the routing and switching tables, sends routing information to the Packet Forwarding Engine, and handles several software processes for the device (such as interface control, chassis 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



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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 21](#)
- [Understanding the QFabric System Control Plane on page 41](#)
- [Understanding the QFabric System Hardware Architecture on page 17](#)

Understanding Interconnect Devices

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](#)
- [QFX5100-24Q Interconnect Devices on page 26](#)

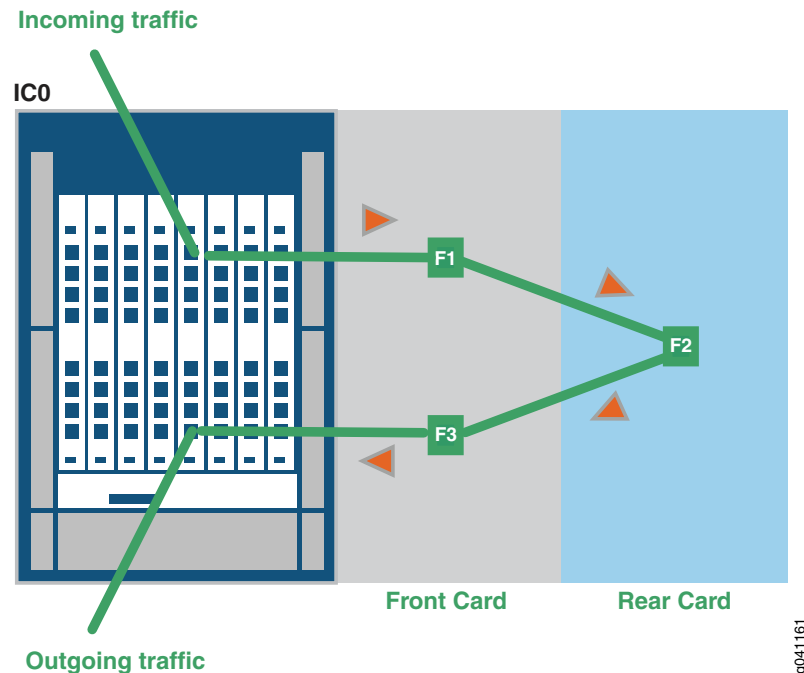
Interconnect Device Introduction

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

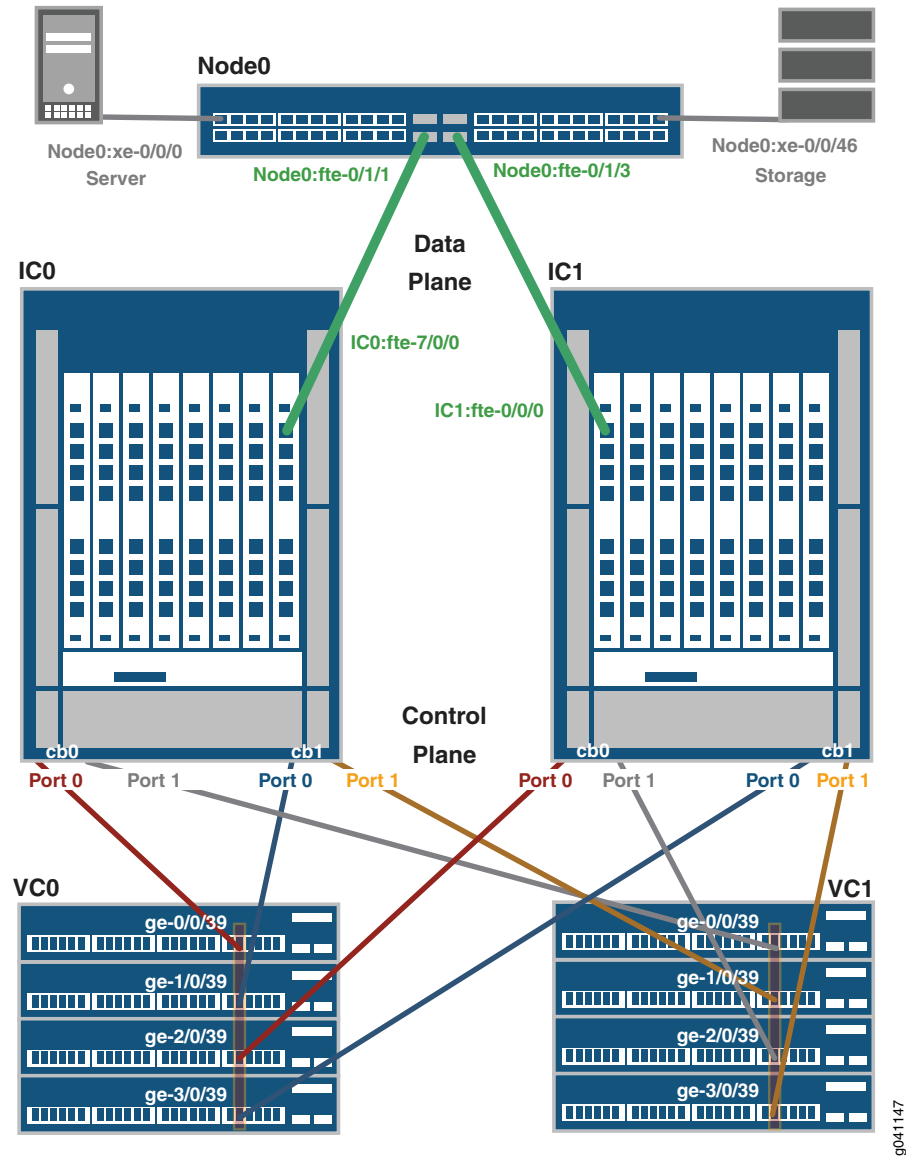


Traffic enters a QSFP+ port from a Node device, and an ingress chipset provides stage F1 processing. For the F2 stage, the frame is sent to a rear card and processed by a midplane chipset. Lastly, an egress chipset on the front card QSFP+ port handles processing tasks for the F3 stage. At each of the 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.

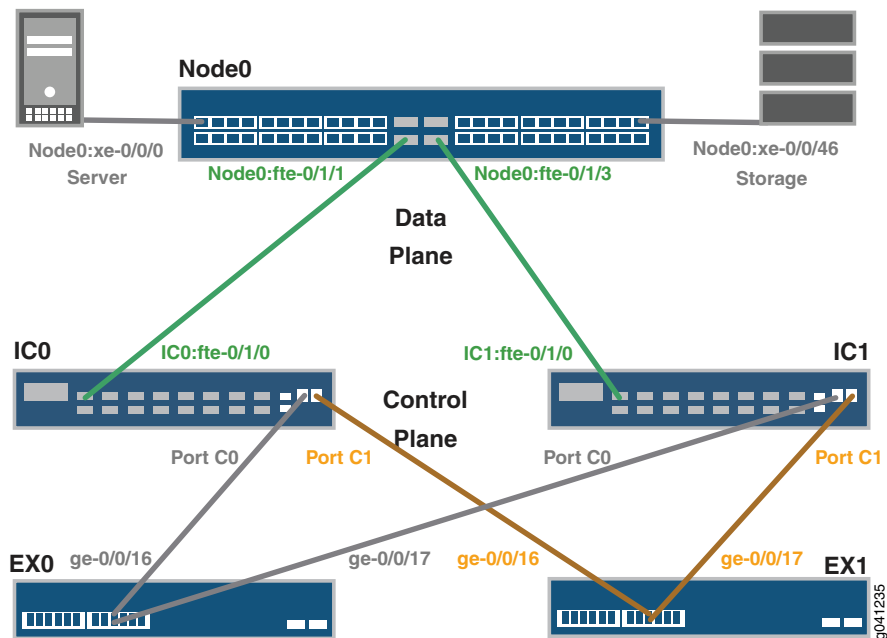
Figure 6: QFX3008-I Data Plane and Control Plane Connections



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.

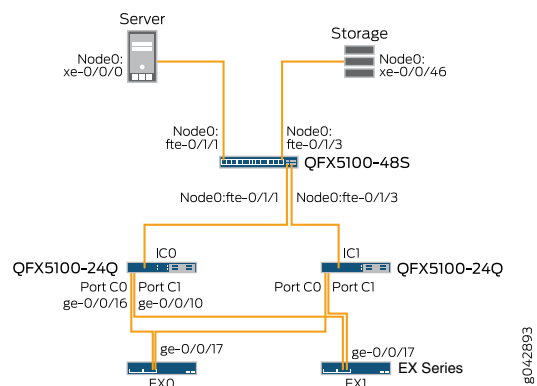
Figure 7: QFX3600-I Data Plane and Control Plane Connections



QFX5100-24Q Interconnect Devices

The QFX5100-24Q switch can be configured to operate either as an Interconnect device or as a Node device in a QFX3000-M QFabric system. The QFX5100-24Q has 24 40-Gbps QSFP+ ports and can hold an additional 8 40-Gbps QSFP+ ports. These QSFP+ ports provide interconnects for the entire QFabric system. QFX5100 devices have a minimum of two management ports: a 10/100/1000BASE-T RJ-45 port and a 1-Gbps SFP ports. If you plan to use all fiber connections, be sure to order the product SKUs have an additional 1-Gbps SFP port that can be used either for fiber or copper connections.

Figure 8: QFX5100-24Q Data Plane and Control Plane Connections



Related Documentation

- [Understanding Node Devices on page 27](#)

- [Understanding the QFabric System Data Plane on page 45](#)
- [Understanding the QFabric System Control Plane on page 41](#)
- [Understanding the QFabric System Hardware Architecture on page 17](#)

Understanding Node Devices

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 27](#)
- [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.

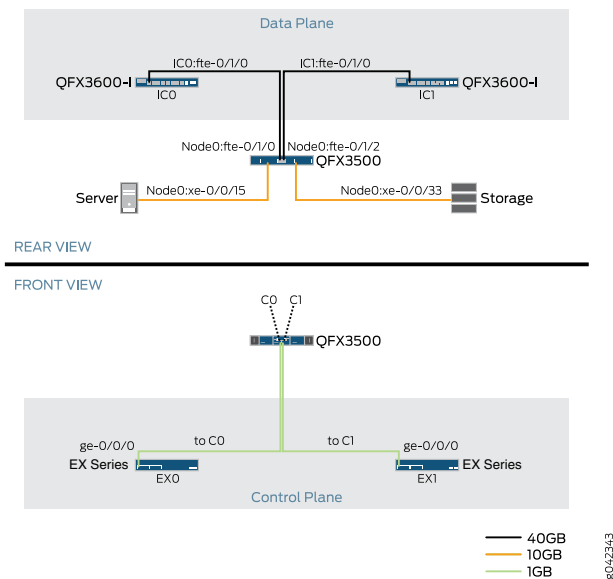


NOTE: You can configure interface ports 0 through 47 as 10-Gigabit Ethernet ports, 0 through 5 and 42 through 47 as Fibre Channel over Ethernet ports, and 6 through 41 as Gigabit Ethernet ports. However, you cannot configure any Fibre Channel over Ethernet ports as Gigabit Ethernet ports or vice versa.

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 9 on page 28](#) shows an example of the data plane and control plane connections for a QFX3500 Node device.

Figure 9: QFX3500 Data Plane and Control Plane Connections

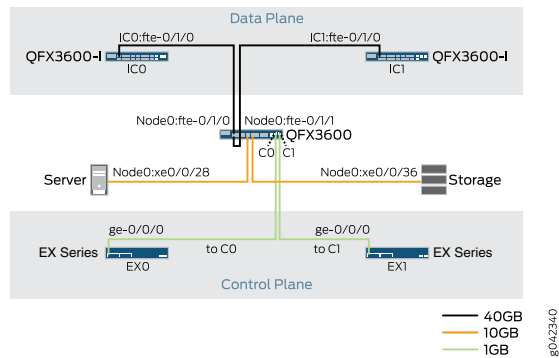


QFX3600 Node Devices

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 10 on page 29](#) shows an example of the data plane and control plane connections for a QFX3600 Node device.

Figure 10: QFX3600 Data Plane and Control Plane Connections



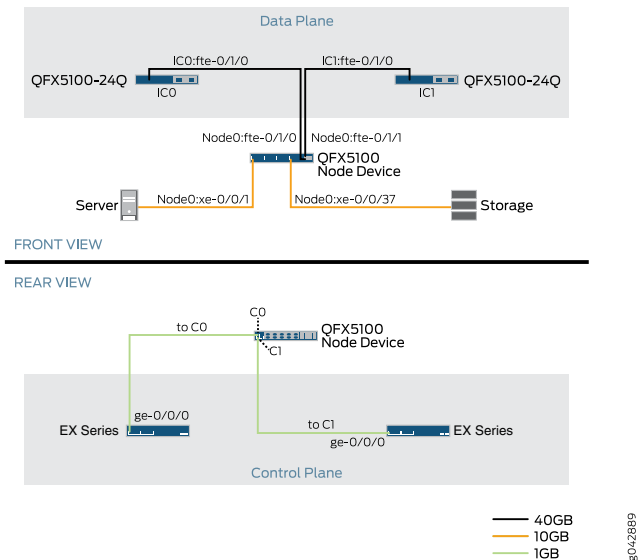
QFX5100 Node Devices

Three models of the QFX5100 line of switches are supported as Node devices on a QFabric system:

- QFX5100-48S
- QFX5100-48T
- QFX5100-24Q

Figure 11 on page 29 shows an example of the data plane and control plane connections for a QFX5100 Node device.

Figure 11: QFX5100 Data Plane and Control Plane Connections



- QFX5100-48S

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-0/1/0** through **fte-0/1/1**) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 2 QSFP+ interfaces (labeled **xle-0/1/4** and **xle-0/1/5**) 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-0/1/8** and **xle-0/1/15**) for 10-Gigabit Ethernet or 40-Gigabit Ethernet connections to either endpoint systems or external networks, and you can choose to configure the last two interfaces (**fte-0/1/4** and **fte-0/1/5**) for uplink connections between your Node device and your Interconnect devices.

- QFX5100-48T

A QFX5100-48T Node device provides 48 10GBASE-T interfaces to connect to endpoints or external networks and 6 40-Gbps QSFP+ interfaces.

By default, 4 of the QSFP+ interfaces (labeled **fte-0/1/0** through **fte-0/1/3**) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 2 QSFP+ interfaces (labeled **xle-0/1/4** and **xle-0/1/5**) 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-0/1/8** and **xle-0/1/15**) for 10-Gigabit Ethernet or 40-Gigabit Ethernet connections to either endpoint systems or external networks, and you can choose to configure the last two interfaces (**fte-0/1/4** and **fte-0/1/5**) for uplink connections between your Node device and your Interconnect devices.

- QFX5100-24Q

A QFX5100-24Q Node device provides 24 QSFP+ interfaces **fte-0/1/0** through **fte-0/1/7** as uplinks and **xle-0/1/8** to **xle-0/1/23** as endpoint systems or external networks.

The QFX5100-24Q has two expansion bays. With the optional QFX-EM-4Q expansion modules, the QFX5100-24Q can provide an additional 8 40-Gbps interfaces that are channelized into 10G ports. The QFX-EM-4Q expansion modules only support 40 Gigabit XLE interfaces. Valid interfaces are in the range of **xle-0/2/0** to **xle-0/2/3** for the first expansion module and from **xle-0/3/0** to **xle-0/3/3** in the second expansion module.

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

Related Documentation

- [Converting the Device Mode for a QFabric System Component on page 408](#)
- [Configuring Aliases for the QFabric System on page 460](#)
- [Configuring Node Groups for the QFabric System on page 470](#)
- [Configuring the Port Type on QFX3600 Node Devices on page 474](#)
- [Understanding Node Groups on page 31](#)
- [Understanding Interconnect Devices on page 23](#)
- [Understanding the QFabric System Data Plane on page 45](#)
- [Understanding the QFabric System Control Plane on page 41](#)

- [Understanding the QFabric System Hardware Architecture on page 17](#)

Understanding Node Groups

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 470](#)
- [Understanding Node Devices on page 27](#)
- [Understanding Routing Engines in the QFabric System on page 22](#)
- [Understanding the QFabric System Hardware Architecture on page 17](#)

Understanding Port Oversubscription on Node Devices

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 the Interconnect devices.. 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.

Other important factors to consider are:

- When you connect more than one port on a Node device to an Interconnect device, you reduce the overall number of Node devices supported on the QFabric system.
- When you have two Interconnect devices and a single connection from each Node device, you can connect any remaining ports as access ports not server ports.

[Table 7 on page 33](#) shows the oversubscription ratio for ports on QFX3500 Node devices in default mode 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 in default mode 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 QFX5100-48S Node devices and QFX5100-48T 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 QFX5100-48S and QFX5100-48T Node Devices

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

Unlike other Node Devices, the QFX5100-24Q supports the QFX-EM-4Q expansion module, that impact the oversubscription ratio. [Table 10 on page 34](#) shows the

oversubscription ratio for the base model without expansion modules inserted into the device and with two QFX-EM-4Q modules installed. Other factors that impact the oversubscription ratio include the system mode selected for the device. See [Table 11 on page 34](#) for details on system mode.

Table 10: Oversubscription Ratio on QFX5100-24Q Node Devices

Number of Interconnect Devices	Number of Connections from Each Node Device to Each Interconnect Device	Oversubscription Ratio on Node Device	Oversubscription Ratio on Node Device with Two QFX-EM-4Q Installed
2	1	8:1	12:1
2	2	4:1	6:1
2	4	2:1	3:1
2	8	N/A	1:1
4	1	4:1	6:1
4	2	2:1	3:1
4	4	N/A	1:1

[Table 11 on page 34](#) shows the ports the default port configuration and identifies the ports that can be converted on Node devices. Because the QFX5100-24Q has expansion bays that allow you to add additional types of ports, see [Table 12 on page 35](#) for the supported system modes and default configuration of that Node device.

Table 11: Port Configurations on Node Devices

Model	Total Ports	Fixed FTE Ports	Ports that can be configured FTE or XLE	Ports that can be configured XLE or XE	Default Configuration
QFX3500	<ul style="list-style-type: none"> 48 x 10G 4 x 40G 	Q0 through Q3	NA	NA	<ul style="list-style-type: none"> 48 x 10G (xe-0/0/0 through xe-0/0/47) 4 x 40G (fte-0/1/0 through fte-0/1/3)
QFX3600	16 x 40G	Q0 and Q1	Q2 through Q7	Q2 through Q15	<ul style="list-style-type: none"> 12 x 40G xle-0/1/4 through xle-0/1/15) 4 x 40G (fte-0/1/0 through fte-0/1/3)

Table 11: Port Configurations on Node Devices (*continued*)

Model	Total Ports	Fixed FTE Ports	Ports that can be configured FTE or XLE	Ports that can be configured XLE or XE	Default Configuration
QFX5100-48S and QFX5100-48T	<ul style="list-style-type: none"> 48 x 10G 6 x 40G 	0 and 1	2 through 5	2 through 5	<ul style="list-style-type: none"> 2 x 40G (xle-0/1/4 through xle-0/1/5)) 4 x 40G fte-0/1/0 through fte-0/1/3) 48 x 10G (xe-0/0/0 through xe-0/0/47)
<p>NOTE:</p> <p>Port 2 and port 3 can be configured together as either as XE or XLE. Port 4 and port 5 can be independently configured as XE or XLE.</p>					

The QFX5100-24Q can be configured up to 104 10G ports using different system modes to achieve varying levels of port density. See [Table 12 on page 35](#) for the default configurations for each system mode.

Table 12: QFX5100-24Q System Mode Default Port Configuration

System Mode	Total Ports	Fixed FTE Ports	Ports that can be configured FTE or XLE	Ports that can be configured XLE or XE	Disabled	Default Configuration	QFX-EM-4Q Expansion Modules
Default	24 x 40G (base configuration) optional expansion module configuration of two modules: <ul style="list-style-type: none"> 4 x 4 x 10G (QFX-EM-4Q) 	0 through 7	8 through 15	8 through 23 NOTE: Of these 16 available ports, only 12 may be channelized.	NA	<ul style="list-style-type: none"> 16 x 40G (xle-0/1/8 through xle-0/1/23) 8 x 40G (fte-0/1/0 through fte-0/1/7) 	Ports in the expansion modules are xe by default. The expansion module ports are supported, but cannot be channelized. These ports also cannot be converted to XLE or FTE ports (Xe-0/2/0 through xe-0/2/15 for 1 expansion module and x-0/3/0 and 0/3/15 for a second expansion module)

Related Documentation

- [Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device](#)
- [Connecting a QFX3600 Node Device to a QFX3008-I Interconnect Device](#)
- [Connecting a QFX5100 Node Device to a QFX3008-I Interconnect Device](#)
- [Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device on page 397](#)
- [Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device on page 393](#)

- [Connecting a QFX5100 Node Device to a QFX3600-I Interconnect Device on page 389](#)

CHAPTER 3

Software Architecture Overview

- [Understanding the QFabric System Software Architecture on page 37](#)
- [Understanding the Director Software on page 38](#)
- [Understanding Partitions on page 39](#)
- [Understanding the QFabric System Control Plane on page 41](#)
- [Understanding the QFabric System Data Plane on page 45](#)

Understanding the QFabric System Software Architecture

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 38](#)
 - [Understanding Partitions on page 39](#)
 - [Understanding the QFabric System Control Plane on page 41](#)
 - [Understanding the QFabric System Data Plane on page 45](#)

Understanding the Director Software

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 451](#)
- [Understanding the Director Group on page 21](#)
- [Understanding the QFabric System Software Architecture on page 37](#)

Understanding Partitions

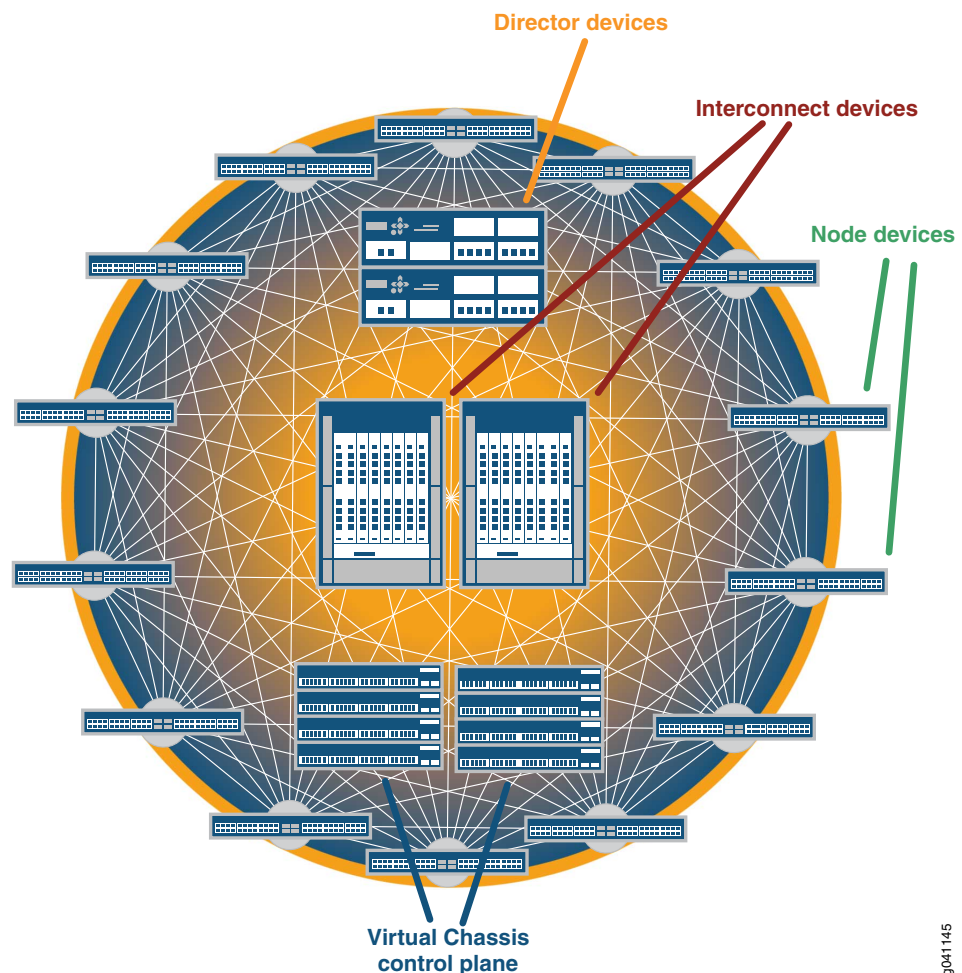
Partitions provide a way to allocate specified virtual and physical resources within your QFabric system. This topic covers:

- [QFabric System Default Partition on page 39](#)

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 12 on page 40](#) shows a topology with the default settings—a single collection that contains all the devices in the QFabric system.

Figure 12: QFabric System Topology - Default Partition



g041145



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 451](#)
- [Understanding the QFabric System Software Architecture on page 37](#)
- [Understanding the QFabric System Hardware Architecture on page 17](#)

Understanding the QFabric System Control Plane

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

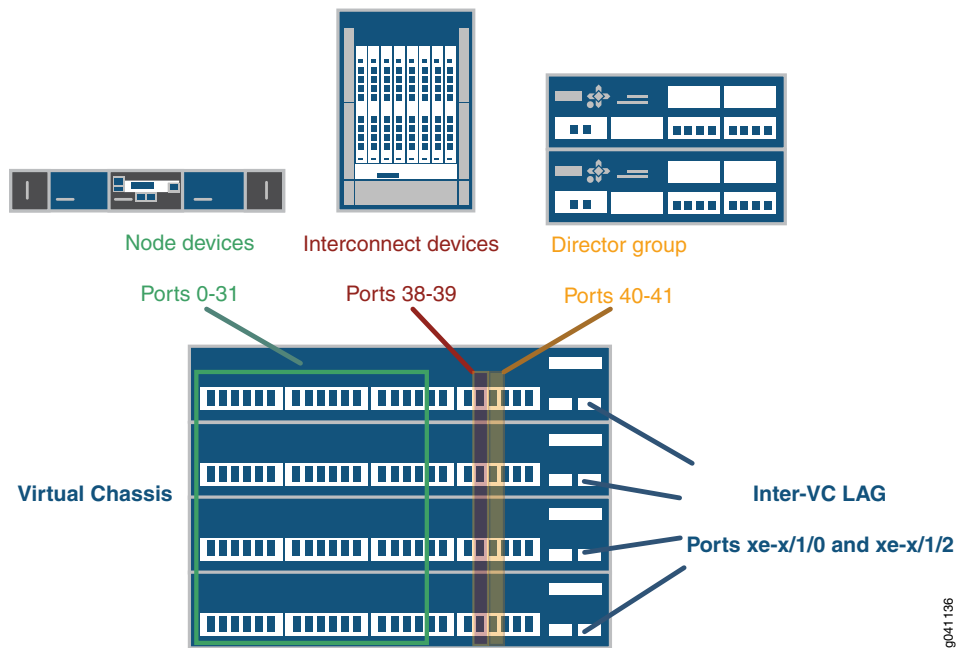
This topic covers:

- [Control Plane Elements on page 42](#)
- [Control Plane Services on page 44](#)

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 13 on page 42](#) shows a diagram of the QFabric system devices that compose the control plane network.

Figure 13: 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 for the QFX3000-G QFabric system requires two Virtual Chassis containing either four EX4200 switch members or four EX4300 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. The control plane for the QFX3000-M QFabric system requires either two EX4200 switches or two EX4300 switches, interconnected and configured in a LAG for redundancy.



NOTE: You cannot mix EX4200 switches and EX4300 switches in the control plane in a QFabric system.

- **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 in a QFX3000-G QFabric system, 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 control plane Virtual Chassis, and connect the second interface from each Control Board to the second control plane 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 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*
- *Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System*
- [Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane on page 414](#)
- **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*
- *Example: Configuring a Fiber-Based Control Plane for the QFX3000-G QFabric System*
- [Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane on page 414](#)
- [Understanding the QFabric System Data Plane on page 45](#)
- [Understanding Routing Engines in the QFabric System on page 22](#)
- [Understanding the QFabric System Hardware Architecture on page 17](#)

Understanding the QFabric System Data Plane

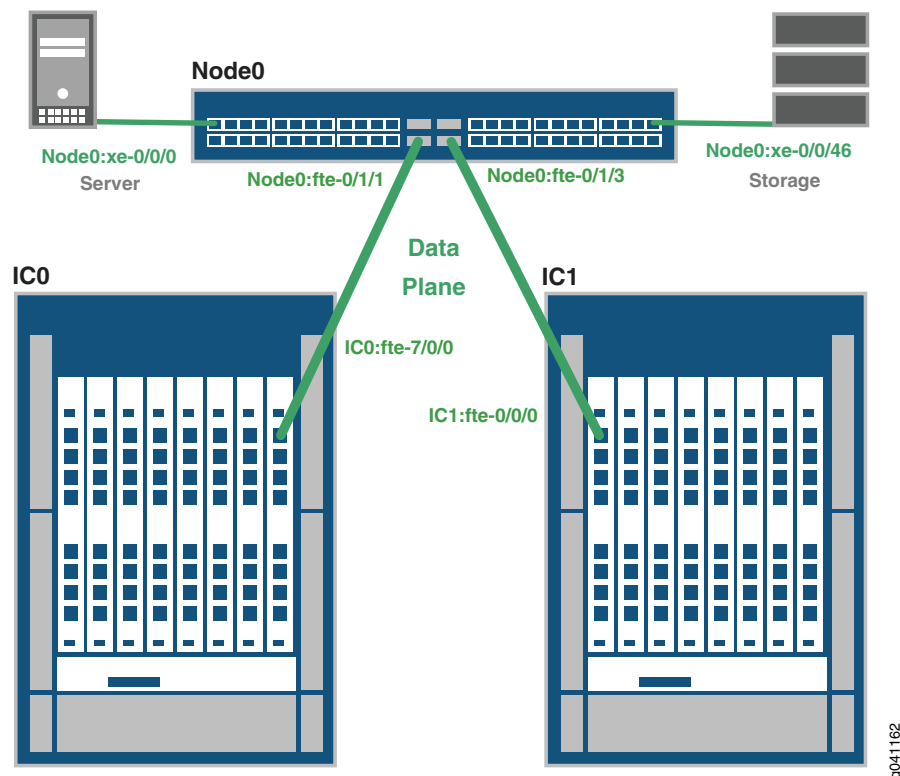
The data plane in the QFabric system transfers application traffic between QFabric system components rapidly and efficiently. This topic covers:

- [Data Plane Components on page 45](#)
- [QFabric System Fabric on page 46](#)

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 14 on page 45](#) shows an example diagram of the QFabric system data plane network.

Figure 14: QFabric System Data Plane Network



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

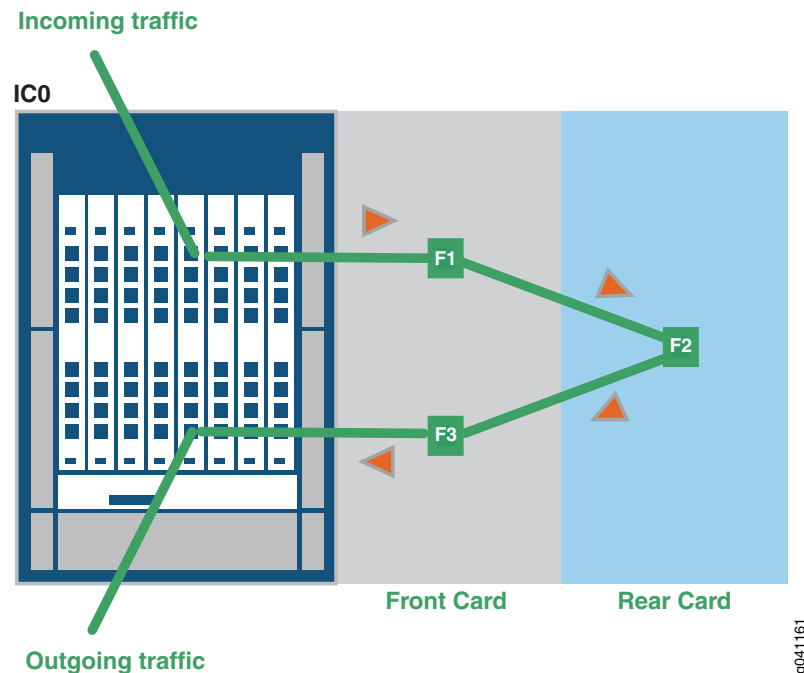
- 10-Gigabit Ethernet or 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel connections between QFabric system endpoints (such as servers or storage devices) and the Node devices.
- 40-Gbps quad, small form-factor pluggable plus (QSFP+) connections between the Node devices and the Interconnect devices.

- 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 15 on page 46.

Figure 15: 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 41](#)
- [Understanding the QFabric System Hardware Architecture on page 17](#)

CHAPTER 4

Software Features

- [Understanding Software Upgrade on the QFabric System on page 47](#)
- [Understanding Nonstop Software Upgrade for QFabric Systems on page 49](#)
- [Understanding Statements and Commands on the QFabric System on page 53](#)
- [Understanding NTP on the QFabric System on page 55](#)
- [Understanding Network Management Implementation on the QFabric System on page 55](#)
- [Understanding the Implementation of SNMP on the QFabric System on page 56](#)
- [Understanding the Implementation of System Log Messages on the QFabric System on page 59](#)
- [Understanding User and Access Management Features on the QFabric System on page 60](#)
- [Understanding QFabric System Login Classes on page 61](#)
- [Understanding Interfaces on the QFabric System on page 62](#)
- [Understanding Layer 3 Features on the QFabric System on page 66](#)
- [Understanding Security Features on the QFabric System on page 67](#)
- [Understanding Port Mirroring on page 68](#)
- [Understanding Fibre Channel Fabrics on the QFabric System on page 73](#)
- [Understanding CoS Fabric Forwarding Class Sets on page 75](#)

Understanding Software Upgrade on the 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 on page 47](#)
- [Operational Reboot Commands on page 48](#)

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 558](#)

Understanding Nonstop Software Upgrade for QFabric Systems

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:



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 538](#).
 - 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 485](#).
 - 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 533](#)
- [Verifying Nonstop Software Upgrade for QFabric Systems on page 538](#)
- [request system software nonstop-upgrade on page 589](#)
- [request system software add](#)
- [Configuring Graceful Restart for QFabric Systems on page 485](#)

Understanding Statements and Commands on the QFabric System

- [Chassis Statements on page 53](#)
- [Chassis Commands on page 54](#)

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 405](#)
- [Understanding User and Access Management Features on the QFabric System on page 60](#)
- [Generating the MAC Address Range for a QFabric System on page 440](#)
- [Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 441](#)

Understanding NTP on the 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 Switch to Listen for Broadcast Messages Using NTP*
- *Configuring the 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

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.



NOTE: Do not install Junos Space and AIS on the control plane network EX4200 switches or EX4200 Virtual Chassis in a QFX3000 QFabric system

**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 56](#)
- [SNMP MIBs Support](#)

Understanding the Implementation of SNMP on the 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

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 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 on page 483](#)
- [syslog \(QFabric System\) on page 529](#)

Understanding User and Access Management Features on the 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

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 452](#)
- [remote-debug-permission on page 525](#)
- [request component login on page 572](#)
- [Junos OS Login Classes Overview](#)

Understanding Interfaces on the QFabric System

This topic describes:

- [Four-Level Interface Naming Convention on page 62](#)
- [QSFP+ Interfaces on page 63](#)
- [Link Aggregation on page 66](#)

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 474](#)). [Table 4 on page 13](#) shows the port mappings for QFX3600 Node devices.

Table 13: 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
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

Table 13: 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)
Q5	xe-0/0/20	xle-0/1/5	fte-0/1/5
	xe-0/0/21		
	xe-0/0/22		
	xe-0/0/23		
Q6	xe-0/0/24	xle-0/1/6	fte-0/1/6
	xe-0/0/25		
	xe-0/0/26		
	xe-0/0/27		
Q7	xe-0/0/28	xle-0/1/7	fte-0/1/7
	xe-0/0/29		
	xe-0/0/30		
	xe-0/0/31		
Q8	xe-0/0/32	xle-0/1/8	Not supported on this port
	xe-0/0/33		
	xe-0/0/34		
	xe-0/0/35		
Q9	xe-0/0/36	xle-0/1/9	Not supported on this port
	xe-0/0/37		
	xe-0/0/38		
	xe-0/0/39		
Q10	xe-0/0/40	xle-0/1/10	Not supported on this port
	xe-0/0/41		
	xe-0/0/42		
	xe-0/0/43		
Q11	xe-0/0/44	xle-0/1/11	Not supported on this port
	xe-0/0/45		
	xe-0/0/46		
	xe-0/0/47		

Table 13: 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)
Q12	xe-0/0/48	xle-0/1/12	Not supported on this port
	xe-0/0/49		
	xe-0/0/50		
	xe-0/0/51		
Q13	xe-0/0/52	xle-0/1/13	Not supported on this port
	xe-0/0/53		
	xe-0/0/54		
	xe-0/0/55		
Q14	xe-0/0/56	xle-0/1/14	Not supported on this port
	xe-0/0/57		
	xe-0/0/58		
	xe-0/0/59		
Q15	xe-0/0/60	xle-0/1/15	Not supported on this port
	xe-0/0/61		
	xe-0/0/62		
	xe-0/0/63		

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 478](#)). [Table 5 on page 16](#) shows the port mappings for QFX5100-48S Node devices.

Table 14: 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

Table 14: QFX5100-48S Node Device Port Mappings (*continued*)

Port Number	40-Gigabit Ethernet Interfaces (On PIC 1)	40-Gigabit Data Plane Uplink Interfaces (On PIC 1)
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 474](#)
- [Configuring the QSFP+ Port Type on QFX5100 Devices on page 478](#)

Understanding Layer 3 Features on the 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

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

- [Port Mirroring Overview on page 68](#)
- [Port Mirroring Instance Types on page 69](#)
- [Port-Mirroring Terminology on page 69](#)
- [Port Mirroring and STP on page 71](#)
- [Port Mirroring Constraints and Limitations on page 71](#)

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** 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** action. You can use this approach if there is only one port-mirroring instance defined.

Port-Mirroring Terminology

Table 15 on page 69 lists the terms used in the documentation about port mirroring and provides definitions.

Table 15: 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).

Table 15: Port Mirroring Terms and Definitions (*continued*)

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 <i>instance-name</i> in the firewall filter configuration to send packets to the port mirror.
Output interface (also known as monitor interface)	<p>Access interface to which packet copies are sent and to which a device running an analyzer application is connected.</p> <p>The following limitations apply to an output interface:</p> <ul style="list-style-type: none"> • 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. <p>If the capacity of the output interface is insufficient to handle the traffic from the source ports, overflow packets are dropped.</p>
Output IP address	<p>IP address of the device running an analyzer application. The device can be on a remote network. When you use this feature, the mirrored packets are GRE-encapsulated. The analyzer device must be able to de-encapsulate GRE-encapsulated packets, or the GRE-encapsulated packets must be de-encapsulated before reaching the analyzer device. (You can use a network sniffer to de-encapsulate the packets.)</p> <ul style="list-style-type: none"> • An output IP 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).
Output VLAN (also known as monitor or analyzer VLAN)	<p>VLAN to which copies are sent and to which a device running an analyzer application is connected. The analyzer VLAN can span multiple switches.</p> <p>The following limitations apply to an output VLAN:</p> <ul style="list-style-type: none"> • 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 15: 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.
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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

- [Local and Remote Port Mirroring on page 71](#)
- [Remote Port Mirroring Only on page 73](#)

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

Understanding Fibre Channel Fabrics on the 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

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. Fabric fc-sets are mapped directly to Interconnect device output queues; in this way, they behave similarly to forwarding classes on a Node device.

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. Also like fc-sets on a Node device, you can 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. The CoS you configure on a fabric fc-set applies to all the traffic that belongs to that fabric fc-set, from all connected Node devices.

This topic describes:

- [Default Fabric Forwarding Class Sets on page 76](#)
- [Fabric Forwarding Class Set Configuration and Implementation on page 79](#)

- [QFabric System CoS on page 81](#)
- [Support for Flow Control and Lossless Transport Across the Fabric on page 81](#)
- [Viewing Fabric Forwarding Class Set Information on page 83](#)
- [Summary of Fabric Forwarding Class Set and Node Device Forwarding Class Set Differences on page 85](#)

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 multdestination (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 multdestination traffic that you can use if you want to map different multdestination forwarding classes to different multdestination 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 16 on page 76](#) shows the default fabric fc-sets:

Table 16: 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 16: 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 multdestination traffic in the mcast forwarding class across the fabric. This fabric fc-set is valid only for multdestination 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 multdestination 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 multdestination 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 multdestination 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 17 on page 77](#).

Table 17: 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
No forwarding classes are mapped by default to this hidden fabric fc-set.	fabric_fcset_noloss4	4	9k

Table 17: 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_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.)

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



NOTE: To avoid fate sharing, we recommend that you configure one-to-one mapping of user-configured lossless forwarding classes to lossless fabric fc-sets instead of using the default mapping. You can also use firewall filters to mitigate fate sharing by separating flows that belong to the same forwarding class as the traffic traverses the Interconnect device (see *Understanding How to Mitigate Fate Sharing on a QFabric System Interconnect Device by Remapping Traffic Flows (Forwarding Classes)* for more information.)

- 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 and configure CoS scheduling for fabric fc-sets. This section describes:

- [Mapping Forwarding Classes to Fabric Forwarding Class Sets on page 79](#)
- [Fabric Forwarding Class Set Implementation on page 80](#)

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 in 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 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 connected 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 multdestination forwarding classes to multdestination fabric fc-sets.
- You cannot map multdestination forwarding classes to unicast fabric fc-sets.
- You cannot map unicast forwarding classes to multdestination fabric fc-sets.

QFabric System CoS

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

However, when traffic enters a QFabric system 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 and 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 to the traffic.
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, and IEEE 802.1p or DSCP code-point rewrite).

Traffic that traverses the Interconnect device can use the default CoS fabric scheduling or you can configure two-tier hierarchical CoS scheduling explicitly on fabric fc-sets as described in *Understanding CoS Scheduling Across the QFabric System*.

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 multdestination traffic.

Table 18 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 18 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 18: 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 19 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 19: 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: <ul style="list-style-type: none"> Fabric-type—Fabric fc-set Normal-type—Node device fc-set
Forwarding class set index	Index of this forwarding class set.

Table 19: show class-of-service forwarding-class-set Command Output Fields (*continued*)

Field Name	Field Description
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 20 on page 85 summarizes the differences between fabric fc-sets and fc-sets:

Table 20: Summary of Differences Between Fabric fc-sets and Local fc-sets

Characteristic	Fabric fc-set	Local fc-set
Location	QFX3008-I or QFX3600-I Interconnect device (the fabric).	QFabric Node device.
Global or local	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	User-configurable using fabric fc-set scheduler maps.	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 the 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 Across the QFabric System*
- *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)*
- *Understanding How to Mitigate Fate Sharing on a QFabric System Interconnect Device by Remapping Traffic Flows (Forwarding Classes)*
- *Defining CoS Forwarding Class Sets*
- *Example: Configuring Forwarding Class Sets*
- *Example: Configuring CoS Scheduling Across the QFabric System*
- *show class-of-service forwarding-class-set*

CHAPTER 5

Licenses

- [Junos OS Feature Licenses on page 87](#)
- [Software Features That Require Licenses on the QFX Series on page 88](#)
- [Junos OS Feature License Keys on page 89](#)

Junos OS Feature Licenses

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 496](#)

Software Features That Require Licenses on the QFX Series



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 21 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 21: 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 21: 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
QFX and EX Series feature license for enabling Media Access Control security (MACsec)	QFX switches that support MACsec. See <i>Understanding Media Access Control Security (MACsec)</i> .	One per switch, two per Virtual Chassis,	EX-QFX-MACSEC-AGG
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 491](#)
- [Adding New Licenses \(CLI Procedure\) on page 493](#)
- [Deleting a License \(CLI Procedure\) on page 494](#)
- [Saving License Keys on page 495](#)
- [Verifying Junos OS License Installation on page 496](#)

Junos OS Feature License Keys

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 22 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 22: 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.

Port Activation on MX104 Routers

Starting with Junos OS Release 13.3, license keys are available to activate the ports on the MX104 router. MX104 routers have four built-in ports. By default, in the absence of valid licenses, all four built-in ports are deactivated. By installing licenses, you can activate any two of the four or all of the four built-in ports. For instance, you can install a license to activate the first two built-in ports (xe-2/0/0 and xe-2/0/1) or you can install a license to activate the next two built-in ports (xe-2/0/2 and xe-2/0/3). You can also install a license to activate all four built-in ports (xe-2/0/0, xe-2/0/1, xe-2/0/2, and xe-2/0/3). If you have already activated two of the built-in ports, you can install an additional license to activate the other two built-in ports on the MX104 router.

A feature ID is assigned to every license for activating the built-in ports on the MX104 router. The port license model with the feature ID is described in [Table 23 on page 93](#).

Table 23: Port Activation License Model for MX104 Routers

Feature ID	Feature Name	Functionality
F1	MX104 2X10G Port Activate (0 and 1)	Ability to activate first two built-in ports (xe-2/0/0 and xe-2/0/1)
F2	MX104 2X10G Port Activate (2 and 3)	Ability to activate next two built-in ports (xe-2/0/2 and xe-2/0/3)

Both the features are also provided in a single license key for ease of use. To activate all four ports, you must either install the licenses for both the features listed in [Table 23 on page 93](#) or the single license key for both features. If you install the single license key when feature IDs F1 and F2 are already installed, the license does not get rejected. Also, MX104 routers do not support the graceful license expiry policy. A graceful license expiry policy allows the use of a feature for a certain period of time (usually a grace period of 30 days), and reverts if the license for that feature is not installed after the grace period.

**Related
Documentation**

- [Junos OS Feature Licenses on page 87](#)
- *License Enforcement*
- *Software Feature Licenses*
- [Verifying Junos OS License Installation on page 496](#)
- *show system license*

PART 2

Installation

- [Before You Begin on page 97](#)
- [Ports and Connectors on page 121](#)
- [Power on page 253](#)
- [Installing a QFX3100 Director Device on page 269](#)
- [Installing a QFX3600-I Interconnect Device or QFX3600 Node Device on page 281](#)
- [Installing a QFX3500 Node Device on page 299](#)
- [Installing a QFX5100 Node Device on page 315](#)
- [Cabling a Copper-Based Control Plane for the QFX3000-M QFabric System on page 335](#)
- [Cabling a Fiber-Based Control Plane for the QFX3000-M QFabric System on page 361](#)
- [Cabling the Data Plane for the QFX3000-M QFabric System on page 389](#)

CHAPTER 6

Before You Begin

- [QFX3000-M QFabric System Installation Overview on page 97](#)
- [Understanding QFX3000-M QFabric System Hardware Configurations on page 99](#)
- [Planning a QFX3000-M QFabric System Deployment on page 105](#)
- [General Site Guidelines on page 110](#)
- [Site Electrical Wiring Guidelines on page 111](#)
- [Environmental Requirements and Specifications for a QFX3100 Director Device on page 113](#)
- [Environmental Requirements and Specifications for QFX3600 and QFX3600-I Devices on page 114](#)
- [Environmental Requirements and Specifications for a QFX3500 Device on page 115](#)
- [Environmental Requirements and Specifications for a QFX5100 Device on page 116](#)
- [Environmental Requirements and Specifications for EX Series Switches on page 117](#)

QFX3000-M QFabric System Installation Overview

A QFX3000-M QFabric system is formed by interconnecting QFX3500 or QFX3600 Node devices, QFX3600-I Interconnect devices, and QFX3100 Director devices. Two EX4200 or EX4300 switches are used to interconnect the control plane and management network. For more information about the role of each device in the QFX3000-M QFabric system, see [“Understanding QFX3000-M QFabric System Hardware Configurations” on page 99](#).

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

- Read *General Safety Guidelines and Warnings*.
- Review [“Planning a QFX3000-M QFabric System Deployment” on page 105](#) and the topics it references. Do not start the installation 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 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 or Site Preparation Checklist for EX4300 Switches.*



NOTE: Do not mix control plane EX4200 and EX4300 switches in the same QFabric system.

To install a QFX3000-M 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 269](#)
 - [Installing and Connecting a QFX5100 Device on page 315](#)
 - [Installing and Connecting a QFX3600 or QFX3600-I Device on page 281](#)
 - [Installing and Connecting a QFX3500 Device on page 299](#)
 - [Installing and Connecting an EX4200 Switch or Installing and Connecting an EX4300 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 408](#).
3. Interconnect the two EX Series switches using the SFP+ uplink module ports. The EX4200 uses 1-Gigabit Ethernet ports; the EX4300 uses 10-Gigabit Ethernet ports. These ports will later be configured in a LAG. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).
4. Interconnect the two QFX3100 Director devices for control plane redundancy. See [“Connecting QFX3100 Director Devices in a Director Group” on page 338](#).
5. Based on your QFX3000-M QFabric system control plane type, connect each QFX Series device to each EX Series switch for control plane interconnection.
 - For a copper-based QFabric system control plane, see:
 - [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
 - [Connecting a QFX3600-I Interconnect Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 347](#)
 - [Connecting a QFX3500 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 357](#)

- [Connecting a QFX3600 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 354](#)
 - [Connecting a QFX5100 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 351](#)
 - For a fiber-based QFabric system control plane, see:
 - [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
 - [Connecting a QFX3600-I Interconnect Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 374](#)
 - [Connecting a QFX3500 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 381](#)
 - [Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 385](#)
 - [Connecting a QFX5100 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 377](#)
6. Connect each Node device to each QFX3600-I Interconnect device for data plane interconnection. See:
- [Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device on page 397](#)
 - [Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device on page 393](#)
 - [Connecting a QFX5100 Node Device to a QFX3600-I Interconnect Device on page 389](#)
- Leave the Node and Interconnect devices powered on.
7. Configure each EX4200 or EX4300 switch using the recommended configuration as described in this example: [“Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane” on page 414.](#)
- Leave the EX Series switches powered on.
8. Power on the QFX3100 Director devices and complete the initial configuration for the QFX3000-M QFabric system described in [“Performing the QFabric System Initial Setup on a QFX3100 Director Group” on page 441.](#)



NOTE: 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.

Understanding QFX3000-M QFabric System Hardware Configurations

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

- **EX Series switches**—Two EX4200 switches or two EX4300 switches are required for a QFX3000-M QFabric system control plane and management network interconnection. You may not mix EX4200 and EX4300 switches on the same QFabric system.
 - **EX4200**—Use EX4200-24T switches with an SFP+ uplink module installed for copper-based control planes and EX4200-24F for fiber-based control planes. Two small form-factor pluggable (SFP) Gigabit Ethernet uplink ports on each EX4200 switch interconnect the two EX4200 switches.
 - **EX4300**—Use EX4300-48T switches with an SFP+ uplink module installed for copper-based control planes and EX4300-48P for fiber-based control planes. Four quad small form-factor pluggable plus (QSFP+) 40-Gigabit Ethernet uplink ports on each EX4300 interconnect the two EX Series switches.
- **QFX3100 Director devices**—Two QFX3100 Director devices are required for a QFX3000-M QFabric system. Together, the two Director devices are called a *Director group*.
 - Four Gigabit Ethernet ports on each QFX3100 Director device provide connection to the control plane and management network through the EX4200 switches.
 - Two Gigabit Ethernet 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 management network.



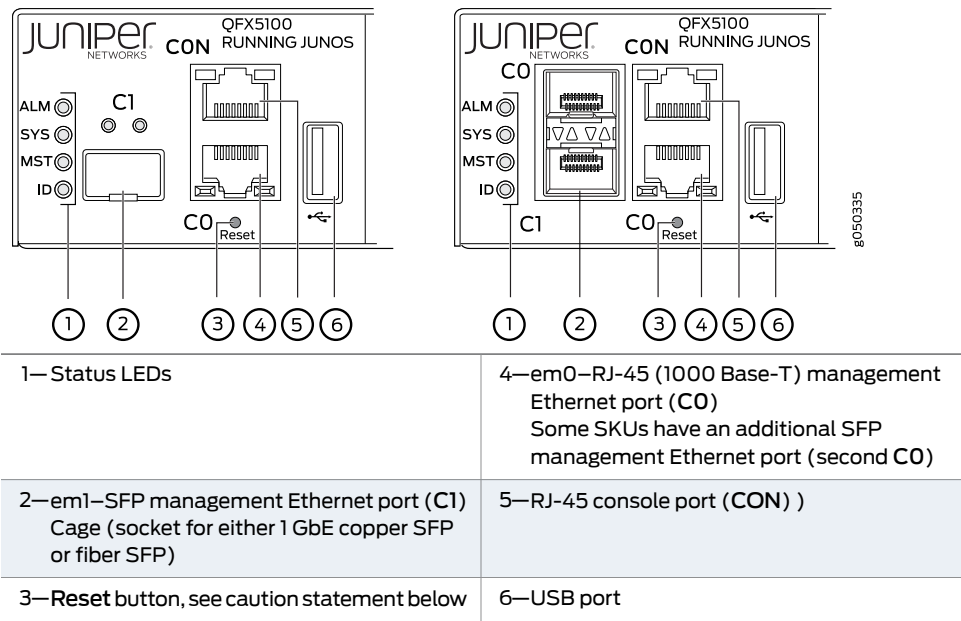
NOTE: For a copper-based QFX3000-M QFabric system control plane network, use QFX3100 Director devices with RJ-45 network modules installed. For a fiber-based control plane network, use QFX3100 Director devices with SFP network modules installed.

- **QFX5100-24Q or QFX3600-I Interconnect devices**—Two interconnect devices are required for a QFX3000-M QFabric system. Up to four interconnect devices can be used in a QFX3000-M QFabric system.
 - **QFX5100-24Q Interconnect device**
 - Up to 24 40-Gbps QSFP+ ports on each Interconnect device connect the QFX5100, QFX3600, or QFX3500 Node devices to the data plane network across fiber-optic cables and a high-speed backplane.
 - Two Gigabit Ethernet management ports connect each QFX5100-24Q Interconnect device to the control plane and management network through the EX4200 switches.



NOTE: For a copper-based QFX3000-M QFabric system control plane network, use the 1000BASE-T management port labeled C0 and the SFP management port labeled C1 on QFX5100-24Q Interconnect devices. For a fiber-based control plane network, use the SFP management ports labeled C0 and C1 on QFX5100-24Q Interconnect devices.

Figure 16: QFX5100-24Q Management Panel



CAUTION: Do not use the Reset button to restart the power sequence unless under the direction of Juniper Networks Technical Assistance Center (JTAC).

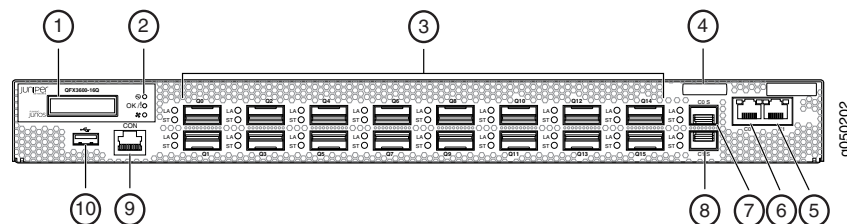
- QFX3600-I Interconnect device
 - Up to 16 40-Gbps quad form-factor-pluggable plus (QSFP+) ports on each QFX3600-I Interconnect device connect the QFX3500 or QFX3600 Node devices to the data plane network across fiber-optic cables and a high-speed backplane.
 - Two Gigabit Ethernet management ports connect each QFX3600-I Interconnect device to the control plane and management network through the EX Series switches.



NOTE: For a copper-based QFX3000-M QFabric system control plane network, use the 1000BASE-T management ports labeled C0 and C1 on QFX3600-I Interconnect devices. For a fiber-based control plane network, use the SFP management ports labeled C0S and C1S on QFX3600-I Interconnect devices.

Figure 17 on page 102 shows the front of a QFX3600-I Interconnect device.

Figure 17: QFX3600-I Interconnect Device Front Panel



1—LCD panel	6—C0 management port
2—Chassis status LEDs	7—C0S management port
3—Access and uplink ports	8—C1S management port
4—Chassis serial number label and ESD point	9—Console (CON) port
5—C1 management port	10—USB port

- QFX3500, QFX3600, QFX5100-24Q, QFX5100-48S, or QFX5100-48T Node devices—Up to 16 Node devices can be connected to the QFX3000-M QFabric system.

Table 24: Connecting Node Devices to Servers, Storage, or External Networks

Node Device	Description
QFX3500	<p>Total of 48 10-Gbps SFP+ ports.</p> <ul style="list-style-type: none"> • 12 (ports 0 through 5 and 42 through 47) can be configured as 2-Gbps, 4-Gbps, or 8-Gbps Fibre Channel ports. • 36 (ports 6 through 41) can be configured as Gigabit Ethernet ports. • No limitations on which ports can be configured as 10-Gigabit Ethernet ports. • However, if a Fibre Channel transceiver is in ports 0 through 5 or 42 through 47, <i>all</i> of the ports in that group must be configured as Fibre Channel, even though only one port in a group might have a Fibre Channel transceiver, and no port in the group can use a 10-Gigabit Ethernet transceiver.
QFX3600	<p>Up to 14 40-Gbps QSFP+ ports (Q2 through Q15) on each Node device use QSFP+ DAC breakout cables or QSFP+ transceivers with fiber breakout cables to support 48 10-Gigabit Ethernet interfaces.</p> <ul style="list-style-type: none"> • By default, 12 ports (Q4 through Q15) are configured for 10-Gigabit Ethernet connections between the Node device and servers, storage, or external networks. • Optionally, you can configure ports Q2 through Q15 for 10-Gigabit Ethernet connections.

Table 24: Connecting Node Devices to Servers, Storage, or External Networks (*continued*)

Node Device	Description
QFX5100-24Q	<p>The base model supports 24 40-Gbps Ethernet QSFP+ ports. With two QFX-EM-4Q expansion modules inserted, eight additional QSFP+ ports provide a total of 32 40-Gbps ports. The availability of these ports depends on the system mode you configure.</p> <p>Optionally, you can configure these ports on each Node device use QSFP+ direct-attach copper (DAC) breakout cables or QSFP+ transceivers with fiber breakout cables to support 96 10-Gigabit Ethernet interfaces. With two QFX-EM-4Q expansion modules inserted, eight additional QSFP+ ports provide a total of 104 10-Gbps ports.</p>
QFX5100-48S	<p>Total of 48 10-Gbps SFP+ ports and 6 40-Gbps QSFP+ ports.</p> <ul style="list-style-type: none"> 48 (ports 0 through 47) can be configured as either 1-Gigabit Ethernet, using a breakout cable, or 10-Gigabit Ethernet interfaces. By default, 4 of the QSFP+ interfaces (labeled fte-0/1/0 through fte-0/1/3) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 2 QSFP+ interfaces (labeled xle-0/1/4 and xle-0/1/5) 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-0/1/8 and xle-0/1/15) for 10-Gigabit Ethernet or 40-Gigabit Ethernet connections to either endpoint systems or external networks, and you can choose to configure the last two interfaces (fte-0/1/4 and fte-0/1/5) for uplink connections between your Node device and your Interconnect devices.
QFX5100-48T	<p>The base supports 48 10GBASE-T ports and 6 QSFP+ ports.</p> <ul style="list-style-type: none"> The forty-eight copper physical ports (0 through 47) are tri-speed (10GbE/1GbE/100 Mbps) and can be configured as access ports. By default, 4 of the QSFP+ interfaces (labeled fte-0/1/0 through fte-0/1/3) are configured for 40-Gbps uplink connections between your Node device and your Interconnect devices, and 2 QSFP+ interfaces (labeled xle-0/1/4 and xle-0/1/5) 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-0/1/8 and xle-0/1/15) for 10-Gigabit Ethernet or 40-Gigabit Ethernet connections to either endpoint systems or external networks, and you can choose to configure the last two interfaces (fte-0/1/4 and fte-0/1/5) for uplink connections between your Node device and your Interconnect devices.

Table 25: Connecting Node Devices to the Data Plane

Node Device	Interconnect Device	Description
QFX3500	QFX3600-I or QFX5100-24Q	Up to four 40-Gbps QSFP+ uplink ports (Q0 through Q3) connect to the data plane network.
QFX3600	QFX3600-I or QFX5100-24Q	<p>Up to eight 40-Gbps QSFP+ uplink ports (Q0 through Q7) connect to the data plane network.</p> <ul style="list-style-type: none"> By default, four ports (Q0 through Q3) are configured for connection between the Node device and the data plane network. Optionally, you can configure the first eight ports (Q0 through Q7) for this connection.

Table 25: Connecting Node Devices to the Data Plane (*continued*)

Node Device	Interconnect Device	Description
QFX5100-24Q	QFX3600-I	When introducing a QFX5100-24Q into an existing QFX3000-M QFabric System, install the QFX5100-24Q as the interconnect device and convert the QFX3600-I to a QFX3600 for use as a node device. See “Converting the Device Mode for a QFabric System Component” on page 408 .
	QFX5100-24Q	Any of the 24 40-QSFP+ uplink ports (0 through 23) may be used to connect to the data plane network.
QFX5100-48S	QFX3600-I or QFX5100-24Q	Up to six 40-Gbps QSFP+ uplink ports (48 through 53) connect to the data plane network.
QFX5100-48T	QFX3600-I or QFX5100-24Q	Up to six 40-Gbps QSFP+ uplink ports (48 through 53) connect to the data plane network.

Table 26: Connecting Node Devices to the Control Plane and Management Network through EX4200 Switches

Node Device	Description
QFX3500	<p>Two Gigabit Ethernet management ports on each Node device provide connection to the control plane and management network.</p> <ul style="list-style-type: none"> For a copper-based QFX3000-M QFabric system control plane network, use the management ports on Node devices with a 1000BASE-T management board installed. For a fiber-based control plane network, use the management ports on Node devices with an SFP management board installed.
QFX3600	<p>Two Gigabit Ethernet management ports on each Node device provide connection to the control plane and management network.</p> <ul style="list-style-type: none"> For a copper-based control plane network, use the 1000BASE-T management ports (C0 and C1) on Node devices. For a fiber-based control plane network, use the SFP management ports (C0S and C1S) on Node devices.
QFX5100-24Q	<p>Two Gigabit Ethernet management ports on each Node device provide connection to the control plane and management network.</p> <ul style="list-style-type: none"> For a copper-based QFX3000-M QFabric system control plane network, use the RJ-45 management port (C0) and the SFP management port (C1) on Node devices with a 1 Gbps copper SFP. For a fiber-based control plane network, use the SFP management port (C0) and (C1) on Node devices with a 1 Gbps fiber SFP. <p>NOTE: Not all QFX5100-24Q product SKUs support an all-fiber connection.</p>

Table 26: Connecting Node Devices to the Control Plane and Management Network through EX4200 Switches (*continued*)

Node Device	Description
QFX5100-48S	<p>Two Gigabit Ethernet management ports on each Node device provide connection to the control plane and management network.</p> <ul style="list-style-type: none"> For a copper-based QFX3000-M QFabric system control plane network, use the RJ-45 management port (C0) and the SFP management port (C1) on Node devices with a 1 Gbps copper SFP. For a fiber-based control plane network, use the SFP management port (C0) and (C1) on Node devices with a 1 Gbps fiber SFP. <p>NOTE: Not all QFX5100-48S product SKUs support an all-fiber connection.</p>
QFX5100-48S	<p>Two Gigabit Ethernet management ports on each Node device provide connection to the control plane and management network.</p> <ul style="list-style-type: none"> For a copper-based QFX3000-M QFabric system control plane network, use the RJ-45 management port (C0) and the SFP management port (C1) on Node devices with a 1 Gbps copper SFP. For a fiber-based control plane network, use the SFP management port (C0) and (C1) on Node devices with a 1 Gbps fiber SFP. <p>NOTE: Not all QFX5100-48S product SKUs support an all-fiber connection.</p>
QFX5100-48T	<p>Two Gigabit Ethernet management ports on each Node device provide connection to the control plane and management network.</p> <ul style="list-style-type: none"> For a copper-based QFX3000-M QFabric system control plane network, use the RJ-45 management port (C0) and the SFP management port (C1) on Node devices with a 1 Gbps copper SFP. For a fiber-based control plane network, use the SFP management port (C0) and (C1) on Node devices with a 1 Gbps fiber SFP.

- Related Documentation**
- [QFX3000-M QFabric System Installation Overview on page 97](#)
 - *Management Panel of a QFX5100 Device*

Planning a QFX3000-M QFabric System Deployment

A QFX3000-M QFabric system is formed by interconnecting QFX3500, QFX3600, or QFX5100 Node devices, QFX3600-I or QFX5100-24Q Interconnect devices, and QFX3100 Director devices. Two Juniper Networks EX Series switches are used to interconnect the control plane and management network.

Before installing a QFX3000-M QFabric system, you must consider the following factors:

- The number of devices in the QFabric system and their location.
 - You must have two QFX3100 Director devices operating in a Director group.
 - You can have up to four Interconnect devices, either QFX5100-24Q or QFX3600-I, but not intermixed in the same QFabric Node group.
 - You can interconnect up to 16 QFX Series Switches as Node devices using either QFX5100-24Q or QFX3600-I as the Interconnect Devices. You may not mix

QFX5100-24Q Interconnect devices with QFX3600-I Interconnect devices on the same QFX3000-M QFabric system. Supported models are:

- QFX5100-24Q
- QFX5100-48S
- QFX5100-48T
- QFX3600
- QFX3500
- 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 27 on page 106](#) 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 27: 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 QFX5100-24Q Node Device	Number of 10-Gigabit Ethernet Access Ports Supported on a QFX5100-48S and QFX5100-48T Node Device
1:1 (no oversubscription)	1:1 oversubscription not supported	32	104	1:1 oversubscription not supported
3:1	48	48	104 ports with 2 QFX-EM-4Q expansion modules	3:1 oversubscription not supported
3.5:1	3.5:1 oversubscription not supported	3.5:1 oversubscription not supported	3.5:1 oversubscription not supported	56
6:1	48	48	96 ports with 2 QFX-EM-4Q expansion modules	3:1 oversubscription not supported

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:

$$N_n = N_p / N_a$$

$$N_n = 300/48$$

$$N_n = 6.25 \text{ (rounded up to 7)}$$

- 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 28 on page 107](#) to determine the number of Interconnect devices you require. For example, if you plan to install 14 Node devices and require 3:1 oversubscription ratio on the Node devices, you must install 4 Interconnect devices.

Table 28: Maximum Number of Node Devices Supported Based on Oversubscription Ratio and Number of Interconnect Devices

Oversubscription Ratio	QFX Series Switch Models	Number of Interconnect Devices	Maximum Number of Node Devices
1:1	QFX3600 or	2	4
		4	8
	QFX5100-24Q	8	32 connecting to QFX5100-24Q Interconnect devices and 16 connecting to QFX3600-I Interconnect devices
2:1	QFX5100-24Q	4	32 connecting to QFX5100-24Q Interconnect devices and 16 connecting to QFX3600-I Interconnect devices
3:1	<ul style="list-style-type: none"> • QFX3600 • QFX3500 	2	32 connecting to QFX5100-24Q Interconnect devices and 16 connecting to QFX3600-I Interconnect devices
		4	32 connecting to QFX5100-24Q Interconnect devices and 16 connecting to QFX3600-I Interconnect devices
3.5:1	QFX5100-48S or QFX5100-48T	2	32 connecting to QFX5100-24Q Interconnect devices and 16 connecting to QFX3600-I Interconnect devices
		4	32 connecting to QFX5100-24Q Interconnect devices and 16 connecting to QFX3600-I Interconnect devices
6:1	<ul style="list-style-type: none"> • QFX5100-24Q • QFX5100-48S • QFX5100-48T • QFX3600 • QFX3500 	2	32 connecting to QFX5100-24Q Interconnect devices and 16 connecting to QFX3600-I Interconnect devices

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 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 QFX5100 Device*
- *Chassis Physical Specifications for QFX3600 and QFX3600-I Devices*
- *Chassis Physical Specifications for a QFX3500 Chassis*
- *Chassis Physical Specifications for EX4200 Switches*
- The type of control plane and management network—copper-based or fiber-based.
 - For a copper-based control plane and management network, use:
 - QFX3100 Director devices with RJ-45 network modules installed
 - QFX5100 Node devices using the RJ-45 network port (C0 and a 1 Gbps SFP installed in network port (C1).
 - QFX3500 Node devices with a 1000BASE-T management board installed
 - EX4200-24T switches with an SFP+ uplink module installed
 - For a fiber-based control plane and management network, use:
 - QFX3100 Director devices with SFP network modules installed
 - QFX5100 Node devices using 1 Gbps SFP installed in network ports (C0) and (C1).
 - QFX3500 Node devices with an SFP management board installed
 - EX4200-24F switches with an SFP+ uplink module installed
- Cabling requirements for the control plane and management network
 - The copper-based 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 250](#).
 - The fiber-based control plane and management network are interconnected using small form-factor pluggable (SFP) transceivers over fiber-optic cabling. Each network segment can be a maximum length of 10 km (6.2 miles). However, keep in mind that each network segment in the data plane is limited to a maximum length of 150 m (492 ft). See [“Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 137](#).

- **Cabling requirements for the data plane**—The data plane is interconnected using standard 40GBASE-SR 40-Gigabit 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 if you are using a copper-based control plane and management network, each copper network segment is limited to a maximum length of 100 m (328 ft). This limitation of the copper control plane network segment effectively limits the network segments in your data plane to 100 m (328 ft). See [“Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 137](#).

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 29 on page 109](#) 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 29: 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	<ul style="list-style-type: none"> • QFX3600 • QFX5100-24Q 	8
3:1	<ul style="list-style-type: none"> • QFX3600 • QFX3500 	4
3.5:1	<ul style="list-style-type: none"> • QFX5100-48S • QFX5100-48T 	4
6:1	<ul style="list-style-type: none"> • QFX5100-24Q • QFX5100-48S • QFX5100-48T • QFX3600 • QFX3500 	2

- **Power supply**—You must plan the installation site to meet the power requirements of all the devices in the 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 253](#)
 - [AC Power Specifications for a QFX3600 or QFX3600-I Device on page 255](#)
 - [DC Power Specifications for a QFX3600 or QFX3600-I Device on page 264](#)
 - [AC Power Specifications for a QFX5100 Device on page 256](#)
 - [DC Power Specifications for a QFX5100 Device on page 265](#)
 - [AC Power Specifications for a QFX3500 Device on page 255](#)

- [DC Power Specifications for a QFX3500 Device on page 265](#)
 - [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 QFX3600 or QFX3600-I Device](#)
 - [Site Preparation Checklist for a QFX5100 Device](#)
 - [Site Preparation Checklist for a QFX3500 Device](#)
 - [Site Preparation Checklist for EX4200 Switches](#)
- Related Documentation**
- [QFX3000-M QFabric System Installation Overview on page 97](#)
 - [Understanding QFX3000-M QFabric System Hardware Configurations on page 99](#)
 - [Clearance Requirements for Airflow and Hardware Maintenance for a QFX3100 Director 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

This topic applies to hardware devices in the EX Series product family, which includes EX Series 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 and to OCX1100 switches.

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 on page 117](#)
- *Environmental Requirements and Specifications for OCX1100 Switches*
- [Environmental Requirements and Specifications for a QFX3100 Director Device on page 113](#)
- *Environmental Requirements and Specifications for a QFX3008-I Interconnect Device*
- [Environmental Requirements and Specifications for a QFX3500 Device on page 115](#)
- [Environmental Requirements and Specifications for QFX3600 and QFX3600-I Devices on page 114](#)
- [Environmental Requirements and Specifications for a QFX5100 Device on page 116](#)

Site Electrical Wiring Guidelines

This topic applies to hardware devices in the EX Series product family, which includes EX Series 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 and to OCX1100 switches.

[Table 30 on page 111](#) 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 30: Site Electrical Wiring Guidelines

Site Wiring Factor	Guidelines
Signaling limitations	<p>If your site experiences any of the following problems, consult experts in electrical surge suppression and shielding:</p> <ul style="list-style-type: none"> • 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.

Table 30: Site Electrical Wiring Guidelines (*continued*)

Site Wiring Factor	Guidelines
Radio frequency interference	<p>To reduce or eliminate RFI from your site wiring, do the following:</p> <ul style="list-style-type: none"> • 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	<p>If your site is susceptible to problems with electromagnetic compatibility (EMC), particularly from lightning or radio transmitters, seek expert advice.</p> <p>Some of the problems caused by strong sources of electromagnetic interference (EMI) are:</p> <ul style="list-style-type: none"> • 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 OCX1100 Switches*
- *DC Power Supply in OCX1100 Switches*
- *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

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 31 on page 113](#) provides the required environmental conditions for normal device operation.

Table 31: 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

Table 31: QFX3100 Director Device Environmental Tolerances (*continued*)

Description	Tolerance
Temperature	<ul style="list-style-type: none"> 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) <p>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.</p> <ul style="list-style-type: none"> 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 269](#)

Environmental Requirements and Specifications for QFX3600 and QFX3600-I Devices

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 32 on page 114](#) provides the required environmental conditions for normal device operation.

Table 32: 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

Table 32: QFX3600 and QFX3600-I Device Environmental Tolerances (*continued*)

Description	Tolerance
Temperature	<ul style="list-style-type: none"> 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) <p>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.</p> <ul style="list-style-type: none"> 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 281](#)

Environmental Requirements and Specifications for a QFX3500 Device

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 33 on page 115](#) provides the required environmental conditions for normal device operation.

Table 33: 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

Table 33: QFX3500 Device Environmental Tolerances (*continued*)

Description	Tolerance
Temperature	<ul style="list-style-type: none"> 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) <p>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.</p> <ul style="list-style-type: none"> 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 299](#)

Environmental Requirements and Specifications for a QFX5100 Device

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 34 on page 116](#) provides the required environmental conditions for normal switch operation.

Table 34: QFX5100 Switch Environmental Tolerances

Description	Tolerance
Altitude	No performance degradation to 6,562 feet (2000 meters)

Table 34: QFX5100 Switch Environmental Tolerances (*continued*)

Description	Tolerance
Relative humidity	<p>Normal operation ensured in relative humidity range of 5% through 90%, noncondensing</p> <ul style="list-style-type: none"> Short-term operation ensured in relative humidity range of 5% through 93%, noncondensing <p>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.</p>
Temperature	<ul style="list-style-type: none"> Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C) <p>NOTE: Customers with QFX5100-48T switches should ensure the room temperature does not exceed a 2° C increase or decrease per minute.</p> <ul style="list-style-type: none"> 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 315](#)

Environmental Requirements and Specifications for EX Series Switches

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

Ensure that these environmental guidelines are followed:

- 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 switch to protect the hardware components.

[Table 35 on page 118](#) provides the required environmental conditions for normal switch operation.

Table 35: EX Series Switch Environmental Tolerances

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
EX2200-C	No performance degradation up to 5,000 feet (1524 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F through 104° F (0° C through 40° C) at altitudes up to 5,000 ft (1,524 m). For information about extended temperature SFPs, see <i>Pluggable Transceivers Supported on EX2200 Switches</i> .	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX2200 (except EX2200-C switches)	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F through 113° F (0° C through 45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX3200	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F through 113° F (0° C through 45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX3300	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F through 113° F (0° C through 45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX4200	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F through 113° F (0° C through 45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX4300	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F through 113° F (0° C through 45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX4500	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F through 113° F (0° C through 45° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX4550	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	<ul style="list-style-type: none"> EX4550-32F switches—Normal operation ensured in the temperature range 32° F through 113° F (0° C through 45° C) EX4550-32T switches—Normal operation is ensured in the temperature range 32° F through 104° F (0° C through 40° C) 	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.

Table 35: EX Series Switch Environmental Tolerances (*continued*)

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
EX4600	No performance degradation to 6,562 feet (2000 meters)	<p>Normal operation ensured in relative humidity range of 5% through 90%, noncondensing</p> <ul style="list-style-type: none"> Short-term operation ensured in relative humidity range of 5% through 93%, noncondensing <p>NOTE: As defined in NEBS GR-63-CORE, Issue 4, short-term events can be up to 96 hours in duration but not more than 15 days per year.</p>	<ul style="list-style-type: none"> Normal operation ensured in temperature range of 32° F through 104° F (0° C through 40° C) Nonoperating storage temperature in shipping container: –40° F through 158° F (–40° C through 70° C) 	Designed to comply with Zone 4 earthquake requirements per NEBS GR-63-CORE, Issue 4.
EX6210	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F through 104° F (0° C through 40° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX8208	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F through 104° F (0° C through 40° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX8216	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 32° F through 104° F (0° C through 40° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.
EX9204	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 5% through 90% (noncondensing)	<p>Normal operation ensured in the temperature range 32° F through 104° F (0° C through 40° C)</p> <p>Nonoperating storage temperature in shipping container: –40° F (–40° C) to 158° F (70° C)</p>	Complies with Zone 4 earthquake requirements as per GR-63.
EX9208	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 5% through 90% (noncondensing)	<p>Normal operation ensured in the temperature range 32° F through 104° F (0° C through 40° C)</p> <p>Nonoperating storage temperature in shipping container: –40° F (–40° C) to 158° F (70° C)</p>	Complies with Zone 4 earthquake requirements as per GR-63.

Table 35: EX Series Switch Environmental Tolerances (*continued*)

Switch or device	Environment Tolerance			
	Altitude	Relative Humidity	Temperature	Seismic
EX9214	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 5% through 90% (noncondensing)	Normal operation ensured in the temperature range 32° F through 104° F (0° C through 40° C) Nonoperating storage temperature in shipping container: -40° F (-40° C) to 158° F (70° C)	Complies with Zone 4 earthquake requirements as per GR-63.
XRE200	No performance degradation up to 10,000 feet (3048 meters)	Normal operation ensured in relative humidity range of 10% through 85% (noncondensing)	Normal operation ensured in the temperature range 41° F through 104° F (5° C through 40° C)	Complies with Zone 4 earthquake requirements as per GR-63, Issue 4.



NOTE: Install EX Series switches 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 EX2200 Switches*
- *Clearance Requirements for Airflow and Hardware Maintenance for EX3200 Switches*
- *Clearance Requirements for Airflow and Hardware Maintenance for EX3300 Switches*
- *Clearance Requirements for Airflow and Hardware Maintenance for EX4200 Switches*
- *Clearance Requirements for Airflow and Hardware Maintenance for EX4300 Switches*
- *Clearance Requirements for Airflow and Hardware Maintenance for an EX4600 Switch*
- *Clearance Requirements for Airflow and Hardware Maintenance for an EX Series Redundant Power System*
- *Clearance Requirements for Airflow and Hardware Maintenance for EX4500 Switches*
- *Clearance Requirements for Airflow and Hardware Maintenance for EX4550 Switches*
- *Clearance Requirements for Airflow and Hardware Maintenance for an EX6210 Switch*
- *Clearance Requirements for Airflow and Hardware Maintenance for an EX8208 Switch*
- *Clearance Requirements for Airflow and Hardware Maintenance for an EX8216 Switch*
- *Clearance Requirements for Airflow and Hardware Maintenance for an EX9204 Switch*
- *Clearance Requirements for Airflow and Hardware Maintenance for an EX9208 Switch*
- *Clearance Requirements for Airflow and Hardware Maintenance for an EX9214 Switch*

CHAPTER 7

Ports and Connectors

- [Interface Support for the QFX3600 Device on page 121](#)
- [Interface Support for the QFX3500 Device on page 125](#)
- [Interface Support for the QFX5100 Device on page 130](#)
- [Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 137](#)
- [Interface Specifications for SFP+ DAC Cables for the QFX Series on page 172](#)
- [Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 181](#)
- [Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 186](#)
- [Pluggable Transceivers Supported on EX4300 Switches on page 193](#)
- [Pluggable Transceivers Supported on EX4200 Switches on page 214](#)
- [Cable Specifications for Copper-Based Control Plane Connections for the QFabric System on page 250](#)

Interface Support for the QFX3600 Device

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 474](#) 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.

See the [Hardware Compatibility Tool](#) or [Table 36 on page 122](#) for a list the supported transceivers and the software release in which they were first supported.

Table 36: 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
40GBASE-LR4	Junos OS 12.2X50-D50	Junos 12.2X50-D50	Junos 12.2X50-D50
Juniper Networks proprietary 40G-LX4 QSFP+ module (JNP-QSFP-40G-LX4)	Junos OS 13.2X51-D20	Junos OS 14.1X53-D10	Junos OS 14.1X53-D10

See the [Hardware Compatibility Tool](#) or [Table 37 on page 123](#) for a description of 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 181](#) and [“Interface Specifications for QSFP+ DAC Cables for the QFX Series” on page 186](#)

Table 37: 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 37: 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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 37: 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)	<ul style="list-style-type: none"> 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 137](#)
- [Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 181](#)
- [Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 186](#)

Interface Support for the QFX3500 Device

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.

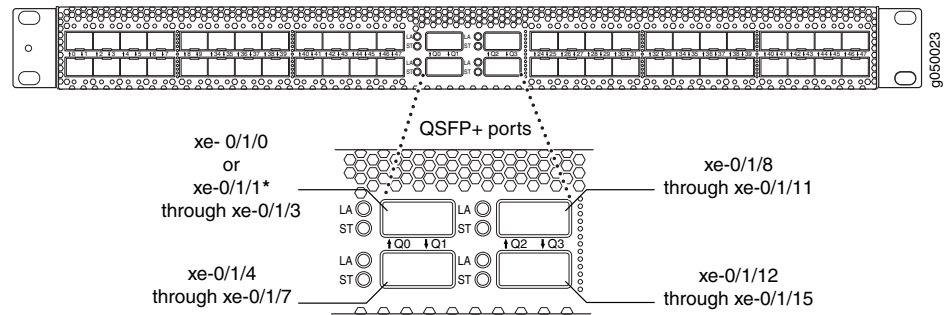
The four quad small form-factor pluggable plus (QSFP+) uplink ports in the QFX3500 device support QSFP+ transceivers, as well as QSFP+ DAC and DAC breakout cables. When the QFX3500 device is operating as a standalone switch, each QSFP+ port can be configured to operate as 10-Gigabit Ethernet interfaces 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 18 on page 126 shows the uplink ports and lists the interfaces created on each port when they are configured as 10-Gigabit Ethernet interfaces.

Figure 18: 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

The [Hardware Compatibility Tool](#) and [Table 38 on page 126](#) lists the supported transceivers and the software release in which they were first supported.

Table 38: 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 38: 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.
40GBASE-LR4 QSFP+ module (JNP-QSFP-40G-LR4)	Junos OS 12.2X50-D50	Junos OS 12.2X50-D50	Junos OS 12.2X50-D50
40GBASE-LX4 QSFP+ module (JNP-QSFP-40G-LX4)	Junos OS 13.2X52-D20	Junos OS 14.1X53-D10	Junos OS 14.1X53-D10

The [Hardware Compatibility Tool](#) and [Table 39 on page 128](#) 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 172, “[Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series](#)” on page 181, and “[Interface Specifications for QSFP+ DAC Cables for the QFX Series](#)” on page 186



CAUTION: If you are having a problem running a Juniper Networks device that is using a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

Table 39: 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)	<ul style="list-style-type: none"> 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 39: 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, 3-meter (QFX-QSFP-DAC-3M)	<ul style="list-style-type: none"> 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, 5-meter (QFX-QSFP-DAC-5M)	<ul style="list-style-type: none"> 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 (JNP-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 137](#)
 - [Interface Specifications for SFP+ DAC Cables for the QFX Series on page 172](#)
 - [Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 181](#)
 - [Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 186](#)

Interface Support for the QFX5100 Device

All product SKUs of the QFX5100 supply 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. 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 478](#) for more information.

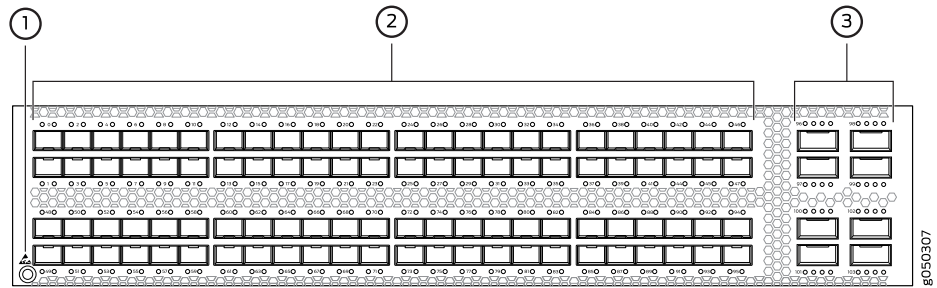
On all QFX5100 product SKUs, the ports are enabled by default and the default config adds the ports to the default VLAN.

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.
- *QFX5100-24Q-AA*—has 24 QSFP+ access ports that can be configured to operate as 10-Gigabit Ethernet interfaces or as a single 40-Gigabit Ethernet interface.

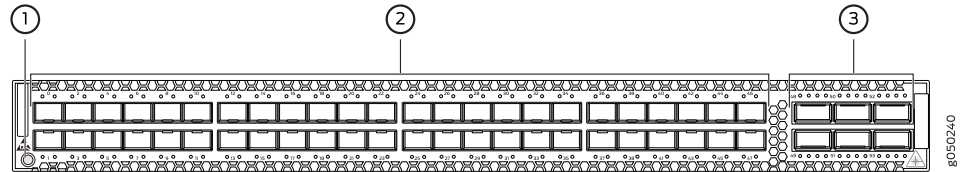
[Figure 19 on page 131](#) shows the location of SFP+ and QSFP+ ports for the QFX5100-96S, [Figure 20 on page 131](#) shows these ports for the QFX5100-48S device, [Figure 21 on page 131](#) shows the RJ45 and QSFP+ ports for the QFX5100-48T device, and [Figure 22 on page 131](#) shows the location of QSFP+ ports for the QFX5100-24Q device.

Figure 19: Port Panel QFX5100-96S Device



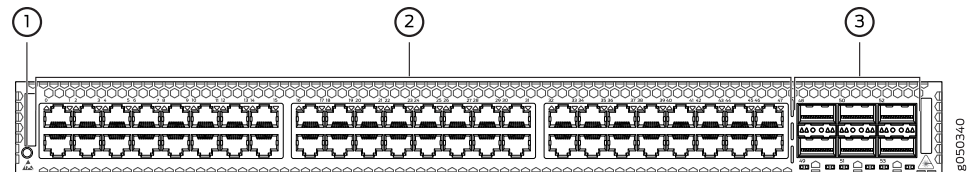
1— Electrostatic discharge (ESD) terminal	3—QSFP+ uplink ports (8)
2—SFP+ access ports (96)	

Figure 20: Port Panel QFX5100-48S Device



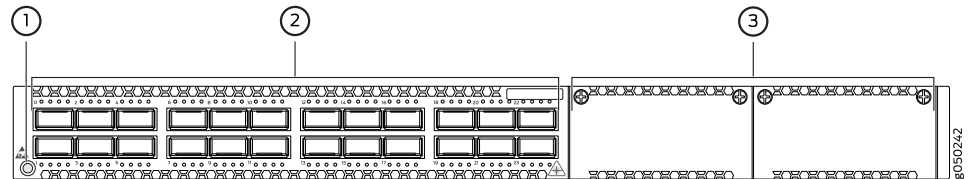
1— Electrostatic discharge (ESD) terminal	3—QSFP+ uplink ports (6)
2—SFP+ access ports (48)	

Figure 21: Port Panel QFX5100-48T Device



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

Figure 22: Port Panel QFX5100-24Q Device



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

Figure 23: Port Panel QFX5100-24Q-AA Device

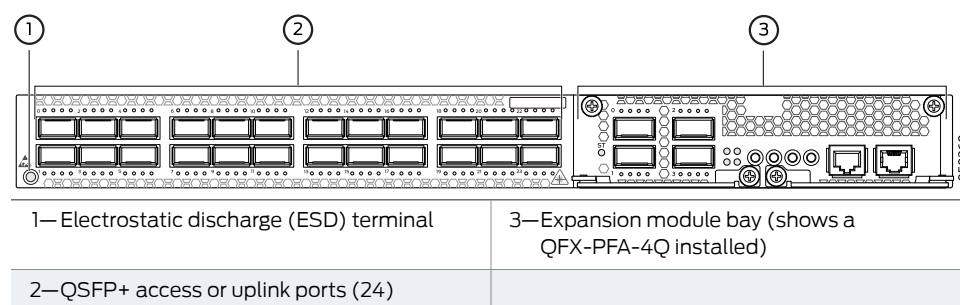


Table 40 on page 132 lists the optical transceivers supported on QFX5100 devices. For the full specification for each of these optical transceivers, see the [Hardware Compatibility Tool](#) or “Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 137.

Table 40: 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)	220 m transmission on FDDI, multimode fiber (MMF) cable 275 m transmission on OM1, MMF cable 550 m transmission on OM2, MMF cable
QFX-SFP-1GE-LX	SFP module 1000BASE-LX Gigabit Ethernet	10 km transmission on single-mode fiber (SMF) cable 550 m transmission on OM1, MMF cable 550 m transmission on OM2, MMF cable
JNP-SFP-10G-BX10D	SFP module 10-Gigabit Ethernet bi-directional; works in conjunction with JNP-SFP-10G-BX10U	10 km transmission on single strand fiber cable
JNP-SFP-10G-BX10U	SFP module 10-Gigabit Ethernet bi-directional; works in conjunction with JNP-SFP-10G-BX10D	10 km transmission on single strand fiber cable
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)	26 m transmission on FDDI, MMF cable 33 m transmission on OM1, MMF cable 82 m transmission on OM2, MMF cable 300 m transmission on OM3, MMF cable 400 m transmission on OM4, MMF cable
QFX-SFP-10GE-LR	SFP+ module 10GBASE-LR, 10-Gigabit Ethernet	10 km transmission on MMF cable

Table 40: Supported Optical Transceivers for the QFX5100 Switch (*continued*)

Part Number	Description	Maximum Distance Supported
QFX-SFP-10GE-ER NOTE: Not available for the QFX5100-48T	SFP+ module 10GBASE-ER, 10-Gigabit Ethernet	40 km transmission on SMF cable
QFX-SFP-10GE-USR NOTE: Not available for the QFX5100-48T	Juniper Networks proprietary SFP+ module 10-Gigabit Ethernet Ultra Short Reach (USR)	10 m transmission on OM1 MMF cable 30 m transmission on OM2, MMF cable 100 m transmission on OM3 (OM4 compatible) cable
EX-SFP-10GE-ZR NOTE: Not available for the QFX5100-48T	Juniper Networks proprietary SFP+ module 10GBASE-ZR, 10-Gigabit Ethernet	80 km transmission on SMF cable
JNP-QSFP-40GE-ER4	QSFP+ module 40GBASE-ER4, 40-Gigabit Ethernet	40 km transmission on SMF cable
QFX-QSFP-40G-ESR4	Juniper Networks proprietary QSFP+ module 4X10G-SR, 40-Gigabit Ethernet	300 m transmission on OM3, MMF cable 400 m transmission on OM4, MMF cable
JNP-QSFP-4X10GE-IR	Juniper Networks proprietary 4X10G-IR parallel single mode QSFP+ module, 40-Gigabit Ethernet pluggable	1.4 km transmission on SMF cable
JNP-QSFP-40GE-IR4	Juniper Networks proprietary 40GBASE-IR4 QSFP+ module, 40-Gigabit Ethernet pluggable	2 km transmission on SMF cable
JNP-QSFP-4X10GE-LR	QSFP+ module 10GBASE-LW and 10GBASE-LR, 40-Gigabit Ethernet pluggable	10 km transmission on SMF cable
JNP-QSFP-40G-LR4	QSFP+ module 40GBASE-LR4, 40-Gigabit Ethernet pluggable	10 km transmission on SMF cable
JNP-QSFP-40G-LX4 Also available in packs of 4 transceivers, JNP-40G-LX4-4PACK.	Juniper Networks proprietary 40G-LX4, QSFP+ module 40-Gigabit Ethernet pluggable	2 km transmission on SMF cable 100 m transmission on OM3, MMF cable 150 m transmission on OM4, MMF cable
QFX-QSFP-40G-SR4	QSFP+ module 40GBASE-SR4, 40-Gigabit Ethernet	100 m transmission on OM3, MMF cable 150 m transmission on OM4, MMF cable

Table 41 on page 134 describes the supported DAC and DAC breakout cables. For an online version of the specification, see the [Hardware Compatibility Tool](#). 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 172, “[Interface Specifications for QSFP+](#)

DAC Breakout Cables for the QFX Series” on page 181, and “Interface Specifications for QSFP+ DAC Cables for the QFX Series” on page 186.



CAUTION: If you are having a problem running a Juniper Networks device that is using a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

Table 41: Supported DAC and DAC Breakout Cables for the QFX5100 Device

Part Number	Description	Active/Passive	Length
QFX-SFP-DAC-1MA <i>NOTE:</i> Not available for the QFX5100-48G	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Active	1 m (3.3 ft.)
QFX-SFP-DAC-1M <i>NOTE:</i> Not available for the QFX5100-48G	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Passive	1 m (3.3 ft.)
QFX-SFP-DAC-2M <i>NOTE:</i> Not available for the QFX5100-48G	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Passive	2 m (6.6 ft.)
QFX-SFP-DAC-3MA <i>NOTE:</i> Not available for the QFX5100-48G	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Active	3 m (9.84 ft.)
QFX-SFP-DAC-3M <i>NOTE:</i> Not available for the QFX5100-48G	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Passive	3 m (9.84 ft.)
QFX-SFP-DAC-5MA <i>NOTE:</i> Not available for the QFX5100-48G	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Active	5 m (16.4 ft.)
QFX-SFP-DAC-5M <i>NOTE:</i> Not available for the QFX5100-48G	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Passive	5 m (16.4 ft.)
QFX-SFP-DAC-7MA <i>NOTE:</i> Not available for the QFX5100-48G	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Active	7 m (22.9 ft.)

Table 41: Supported DAC and DAC Breakout Cables for the QFX5100 Device (*continued*)

Part Number	Description	Active/Passive	Length
QFX-SFP-DAC-10MA NOTE: Not available for the QFX5100-48G	SFP+ 10-Gigabit Ethernet DAC cable assembly, 30 AWG	Active	10 m (32.8 ft.)
QFX-QSFP-DAC-1M	QSFP+ 40-Gigabit Ethernet, programmable ID, cable assembly, 30 AWG	Passive	1 m (3.3 ft.)
QFX-QSFP-DAC-3M	QSFP+ 40-Gigabit Ethernet, programmable ID, cable assembly, 30 AWG	Passive	3 m (9.84 ft.)
JNP-QSFP-DAC-5MA	QSFP+ 40-Gigabit Ethernet DAC assembly, programmable ID, cable assembly, 26 AWG	Active	5 m (16.4 ft.)
JNP-QSFP-DAC-5M	QSFP+ 40-Gigabit Ethernet DAC assembly, programmable ID, cable assembly, 26 AWG	Passive	5 m (16.4 ft.)
JNP-QSFP-DAC-7MA	QSFP+ 40-Gigabit Ethernet DAC assembly, programmable ID, cable assembly, 30 AWG	Active	7 m (22.9 ft.)
JNP-QSFP-DAC-10MA	QSFP+ 40-Gigabit Ethernet DAC assembly, programmable ID, cable assembly, 28 AWG	Active	10 m (32.8 ft.)
QFX-QSFP-DACBO-1M	QSFP+ to SFP+ 10-Gigabit Ethernet DACBO cable assembly, 30 AWG	Passive	1 m (3.3 ft.)
QFX-QSFP-DACBO-3M	QSFP+ to SFP+ 10-Gigabit Ethernet DACBO assembly, 30 AWG	Passive	3 m (9.84 ft.)
QFX-QSFP-DACBO-5MA	QSFP+ to SFP+ 10-Gigabit Ethernet DACBO assembly, 30 AWG	Active	5 m (16.4 ft.)
QFX-QSFP-DACBO-7MA	QSFP+ to SFP+ 10-Gigabit Ethernet DACBO assembly, 30 AWG	Active	7 m (22.9 ft.)
QFX-QSFP-DACBO-10MA	QSFP+ to SFP+ 10-Gigabit Ethernet DACBO assembly, 28 AWG	Active	10 m (32.8 ft.)

Table 42 on page 135 describes the active optical cables (AOCs) supported on QFX5100 devices. Details for these cables are found in the [Hardware Compatibility Tool](#) and in *Interface Specifications for SFP+ and QSFP+ Active Optical Cables for the QFX5100*.

Table 42: Supported AOC on QFX5100

Part Number	Description	Maximum Distance Supported
JNP-10G-AOC-1M	SFP+ 10-Gigabit Ethernet active optical cable assembly	1 m (3.3 ft.)

Table 42: Supported AOC on QFX5100 (*continued*)

Part Number	Description	Maximum Distance Supported
JNP-10G-AOC-3M	SFP+ 10-Gigabit Ethernet active optical cable assembly	3 m (9.84 ft.)
JNP-10G-AOC-5M	SFP+ 10-Gigabit Ethernet active optical cable assembly	5 m (16.4 ft.)
JNP-10G-AOC-7M	SFP+ 10-Gigabit Ethernet active optical cable assembly	7 m (22.9 ft.)
JNP-10G-AOC-10M	SFP+ 10-Gigabit Ethernet active optical cable assembly	10 m (32.8 ft.)
JNP-10G-AOC-15M	SFP+ 10-Gigabit Ethernet active optical cable assembly	15 m (49.2 ft.)
JNP-10G-AOC-20M	SFP+ 10-Gigabit Ethernet active optical cable assembly	20 m (65.6 ft.)
JNP-10G-AOC-30M	SFP+ 10-Gigabit Ethernet active optical cable assembly	30 m (98.4 ft.)

Table 43: Supported 40-Gigabit AOC and AOC Breakout on QFX5100

JNP-40G-AOC-1M	QSFP+ 40-Gigabit Ethernet active optical cable assembly	1 m (3.3 ft.)
JNP-40G-AOC-3M	QSFP+ 40-Gigabit Ethernet active optical cable assembly	3 m (9.84 ft.)
JNP-40G-AOC-5M	QSFP+ 40-Gigabit Ethernet active optical cable assembly	5 m (16.4 ft.)
JNP-40G-AOC-7M	QSFP+ 40-Gigabit Ethernet active optical cable assembly	7 m (22.9 ft.)
JNP-40G-AOC-10M	QSFP+ 40-Gigabit Ethernet active optical cable assembly	10 m (32.8 ft.)
JNP-40G-AOC-15M	QSFP+ 40-Gigabit Ethernet active optical cable assembly	15 m (49.2 ft.)
JNP-40G-AOC-20M	QSFP+ 40-Gigabit Ethernet active optical cable assembly	20 m (65.6 ft.)
JNP-40G-AOC-30M	QSFP+ 40-Gigabit Ethernet active optical cable assembly	30 m (98.4 ft.)
JNP-QSFP-AOCBO-1M	QSFP+ to SFP+ 10-Gigabit Ethernet active optical cable assembly	1 m (3.3 ft.)

Table 43: Supported 40-Gigabit AOC and AOC Breakout on QFX5100 (*continued*)

JNP-QSFP-AOCBO-3M	QSFP+ to SFP+ 10-Gigabit Ethernet active optical cable assembly	3 m (9.84 ft.)
JNP-QSFP-AOCBO-5M	QSFP+ to SFP+ 10-Gigabit Ethernet active optical cable assembly	5 m (16.4 ft.)
JNP-QSFP-AOCBO-7M	QSFP+ to SFP+ 10-Gigabit Ethernet active optical cable assembly	7 m (22.9 ft.)
JNP-QSFP-AOCBO-10M	QSFP+ to SFP+ 10-Gigabit Ethernet active optical cable assembly	10 m (32.8 ft.)

Related Documentation

- [Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 137](#)
- [Interface Specifications for SFP+ DAC Cables for the QFX Series on page 172](#)
- [Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 181](#)
- [Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 186](#)

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

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 [Hardware Compatibility Tool](#) or the following topics:

- [Interface Support for the QFX3600 Device on page 121](#)
- [Interface Support for the QFX3500 Device on page 125](#)
- [Interface Support for the QFX5100 Device on page 130](#)
- [Interface Support for the QFX3008-I Interconnect Device](#)

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 44 on page 139](#)—Copper interface support and optical interface support for Gigabit Ethernet SFP transceivers.

- [Table 45 on page 144](#)—Optical interface support for 10-Gigabit Ethernet SFP+ transceivers.
- [Table 46 on page 157](#)—Optical interface support for 40-Gigabit Ethernet QSFP+ transceivers.



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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.

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Table 44: Copper Interface Support and Optical Interface Support for Gigabit Ethernet SFP Transceivers for the QFX Series

Ethernet Standard	Specifications	
1000BASE-T NOTE: On QFX5100-48S and QFX5100-96S devices, this transceiver can be forced to 100 Mbps speed using the set interface speed command.	Product SKU number	QFX-SFP-1GE-T
	Supported models	QFX3500
	Signaling rate (range)	1.25 GBd +/- 100 ppm
	Connector type	RJ-45
	Fiber pairs	—
	Transmit and receive wavelength	—
	Average transmit launch power (minimum)	—
	Average transmit launch power (maximum)	—
	Average receive power (maximum)	—
	Receive sensitivity	—
	DOM support	Not available
	Fiber type	—
	Operating range	100 m (328 ft)
	Minimum Junos OS Release	11.1R1: QFX3500 12.2X50-20: QFX3600, QFX3600-I (management port only) 13.2X51-D10: QFX5100-48S, QFX5100-24Q (management port only) 13.2X51-D25: QFX5100-48T

Table 44: 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		
	Signaling rate	1.25 GBd +/- 100 ppm		
	Connector type	Lucent connector (LC)/physical contact (PC)		
	Fiber pairs	1		
	Transmit and receive wavelength (range)	770 nm to 860 nm		
	Average transmit launch power (minimum)	-9.5 dBm		
	Average transmit launch power (maximum)	-3 dBm		
	Receive sensitivity	-17 dBm		
	Average receiver power (maximum)	0 dBm		
	DOM support	Available		
	Fiber type	Multimode fiber (MMF)		
	Core/cladding size	62.5/125 µm	62.5/125 µm	50/125 µm
	Fiber grade	FDDI	OM1	OM2
	Modal bandwidth at 850 nm (minimum overfilled launch)	160 MHz x km	200 MHz x km	500 MHz x km
	Operating range	2 m (6.6 ft) to 220 m (721 ft)	2 m (6.6 ft) to 275 m (902 ft)	2 m (6.6 ft) to 500 m (1640 ft)
Minimum Junos OS Release				

Table 44: Copper Interface Support and Optical Interface Support for Gigabit Ethernet SFP Transceivers for the QFX Series (*continued*)

Ethernet Standard	Specifications
	11.1R1: QFX3500
	12.2X50-D20: QFX3600 (management port only), QFX3600-I (management port only)
	13.2X51-D10: QFX5100-24Q (management port only), QFX5100-48S
	13.2x51-D15: QFX5100-96S
	13.2X51-D25: QFX5100-48T

Table 44: 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		
	Signaling rate	1.25 GBd +/- 100 ppm		
	Connector type	LC/PC		
	Fiber pairs	1		
	Wavelength range	1270 nm to 1355 nm		
	Average transmit launch power (minimum)	-9.5 dBm		
	Average transmit launch power (maximum)	-3 dBm		
	Receive sensitivity	-19 dBm		
	Average receiver power (maximum)	-3 dBm		
	DOM support	Available		
	Fiber type	NOTE: Mode-conditioning patch (MCP) cable is required for 1000BASE-LX applications over OM1 and OM2 fiber types.		
	Core/cladding size	9/125 µm	62.5/125 µm	50/125 µm
	Fiber grade	Single-mode fiber (SMF)	OM1	OM2
	Modal bandwidth at 1300 nm (minimum overfilled launch)	—	500 MHz x km	400 MHz x km
	Operating range	2 m (6.6 ft) to 10 km (6.2 miles)	2 m (6.6 ft) to 550 m (0.34 miles)	2 m (6.6 ft) to 550 m (0.34 miles)
Minimum Junos OS Release				

Table 44: Copper Interface Support and Optical Interface Support for Gigabit Ethernet SFP Transceivers for the QFX Series (*continued*)

Ethernet Standard	Specifications
	11.1R1: QFX3500
	12.2X50-D20: QFX3600 (management port only), QFX3600-I (management port only)
	13.2X51-D10: QFX5100-24Q, QFX5100-48S
	13.2x51-D15: QFX5100-96S
	13.2X51-D25: QFX5100-48T

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series

Standards Compliance	Specifications	
Juniper Networks proprietary 10 km 10G-BiDi	Product SKU number	JNP-SFP-10G-BX10D Used in conjunction with JNP-SFP-10G-BX10U
	Supported models	QFX5100-24Q QFX5100-48S QFX5100-96S
Complies with SSF-8431; SSF-8472; and SSF-8432	Signaling rate	9.95328 GBd +/- 20 ppm 10.3125 GBd +/- 100 ppm
	Connector type	LC/PC
	Fiber count	1
	Transmit center wavelength (range)	1320 nm to 1340 nm
	Receive center wavelength (range)	1260 nm to 1280 nm
	Average transmit launch power, each lane (minimum)	-8.2 dBm
	Average transmit launch power, each lane (maximum)	0.5 dBm
	Average receive power each lane (minimum)	-14.4 dBm
	Average receive power each lane (maximum)	0.5 dBm
	Receiver sensitivity (OMA) each lane (maximum)	-12.6 dBm -10.3 dBm

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
	Stressed receiver sensitivity (OMA) each lane (maximum)	
	Fiber type	Type B1.1, B1.3 SMF
	Core/cladding	9/125 μm
	Operating range	2 m (6.56 ft.) to 10 km (6.21 miles)
	Diagnostic support	Supported
	Minimum Junos OS release	14.1X53-D35: QFX5100-24Q, QFX5100-48S, QFX5100-96S

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
Juniper Networks proprietary 10 km 10G-BiDi	Product SKU number	JNP-SFP-10G-BX10U Used in conjunction with JNP-SFP-10G-BX10D
	Supported models	QFX5100-24Q QFX5100-48S QFX5100-96S
Complies with SSF-8431; SSF-8472; and SSF-8432	Signaling rate	9.95328 GBd +/- 20 ppm 10.3125 GBd +/- 100 ppm
	Connector type	LC/PC
	Fiber count	1
	Transmit center wavelength (range)	1260 nm to 1280 nm
	Receive center wavelength (range)	1320 nm to 1340 nm
	Average transmit launch power, each lane (minimum)	-8.2 dBm
	Average transmit launch power, each lane (maximum)	0.5 dBm
	Average receive power each lane (minimum)	-14.4 dBm
	Average receive power each lane (maximum)	0.5 dBm
	Receiver sensitivity (OMA) each lane (maximum)	-12.6 dBm
		-10.3 dBm

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
	Stressed receiver sensitivity (OMA) each lane (maximum)	
	Fiber type	Type B1.1, B1.3 SMF
	Core/cladding	9/125 μm
	Operating range	2 m (6.56 ft.) to 10 km (6.21 miles)
	Diagnostic support	Supported
	Minimum Junos OS release	14.1X53-D35: QFX5100-24Q, QFX5100-48S, QFX5100-96S

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
Juniper Networks proprietary 10G-USR	Product SKU number	QFX-SFP-10GE-USR
	Supported models	QFX3500
		QFX5100-24Q (management ports only)
		QFX5100-48S
		QFX5100-48T (management port only)
		QFX5100-96S
	Signaling rate	9.95328 GBd +/- 20 ppm
		10.3125 GBd +/- 100 ppm
	Connector type	LC/PC
	Fiber pairs	1
	Center wavelength (range)	840 nm to 860 nm
	RMS spectral width (maximum)	0.65 nm
	Average transmit launch power (minimum)	-7.3 dBm
	Average transmit launch power (maximum)	-1.3 dBm
	Average receive power (minimum)	-9.9 dBm
	Average receive power (maximum)	-1.0 dBm
	Receiver sensitivity (OMA) (maximum)	-11.1 dBm
	DOM support	Available
	Fiber type	MMF

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications			
	Core/cladding size	62.5/125 μm	50/125 μm	50/125 μm
	Fiber grade	OM1	OM2	OM3 (OM4 compatible)
	Minimum modal bandwidth at 850 nm	200 MHz x km	500 MHz x km	2000 MHz x km
	Operating range	2 m (6.6 ft) to 10 m (32 ft)	2 m (6.6 ft) to 30 m (98 ft)	2 m (6.6 ft) to 100 m (328 ft)
Minimum Junos OS Release	11.1R1: QFX3500 13.2X51-D10: QFX5100-24Q, QFX5100-48S 13.2x51-D15: QFX5100-96S 13.2X51-D25: QFX5100-48T			

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
10GBASE-SR	Product SKU number	QFX-SFP-10GE-SR
	Supported models	QFX3500 QFX5100-24Q (management ports only) QFX5100-48S QFX5100-48T (management port only) QFX5100-96S
	Signaling rate	9.95328 GBd +/- 20 ppm 10.3125 GBd +/- 100 ppm
	Connector type	LC/ultra physical contact (UPC)
	Fiber pairs	1
	Center wavelength (range)	840 nm to 860 nm
	RMS spectral width (maximum)	0.45 nm
	Average transmit launch power (minimum)	-7.3 dBm
	Average transmit launch power (maximum)	-1.3 dBm
	Average receive power (minimum)	-9.9 dBm
	Average receive power (maximum)	-1.0 dBm
	Receiver sensitivity (OMA) (maximum)	-11.1 dBm
	Stressed receiver sensitivity in OMA (maximum)	-7.5 dBm

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications						
	DOM support	Available					
	Fiber type	MMF					
	Core/cladding size	62.5/125µm	62.5/125µm	50/125µm	50/125µm	50/125µm	50/125µm
	Fiber grade	FDDI	OM1	–	OM2	OM3	OM4
	Minimum modal bandwidth at 850 nm	160 MHz x km	200 MHz x km	400 MHz x km	500 MHz x km	2000 MHz x km	4700 MHz x km
	Operating range	26 m (85 ft)	33 m (108 ft)	66 m (216 ft)	82 m (269 ft)	300 m (984 ft)	400 m (1312 ft)
	Minimum Junos OS Release	11.1R1: QFX3500 13.2X51-D10: QFX5100-24Q, QFX5100-48S 13.2x51-D15: QFX5100-96S 13.2X51-D25: QFX5100-48T					

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
10GBASE-LR	Product SKU number	QFX-SFP-10GE-LR
	Supported models	QFX3500 QFX5100-24Q (management ports only) QFX5100-48S QFX5100-48T (management port only) QFX5100-96S
	Signaling rate	9.95328 GBd +/- 20 ppm 10.3125 GBd +/- 100 ppm
	Connector type	LC/UPC
	Fiber pairs	1
	Center wavelength (range)	1260 nm to 1355 nm
	Average transmit launch power (minimum)	-8.2 dBm
	Average transmit launch power (maximum)	0.5 dBm
	Average receive power (minimum)	-14.4 dBm
	Average receive power (maximum)	0.5 dBm
	Receiver sensitivity (OMA) maximum	-12.6 dBm
	Stressed receiver sensitivity (maximum) in OMA	-10.3 dBm
	DOM support	Available
	Fiber type	SMF

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications
	Core/cladding size 9/125 μm
	Operating range 2 m (6.6 ft) to 10 km (6.2 miles)
Minimum Junos OS Release	11.1R1: QFX3500
	13.2X51-D10: QFX5100-24Q, QFX5100-48S
	13.2x51-D15: QFX5100-96S
	13.2X51-D25: QFX5100-48T

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
10GBASE-ER	Product SKU number	QFX-SFP-10GE-ER
	Supported models	QFX3500 QFX5100-24Q (management ports only) QFX5100-48S QFX5100-48T (management port only) QFX5100-96S
	Signaling rate	9.95328 GBd +/- 20 ppm 10.3125 GBd +/- 100 ppm
	Connector type	LC/ultra physical connector (UPC)
	Fiber pairs	1
	Center wavelength (range)	1530 nm to 1565 nm
	Average transmit launch power (minimum)	-4.7 dBm
	Average transmit launch power (maximum)	4.0 dBm
	Average receive power (minimum)	-15.8 dBm
	Average receive power (maximum)	-1.0 dBm
	Receiver sensitivity (OMA) (maximum)	-14.1 dBm
	Stressed receiver sensitivity (maximum) in OMA	-11.3 dBm
	DOM support	Available

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
	Fiber type	SMF
	Core/cladding size	9/125 μm
	Operating range	2 m (6.6 ft) to 40 km (24.8 miles)
	Minimum Junos OS Release	13.2X51-D10: QFX5100-24Q, QFX5100-48S
		13.2x51-D15: QFX5100-96S
		13.2X51-D25: QFX5100-48T

Table 45: Optical Interface Support for 10-Gigabit Ethernet SFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
Juniper Networks proprietary 10G-ZR	Product SKU number	EX-SFP-10GE-ZR
	Supported models	QFX5100-24Q (management ports only) QFX5100-48S QFX5100-48T (management port only) QFX5100-96S
	Signaling rate	9.95328 GBd +/- 20 ppm 10.3125 GBd +/- 100 ppm
	Connector type	LC/PC
	Fiber pairs	1
	Transmitter wavelength (range)	1530 nm to 1565 nm
	Mean transmit output power (minimum)	0
	Mean transmit output power (maximum)	4 dBm
	Average receive power (maximum)	-7 dBm
	Equivalent sensitivity (minimum)	-24 dBm
	DOM support	Available
	Fiber type	SMF
	Operating range	80 km (49.7 miles)
	Minimum Junos OS Release	13.2X51-D10: QFX5100-24Q, QFX5100-48S 13.2x51-D15: QFX5100-96S 13.2X51-D25: QFX5100-48T

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series

Standards Compliance	Specifications	
40GBASE-ER4 and SFF-8436	Product SKU number	JNP-QSFP-40GE-ER4
	Supported models	QFX5100-24Q QFX5100-48S QFX5100-48T QFX5100-96S
	Signaling rate	10.3125 GBd +/- 100 ppm
	Connector type	LC/PC
	Fiber pairs	1
	Transmit and receive lane wavelengths (range)	Lane 0–1264.5 to 1277.5 nm Lane 1–1284.5 to 1297.5 nm Lane 2–1304.5 to 1317.5 nm Lane 3–1324.5 to 1337.5 nm
	Average transmit launch power, each lane (minimum)	–2.7 dBm
	Average transmit launch power, each lane (maximum)	4.5 dBm
	Average receive power, each lane (minimum)	–21.2 dBm
	Average receive power, each lane (maximum)	–4.5 dBm
	Receiver sensitivity (OMA), each lane (maximum)	–19 dBm
	Stressed receiver sensitivity (OMA) each lane (maximum)	–16.8 dBm
	Fiber type	Type B1.1, B1.3, or B6 SMF
	Core/cladding	9/125 µm
	Operating range	2 m (6.6 ft) to 40 km (24.8 miles)
	Diagnostic support	Supported

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series *(continued)*

Standards Compliance	Specifications	
	Minimum Junos OS release	14.1X53-D35: QFX5100-24Q, QFX5100-48S, QFX5100-48T, and QFX5100-96S

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
40GBASE-SR4	Product SKU number	QFX-QSFP-40G-SR4
	Supported models	QFX3008-I QFX3500 QFX3600 QFX3600-I QFX5100-24Q QFX5100-48S QFX5100-48T QFX5100-96S
	Signaling rate	10.3125 GBd +/- 100 ppm
	Connector type	12-ribbon multimode fiber crossover cable with female multi-fiber push-on (MPO)/ultra-physical contact (UPC) connectors. To channelize a 40-Gigabit port to four 10-Gigabit ports, use a 12-fiber parallel to 2-fiber duplex breakout cable. NOTE: See <i>Cable Specifications for QSFP+ Transceivers</i> for more information.
	Fiber pairs	4
	Center wavelength (range)	840 nm to 860 nm
	RMS spectral width (maximum)	0.65 nm
	Average transmit launch power, each lane (minimum)	-7.6 dBm
	Average transmit launch power, each lane (maximum)	2.4 dBm
	Average receive power, each lane (minimum)	-9.5 dBm
	Average receive power, each lane (maximum)	2.4 dBm
	Stressed receiver sensitivity (OMA), each lane (maximum)	-5.4 dBm

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications		
	DOM support	Available	
	Fiber type	MMF	
	Core/cladding size	50/125 μ m	50/125 μ m
	Fiber grade	OM3	OM4
	Effective modal bandwidth at 850 nm	2000 MHz x km	4700 MHz x km
	Operating range	0.5 m (1.64 ft) to 100 m (325 ft)	0.5 m (1.64 ft) to 150 m (425 ft)
	Minimum Junos OS Release	12.2X50-D20: QFX3600-I 12.2X50-D20: QFX3500, QFX3600 12.2X51-D10: QFX3008-I 13.2X51-D10; QFX5100-24Q, QFX5100-48S 13.2x51-D15: QFX5100-96S 13.2X51-D25: QFX5100-48T	

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
Juniper Networks proprietary 4X10G-SR	Product SKU number	QFX-QSFP-40G-ESR4
	Supported models	QFX3500
		QFX3600
		QFX3600-I
		QFX5100-24Q
		QFX5100-48S
		QFX5100-48T
		QFX5100-96S
	Signaling rate	9.95328 GBd +/- 20 ppm
		10.3125 GBd +/- 100 ppm
	Connector type	12-ribbon multimode fiber crossover cable with female MPO/PC connectors. To channelize a 40-Gigabit port to four 10-Gigabit ports, use a 12-fiber parallel to 2-fiber duplex breakout cable. <i>NOTE:</i> See <i>Cable Specifications for QSFP+ Transceivers</i> for more information.
	Fiber pairs	4
	Center wavelength (range)	840 nm to 860 nm
	RMS spectral width (maximum)	0.45 nm
	Average transmit launch power, each lane (minimum)	-7.3 dBm
	Average transmit launch power, each lane (maximum)	-1.3 dBm
	Average receive power, each lane (minimum)	-9.9 dBm
	Average receive power, each lane (maximum)	-1.0 dBm
	Receiver sensitivity (OMA), each lane (maximum)	-11.1 dBm
		-1.0 dBm

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications		
	Average receive power each lane (maximum)		
	Stressed receiver sensitivity (OMA), each lane (maximum)	-7.5 dBm	
	DOM support	Available	
	Fiber type	MMF	
	Core/cladding size	50/125 μ m	
	Fiber grade	OM3	OM4
	Effective modal bandwidth at 850 nm	2000 MHz x km	4700 MHz x km
	Operating range	2 m (6.6 ft) to 300 m (984 ft)	2 m (6.6 ft) to 400 m (1312 ft)
	Minimum Junos OS Release	12.2X50-D40: QFX3500, QFX3600, QFX3600-I 13.2X51-D10: QFX5100-24Q, QFX5100-48S 13.2x51-D15: QFX5100-96S 13.2X51-D25: QFX5100-48T	

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
40GBASE-LR4	Product SKU number	JNP-QSFP-40G-LR4
	Supported models	QFX3500
		QFX3600
		QFX3600-I
		QFX5100-24Q
		QFX5100-48S
		QFX5100-48T
		QFX5100-96S
	Signaling rate	10.3125 GBd +/- 100 ppm
	Connector type	LC/PC
	Fiber pairs	1
	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
	Average transmit launch power, each lane (minimum)	-7.0 dBm
	Average transmit launch power, each lane (maximum)	2.3 dBm
	Average receive power, each lane (minimum)	-13.7 dBm
	Average receive power, each lane (maximum)	2.3 dBm
	Receiver sensitivity (OMA), each lane (maximum)	-11.5 dBm
	Stressed receiver sensitivity (OMA) each lane (maximum)	-9.6 dBm
	DOM support	Available

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
	Fiber type	SMF
	Core/cladding size	9/125 μm
	Operating range	2 m (6.6 ft) to 10 km (6.2 miles)
	Minimum Junos OS Release	12.2X50-D50: QFX3500, QFX3600, QFX3600-I
		13.2X51-D10: QFX5100-24Q, QFX5100-48S
		13.2x51-D15: QFX5100-96S
		13.2X51-D25: QFX5100-48T

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
Juniper Networks proprietary 4X10G-LR	Product SKU number	JNP-QSFP-4X10GE-LR
	Supported models	QFX5100-24Q
		QFX5100-48S
		QFX5100-48T
		QFX5100-96S
	Signaling rate, each lane (range)	9.95328 +/- 20 ppm
		10.3125 GBd +/-100 ppm
	Connector type	12-ribbon single mode fiber-cable with female MPO/APC connector <i>NOTE: See Cable Specifications for QSFP+ Transceivers.</i>
	Fiber pairs	4
	Transmit and receive lane wavelength	1260 nm to 1355 nm
	Average transmit launch power, each lane (minimum)	-6.5 dBm
	Average transmit launch power, each lane (maximum)	0.5 dBm
	Average receive power, each lane (minimum)	-14.4 dBm
	Average receive power, each lane (maximum)	-1.5 dBm
	Receiver sensitivity (OMA), each lane (maximum)	-12.6 dBm
	Stressed receiver sensitivity (OMA), each lane (maximum)	-10.3 dBm
DOM support		Available
Core/cladding size		9/125 μ m
Operating distance		2 m (6.56 ft) to 10 km (6.21 miles)
Minimum Junos OS Release		

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series *(continued)*

Standards Compliance	Specifications
	13.2X51-D26: QFX5100-24Q, QFX5100-48S, QFX5100-48T, QFX5100-96S

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications		
Juniper Networks proprietary 40G-LX4	Product SKU Number	JNP-QSFP-40G-LX4	
	Supported models	QFX3008-I	
		QFX3500	
		QFX3600	
		QFX3600-I	
		QFX5100-24Q	
		QFX5100-48S	
		QFX5100-48T	
		QFX5100-96S	
	Signaling rate	10.3125 GBd +/- 100 ppm	
	Connector	Dual LC/PC	
	Fiber pairs	1	
	Lane wavelength (typical)	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	
	Average transmit launch power, each lane (minimum)	SMF	-9.0 dBm
		MMF	-7.0 dBm
	Average transmit launch power, each lane (maximum)	SMF	2.3 dBm
		MMF	4.3 dBm
	Average receive power, each lane (minimum)	SMF	-12 dBm
		MMF	-10.0 dBm
	Average receive power, each lane (maximum)	SMF	2.3 dBm
		MMF	4.3 dBm
	Receiver sensitivity (OMA), each lane (maximum)	SMF	-0.5 dBm
		MMF	-11.5 dBm

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications			
	DOM support	Available		
	Fiber type	SMF	MMF	MMF
	Core/cladding size	9/125 μm	50/125 μm	50/125 μm
	Fiber grade	OS1	OM3	OM4
	Effective modal bandwidth at 850 nm	–	2000 MHz x km	4700 MHz x km
	Operating range	2 km	100 m (328 ft)	150 m (492 ft)
	Minimum Junos OS Release	13.2X51-D20: QFX3500, QFX3600, QFX5100-24Q, QFX5100-48S 13.2X52-D10: QFX3008-I, 13.2X51-D25: QFX5100-48T 14.1X53-D10: QFX3600-I, QFX5100-96S		

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications		
Juniper Networks proprietary 4x10G-IR PSM	Product SKU Number	JNP-QSFP-4x10GE-IR	Parallel single mode
	Supported models	QFX5100-24Q QFX5100-48S QFX5100-48T QFX5100-96S	
	Signaling rate	10.3125 GBd +/- 100 ppm	
	Connector type	12-ribbon single-mode fiber cable with female, MPO/APC connector. To channelize a 40-Gigabit port to four 10-Gigabit ports, use a 12-fiber parallel to 2-fiber duplex breakout cable. <i>NOTE:</i> See <i>Cable Specifications for QSFP+ Transceivers</i> for more information.	
	Fiber pairs	4	
	Transmitter center wavelength ranges	1290.5 nm through 1355 nm	
	RMS spectral width (maximum)	2.4 nm	
	Average transmit launch power, each lane (minimum)	-10.4 dBm	
	Average transmit launch power, each lane (maximum)	1.5 dBm	
	Receiver center wavelength range	1260 nm through 1355 nm	
	Average receive power, each lane (minimum)	-13 dBm	
	Average receive power, each lane (maximum)	1.5 dBm	
	Receiver sensitivity (OMA), each lane (maximum)	-12.6 dBm	
	DOM	Available	
	Fiber type	SMF	

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
	Core/cladding size	9/125 μm
	Operating range	1.4 km (.87 miles)
	Minimum Junos OS Release	13.2X51-D26: QFX5100-24Q, QFX5100-48S, QFX5100-48T, QFX5100-96S 13.2X51-D25: QFX5100-48T

Table 46: Interface Support for 40-Gigabit Ethernet QSFP+ Transceivers for the QFX Series (*continued*)

Standards Compliance	Specifications	
Juniper Networks proprietary 40G-IR4	Product SKU Number	JNP-QSFP-40GE-IR4
	Signaling rate	10.3125 GBd +/- 100 ppm
	Connector type	LC/PC
	Fiber pairs	1
	Transmit and receive lane wavelengths	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
	Average transmit launch power, each lane (minimum)	-7.0 dBm
	Average transmit launch power, each lane (maximum)	2.3 dBm
	Average receive power, each lane (minimum)	-11.5 dBm
	Average receive power, each lane (maximum)	2.3 dBm
	Receiver sensitivity (OMA), each lane (maximum)	-10.6 dBm
	DOM support	Available
	Fiber type	SMF
	Core/cladding size	9/125 μ m
	Operating range	2 m (6.6 ft) to 2 km (1.24 miles)
Minimum Junos OS Release		

Related Documentation

- [Interface Specifications for SFP+ DAC Cables for the QFX Series on page 172](#)
- [Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 181](#)
- [Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 186](#)
- [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

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).

While we highly recommend using Juniper Network DAC cables, QFX Series switches do support third-party DAC cables. If you choose to use a third-party cable, it should meet the specifications described in [Table 48 on page 173](#) and [Table 49 on page 177](#).



CAUTION: If you are having a problem running a Juniper Networks device that is using a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

[Table 47 on page 172](#) describes the Junos OS software releases that supports third-party DAC cables. Prior releases only permitted Juniper Networks DAC cables.

Table 47: 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 [Hardware Compatibility Tool](#) or the following topics:

- [Interface Support for the QFX3600 Device on page 121](#)
- [Interface Support for the QFX3500 Device on page 125](#)
- [Interface Support for the QFX5100 Device on page 130](#)
- [Interface Support for the QFX3008-I Interconnect Device](#)

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. The [Hardware Compatibility Tool](#) and [Table 48 on page 173](#) describe the passive DAC cable specifications.
- Active DAC cables have signal amplification and equalization built into the cable assembly. The [Hardware Compatibility Tool](#) and [Table 49 on page 177](#) describe the active DAC cable specifications.

Table 48: SFP+ Passive Direct Attach Copper Cable Specifications

Product Number	Specifications	
QFX-SFP-DAC-1M	Rate	10-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	11.1: QFX3500 13.2X51-D10: QFX5100-24Q, QFX5100-48S 13.2X51-D15: QFX5100-96S

Table 48: SFP+ Passive Direct Attach Copper Cable Specifications (*continued*)

Product Number	Specifications	
QFX-SFP-DAC-2M	Rate	10-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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	2 m (6.6 ft)
	Minimum Junos OS Release	14.1X53-D30: QFX5100-24Q, QFX5100-48S, QFX5100-96S

Table 48: SFP+ Passive Direct Attach Copper Cable Specifications (*continued*)

Product Number	Specifications	
QFX-SFP-DAC-3M	Rate	10-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	11.1: QFX3500 13.2X51-D10: QFX5100-24Q, QFX5100-48S 13.2X51-D15: QFX5100-96S

Table 48: SFP+ Passive Direct Attach Copper Cable Specifications (*continued*)

Product Number	Specifications	
QFX-SFP-DAC-5M	Rate	10-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	11.1: QFX3500 13.2X51-D10: QFX5100-24Q, QFX5100-48S 13.2X51-D15: QFX5100-96S



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

Table 49: SFP+ Active Direct Attach Copper Cable Specifications

Product Number	Specifications	
QFX-SFP-DAC-IMA	Rate	10-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	11.1: QFX3500
		13.2X51-D10: QFX5100-24Q, QFX5100-48S
		13.2X51-D15: QFX5100-96S

Table 49: SFP+ Active Direct Attach Copper Cable Specifications (*continued*)

Product Number	Specifications	
QFX-SFP-DAC-3MA	Rate	10-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	11.1: QFX3500
		13.2X51-D10: QFX5100-24Q, QFX5100-48S
		13.2X51-D15: QFX5100-96S

Table 49: SFP+ Active Direct Attach Copper Cable Specifications (*continued*)

Product Number	Specifications	
QFX-SFP-DAC-5MA	Rate	10-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	11.1: QFX3500
		13.2X51-D10: QFX5100-24Q, QFX5100-48S
		13.2X51-D15: QFX5100-96S

Table 49: SFP+ Active Direct Attach Copper Cable Specifications (*continued*)

Product Number	Specifications	
QFX-SFP-DAC-7MA	Rate	10-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	13.2X51-D10: QFX5100-24Q, QFX5100-48S
		13.2X51-D15: QFX5100-96S

Table 49: SFP+ Active Direct Attach Copper Cable Specifications (*continued*)

Product Number	Specifications	
QFX-SFP-DAC-10MA	Rate	10-Gbps full-duplex serial transmission
QFX5100-24Q, QFX5100-48S, and QFX5100-96S only	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	13.2X51-D10: QFX5100-24Q, QFX5100-48S 13.2X51-D15: QFX5100-96S

Related Documentation

- [Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 137](#)
- [Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 181](#)
- [Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 186](#)
- *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

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

[Table 50 on page 182](#) describes the Junos OS software releases that support third-party DAC breakout cables. Earlier releases do not support third-party breakout cables.

You can use breakout cables purchased from a third party. These cables should meet the specifications described in [Table 51 on page 183](#).



CAUTION: If you are having a problem running a Juniper Networks device that is using a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

Table 50: Third-Party QSFP+ DAC Breakout Cable Support

Platform	Third-Party DAC Breakout Cable Support Added
QFX3600 Node device in a QFabric system	Junos OS Release 12.2X50-D10
QFX3600 device as a standalone switch	Junos OS Release 12.2X50-D20
QFX3500 device as a standalone switch	Junos OS Release 11.3R4
QFX5100 device as a standalone switch	Junos OS Release 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 [Hardware Compatibility Tool](#) or the following topics:

- [Interface Support for the QFX3600 Device on page 121](#)
- [Interface Support for the QFX3500 Device on page 125](#)
- [Interface Support for the QFX5100 Device on page 130](#)
- *Interface Support for the QFX3008-I Interconnect Device*

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. The [Hardware Compatibility Tool](#) and [Table 51 on page 183](#) describe the passive QSFP+ DAC breakout cable specifications.
- Active DAC cables have signal amplification and equalization built into the cable assembly. The [Hardware Compatibility Tool](#) and [Table 52 on page 185](#) describe the passive QSFP+ DAC breakout cable specifications.

Table 51: QSFP+ DAC Passive Breakout Cable Specifications

Product SKU	Specifications	
QFX-QSFP-DACBO-1M	Rate	40-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	12.2X50-D10: QFX3500, QFX3600, QFX3600-I 13.2X51-D10: QFX5100-24Q, QFX5100-48S 13.2X51-D15: QFX5100-96S

Table 51: QSFP+ DAC Passive Breakout Cable Specifications (*continued*)

Product SKU	Specifications	
QFX-QSFP-DACBO-3M	Rate	40-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	12.2X50-D10: QFX3500, QFX3600, QFX3600-I
		13.2X51-D10
		13.2X51-D15: QFX5100-96S

Table 52: QSFP+ Active DAC Breakout Cable Specifications

Product SKU	Specifications	
JNP-QSFP-DACBO-5MA	Rate	40-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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	5 m (16.4 ft)
JNP-QSFP-DACBO-7MA	Rate	40-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)

Table 52: QSFP+ Active DAC Breakout Cable Specifications (*continued*)

Product SKU	Specifications	
JNP-QSFP-DACBO-10MA	Rate	40-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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
	Length	10 m (32.8 ft)
	Minimum Junos OS release	14.1X53-D35

Related Documentation

- [Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 137](#)
- [Interface Specifications for SFP+ DAC Cables for the QFX Series on page 172](#)
- [Interface Specifications for QSFP+ DAC Cables for the QFX Series on page 186](#)
- *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

Use quad small-form factor pluggable plus (QSFP+) direct-attach copper (DAC) cables to connect:

- A standalone device to other standalone device (QFX3500, QFX3600, QFX5100, or QFX10000 fixed-chassis)
- A QFabric Node device (QFX3500, QFX3600, QFX5100) to a QFabric QFX3000-M Interconnect device (QFX3600-I or QFX5100-24Q).
- A leaf device to a spine device in a Virtual Chassis Fabric (VCF).
- A master, backup, or line card in a QFX Virtual Chassis.



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 QFX5100 or a QFX3600-I Interconnect device and a QFabric 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.

Table 53 on page 187 describes the Junos OS software releases that supports third-party DAC breakout cables. Earlier releases do not support third-party breakout cables.

While we highly recommend using Juniper Network DAC cables, you may use cables from a third-party vendor. If you choose to use a third-party cable, it should meet the specifications described in Table 54 on page 188.



CAUTION: If you are having a problem running a Juniper Networks device that is using a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

Table 53: Third-Party QSFP+ DAC Cable Support

Platform	Third-Party DAC Cable Support Added
QFX3600 Node device in a QFX3000-M QFabric system	Junos OS Release 12.2X50-D10
QFX3600 device as a standalone switch	Junos OS Release 12.2X50-D20
QFX3500 Node device in a QFX3000-M QFabric system	Junos OS Release 12.2X50-D10
QFX3500 device as a standalone switch	Junos OS Release 12.2X50-D10
QFX5100 device as a standalone switch	Junos OS Release 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 [Hardware Compatibility Tool](#) or the following topics:

- [Interface Support for the QFX3600 Device on page 121](#)
- [Interface Support for the QFX3500 Device on page 125](#)
- [Interface Support for the QFX5100 Device on page 130](#)
- [Interface Support for the QFX3008-I Interconnect Device](#)

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. The [Hardware Compatibility Tool](#) and [Table 54 on page 188](#) describe the passive DAC cable specifications for QSFP+.

Active DAC cables have signal amplification and equalization built into the cable assembly. The [Hardware Compatibility Tool](#) and [Table 55 on page 191](#) describe the active DAC cable specifications.

Table 54: Interface Specifications for Passive Copper QSFP+ to QSFP+ DAC Cables

Product Number	Specifications	
QFX-QSFP-DAC-1M	Rate	40-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	13.2X51-D10

Table 54: Interface Specifications for Passive Copper QSFP+ to QSFP+ DAC Cables (*continued*)

Product Number	Specifications	
QFX-QSFP-DAC-3M	Rate	40-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	13.2X51-D10

Table 54: Interface Specifications for Passive Copper QSFP+ to QSFP+ DAC Cables (*continued*)

Product Number	Specifications	
JNP-QSFP-DAC-5M	Rate	40-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	Supply voltage	3.3 V
	Power consumption (per end)	0.015 W
	Storage temperature	–40° C to 85° C
	Cable type	Twinax
	Wire AWG	26 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)
	Minimum Junos OS Release	13.2X51-D10

Table 55: Interface Specifications for Active Copper QSFP+ DAC Cables

Product Number	Specifications	
JNP-QSFP-DAC-5MA	Rate	40-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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	5 m (16.4 ft)

Table 55: Interface Specifications for Active Copper QSFP+ DAC Cables (*continued*)

Product Number	Specifications	
JNP-QSFP-DAC-7MA	Rate	40-Gbps full-duplex serial transmission
	Connector type	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	13.2X51-D10

Table 55: 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	None. SFPs are permanently attached.
	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)
	Minimum Junos OS Release	13.2X51-D10

Related Documentation

- [Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 137](#)
- [Interface Specifications for SFP+ DAC Cables for the QFX Series on page 172](#)
- [Interface Specifications for QSFP+ DAC Breakout Cables for the QFX Series on page 181](#)
- [Installing a Transceiver in a QFX Series Device](#)
- [Removing a Transceiver from a QFX Series Device](#)

Pluggable Transceivers Supported on EX4300 Switches

Optional uplink modules for EX4300 switches support SFP, SFP+, and QSFP+ transceivers. This topic describes the optical interfaces supported for those transceivers. It also lists the copper interfaces supported for the SFP transceivers.



NOTE: We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.



CAUTION: If you are having a problem running a Juniper Networks device that is using a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

The Gigabit Ethernet SFP, SFP+, and QSFP+ transceivers installed in EX4300 switches 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**.



NOTE: The transceivers support DOM even if they are installed in the SFP+ uplink module ports or QSFP+ ports configured as Virtual Chassis ports (VCPs).

The tables in this topic describe the optical interface support over single-mode fiber-optic (SMF) and multimode fiber-optic (MMF) cables for SFP, SFP+, and QSFP+ transceivers and the copper interfaces supported for the SFP transceivers:

- [Table 56 on page 195](#)—Optical interface support and copper interface support for Gigabit Ethernet SFP transceivers.
- [Table 57 on page 203](#)—Optical interface support for Fast Ethernet SFP transceivers.



NOTE: Only the SFP network ports on 32-port EX4300 switches support Fast Ethernet SFP transceivers. The built-in uplink ports or the uplink module ports do not support Fast Ethernet SFP transceivers.

- [Table 58 on page 204](#)—Optical interface support for SFP+ transceivers.
- [Table 59 on page 210](#)—Optical interface support for QSFP+ transceivers.

Table 56: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4300 Switches

Ethernet Standard	Specification	Value
1000BASE-T	Model number	EX-SFP-1GE-T
	Rate	10/100/1000 Mbps
	Connector type	RJ-45
	Transmitter wavelength	—
	Minimum launch power	—
	Maximum launch power	—
	Minimum receiver sensitivity	—
	Maximum input power	—
	Core/Cladding size	—
	Modal bandwidth	—
	Distance	100 m (328 ft)
	Software required	<ul style="list-style-type: none"> EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-32F-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later
	Support for Virtual Chassis configuration	No

Table 56: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value			
1000BASE-SX	Model number	EX-SFP-1GE-SX			
	Rate	1000 Mbps			
	Connector type	LC			
	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			
	Fiber type	MMF			
	Core size	62.5 μm	62.5 μm	50 μm	50 μm
	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)
	DOM support	Available			
	Support for Virtual Chassis configuration	No			
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later 			

Table 56: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-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
	Fiber type	SMF
	Core/Cladding size	9/125 μm
	Modal bandwidth	—
	Distance	10 km (6.2 miles)
	DOM support	Available
	Support for Virtual Chassis configuration	No
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later

Table 56: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-BX-U	Model number	EX-SFP-GE10KT13R14
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1310 nm
	Receiver wavelength	1490 nm
	Minimum launch power	–9 dBm
	Maximum launch power	–3 dBm
	Minimum receiver sensitivity	–30 dBm
	Maximum input power	–3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	10 km (6.2 miles)
	DOM support	Available
	Support for Virtual Chassis configuration	No
	Software required	Junos OS for EX Series switches, Release 14.1X53-D26 or later

Table 56: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-BX-D	Model number	EX-SFP-GE10KT14R13
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1490 nm
	Receiver wavelength	1310 nm
	Minimum launch power	–9 dBm
	Maximum launch power	–3 dBm
	Minimum receiver sensitivity	–30 dBm
	Maximum input power	–3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	10 km (6.2 miles)
	DOM support	Available
	Support for Virtual Chassis configuration	No
	Software required	Junos OS for EX Series switches, Release 14.1X53-D26 or later

Table 56: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-BX-U	Model number	EX-SFP-GE10KT13R15
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1310 nm
	Receiver wavelength	1550 nm
	Minimum launch power	–9 dBm
	Maximum launch power	–3 dBm
	Minimum receiver sensitivity	–21 dBm
	Maximum input power	–3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	10 km (6.2 miles)
	DOM support	Available
	Support for Virtual Chassis configuration	No
	Software required	Junos OS for EX Series switches, Release 14.1X53-D26 or later

Table 56: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-BX-D	Model number	EX-SFP-GE10KT15R13
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1550 nm
	Receiver wavelength	1310 nm
	Minimum launch power	–9 dBm
	Maximum launch power	–3 dBm
	Minimum receiver sensitivity	–21 dBm
	Maximum input power	–3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	10 km (6.2 miles)
	DOM support	Available
	Support for Virtual Chassis configuration	No
	Software required	Junos OS for EX Series switches, Release 14.1X53-D26 or later

Table 56: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LH (or 1000BASE-ZX)	Model number	EX-SFP-1GE-LH
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1550 nm
	Minimum launch power	–2 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–25 dBm
	Maximum input power	–3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	70 km (43.5 miles)
	DOM support	Available
	Support for Virtual Chassis configuration	No
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later

Table 57: Optical interface Support for Fast Ethernet SFP Transceivers in EX4300 Switches

Ethernet Standard	Specification	Value
100BASE-FX NOTE: Only the SFP network ports on 32-port EX4300 switches support Fast Ethernet SFP transceivers. The built-in uplink ports or the uplink module ports do not support Fast Ethernet SFP transceivers.	Model number	EX-SFP-1FE-FX
	Rate	100 Mbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1310 nm
	Minimum launch power	–20 dBm
	Maximum launch power	–14 dBm
	Minimum receiver sensitivity	–32.5 dBm
	Maximum input power	–8 dBm
	Fiber type	MMF
	Core/Cladding size	62.5/125 μ m
	Fiber grade	FDDI/OM1
	Modal bandwidth	500 MHz/km
	Distance	2 km (1.2 miles)
	DOM support	Not available
	Support for Virtual Chassis configuration	No
	Software required	<ul style="list-style-type: none"> EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-32F-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later

Table 58: Optical interface Support for SFP+ Transceivers in EX4300 Switches

Ethernet Standard	Specification	Value		
10GBASE-USR	Model number	EX-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	−1.0 dBm		
	Fiber type	MMF		
	Core/Cladding size	62.5/125 μm	50/125 μm	50/125 μm
	Fiber grade	OM1	OM3	OM3
	Modal bandwidth	200 MHz/km	500 MHz/km	1500 MHz/km
	Distance	10 m (32.8 ft)	30 m (98.4 ft)	100 m (328 ft)
	DOM support	Available		
	Support for Virtual Chassis configuration	Yes		
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later 		

Table 58: Optical interface Support for SFP+ Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value				
10GBASE-SR	Model number	EX-SFP-10GE-SR				
	Rate	10 Gbps				
	Connector type	LC				
	Fiber count	Dual				
	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				
	Fiber type	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
	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)
	DOM support	Available				
	Support for Virtual Chassis configuration	Yes				
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later 				

Table 58: Optical interface Support for SFP+ Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value		
10GBASE-LRM	Model number	EX-SFP-10GE-LRM		
	Rate	10 Gbps		
	Connector type	LC		
	Fiber count	Dual		
	Transmitter wavelength	1310 nm		
	Minimum launch power	−6.5 dBm		
	Maximum launch power	0.5 dBm		
	Minimum receiver sensitivity	−21 dBm		
	Maximum input power	0.5 dBm		
	Fiber type	MMF		
	Core/Cladding size	62.5/125 µm	50/125 µm	50/125 µm
	Fiber grade	FDDI/OM1	OM2	OM3
	Modal bandwidth	500 MHz/km	500 MHz/km	500 MHz/km
	Distance	220 m (722 ft)	220 m (722 ft)	220 m (722 ft)
	DOM support	Available		
	Support for Virtual Chassis configuration	Yes		
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later 		

Table 58: Optical interface Support for SFP+ Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
10GBASE-LR	Model number	EX-SFP-10GE-LR
	Rate	10 Gbps
	Connector type	LC
	Fiber count	Dual
	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
	Fiber type	SMF
	Core/Cladding size	9/125 μm
	Modal bandwidth	—
	Distance	10 km (6.2 miles)
	DOM support	Available
	Support for Virtual Chassis configuration	Yes
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later

Table 58: Optical interface Support for SFP+ Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
10GBASE-ER	Model number	EX-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	−15.8 dBm
	Maximum input power	−1 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μm
	Modal bandwidth	—
	Distance	40 km (24.8 miles)
	DOM support	Available
	Support for Virtual Chassis configuration	Yes
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later

Table 58: Optical interface Support for SFP+ Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
10GBASE-ZR	Model number	EX-SFP-10GE-ZR
	Rate	10 Gbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1550 nm
	Minimum launch power	0 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–20 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Support for Virtual Chassis configuration	Yes
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later

Table 59: Optical interface Support for QSFP+ Transceivers in EX4300 Switches

Ethernet Standard	Specification	Value
40GBASE-SR4	Model number	QFX-QSFP-40G-SR4
	Rate	40 Gbps
	Connector type	12-ribbon multimode fiber crossover cable with female MTP connectors
	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
	Fiber type	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)
	DOM support	Available
	Support for Virtual Chassis configuration	Yes
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later

Table 59: Optical interface Support for QSFP+ Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
40GBASE-ESR4	Model number	QFX-QSFP-40G-ESR4
	Rate	40 Gbps
	Connector type	12-ribbon multimode fiber crossover cable with female MTP connectors
	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
	Fiber type	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)
	DOM support	Available
	Support for Virtual Chassis configuration	Yes
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later

Table 59: Optical interface Support for QSFP+ Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value	
40GBASE-LX4	Model number	JNP-QSFP-40G-LX4	
	Rate	40 Gbps (10 Gbps per lane)	
	Connector type	Dual LC	
	Fiber count	Dual	
	Lane wavelength	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	
	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)
	DOM support	Available	
	Support for Virtual Chassis configuration	Yes	
	Software required	Junos OS for EX Series switches, Release 14.1 or later	

Table 59: Optical interface Support for QSFP+ Transceivers in EX4300 Switches (*continued*)

Ethernet Standard	Specification	Value
40GBASE-LR4	Model number	JNP-QSFP-40G-LR4
	Rate	40 Gbps (10Gbps 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)
	Maximum receiver sensitivity	−11.5 dBm (per lane)
	Maximum input power (per lane)	3.3 dBm (per lane)
	Fiber type	SMF
	Core/Cladding size	9/125 μm
	Distance	10 km (6.2 miles)
	DOM support	Available
	Support for Virtual Chassis configuration	Yes
	Software required	<ul style="list-style-type: none"> EX4300-24T, EX4300-24P, EX4300-48T, EX4300-48T-AFI, EX4300-48P, EX4300-48T-DC, and EX4300-48T-DC-AFI switches—Junos OS for EX Series switches, Release 13.2X50-D10 or later EX4300-32F switches—Junos OS for EX Series switches, Release 13.2X51-D15 or later EX4300-24T-S, EX4300-24P-S, EX4300-32F-S, EX4300-48T-S, and EX4300-48P-S switches—Junos OS for EX Series switches, Release 13.2X51-D26 or later

Related Documentation

- *EX4300 Switches Hardware Overview*
- *Installing a Transceiver in an EX Series Switch*

- *Removing a Transceiver from a Switch*

Pluggable Transceivers Supported on EX4200 Switches

Optional uplink modules for EX4200 switches support SFP, SFP+, or XFP transceivers. This topic describes the optical interfaces supported for those transceivers. It also lists the copper interface supported for the SFP transceivers.



NOTE: We recommend that you use only optical transceivers and optical connectors purchased from Juniper Networks with your Juniper Networks device.



CAUTION: If you are having a problem running a Juniper Networks device that is using a third-party optic or cable, the Juniper Networks Technical Assistance Center (JTAC) can help you diagnose the source of the problem. Your JTAC engineer might recommend that you check the third-party optic or cable and potentially replace it with an equivalent Juniper Networks optic or cable that is qualified for the device.

The Gigabit Ethernet SFP, SFP+, or XFP transceivers installed in EX4200 switches 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**.



NOTE: The transceivers support DOM even if they are installed in uplink module ports configured as Virtual Chassis ports.

The tables in this topic describe the optical interface support over single-mode fiber-optic (SMF) and multimode fiber-optic (MMF) cables for SFP, SFP+, and XFP transceivers and over the copper interface for SFP transceivers:

- [Table 60 on page 215](#)—Optical interface support and copper interface support for Gigabit Ethernet SFP transceivers.
- [Table 61 on page 234](#)—Optical interface support for Fast Ethernet SFP transceivers.
- [Table 62 on page 240](#)—Optical interface support for Gigabit Ethernet SFP+ transceivers.
- [Table 63 on page 245](#)—Optical interface support for Gigabit Ethernet XFP transceivers.

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches

Ethernet Standard	Specification	Value
1000BASE-T	Model number	EX-SFP-1GE-T
	Rate	10/100/1000 Mbps
	Connector type	RJ-45
	Fiber count	Copper
	Transmitter wavelength	—
	Minimum launch power	—
	Maximum launch power	—
	Minimum receiver sensitivity	—
	Maximum input power	—
	Fiber type	Copper
	Core/Cladding size	—
	Modal bandwidth	—
	Distance	100 m (328 ft)
	DOM support	Not available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.0 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	No

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value			
1000BASE-SX	Model number	EX-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			
	Fiber type	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 (722 ft)	275 m (902 ft)	500 m (1640 ft)	550 m (1804 ft)
	DOM support	Available			
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.0 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later			
	Support for Virtual Chassis configuration	Yes			

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-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
	Fiber type	SMF
	Core/Cladding size	9/125 μm
	Modal bandwidth	—
	Distance	10 km (6.2 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.0 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-BX-U	Model number	EX-SFP-GE10KT13R14
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1310 nm
	Receiver wavelength	1490 nm
	Minimum launch power	−9 dBm
	Maximum launch power	−3 dBm
	Minimum receiver sensitivity	−30 dBm
	Maximum input power	−3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μm
	Modal bandwidth	—
	Distance	10 km (6.2 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.4 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-BX-D	Model number	EX-SFP-GE10KT14R13
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1490 nm
	Receiver wavelength	1310 nm
	Minimum launch power	−9 dBm
	Maximum launch power	−3 dBm
	Minimum receiver sensitivity	−30 dBm
	Maximum input power	−3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μm
	Modal bandwidth	—
	Distance	10 km (6.2 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.4 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-BX-U	Model number	EX-SFP-GE10KT13R15
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1310 nm
	Receiver wavelength	1550 nm
	Minimum launch power	–9 dBm
	Maximum launch power	–3 dBm
	Minimum receiver sensitivity	–21 dBm
	Maximum input power	–3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	10 km (6.2 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.5 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-BX-D	Model number	EX-SFP-GE10KT15R13
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1550 nm
	Receiver wavelength	1310 nm
	Minimum launch power	−9 dBm
	Maximum launch power	−3 dBm
	Minimum receiver sensitivity	−21 dBm
	Maximum input power	−3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μm
	Modal bandwidth	—
	Distance	10 km (6.2 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.5 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-BX-U	Model number	EX-SFP-GE40KT13R15
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1310 nm
	Receiver wavelength	1550 nm
	Minimum launch power	–6.5 dBm
	Maximum launch power	2 dBm
	Minimum receiver sensitivity	–23 dBm
	Maximum input power	–3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 µm
	Modal bandwidth	–
	Distance	40 km (24.8 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.5 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-BX-D	Model number	EX-SFP-GE40KT15R13
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1550 nm
	Receiver wavelength	1310 nm
	Minimum launch power	–6.5 dBm
	Maximum launch power	2 dBm
	Minimum receiver sensitivity	–23 dBm
	Maximum input power	–3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	40 km (24.8 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.5 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-SFP-1GE-LX40K
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Double
	Transmitter wavelength	1310 nm
	Minimum launch power	–14 dBm
	Maximum launch power	–8 dBm
	Minimum receiver sensitivity	–45 dBm
	Maximum input power	–3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	40 km (24.8 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.4 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LH (or 1000BASE-ZX)	Model number	EX-SFP-1GE-LH
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1550 nm
	Minimum launch power	–2 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–25 dBm
	Maximum input power	–3 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	70 km (43.5 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.0 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-SFP-GE80KCW1470
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1470 nm
	Minimum launch power	0 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–32 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 12.1 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-SFP-GE80KCW1490
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1490 nm
	Minimum launch power	0 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–32 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 12.1 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-SFP-GE80KCW1510
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1510 nm
	Minimum launch power	0 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–32 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 12.1 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-SFP-GE80KCW1530
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1530 nm
	Minimum launch power	0 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–32 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 12.1 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-SFP-GE80KCW1550
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1550 nm
	Minimum launch power	0 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–32 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 12.1 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-SFP-GE80KCW1570
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1570 nm
	Minimum launch power	0 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–32 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 12.1 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-SFP-GE80KCW1590
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1590 nm
	Minimum launch power	0 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–32 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 12.1 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 60: Optical interface Support and Copper Interface Support for Gigabit Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
1000BASE-LX	Model number	EX-SFP-GE80KCW1610
	Rate	1000 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1610 nm
	Minimum launch power	0 dBm
	Maximum launch power	5 dBm
	Minimum receiver sensitivity	–32 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 12.1 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 61: Optical interface Support for Fast Ethernet SFP Transceivers in EX4200 Switches

Ethernet Standard	Specification	Value
100BASE-FX	Model number	EX-SFP-1FE-FX
	Rate	100 Mbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1310 nm
	Minimum launch power	–20 dBm
	Maximum launch power	–14 dBm
	Minimum receiver sensitivity	–32.5 dBm
	Maximum input power	–8 dBm
	Fiber type	MMF
	Core/Cladding size	62.5/125 μ m
	Fiber grade	FDDI/OM1
	Modal bandwidth	500 MHz/km
	Distance	2 km (1.2 miles)
	DOM support	Not available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.2 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	No

Table 61: Optical interface Support for Fast Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
100BASE-LX	Model number	EX-SFP-IFE-LX
	Rate	100 Mbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1310 nm
	Minimum launch power	–15 dBm
	Maximum launch power	–8 dBm
	Minimum receiver sensitivity	–31.5 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	10 km (6.2 miles)
	DOM support	Not available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.5 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	No

Table 61: Optical interface Support for Fast Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
100BASE-BX-U	Model number	EX-SFP-FE20KT13R15
	Rate	100 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1310 nm
	Receiver wavelength	1550 nm
	Minimum launch power	–14 dBm
	Maximum launch power	–8 dBm
	Minimum receiver sensitivity	–45 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	20 km (12.4 miles)
	DOM support	Not available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.3 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	No

Table 61: Optical interface Support for Fast Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
100BASE-BX-D	Model number	EX-SFP-FE20KT15R13
	Rate	100 Mbps
	Connector type	LC
	Fiber count	Single
	Transmitter wavelength	1550 nm
	Receiver wavelength	1310 nm
	Minimum launch power	–14 dBm
	Maximum launch power	–8 dBm
	Minimum receiver sensitivity	–45 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	20 km (12.4 miles)
	DOM support	Not available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.3 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	No

Table 61: Optical interface Support for Fast Ethernet SFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
100BASE-LX40K	Model number	EX-SFP-IFE-LX40K
	Rate	100 Mbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1310 nm
	Minimum launch power	–5 dBm
	Maximum launch power	0 dBm
	Minimum receiver sensitivity	–32 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	40 km (24.8 miles)
	DOM support	Not available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 10.0 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	No

Table 61: Optical interface Support for Fast Ethernet SFP Transceivers in EX4200 Switches (continued)

Ethernet Standard	Specification	Value
100BASE-LH (or 100BASE-ZX)	Model number	EX-SFP-IFE-LH
	Rate	100 Mbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1310 nm
	Minimum launch power	–5 dBm
	Maximum launch power	0 dBm
	Minimum receiver sensitivity	–32 dBm
	Maximum input power	–8 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Not available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 10.0 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	No

Table 62: Optical interface Support for Gigabit Ethernet SFP+ Transceivers in EX4200 Switches

Ethernet Standard	Specification	Value		
10GBASE-USR	Model number	EX-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	−1.0 dBm		
	Fiber type	MMF		
	Core/Cladding size	62.5/125 µm	50/125 µm	50/125 µm
	Fiber grade	OM1	OM3	OM3
	Modal bandwidth	200 MHz/km	500 MHz/km	1500 MHz/km
	Distance	10 m (32.8 ft)	30 m (98.4 ft)	100 m (328 ft)
	DOM support	Available		
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 10.2 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later		
	Support for Virtual Chassis configuration	Yes		

Table 62: Optical interface Support for Gigabit Ethernet SFP+ Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value		
10GBASE-SR	Model number	EX-SFP-10GE-SR		
	Rate	10 Gbps		
	Connector type	LC		
	Fiber count	Dual		
	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		
	Fiber type	MMF		
	Core/Cladding size	62.5/125 μ m	62.5/125 μ m	50/125 μ m
	Fiber grade	FDDI	OM1	–
	Modal bandwidth	160 MHz/km	200 MHz/km	400 MHz/km
	Distance	26 m (85 ft)	33 m (108 ft)	66 m (216 ft)
	DOM support	Available		
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.4 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later		
	Support for Virtual Chassis configuration	Yes		

Table 62: Optical interface Support for Gigabit Ethernet SFP+ Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value		
10GBASE-LRM	Model number	EX-SFP-10GE-LRM		
	Rate	10 Gbps		
	Connector type	LC		
	Fiber count	Dual		
	Transmitter wavelength	1310 nm		
	Minimum launch power	–6.5 dBm		
	Maximum launch power	0.5 dBm		
	Minimum receiver sensitivity	–21 dBm		
	Maximum input power	0.5 dBm		
	Fiber type	MMF		
	Core/Cladding size	62.5/125 µm	50/125 µm	50/125 µm
	Fiber grade	FDDI/OM1	OM2	OM3
	Modal bandwidth	500 MHz/km	500 MHz/km	500 MHz/km
	Distance	220 m (722 ft)	220 m (722 ft)	220 m (722 ft)
	DOM support	Available		
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.5 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later		
	Support for Virtual Chassis configuration	Yes		

Table 62: Optical interface Support for Gigabit Ethernet SFP+ Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
10GBASE-LR	Model number	EX-SFP-10GE-LR
	Rate	10 Gbps
	Connector type	LC
	Fiber count	Dual
	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
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	10 km (6.2 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.4 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 62: Optical interface Support for Gigabit Ethernet SFP+ Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
10GBASE-ER	Model number	EX-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	−15.8 dBm
	Maximum input power	−1 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μm
	Modal bandwidth	—
	Distance	40 km (24.8 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 10.3 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration	Yes

Table 63: Optical interface Support for Gigabit Ethernet XFP Transceivers in EX4200 Switches

Ethernet Standard	Specification	Value				
10GBASE-SR	Model number	EX-XFP-10GE-SR				
	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				
	Fiber type	MMF				
	Core/Cladding size	625/125µm	625/125µm	50/125µm	50/125µm	50/125µm
	Fiber grade	FDDI	OM1	—	OM2	OM3
	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)
	DOM support	Available				
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.0 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later				
	Support for Virtual Chassis configuration on EX4200 switches	Yes				

Table 63: Optical interface Support for Gigabit Ethernet XFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
10GBASE-LR	Model number	EX-XFP-10GE-LR
	Rate	10 Gbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1310 nm
	Minimum launch power	–8.2 dBm
	Maximum launch power	1 dBm
	Minimum receiver sensitivity	–18 dBm
	Maximum input power	0.5 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	10 km (6.2 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.0 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration on EX4200 switches	Yes

Table 63: Optical interface Support for Gigabit Ethernet XFP Transceivers in EX4200 Switches (continued)

Ethernet Standard	Specification	Value
10GBASE-ER	Model number	EX-XFP-10GE-ER
	Rate	10 Gbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1550 nm
	Minimum launch power	−4.7 dBm
	Maximum launch power	2 dBm
	Minimum receiver sensitivity	−15.8 dBm
	Maximum input power	−1 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μm
	Modal bandwidth	—
	Distance	40 km (24.8 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.0 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration on EX4200 switches	Yes

Table 63: Optical interface Support for Gigabit Ethernet XFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
10GBASE-ZR	Model number	EX-XFP-10GE-ZR
	Rate	10 Gbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	1550 nm
	Minimum launch power	0
	Maximum launch power	4 dBm
	Minimum receiver sensitivity	–30 dBm
	Maximum input power	–7 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 9.0 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration on EX4200 switches	Yes

Table 63: Optical interface Support for Gigabit Ethernet XFP Transceivers in EX4200 Switches (*continued*)

Ethernet Standard	Specification	Value
10GBASE-ZR	Model number	EX-XFP-10GE80KDWM
	Rate	10 Gbps
	Connector type	LC
	Fiber count	Dual
	Transmitter wavelength	Tunable (1528 nm through 1569 nm)
	Minimum launch power	–1 dBm
	Maximum launch power	3 dBm
	Minimum receiver sensitivity	–24 dBm
	Maximum input power	–1 dBm
	Fiber type	SMF
	Core/Cladding size	9/125 μ m
	Modal bandwidth	–
	Distance	80 km (49.7 miles)
	DOM support	Available
	Software required	EX4200-24T, EX4200-24T-DC, EX4200-24P, EX4200-24PX, EX4200-24F, EX4200-24F-DC, EX4200-48T, EX4200-48T-DC, EX4200-48P, and EX4200-48PX switches—Junos OS for EX Series switches, Release 12.1 or later EX4200-24F-S and EX4200-48T-S switches—Junos OS for EX Series switches, Release 12.3R4 or later
	Support for Virtual Chassis configuration on EX4200 switches	Yes

- Related Documentation**
- *Uplink Modules in EX4200 Switches*
 - *Installing a Transceiver in an EX Series Switch*
 - *Removing a Transceiver from a Switch*

Cable Specifications for Copper-Based Control Plane Connections for the 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.

QFX5100 Node devices and the QFX5100-24Q Interconnect devices connect using a 1000BASE-T port **C1** and a 1000BASE-T SFP module (Juniper model number QFX-SFP-1GE-T) installed in the the SFP management Ethernet cage **C0**. Some QFX5100 SKUs have an additional SFP management port (second **C0**).

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 137](#).

[Table 64 on page 250](#) lists the specifications for the cables that connect the QFabric system control plane.

Table 64: Cable Specifications for Copper-Based Control Plane Connections for the QFabric System

Port on QFX Series Device	Cable Specification	Maximum Length	Device Receptacle
<ul style="list-style-type: none"> 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 QFX5100 Interconnect device management C0 and C1 (with 1000BASE-T SFP module) QFX3600 Node device management (C0 and C1) ports QFX3500 Node device management (C0 and C1) ports QFX5100 Node device management C0 and C1 (with 1000BASE-T SFP module) 	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](#)
- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)

- [Connecting a QFX3600-I Interconnect Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 347](#)
- *Connecting a QFX3500 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network*
- *Connecting a QFX3600 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network*
- [Connecting a QFX3500 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 357](#)
- [Connecting a QFX3600 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 354](#)
- *Connecting a QFX5100 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network*
- [Connecting a QFX5100 Node Device to a QFX3600-I Interconnect Device on page 389](#)

CHAPTER 8

Power

- [AC Power Specifications for a QFX3100 Director Device on page 253](#)
- [AC Power Cord Specifications for a QFX3100 Director Device on page 254](#)
- [AC Power Specifications for a QFX3600 or QFX3600-I Device on page 255](#)
- [AC Power Specifications for a QFX3500 Device on page 255](#)
- [AC Power Specifications for a QFX5100 Device on page 256](#)
- [AC Power Cord Specifications for a QFX Series Device on page 257](#)
- [AC Power Supply Specifications for EX4300 Switches on page 258](#)
- [AC Power Cord Specifications for an EX4300 Switch on page 260](#)
- [AC Power Cord Specifications for EX4200 Switches on page 263](#)
- [DC Power Specifications for a QFX3600 or QFX3600-I Device on page 264](#)
- [DC Power Specifications for a QFX3500 Device on page 265](#)
- [DC Power Specifications for a QFX5100 Device on page 265](#)
- [DC Power Supply Specifications for EX4300 Switches on page 266](#)

AC Power Specifications for a QFX3100 Director Device

[Table 65 on page 253](#) describes the AC power specifications for a QFX3100 Director device.

Table 65: AC Power Specifications for a QFX3100 Director Device

Item	Specifications
AC input voltage	Operating range: 100–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none">• 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 254](#)

AC Power Cord Specifications for a QFX3100 Director Device

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.

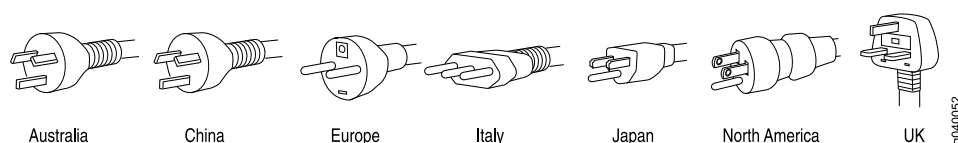
Table 66 on page 254 lists AC power cord specifications provided for each country or region.

Table 66: 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 (CHI-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
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 24 on page 255 illustrates the plug on the power cord for some of the countries or regions listed in Table 66 on page 254.

Figure 24: 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 QFX3600 or QFX3600-I Device

Table 67 on page 255 describes the AC power specifications for a QFX3600 or QFX3600-I device.

Table 67: AC Power Specifications for a QFX3600 or QFX3600-I Device

Item	Specification
AC input voltage	Operating range: <ul style="list-style-type: none"> • 100–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> • 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 257](#)
- [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

Table 68 on page 256 describes the AC power specifications for a QFX3500 device.

Table 68: AC Power Specifications for a QFX3500 Device

Item	Specification
AC input voltage	Operating range: <ul style="list-style-type: none"> 100–127 VAC 200–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> 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 257](#)
- [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

Table 69 on page 256 describes the AC power specifications for a QFX5100 device.

Table 69: AC Power Specifications for a QFX5100 Device

Item	Specification
AC input voltage	Operating range: <ul style="list-style-type: none"> 100 / 240 VAC
AC input line frequency	50–60 Hz (all product SKUs)
AC input current rating	<ul style="list-style-type: none"> 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

Table 69: AC Power Specifications for a QFX5100 Device (*continued*)

Item	Specification
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 257](#)
- [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









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 14.75 feet (approximately 4.5 meters) 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 QFX Series switches are in compliance.

[Table 70 on page 258](#) lists AC power cord specifications provided for each country or region.

Table 70: AC Power Cord Specifications

Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Australia	250 VAC, 10 A, 50 Hz	AS/NZ 3109-1996	CG_CBL-C13-06-AU	
China	250 VAC, 10 A, 50 Hz	GB 1002-1996	CG_CBL-C13-06-CH	
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII	CG_CBL-C13-06-EU	
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16/VII	CG_CBL-C13-06-IT	
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	JIS C8303	CG_CBL-C13-06-JP	
North America	125 VAC, 13 A, 60 Hz	CAN/CSA No. 49-92	CG_CBL-C13-06-US	
South Korea	250 VAC, 10 A, 60 Hz	KSC 8305; K60884-1	CG_CBL-C13-06-KR	
Switzerland	250 VAC, 10 A, 50 Hz	SEV 1011 SEV 1991; EN 60320 C13	CG_CBL-C13-06-SZ	
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A	CG_CBL-C13-06-UK	

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*

AC Power Supply Specifications for EX4300 Switches

EX4300 switches support 350 W, 715 W, and 1100 W AC power supplies.

The tables in this topic provides power supply specification of AC power supplies used in an EX4300 switch:

- [Table 71 on page 259](#): 350 W AC power supply specifications
- [Table 72 on page 259](#): 715 W AC power supply specifications
- [Table 73 on page 259](#): 1100 W AC power supply specifications

Table 71: 350 W AC Power Supply Specifications for an EX4300 Switch

Item	Specification
AC input voltage	<ul style="list-style-type: none"> Low-voltage line: 100–120 VAC High-voltage line: 200–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> Low-voltage line: 4 A High-voltage line: 2 A
Output power	350 W



NOTE: The 32-port EX4300 switches support only 350 W AC power supplies with front-to-back airflow direction.

Table 72: 715 W AC Power Supply Specifications for an EX4300 Switch

Item	Specification
AC input voltage	<ul style="list-style-type: none"> Low-voltage line: 100–120 VAC High-voltage line: 200–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> Low-voltage line: 11 A High-voltage line: 5 A
Output power	715 W

Table 73: 1100 W AC Power Supply Specifications for an EX4300 Switch

Item	Specification
AC input voltage	<ul style="list-style-type: none"> Low-voltage line: 115–120 VAC High-voltage line: 200–240 VAC
AC input line frequency	50–60 Hz
AC input current rating	<ul style="list-style-type: none"> Low-voltage line: 12 A High-voltage line: 6 A
Output power	1100 W

- Related Documentation**
- *AC Power Supply in EX4300 Switches*
 - *AC Power Supply LEDs in EX4300 Switches*

AC Power Cord Specifications for an EX4300 Switch

Each AC power supply has a single AC appliance inlet that requires a dedicated AC power feed. A detachable AC power cord is supplied with each AC power supply. The 350 W AC and the 715 W AC power supplies are shipped with AC power cords with the C13 coupler type and the 1100 W AC power supply is shipped with AC power cord with the C15 coupler type 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 14.75 ft (4.5 m) 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 tables in this topic list the AC power cords specifications provided for different power supplies for each country or region.

- [Table 74 on page 260](#)—Power cords for 350 W AC and 715 W AC power supplies
- [Table 75 on page 262](#)—Power cords for 1100 W AC power supplies

Table 74: AC Power Cord Specifications for 350 W and 715 W AC Power Supplies for an EX4300 Switch

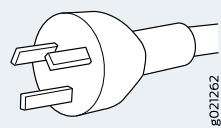
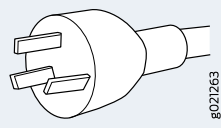
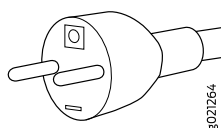
Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Argentina	250 VAC, 10 A, 50 Hz	IRAM 2073 Type RA/3	CBL-EX-PWR-C13-AR	No graphic available
Australia	250 VAC, 10 A, 50 Hz	AS/NZS 3112 Type SAA/3	CBL-EX-PWR-C13-AU	
Brazil	250 VAC, 10 A, 50 Hz	NBR 14136 Type BR/3	CBL-EX-PWR-C13-BR	No graphic available
China	250 VAC, 10 A, 50 Hz	GB 1002-1996 Type PRC/3	CBL-EX-PWR-C13-CH	
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-EX-PWR-C13-EU	
India	250 VAC, 10 A, 50 Hz	IS 1293 Type IND/3	CBL-EX-PWR-C13-IN	No graphic available

Table 74: AC Power Cord Specifications for 350 W and 715 W AC Power Supplies for an EX4300 Switch (continued)

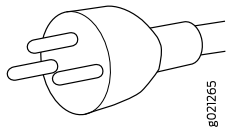
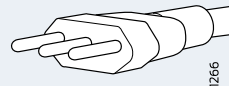
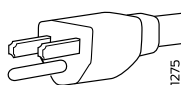
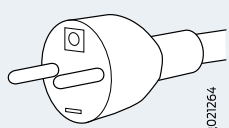
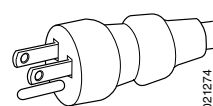
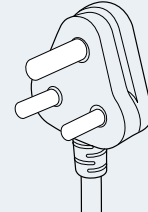
Country/ Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Israel	250 VAC, 10 A, 50 Hz	SI 32/1971 Type IL/3G	CBL-EX-PWR-C13-IL	 g021265
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16 Type I/3G	CBL-EX-PWR-C13-IT	 g021266
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	SS-00259 Type VCTF	CBL-EX-PWR-C13-JP	 g021275
Korea	250 VAC, 10 A, 50 Hz or 60 Hz	CEE (7) VII Type VII GK	CBL-EX-PWR-C13-KR	 g021264
North America	125 VAC, 13 A, 60 Hz	NEMA 5-15 Type N5-15	CBL-EX-PWR-C13-US	 g021274
South Africa	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-EX-PWR-C13-SA	 g021289
Switzerland	250 VAC, 10 A, 50 Hz	SEV 6534-2 Type 12G	CBL-EX-PWR-C13-SZ	No graphic available

Table 74: AC Power Cord Specifications for 350 W and 715 W AC Power Supplies for an EX4300 Switch (continued)


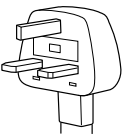
Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number	Graphic
Taiwan	125 VAC, 10 A, 50 Hz	NEMA 5-15P Type N5-15P	CBL-EX-PWR-C13-TW	 8021288
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A Type BS89/13	CBL-EX-PWR-C13-UK	 8021271

Table 75: AC Power Cord Specifications for 1100 W AC Power Supplies for an EX4300 Switch

Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number
Argentina	250 VAC, 10 A, 50 Hz	IRAM 2073 Type RA/3	CBL-PWR-C15M-HITEMP-AR
Australia	250 VAC, 10 A, 50 Hz	AS/NZS 3112-2000 Type SAA/3	CBL-PWR-C15M-HITEMP-AU
Brazil	250 VAC, 10 A, 50 Hz	NBR 14136 Type BR/3	CBL-PWR-C15M-HITEMP-BR
China	250 VAC, 10 A, 50 Hz	GB2099, GB1002 Type PRC/3	CBL-PWR-C15M-HITEMP-CH
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-PWR-C15M-HITEMP-EU
Israel	250 VAC, 10 A, 50 Hz	SI 32 Type IL/3G	CBL-PWR-C15M-HITEMP-IL
India	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-PWR-C15M-HITEMP-IN
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16 Type I/3G	CBL-PWR-C15M-HITEMP-IT
Japan	125 VAC, 15 A, 50 Hz or 60 Hz	JIS 8303 Type 498GJ	CBL-PWR-C15M-HITEMP-JP
Korea	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-PWR-C15M-HITEMP-KR
South Africa	250 VAC, 10 A, 50 Hz	SABS 164/1:1992 Type ZA/3	CBL-PWR-C15M-HITEMP-SA
North America	125 VAC, 15 A, 60 Hz	NEMA 5-15 Type N5/15	CBL-PWR-C15M-HITEMP-US
Switzerland	250 VAC, 10 A, 50 Hz	SEV 1011 / 6534-2 Type 12G	CBL-PWR-C15M-HITEMP-SZ
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A Type BS89/13	CBL-PWR-C15M-HITEMP-UK



CAUTION: The AC power cord for the EX4300 switch is intended for use with this switch only. Do not use the cord with any other product.



CAUTION: Power cords must not block access to switch components.

Related Documentation

- *AC Power Supply in EX4300 Switches*
- *General Safety Guidelines and Warnings*
- *General Electrical Safety Guidelines and Warnings*
- *Prevention of Electrostatic Discharge Damage*
- *Connecting AC Power to an EX4300 Switch*

AC Power Cord Specifications for EX4200 Switches

A detachable AC power cord is supplied with the AC power supplies. 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 AC power cord provided with each power supply is intended for use with that power supply 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 switch are in compliance.

Table 76 on page 263 lists AC power cord specifications for the countries and regions listed in the table.

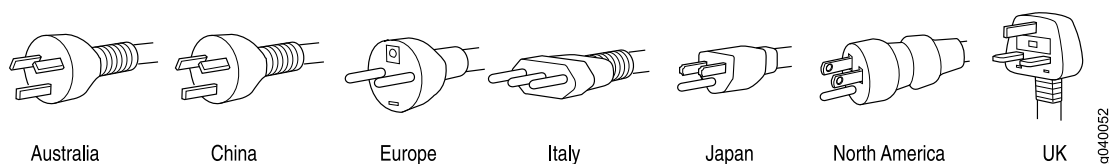
Table 76: AC Power Cord Specifications

Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number
Argentina	250 VAC, 10 A, 50 Hz	IRAM 2073 Type RA/3	CBL-EX-PWR-C13-AR
Australia	250 VAC, 10 A, 50 Hz	AS/NZS 3112 Type SAA/3	CBL-EX-PWR-C13-AU
Brazil	250 VAC, 10 A, 50 Hz	NBR 14136 Type BR/3	CBL-EX-PWR-C13-BR
China	250 VAC, 10 A, 50 Hz	GB 1002-1996 Type PRC/3	CBL-EX-PWR-C13-CH

Table 76: AC Power Cord Specifications (*continued*)

Country/Region	Electrical Specifications	Plug Standards	Juniper Model Number
Europe (except Italy, Switzerland, and United Kingdom)	250 VAC, 10 A, 50 Hz	CEE (7) VII Type VIIG	CBL-EX-PWR-C13-EU
India	250 VAC, 10 A, 50 Hz	IS 1293 Type IND/3	CBL-EX-PWR-C13-IN
Israel	250 VAC, 10 A, 50 Hz	SI 32/1971 Type IL/3G	CBL-EX-PWR-C13-IL
Italy	250 VAC, 10 A, 50 Hz	CEI 23-16 Type I/3G	CBL-EX-PWR-C13-IT
Japan	125 VAC, 12 A, 50 Hz or 60 Hz	SS-00259 Type VCTF	CBL-EX-PWR-C13-JP
Korea	250 VAC, 10 A, 50 Hz or 60 Hz	CEE (7) VII Type VIIGK	CBL-EX-PWR-C13-KR
North America	125 VAC, 13 A, 60 Hz	NEMA 5-15 Type N5-15	CBL-EX-PWR-C13-US
South Africa	250 VAC, 10A, 50 Hz	SABS 164/1:1992 Type ZA/13	CBL-EX-PWR-C13-SA
Switzerland	250 VAC, 10 A, 50 Hz	SEV 6534-2 Type 12G	CBL-EX-PWR-C13-SZ
Taiwan	125 VAC, 11 A and 15 A, 50 Hz	NEMA 5-15P Type N5-15P	CBL-EX-PWR-C13-TW
United Kingdom	250 VAC, 10 A, 50 Hz	BS 1363/A Type BS89/13	CBL-EX-PWR-C13-UK

Figure 25 on page 264 illustrates the plug on the power cord for some of the countries or regions listed in Table 76 on page 263.

Figure 25: AC Plug Types

Related Documentation

- *Power Supply in EX4200 Switches*
- *General Safety Guidelines and Warnings*
- *General Electrical Safety Guidelines and Warnings*
- *Prevention of Electrostatic Discharge Damage*

DC Power Specifications for a QFX3600 or QFX3600-I Device

Table 77 on page 265 describes the DC power specifications for a QFX3600 or QFX3600-I device.

Table 77: DC Power Specifications for a QFX3600 or QFX3600-I Device

Item	Specifications
DC input voltage	<ul style="list-style-type: none"> 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
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

Table 78 on page 265 describes the DC power specifications for a QFX3500 device.

Table 78: DC Power Specifications for a QFX3500 Device

Item	Specifications
DC input voltage	<ul style="list-style-type: none"> 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

Table 79 on page 266 describes the DC power specifications for DC product SKUs of the QFX5100 device.

Table 79: DC Power Specifications for a QFX5100 Device

Item	Product SKUs	Specifications
DC input voltage	QFX5100-24Q	<ul style="list-style-type: none"> Rated operating voltage: –48 VDC to –60 VDC Operating voltage range: –40 VDC through –72 VDC
	QFX5100-48S	
	QFX5100-48T	
	QFX5100-96S	<ul style="list-style-type: none"> Rated operating voltage: VDC –48 VDC to –60 VDC Operating voltage range: –40 VDC through –72 VDC
DC input current rating	QFX5100-24Q	10 A maximum
	QFX5100-48S	
	QFX5100-48T	
	QFX5100-96S	
Typical power consumption	QFX5100-48S	300 W
	QFX5100-48T	
	QFX5100-24Q	
	QFX5100-96S	315 W
Maximum power consumption	QFX5100-24Q	385 W
	QFX5100-48S	
	QFX5100-48T	
	QFX5100-96S	470 W

Related Documentation

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

DC Power Supply Specifications for EX4300 Switches

Table 78 on page 265 lists the power supply specifications for a DC power supply used in an EX4300 switch.

Table 80: DC Power Supply Specifications for an EX4300 Switch

Item	Specifications
DC input voltage	<ul style="list-style-type: none"> Nominal operating voltage: –48 VDC Operating voltage range: –48 VDC through –60 VDC

Table 80: DC Power Supply Specifications for an EX4300 Switch (*continued*)

Item	Specifications
DC input current rating	4 A maximum at nominal operating voltage (–48 VDC)
Output power	550 W

**Related
Documentation**

- *DC Power Supply in EX4300 Switches*
- *DC Power Supply LEDs in EX4300 Switches*

CHAPTER 9

Installing a QFX3100 Director Device

- [Installing and Connecting a QFX3100 Director Device on page 269](#)
- [Unpacking a QFX3100 Director Device on page 270](#)
- [Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet on page 272](#)
- [Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet on page 273](#)
- [Connecting AC Power to a QFX3100 Director Device on page 275](#)
- [Connecting a QFX Series Device to a Management Console on page 277](#)
- [Powering On a QFX3100 Director Device on page 278](#)

Installing and Connecting a QFX3100 Director Device

To install and connect a QFX3100 Director device:

1. Follow instructions in [“Unpacking a QFX3100 Director Device” on page 270](#).
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 272](#) (using the mounting brackets provided)
 - [“Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet” on page 273](#) (using the mounting brackets provided)
3. Follow instructions in [“Connecting AC Power to a QFX3100 Director Device” on page 275](#) to connect power.
4. See [QFX3000-G QFabric System Installation Overview](#) for information about the steps to install and configure your QFX3000-G QFabric system. See [“QFX3000-M QFabric System Installation Overview” on page 97](#) 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

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 26 on page 271](#)):

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 81 on page 271](#).
7. Save the shipping carton and packing materials in case you need to move or ship the device later.

Figure 26: Unpacking a QFX3100 Director Device

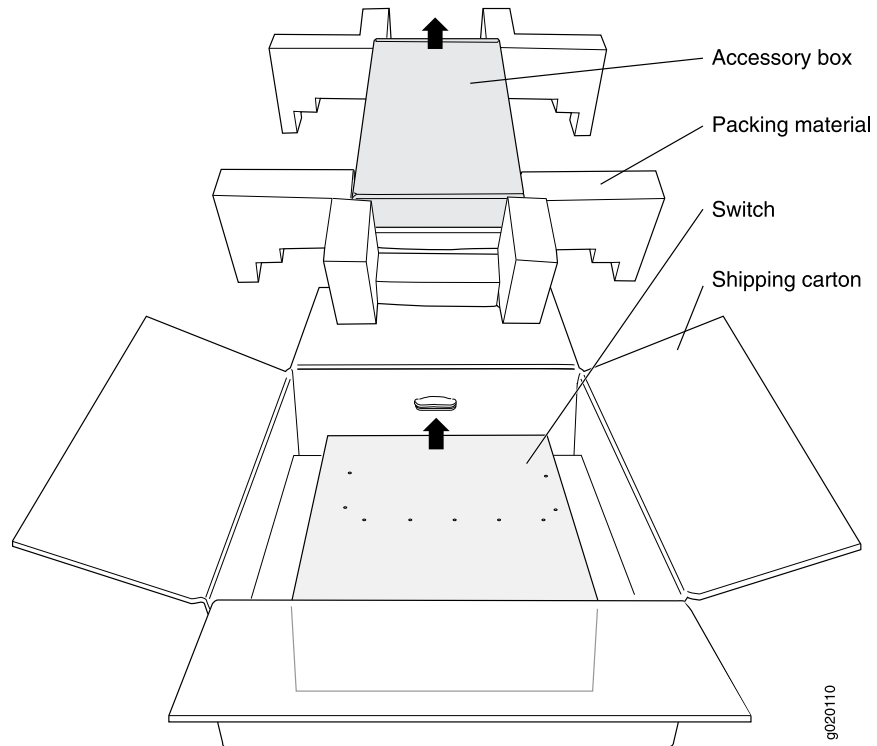


Table 81: Inventory of Components Provided with a QFX3100 Director Device

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 269](#)

Mounting a QFX3100 Director Device on Two Posts in a Rack or Cabinet

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 273](#).

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 270](#)).

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.



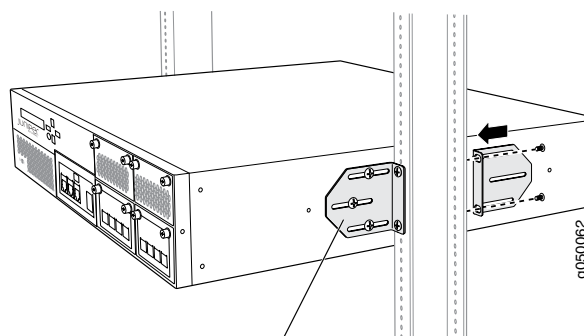
CAUTION: If you are mounting multiple units on the rack, mount the heaviest unit at the bottom and mount the others from bottom to top in order of decreasing weight.

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 27 on page 273](#).

Figure 27: Mounting the QFX3100 Director Device on Two Posts in a Rack



Attach the front bracket to the chassis, and secure the chassis to the post. Attach the rear bracket to the other side of the post, and secure the chassis to the rear bracket, adjusting the bracket width as needed.

Related Documentation

- [Rack-Mounting and Cabinet-Mounting Warnings](#)
- [Installing and Connecting a QFX3100 Director Device on page 269](#)
- [Connecting AC Power to a QFX3100 Director Device on page 275](#)

Mounting a QFX3100 Director Device on Four Posts in a Rack or Cabinet

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 270](#)).

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:

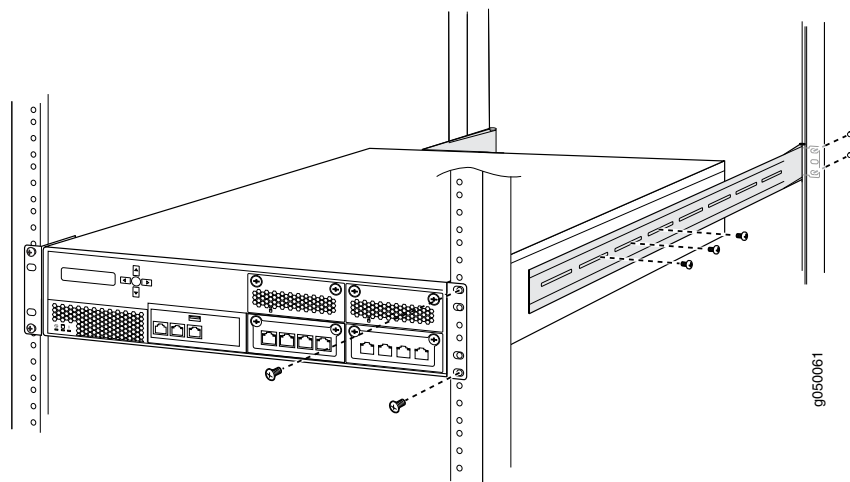
1. Place the QFX3100 Director device on a flat, stable surface.
2. Measure the distance between the front and rear rack rails. Using this measurement, attach the adjustable rear mounting brackets on the chassis using the provided screws.
3. Flip the hinged rack-mounting plates at the end of the brackets 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 28 on page 275](#).

Figure 28: 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 275](#)
- [Installing and Connecting a QFX3100 Director Device on page 269](#)
- [Rack-Mounting and Cabinet-Mounting Warnings](#)

Connecting AC Power to a QFX3100 Director Device

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 (includes video)*.



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 29 on page 276](#)):

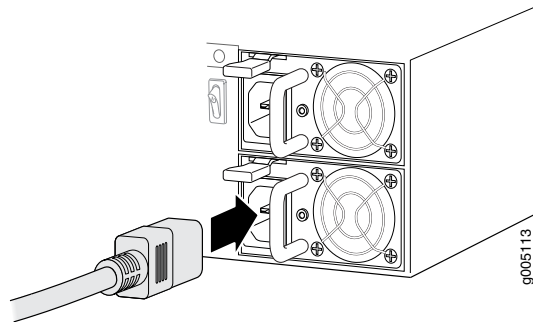
1. Ensure that the power supplies are fully inserted in the QFX3100 Director device.
2. Locate the power cords shipped with the QFX3100 Director device; the cords have plugs appropriate for your geographical location. See [“AC Power Cord Specifications for a QFX3100 Director Device” on page 254](#).



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 29 on page 276](#)).

Figure 29: 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 (I) 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 269](#)

- *AC Power Supply in a QFX3100 Director Device*

Connecting a QFX Series Device to a Management Console

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 30 on page 277](#) and [Figure 31 on page 277](#)):

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 30 on page 277](#)) or management console (see [Figure 31 on page 277](#)).

Figure 30: Connecting the QFX Series to a Management Console Through a Console Server

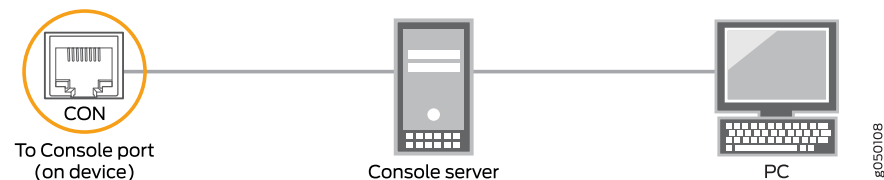


Figure 31: Connecting the QFX Series Directly to a Management Console



Related Documentation

- *Console Port Connector Pinouts for the QFX Series*
- *Configuring Console and Auxiliary Port Properties*

Powering On a QFX3100 Director Device

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 277](#). 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 342](#).



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 441](#).

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 254](#)

CHAPTER 10

Installing a QFX3600-I Interconnect Device or QFX3600 Node Device

- [Installing and Connecting a QFX3600 or QFX3600-I Device on page 281](#)
- [Unpacking a QFX3600 or QFX3600-I Device on page 282](#)
- [Mounting a QFX3600 or QFX3600-I Device on Two Posts in a Rack or Cabinet on page 283](#)
- [Mounting a QFX3600 or QFX3600-I Device on Four Posts in a Rack or Cabinet on page 285](#)
- [Connecting Earth Ground to QFX3600 or QFX3600-I Devices on page 289](#)
- [Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 290](#)
- [Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 292](#)
- [Connecting a QFX Series Device to a Management Console on page 296](#)

Installing and Connecting a QFX3600 or QFX3600-I Device

To install and connect a QFX3600 or QFX3600-I device:

1. Follow the instructions in [“Unpacking a QFX3600 or QFX3600-I Device” on page 282](#).
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 283](#)
 - [Mounting a QFX3600 or QFX3600-I Device on Four Posts in a Rack or Cabinet on page 285](#)
3. Follow the instructions in [“Connecting Earth Ground to QFX3600 or QFX3600-I Devices” on page 289](#).
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 290](#)
 - [Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 292](#)
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* 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” on page 97](#) 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” on page 97](#) 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

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 82 on page 283](#) 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 82: 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	1
NOTE: Use only clip-style ESD grounding straps with the chassis grounding lug.	
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 281](#)

Mounting a QFX3600 or QFX3600-I Device on Two Posts in a Rack or Cabinet

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 285](#).

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 282).

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.



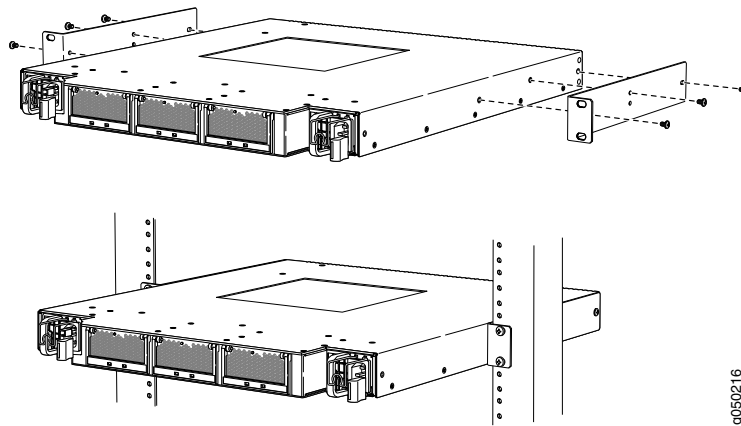
CAUTION: If you are mounting multiple device on a rack, mount a device in the bottom of the rack first and proceed to mount the rest of the devices from bottom to top.

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 32 on page 285](#).
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 32 on page 285](#).
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 32: 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 289](#)
- [Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 290](#)
- [Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 292](#)

Mounting a QFX3600 or QFX3600-I Device on Four Posts in a Rack or Cabinet

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 283](#).

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 110, 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 282).

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.



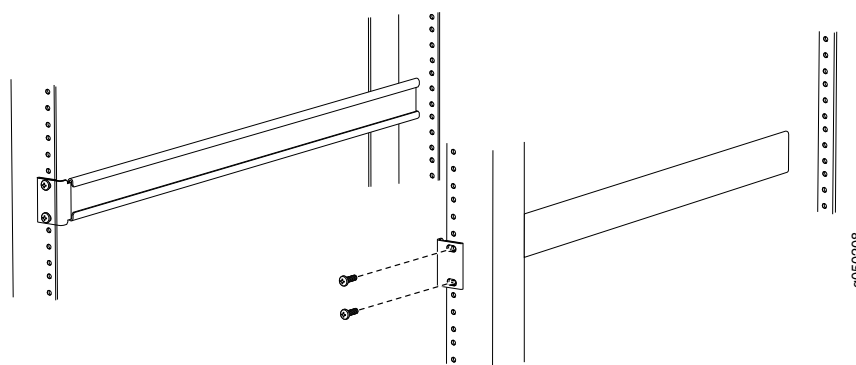
CAUTION: If you are mounting multiple devices on a rack, mount the device in the lowest position of the rack first, and proceed to mount the rest of the devices from bottom to top.

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 33 on page 287](#).

- 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 33: 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 34 on page 288](#).
 - 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 34 on page 288](#).

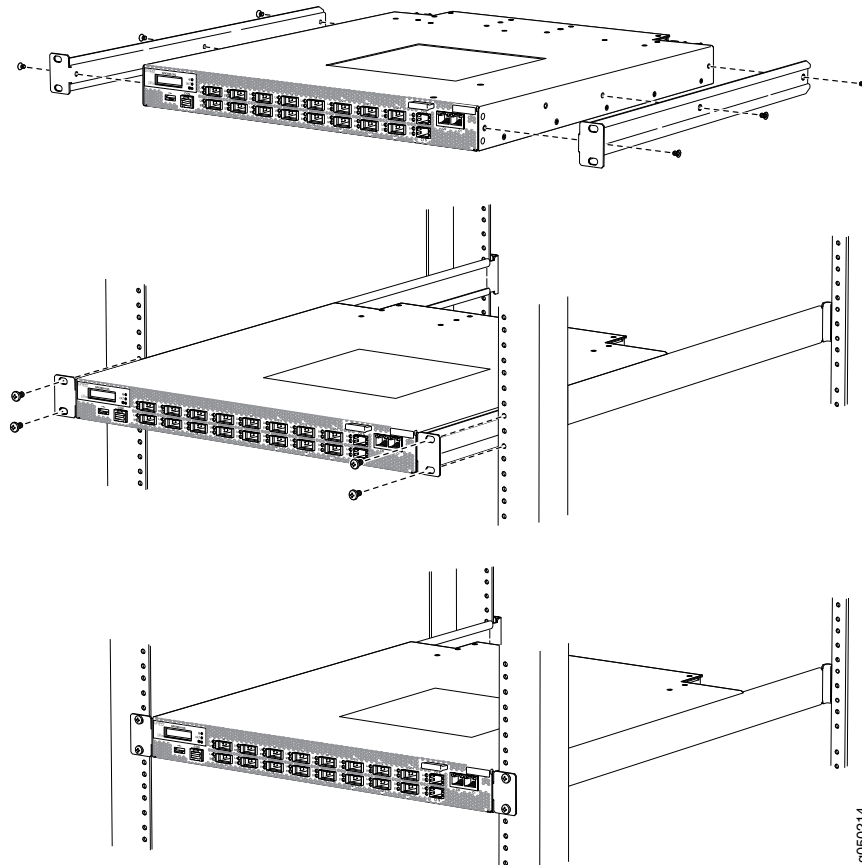


TIP: If someone is assisting you, have one person stand at the rear of the rack where the installation blade is installed, to help guide the device onto the installation blade.

- 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 34: 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 289](#)
- [Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 290](#)
- [Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 292](#)
- [Configuring a QFX3600 Device as a Standalone Switch](#)

Connecting Earth Ground to QFX3600 or QFX3600-I Devices

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 35 on page 290](#)).

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 283](#) and [“Mounting a QFX3600 or QFX3600-I Device on Four Posts in a Rack or Cabinet” on page 285](#).

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 mm²), 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.

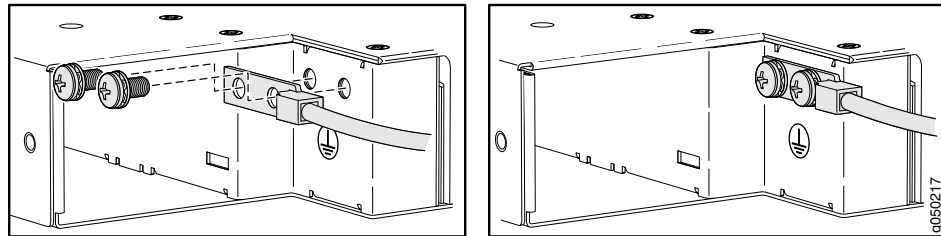
An AC-powered QFX3600 or QFX3600-I device chassis gains additional grounding when you plug the power supply in the switch into a grounded AC power outlet by using an AC power cord appropriate for your geographical location. See [“AC Power Cord Specifications for a QFX Series Device” on page 257](#).

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 35: 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 290](#)
- [Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 292](#)

Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device

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 306](#) or [“Connecting Earth Ground to QFX3600 or QFX3600-I](#)

[Devices](#)” on page 289. 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 257).

- 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 257.



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 36 on page 291](#) or [Figure 37 on page 292](#)).

Figure 36: Connecting an AC Power Cord to an AC Power Supply in a QFX3500 Device

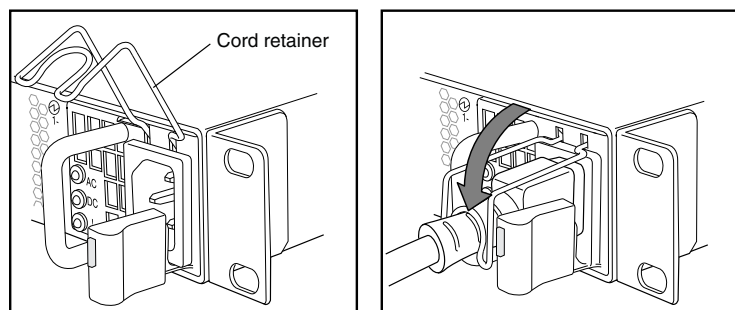
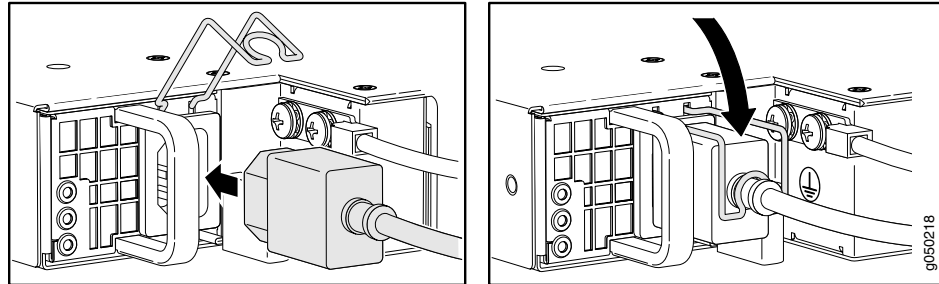


Figure 37: Connecting an AC Power Cord to an AC Power Supply in a QFX3600 or QFX3600-I Device



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 (I) 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

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 306](#) or [“Connecting Earth Ground to QFX3600 or QFX3600-I Devices” on page 289](#).

- 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 38 on page 295](#)).
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 39 on page 296](#) and [Figure 38 on page 295](#)).

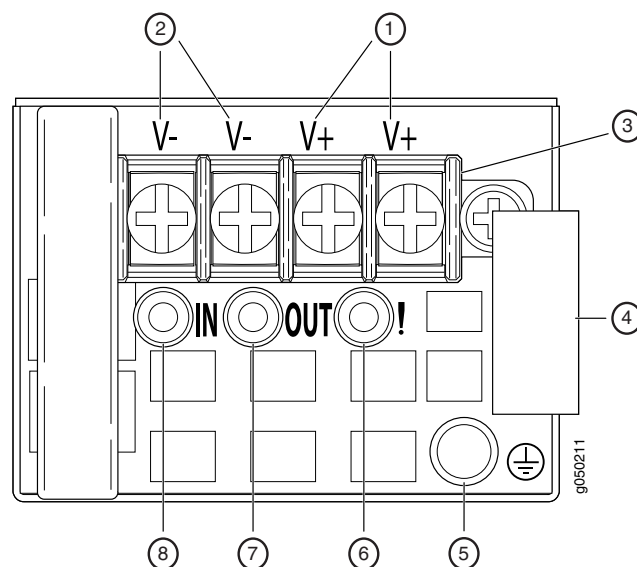


CAUTION: The DC power supply has four terminals labeled V+, V+, V–, and V– for connecting DC power source cables labeled positive (+) and negative (–). The V+ terminals are shunted internally together, as are the V– terminals. The same polarity terminal can be wired together from the same source to provide 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.

- Secure the ring lug of the positive (+) DC power source cable to the V+ terminal on the DC power supply.
- Secure the ring lug of the negative (–) DC power source cable to the V– terminal on the DC power supply.
- 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 38: DC Power Supply Faceplate for a QFX3500, QFX3600 or QFX3600-I Device

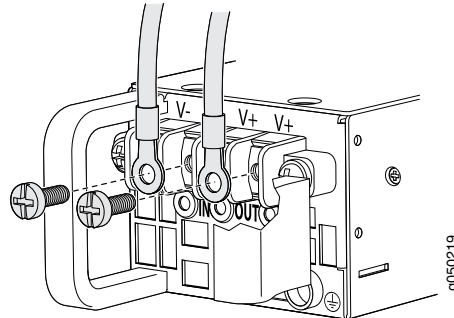


1—Shunt positive input terminals	5—ESD grounding point
2—Shunt negative input terminals	6—Fault LED
3—Terminal block	7—Output LED
4—Ejector lever	8—Input LED



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 39: 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

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 30 on page 277](#) and [Figure 31 on page 277](#)):

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 30 on page 277](#)) or management console (see [Figure 31 on page 277](#)).

Figure 40: Connecting the QFX Series to a Management Console Through a Console Server

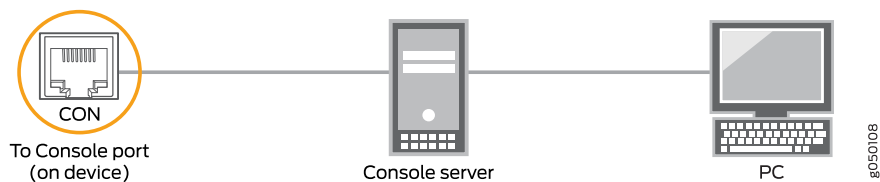


Figure 41: Connecting the QFX Series Directly to a Management Console



Related Documentation

- *Console Port Connector Pinouts for the QFX Series*
- *Configuring Console and Auxiliary Port Properties*

CHAPTER 11

Installing a QFX3500 Node Device

- [Installing and Connecting a QFX3500 Device on page 299](#)
- [Unpacking a QFX3500 Device on page 300](#)
- [Mounting a QFX3500 Device in a Rack or Cabinet on page 301](#)
- [Connecting Earth Ground to a QFX3500 Device on page 306](#)
- [Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 307](#)
- [Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 310](#)
- [Connecting a QFX Series Device to a Management Console on page 313](#)

Installing and Connecting a QFX3500 Device

To install and connect a QFX3500 device:

1. Follow the instructions in [“Unpacking a QFX3500 Device” on page 300](#).
2. Mount the device by following the instructions in [“Mounting a QFX3500 Device in a Rack or Cabinet” on page 301](#).
3. Follow the instructions in [“Connecting Earth Ground to a QFX3500 Device” on page 306](#).
4. Follow the instructions in [“Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device” on page 290](#).
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* 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” on page 97](#) 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

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 83 on page 300](#) 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 83: 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
SFP/SFP+ port dust covers	48
QSFP+ port dust covers	4

Table 83: Inventory of Components Supplied with a QFX3500 Device (*continued*)

Component	Quantity
Electrostatic discharge (ESD) grounding strap	1

- Related Documentation**
- [Mounting a QFX3500 Device in a Rack or Cabinet on page 301](#)
 - [Installing and Connecting a QFX3500 Device on page 299](#)

Mounting a QFX3500 Device in a Rack or Cabinet

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 302](#). 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 304](#). 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 301](#)
- [Two Mounting Rails Procedure on page 302](#)
- [Four Mounting Rails Procedure on page 304](#)

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 110, 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 300).

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.



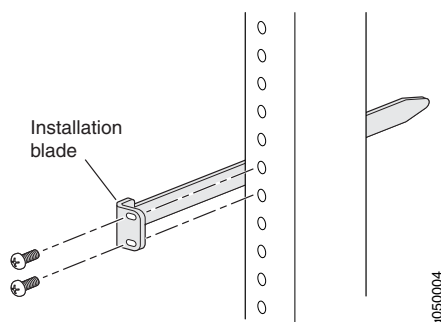
CAUTION: If you are mounting multiple devices on a rack, mount the device in the lowest position of the rack first and proceed to mount the rest of the devices from bottom to top.

Two Mounting Rails Procedure

To mount the device on four posts in a rack using a two-rail 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 42 on page 303](#).

Figure 42: Installing an Installation Blade in a Rack

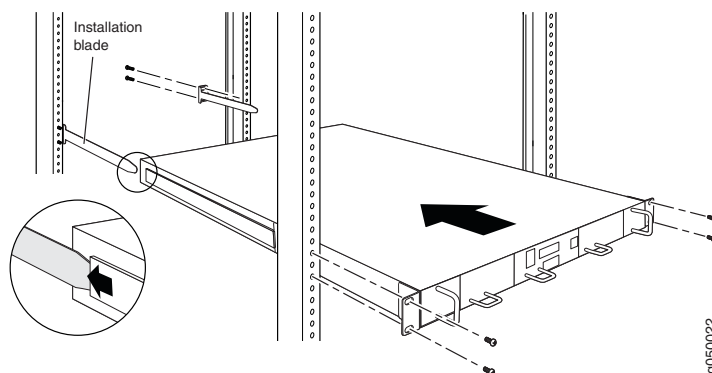


3. Grasp both sides of the device, lift it, and position it in the rack so that the blade receptacle at the rear of the chassis catches and slides onto the installation blade. See [Figure 43 on page 303](#).



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 43: Mounting the QFX3500 Device on Four Posts in a Rack Using Two-Rail Kit



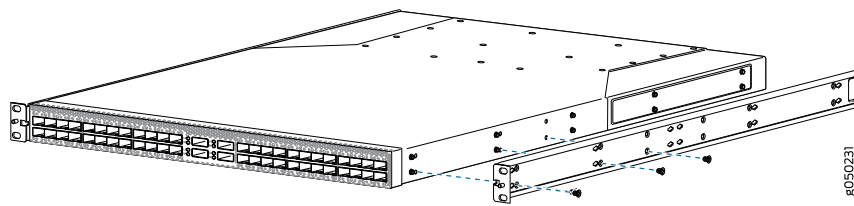
4. Align the holes in the front brackets on the chassis with the holes in the rack. Ensure that the chassis is level.
5. With four mounting screws—and cage nuts and washers if your rack requires them—secure the front of the device to the rack. Insert the first screw on the opposite corner from the rear 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 a four-rail kit:

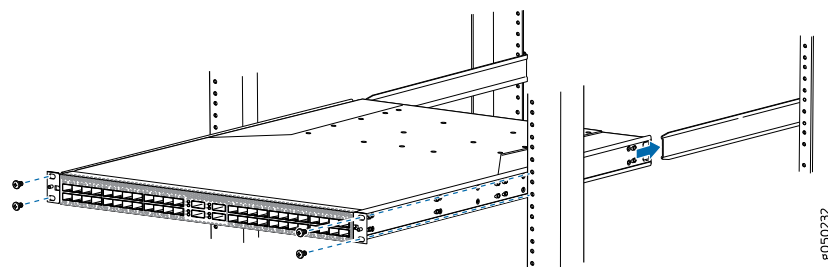
1. Attach the ESD grounding strap to your bare wrist and to a site ESD point.
2. Decide whether the management end of the device or the ports are to be placed at the front of the rack.
3. Align the holes in the mounting rail with the button fasteners on the side of the device and slide the holes over the fasteners to click into place. See [Figure 44 on page 304](#) to see the proper alignment.

Figure 44: Attaching a 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 42 on page 303](#) 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 45 on page 304](#).

Figure 45: 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 290](#)
- *Configuring a QFX3500 Device as a Standalone Switch*

Connecting Earth Ground to a QFX3500 Device

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 46 on page 307](#)).

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 301](#).

Ensure that you have the following parts and tools available:

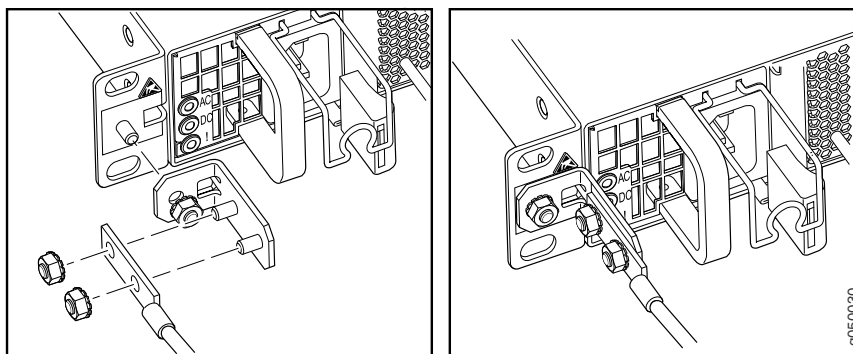
- Protective earthing terminal bracket—This L-shaped bracket attaches to a post on the QFX3500 device left front mounting bracket, providing a protective earthing terminal for the device. This bracket is provided in the accessory kit.
- Grounding cable for your QFX3500 device—The grounding cable must be 14 AWG (2 mm²), 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 257](#).

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 46 on page 307](#).

Figure 46: 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 290](#)
- [Connecting DC Power to a QFX3500, QFX3600, or QFX3600-I Device on page 292](#)

Connecting AC Power to a QFX3500, QFX3600, or QFX3600-I Device

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 306](#) or [“Connecting Earth Ground to QFX3600 or QFX3600-I Devices” on page 289](#). 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 257](#)).

- 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 257](#).



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 36 on page 291](#) or [Figure 37 on page 292](#)).

Figure 47: Connecting an AC Power Cord to an AC Power Supply in a QFX3500 Device

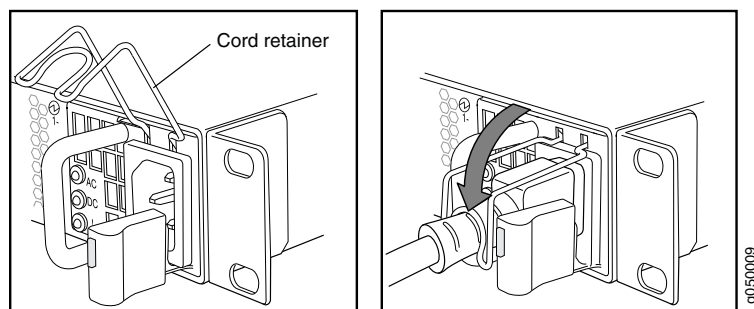
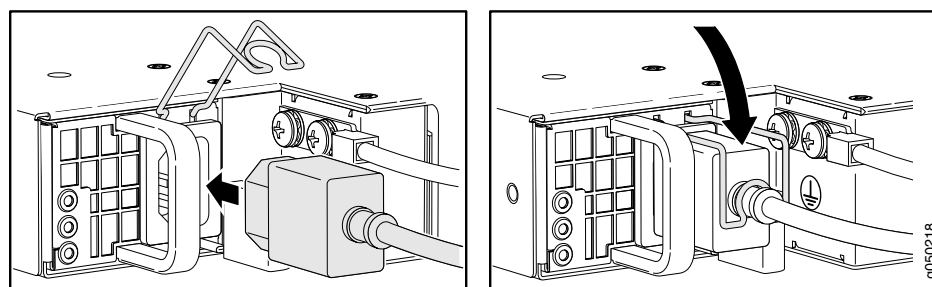


Figure 48: Connecting an AC Power Cord to an AC Power Supply in a QFX3600 or QFX3600-I Device



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 (I) 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

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 306](#) or [“Connecting Earth Ground to QFX3600 or QFX3600-I Devices” on page 289](#).

- 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 38 on page 295](#)).
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 39 on page 296](#) and [Figure 38 on page 295](#)).

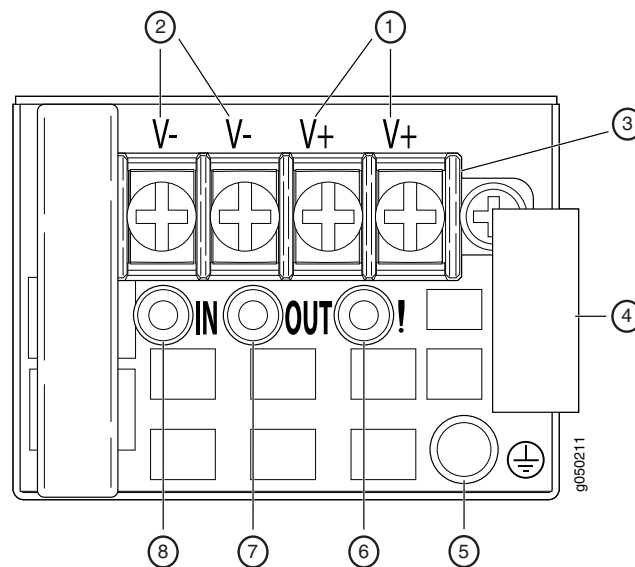


CAUTION: The DC power supply has four terminals labeled V+, V+, V–, and V– for connecting DC power source cables labeled positive (+) and

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.

- Secure the ring lug of the positive (+) DC power source cable to the V+ terminal on the DC power supply.
- Secure the ring lug of the negative (–) DC power source cable to the V– terminal on the DC power supply.
- 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 49: DC Power Supply Faceplate for a QFX3500, QFX3600 or QFX3600-I Device



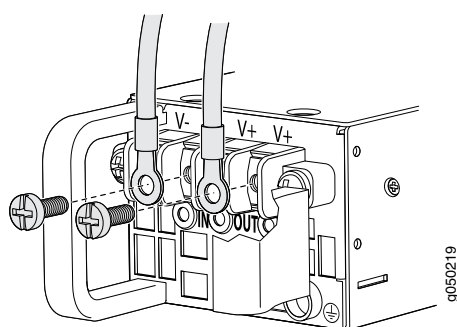
1—Shunt positive input terminals	5—ESD grounding point
2—Shunt negative input terminals	6—Fault LED
3—Terminal block	7—Output LED
4—Ejector lever	8—Input LED



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 50: 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

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 30 on page 277](#) and [Figure 31 on page 277](#)):

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 30 on page 277](#)) or management console (see [Figure 31 on page 277](#)).

Figure 51: Connecting the QFX Series to a Management Console Through a Console Server

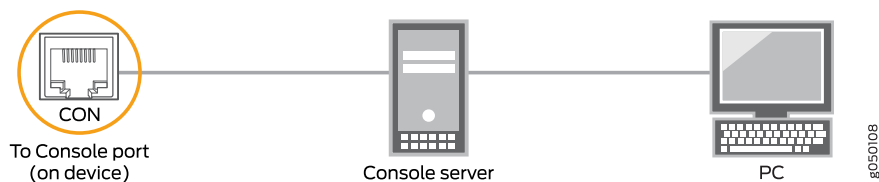


Figure 52: Connecting the QFX Series Directly to a Management Console



Related Documentation

- *Console Port Connector Pinouts for the QFX Series*
- *Configuring Console and Auxiliary Port Properties*

CHAPTER 12

Installing a QFX5100 Node Device

- [Installing and Connecting a QFX5100 Device on page 315](#)
- [Unpacking a QFX5100 Device on page 316](#)
- [Mounting a QFX5100 Device in a Rack or Cabinet on page 317](#)
- [Connecting Earth Ground to a QFX5100 Device on page 324](#)
- [Connecting AC Power to a QFX5100 Device on page 325](#)
- [Connecting DC Power to a QFX5100 Device on page 328](#)
- [Connecting a QFX Series Device to a Management Console on page 332](#)

Installing and Connecting a QFX5100 Device

You can mount a QFX5100 device:

- 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.

To install and connect a QFX5100 device:

1. Follow the instructions in [“Unpacking a QFX5100 Device” on page 316](#).
2. Determine how the device 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 317](#).
3. Follow the instructions in:
 - a. [Connecting Earth Ground to a QFX5100 Device on page 324](#)
 - b. [“Connecting AC Power to a QFX5100 Device” on page 325](#) or [Connecting DC Power to a QFX5100 Device on page 328](#)
 - c. *Registering Products—Mandatory for Validating SLAs*
4. Depending on how you plan to use the QFX5100 device, do one of the following:

- If you are using the QFX5100 device as a standalone switch, follow the instructions in *Configuring a QFX5100 Device*.
- If you are using the QFX5100 device as a Node device in a QFX3000-G QFabric system, see *QFX3000-G QFabric System Installation Overview* for information about the steps to install and configure your QFX3000-G QFabric system.
- If you are using the QFX5100 device as a Node device in a QFX3000-M QFabric system, see “[QFX3000-M QFabric System Installation Overview](#)” on page 97 for information about the steps to install and configure your QFX3000-M QFabric system.
- If you are using a QFX5100-24Q as an Interconnect device in a QFX3000-M QFabric system, see “[Connecting a QFX5100 Node Device to a QFX5100-24Q Interconnect Device](#)” on page 391.
- If you are using the QFX5100 device 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

The QFX5100 switch chassis is a rigid sheet-metal structure that houses the hardware components. A QFX5100 device is shipped in a cardboard carton, secured with foam packing material. The carton also contains an accessory box and quick start instructions.



CAUTION: QFX5100 devices are maximally protected inside the shipping carton. Do not unpack the switch until you are ready to begin installation.

To unpack a QFX5100 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 84 on page 317](#) lists the inventory of components supplied with a QFX5100 device.
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 devices
- Three fan modules for QFX5100-96S devices



NOTE: Product SKU QFX5100-24Q: 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 84: Inventory of Components Supplied with a QFX5100 Device

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 317](#)
 - [Installing and Connecting a QFX5100 Device on page 315](#)

Mounting a QFX5100 Device in a Rack or Cabinet

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 on page 318](#)
- [Four-Post Procedure on page 319](#)
- [Two-Post Procedure on page 322](#)

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 110](#), 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 316](#)).
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 (QFX5100-96S only):
 - One QFX5100-96S 2-post rack mount kit (separately orderable).
 - Sixteen screws for attaching the brackets to the chassis (provided).

- Eight 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 screws.



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, one person to lift the switch into place and another person to attach the switch to the rack. 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 the **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 44 on page 304](#) to see the proper alignment for the QFX5100-24Q switch and [Figure 54 on page 320](#) for the alignment for the QFX5100-48S switch and [Figure 55 on page 320](#) for the QFX5100-96S switch.

Figure 53: Attaching Mounting Rails to the QFX5100-24Q

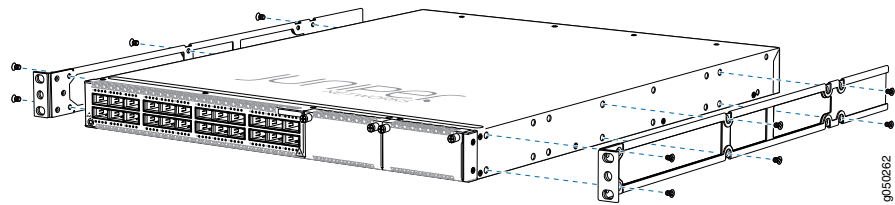


Figure 54: Attaching Mounting Rails to the QFX5100-48S

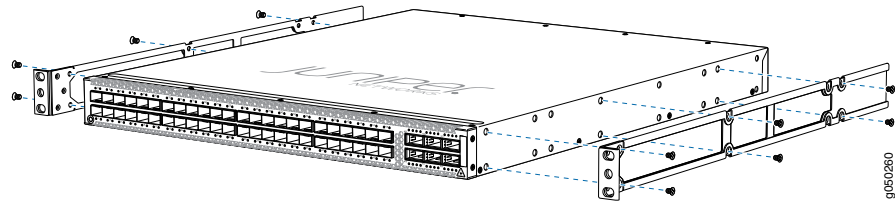
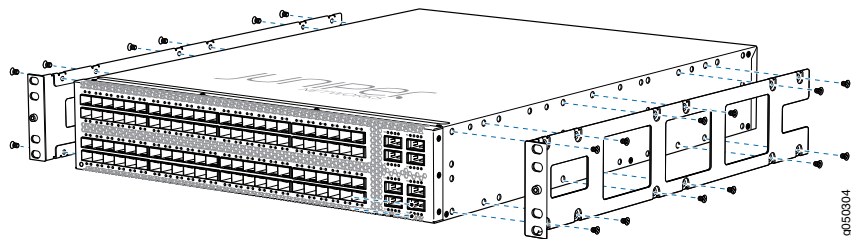


Figure 55: Attaching Mounting Rails to the QFX5100-96S



4. Attach the mounting rail to the switch using the mounting screws. 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 45 on page 304](#) and [Figure 57 on page 321](#) for examples of connecting the mounting rails and blades.

Figure 56: Attach 1 U Switch to Rack

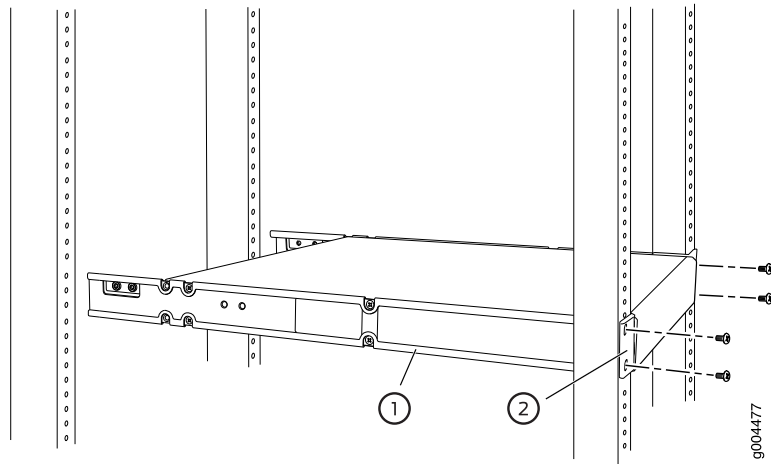
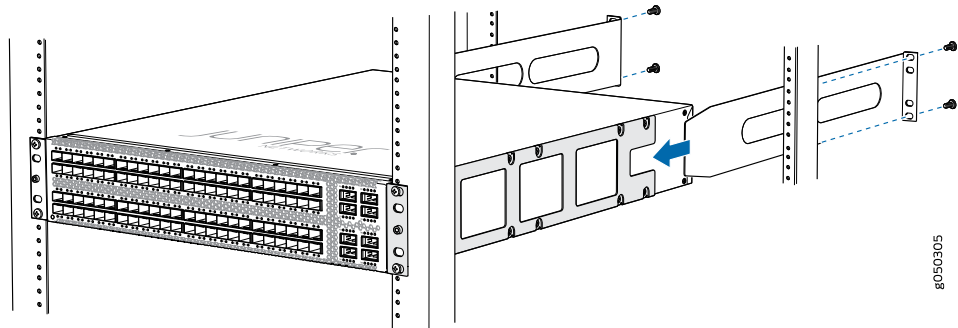
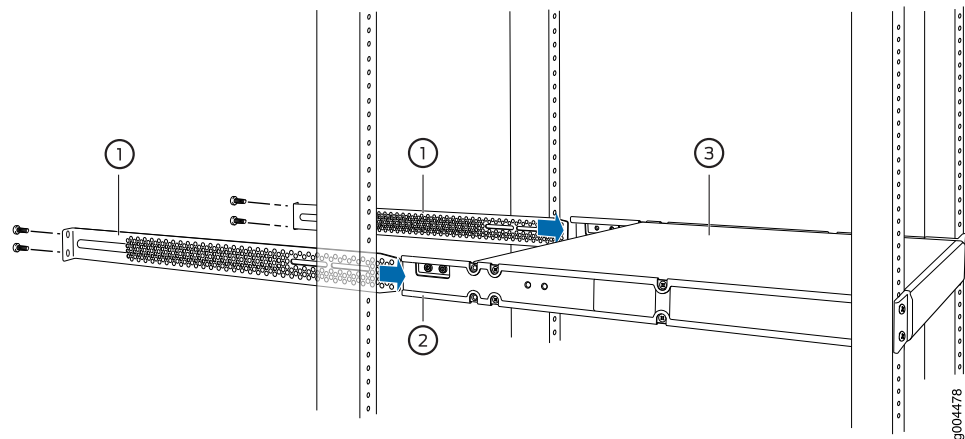


Figure 57: Slide Mounting Rail onto the QFX5100-96S Rear Mounting Blade



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 58 on page 322](#).

Figure 58: 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.

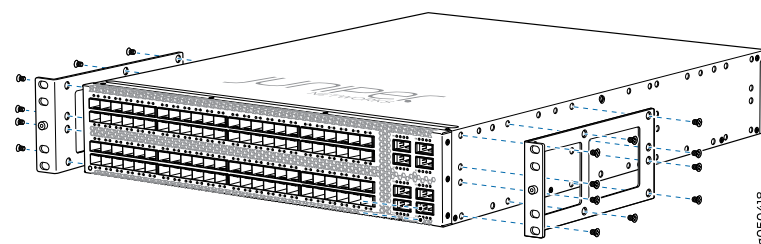
Two-Post Procedure

You can front-mount a QFX5100-96S on two posts of a 19-in. rack or cabinet by using the separately orderable short mounting-brackets. Other product SKUs of the QFX5100 are not recommended for a two-post installation.

To mount the switch on two 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 the **AIR OUT** labels on components are next to the hot aisle.
3. Align the ten mounting holes on the short mounting bracket with one of the three sets of corresponding holes along the side of the switch chassis. See [Figure 59 on page 322](#).

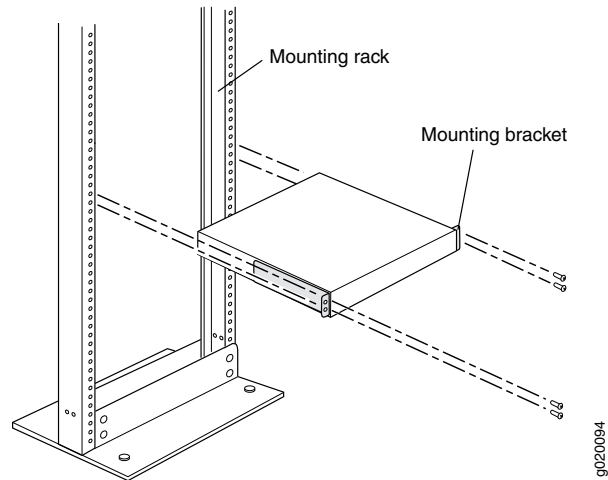
Figure 59: Attaching a Two-Post Mounting Bracket to QFX5100-96S



4. Attach the mounting bracket to the QFX5100-96S switch using ten mounting screws.
5. Repeat this procedure for the mounting bracket on the opposite side of the switch. Tighten all screws.

6. Use two people to attach the brackets to the posts.
 - a. Have one person grasp both sides of the switch and lift it into place.
 - b. Ensure that the switch is level. See [Figure 60 on page 323](#).

Figure 60: Mounting the Switch on Two Posts in a Rack



- c. Have the second person use the four mounting screws (and cage nuts and washers if your rack requires them) to screw the mounting bracket to the rack.
7. Attach a ground cable to earth ground and then attach it to the chassis grounding points, as described in ["Connecting Earth Ground to a QFX5100 Device" on page 324](#).

Related Documentation

- [Rack-Mounting and Cabinet-Mounting Warnings](#)
- [Connecting AC Power to a QFX5100 Device on page 325](#)
- [Connecting Earth Ground to a QFX5100 Device on page 324](#)

Connecting Earth Ground to a QFX5100 Device

To meet safety and electromagnetic interference (EMI) requirements and to ensure proper operation, you must connect the QFX5100 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 QFX5100 device left front mounting bracket to connect to the earth ground (see [Figure 61 on page 325](#)).

Before you connect earth ground to the protective earthing terminal of a QFX5100 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 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 317](#).

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 device—The grounding cable must be 14 AWG (2 mm²), 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.
- Three screws to attach the grounding lug to the switch.
- 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 257](#).

To connect earth ground to a QFX5100 device:

1. Secure the provided protective earthing terminal bracket through the QFX5100 device mounting bracket to the chassis with the screws provided. The posts on the protective earthing terminal bracket should point to the left. See [Figure 61 on page 325](#) and [Figure 62 on page 325](#).

Figure 61: Connecting a Grounding Cable to a 1 U QFX5100 Device

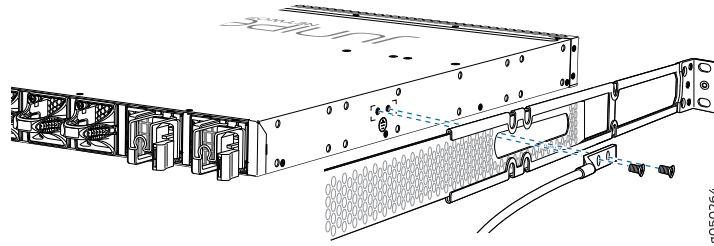
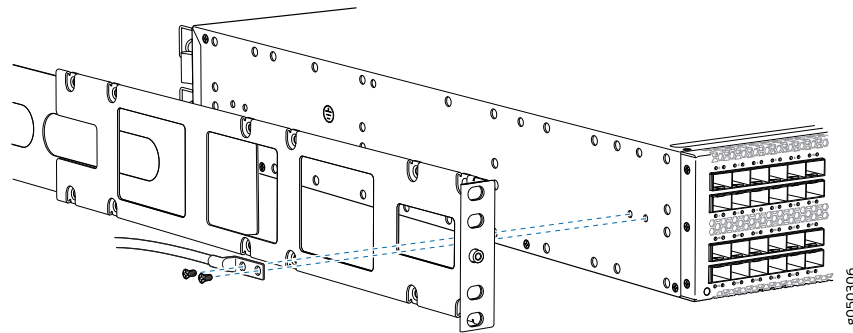


Figure 62: Connecting a Grounding Cable to the 2 U QFX5100-96S Device



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 screws.
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 325](#)
- [Connecting DC Power to a QFX5100 Device on page 328](#)

Connecting AC Power to a QFX5100 Device

The power supply in a QFX5100 device 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 324](#). 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 device, 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 device:

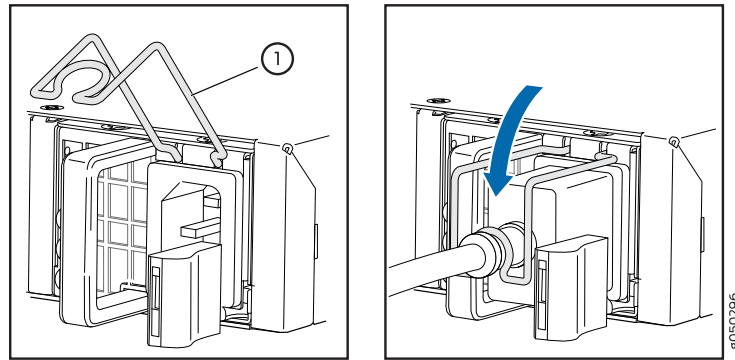
1. Attach the grounding strap to your bare wrist and to a site ESD point.
2. Ensure that the power supplies are fully inserted in the chassis and the latches are secure. If only one power supply is installed, ensure that a blank cover panel is installed over the second power supply slot.
3. Locate the 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 257](#).



WARNING: Ensure that the power cord does not block access to device components or drape where people can trip on it.

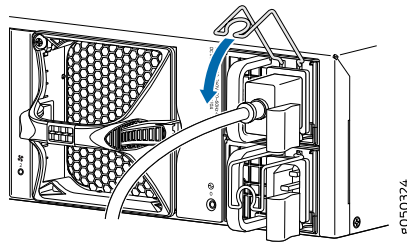
4. Connect each power supply to the power sources. Insert the coupler end of the power cord into the AC power cord inlet on the AC power supply faceplate.
5. Push the power cord retainer onto the power cord (see [Figure 63 on page 327](#) and [Figure 64 on page 327](#)).

Figure 63: Connecting an AC Power Cord to an AC Power Supply in a 1 U QFX5100 Device



1— Power cord retainer

Figure 64: Connecting an AC Power Cord to an AC Power Supply in a 2 U QFX5100 Device



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 (I) 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.



CAUTION: A system reboot with Routing Engine FPGA version 7.1 might not successfully boot the Junos OS software. In case of a system reboot failure, you need to power cycle the switch. To check the current FPGA version, issue the `show chassis firmware` command.

**Related
Documentation**

- *AC Power Supply for a QFX5100 Device*
- *AC Power Supply LEDs on a QFX5100 Device*

Connecting DC Power to a QFX5100 Device

The power supply in a QFX5100 device 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 devices are intended for installation only in a restricted access location.



NOTE: The battery returns of the DC power supply must 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 324](#).

- Install the power supply in the chassis. For instructions on installing a power supply in a QFX5100 device, 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 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 65 on page 331](#)).
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 65 on page 331](#) and [Figure 66 on page 331](#)).

The QFX5100 is designed to operate with a DC power supply that has a single, non-redundant, feed input. For source redundancy, two DC power supplies must be installed in QFX5100; connect source (A) to one power supply and connect source (B) to the second power supply. This configuration provides the commonly deployed A/B feed redundancy for the system.

The terminal block of the 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.

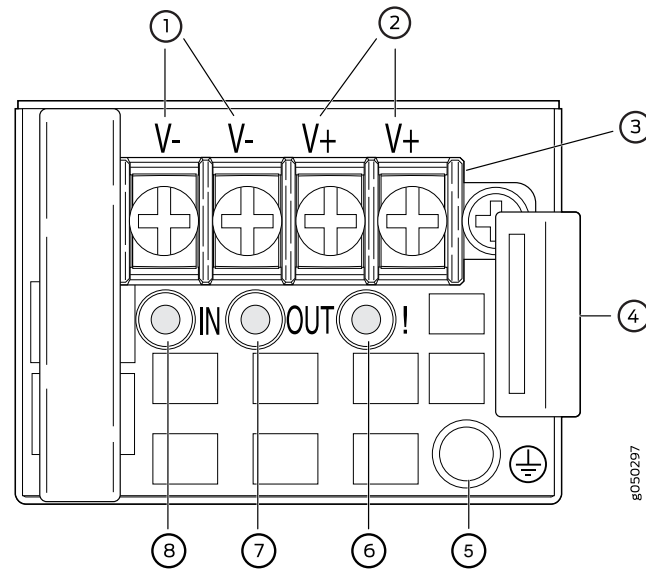


CAUTION: The connection between each power source and power supply must include a circuit breaker.

Do not connect two sources to a single power supply because doing so can potentially cause circulating current in feed wires whenever there is any difference in the voltage of the two sources.

-
- 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 65: DC Power Supply Faceplate for a QFX5100 Device

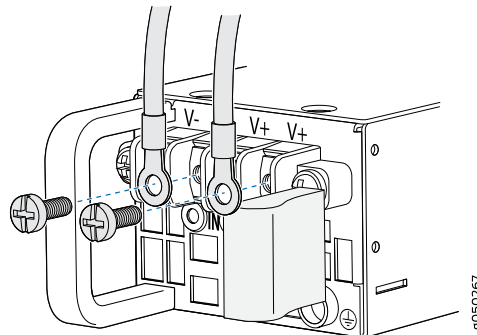


1—Shunt negative input terminals (+RTN)	5—ESD grounding point
2—Shunt positive input terminals (-48V)	6—Fault LED
3—Terminal block	7—Output LED
4—Ejector lever	8—Input LED



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 66: 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.



CAUTION: A system reboot with Routing Engine FPGA version 7.1 might not successfully boot the Junos OS software. In case of a system reboot failure, you need to power cycle the switch. To check the current FPGA version, issue the `show chassis firmware` command.

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

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 30 on page 277](#) and [Figure 31 on page 277](#)):

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 30 on page 277](#)) or management console (see [Figure 31 on page 277](#)).

Figure 67: Connecting the QFX Series to a Management Console Through a Console Server

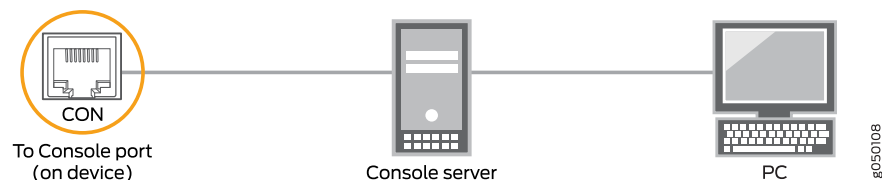


Figure 68: Connecting the QFX Series Directly to a Management Console

**Related Documentation**

- *Console Port Connector Pinouts for the QFX Series*
- *Configuring Console and Auxiliary Port Properties*

CHAPTER 13

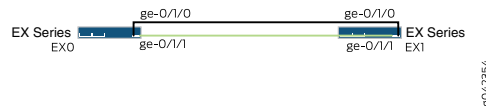
Cabling a Copper-Based Control Plane for the QFX3000-M QFabric System

- [Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy on page 335](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 338](#)
- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
- [Connecting a QFX3100 Director Device to a Network for Out-of-Band Management on page 342](#)
- [Connecting a QFX5100-24Q Interconnect Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 343](#)
- [Connecting a QFX3600-I Interconnect Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 347](#)
- [Connecting a QFX5100 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 351](#)
- [Connecting a QFX3600 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 354](#)
- [Connecting a QFX3500 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 357](#)

Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or to two EX4300 switches. For redundancy and communication, you must connect the two EX Series switches using the Ethernet SFP+ uplink module ports configured as a link aggregation group (LAG) (see [Figure 69 on page 336](#)).

Figure 69: QFX3000-M QFabric System Control Plane—Inter-EX Series Switch LAG Connections



For an EX4200 control plane, use the 1-Gigabit Ethernet SFP+ uplink module ports; for an EX4300 control plane, use the 10-Gigabit Ethernet SFP+ uplink module ports. Do not mix EX4200 and EX4300 switches in the same control plane.

Specific ports have been reserved on the EX Series switches to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.

Before you begin to interconnect two EX Series switches for QFX3000-M 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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).
- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.



NOTE: For a copper-based control plane network, either use EX4200-24T switches with an SFP+ uplink module installed or use an EX4300-48T with an SFP+ uplink module installed. For a fiber-based control plane network, use EX4200-24F switches with an SFP+ uplink module installed or an EX4300-48P with an SFP+ uplink module installed.

- Install transceivers in ports 0 and 1 of the uplink module (see *Installing a Transceiver in an EX Series Switch*).
- For an EX4200 Switch control plane, ensure that you have installed 1-Gigabit Ethernet SFP transceivers in each EX4200 switch uplink module. For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4200 Switches” on page 214](#).
- For an EX4300 Switch control plane, ensure that you have installed 10-Gigabit Ethernet SFP+ transceivers in each EX4300 switch uplink module. For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4300 Switches” on page 193](#).
- Ensure that you have appropriate fiber-optic cables (see [“Pluggable Transceivers Supported on EX4200 Switches” on page 214](#) and [“Pluggable Transceivers Supported on EX4300 Switches” on page 193](#)).
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for Switches*).

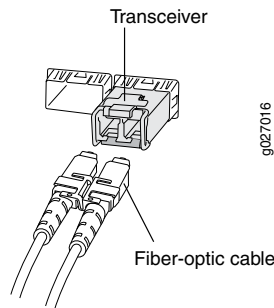
To interconnect two EX Series switches for QFabric system control plane redundancy (see [Figure 69 on page 336](#)):



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 of the first EX Series switch uplink module. Save the cap.
3. Insert the cable connector into the optical transceiver (see [Figure 70 on page 337](#)).

Figure 70: 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 of the *second* EX Series switch uplink module. Save the cap.
6. Insert the cable connector into the optical transceiver.
7. Repeat Step 1 through Step 6 to interconnect uplink module port 1 on both the EX Series switches.
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 269](#)
 - [Installing and Connecting a QFX3600 or QFX3600-I Device on page 281](#)
 - [Installing and Connecting a QFX3500 Device on page 299](#)

Connecting QFX3100 Director Devices in a Director Group

A QFabric system requires two QFX3100 Director devices interconnected as a QFX3100 Director *group* (see [Figure 71 on page 338](#) through [Figure 73 on page 339](#)).

Figure 71: QFX3100 Director Group Control Plane Connections for QFX3000-G QFabric System Using Copper-Based Control Plane

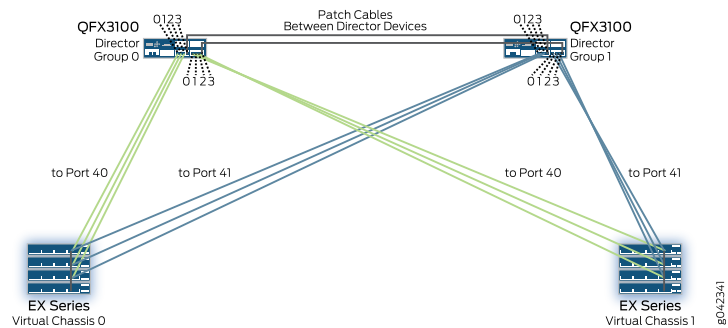


Figure 72: QFX3100 Director Group Control Plane Connections for QFX3000-G QFabric System Using Fiber-Based Control Plane

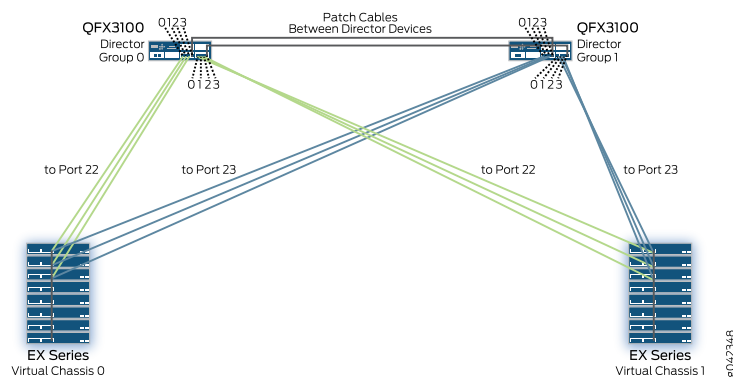
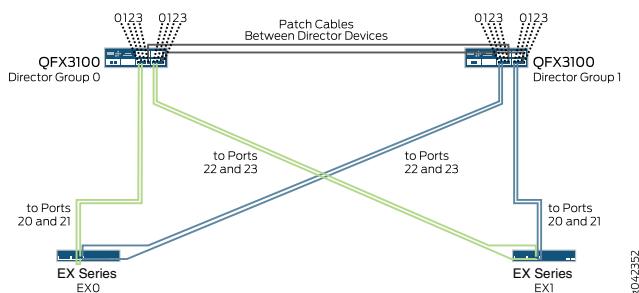


Figure 73: QFX3100 Director Group Control Plane Connections for QFX3000-M QFabric System



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 269](#), [Installing and Connecting a QFX3008-I Interconnect Device](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).



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 250](#) and [“Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 137](#).



CAUTION: The redundant patch cables interconnecting the Director devices are critical links required for the operation of the Director group. The two inter-Director device links must remain connected when the Director devices are online. Although a single inter-Director device can lose a link and regain its connection, the loss of both inter-Director device links causes one of the Director devices to become isolated from the Director group. In [Figure 71 on page 338](#) through [Figure 73 on page 339](#), these redundant patch cables are shown in red and connect port 3 to port 3.

To connect QFX3100 Director devices in a Director group (see [Figure 71 on page 338](#)):



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.

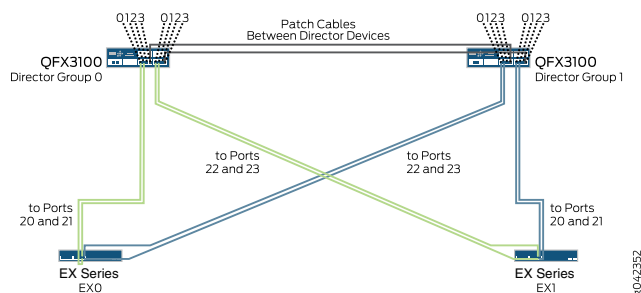
Related Documentation

- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-G QFabric System Control Plane Network](#)
- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
- [Troubleshooting QFX3100 Director Device Isolation](#)

Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX3100 Director devices have two 4-port network modules. Use the network module ports to connect the QFX3100 Director group to the EX Series switches (see [Figure 74 on page 340](#)).

Figure 74: QFX3100 Director Group to EX Series Switch Connections for QFX3000-M QFabric System



Use the following QFX3100 Director devices and EX Series switches for a copper-based QFX3000-M QFabric system control plane network:

- QFX3100 Director devices with 1000BASE-T network modules installed. Each 1000BASE-T network module provides four 1000BASE-T ports (labeled 0 through 3) with RJ-45 connectors.
- EX4200-24T or EX4300-48T switches with an SFP+ uplink module installed.

Specific ports have been reserved on the EX Series switches to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.

Before you begin to connect a QFX3100 Director device to the copper-based QFX3000-M 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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).
- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.



NOTE: Use either EX4200-24T switches with an SFP+ uplink module installed or use an EX4300-48T with an SFP+ uplink module installed.

- Install transceivers in ports 0 and 1 of the uplink module (see *Installing a Transceiver in an EX Series Switch*).
- For an EX4200 Switch control plane, ensure that you have installed 1-Gigabit Ethernet SFP transceivers in each EX4200 switch uplink module. For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4200 Switches” on page 214](#).
- For an EX4300 Switch control plane, ensure that you have installed 10-Gigabit Ethernet SFP+ transceivers in each EX4300 switch uplink module. For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4300 Switches” on page 193](#).
- Interconnect the two EX Series switches. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).
- Connect the two QFX3100 Director devices to create a Director group. See [“Connecting QFX3100 Director Devices in a Director Group” on page 338](#).
- Ensure that you have four RJ-45 patch cables available for each Director device. For cable specifications, see [“Cable Specifications for Copper-Based Control Plane Connections for the QFabric System” on page 250](#).

To connect a QFX3100 Director device to the copper-based QFX3000-M QFabric control plane network (see [Figure 74 on page 340](#)):

1. Connect both network modules on the first Director device (labeled **DG0** in [Figure 74 on page 340](#)) to the two EX4200 or EX4300 switches (labeled **EX0** and **EX1** in [Figure 74 on page 340](#)). You connect the first two ports (labeled **0** and **1**) on the first network module to the first EX Series switch (**EX0**). You connect the first two ports on the second network module (also labeled **0** and **1**) to the second EX Series switch (**EX1**). The ports used are the same on each EX Series switch.

Table 85: QFX3100 Director Device-to-EX Series Switch Control Plane Port Assignments for DG0

Network Module Port 0	Network Module Port 1	Network Module Port 3
EX Series switch port ge-0/0/20	EX Series switch port ge-0/0/21	Connect this port to the identical port on the other Director device. See “Connecting QFX3100 Director Devices in a Director Group” on page 338 .

2. Connect both network modules on the *second* Director device (labeled **DG1** in [Figure 74 on page 340](#)) to the two EX4200 or EX4300 switches (labeled **EX0** and **EX1** in [Figure 74 on page 340](#)). You connect the first two ports on the first network module to the first EX Series switch (**EX0**). You connect the first two ports on the second network module to the second EX Series switch (**EX1**). The ports used are the same on each EX Series switch.

Table 86: Second QFX3100 Director Device-to-EX Series Switch Control Plane Port Assignments for DG1

Network Module Port 0	Network Module Port 1	Network Module Port 3
EX Series switch port ge-0/0/22	EX Series switch port ge-0/0/23	Connect this port to the identical port on the other Director device. See “Connecting QFX3100 Director Devices in a Director Group” on page 338 .

Related Documentation • [Installing and Connecting a QFX3100 Director Device on page 269](#)

Connecting a QFX3100 Director Device to a Network for Out-of-Band Management

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 441](#).

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*
- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
- [Connecting a QFX Series Device to a Management Console on page 277](#)

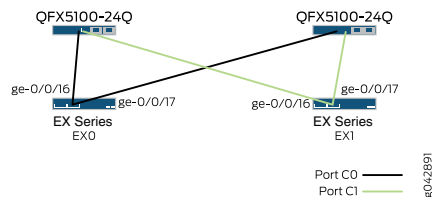
Connecting a QFX5100-24Q Interconnect Device to a Copper-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX5100-24Q Interconnect devices have two management ports (labeled **C0** and **C1**), to connect the QFX5100-24Q Interconnect device to each EX Series switch (see [Figure 75 on page 343](#)).



NOTE: You may not mix EX4200 and EX4300 switches in the same QFabric system.

Figure 75: QFX5100-24Q Interconnect Device Copper-Based Control Plane Connections for QFX3000-M QFabric System



Specific ports have been reserved on the EX Series switch 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.

Before you begin to connect a QFX5100-24Q Interconnect device to the copper-based QFX3000-M 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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), [“Installing and Connecting a QFX3500 Device” on page 299](#), and [“Installing and Connecting a QFX5100 Device” on page 315](#).



NOTE: There can be a maximum of four Interconnect devices in the QFX3000-M QFabric system.

- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.
- Interconnect the two EX Series switches using the SFP+ uplink module ports. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).



NOTE: Use either EX4200-24T switches with an SFP+ uplink module installed or use an EX4300-48T with an SFP+ uplink module installed.

- Ensure that you have two 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 250](#).
- Use [Table 87 on page 345](#) to determine the QFX5100-24Q Interconnect device-to-EX Series switch port mappings. Specific ports have been reserved on the EX Series switch to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.




NOTE: The numerical identifiers for each Interconnect device below are not preassigned to the Interconnect devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Interconnect device (IC0) is connected to port 16 (ge-0/0/16) on the first EX Series switch EX0 and the second EX Series switch EX1.

Table 87: QFX5100-24Q Interconnect Device-to-EX Series Switch Port Mappings for Copper-Based Control Plane

Interconnect Device	EX Series Switch EX0	EX Series Switch EX1
IC0	IC0, management port C0 on the QFX5100-24Q to port 16 (ge-0/0/16) on the EX Series switch	IC0, management port C1 on the QFX5100-24Q to port 16 (ge-0/0/16) on the EX Series switch
IC1	IC1, management port C0 on the QFX5100-24 to port 17 (ge-0/0/17) on the EX Series switch	IC1, management port C1 on the QFX5100-24 to port 17 (ge-0/0/17) on the EX Series switch
IC2	IC2, management port C0 on the QFX5100-24 to port 18 (ge-0/0/18) on the EX Series switch	IC2, management port C1 on the QFX5100-24 to port 18 (ge-0/0/18) on the EX Series switch
IC3	IC3, management port C0 on the QFX5100-24 to port 19 (ge-0/0/19) on the EX Series switch	IC3, management port C1 on the QFX5100-24 to port 19 (ge-0/0/19) on the EX Series switch

To connect each QFX5100-24Q Interconnect device to the copper-based control plane network:

1. Connect the first QFX5100-24Q Interconnect device.
 - a. Connect one end of the first RJ-45 patch cable to the management port labeled **C0**.
- 

NOTE: Some product SKUs have two ports labeled C0. The second C0 port is for fiber connections.
- b. Connect the other end of that cable to port ge-0/0/16 on the first EX Series switch.
 - c. Connect one end of the second RJ-45 patch cable to the management port labeled **C1**.
 - d. Connect the other end of that cable to port ge-0/0/16 on the *second* EX Series switch.
 2. Connect the second QFX5100-24Q Interconnect device.
 - a. Connect one end of the first RJ-45 patch cable to the management port labeled **C0**.
 - b. Connect the other end of that cable to port ge-0/0/17 on the first EX Series switch.
 - c. Connect one end of the second RJ-45 patch cable to the management port labeled **C1**.
 - d. Connect the other end of that cable to port ge-0/0/17 on the *second* EX Series switch.
 3. Connect the third QFX5100-24Q Interconnect device if used.
 - a. Connect one end of the first RJ-45 patch cable to the management port labeled **C0**.
 - b. Connect the other end of that cable to port ge-0/0/18 on the first EX Series switch.
 - c. Connect one end of the second RJ-45 patch cable to the management port labeled **C1**.
 - d. Connect the other end of that cable to port ge-0/0/18 on the *second* EX Series switch.
 4. Connect the fourth QFX5100-24Q Interconnect device if used.
 - a. Connect one end of the first RJ-45 patch cable to the management port labeled **C0**.
 - b. Connect the other end of that cable to port ge-0/0/19 on the first EX Series switch.

- c. Connect one end of the second RJ-45 patch cable to the management port labeled **C1**.
- d. Connect the other end of that cable to port ge-0/0/19 on the *second* EX Series switch.

Related Documentation

- [Connecting a QFX3500 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 357](#)
- [Connecting a QFX3500 Node Device to an QFX5100-24Q Interconnect Device on page 399](#)
- [Connecting a QFX3600 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 354](#)
- [Connecting a QFX3600 Node Device to a QFX5100-24Q Interconnect Device on page 396](#)
- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 338](#)

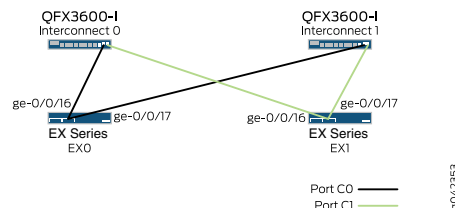
Connecting a QFX3600-I Interconnect Device to a Copper-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX3600-I Interconnect devices have two 1000BASE-T management ports (labeled **C0** and **C1**) with RJ-45 connectors. For a copper-based control plane network, use the 1000BASE-T management ports to connect the QFX3600-I Interconnect device to each EX Series switch (see [Figure 76 on page 347](#)).



NOTE: You may not mix EX4200 and EX4300 switches in the same QFabric system.

Figure 76: QFX3600-I Interconnect Device Copper-Based Control Plane Connections for QFX3000-M QFabric System



Specific ports have been reserved on the EX Series switch 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.

Before you begin to connect a QFX3600-I Interconnect device to the copper-based QFX3000-M 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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).



NOTE: There can be a maximum of four Interconnect devices in the QFX3000-M QFabric system.

- Install your EX4200 or EX4300 switches. See [Installing and Connecting an EX4200 Switch](#) or [Installing and Connecting an EX4300 Switch](#).
- Interconnect the two EX Series switches. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).



NOTE: Use either EX4200-24T switches with an SFP+ uplink module installed or use an EX4300-48T with an SFP+ uplink module installed.

- Ensure that you have two 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 250](#).
- Use [Table 88 on page 348](#) to determine the QFX3600-I Interconnect device-to-EX Series switch port mappings. Specific ports have been reserved on the EX Series switch to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.



NOTE: The numerical identifiers for each Interconnect device below are not preassigned to the Interconnect devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Interconnect device (IC0) is connected to port 16 (ge-0/0/16) on the first EX Series switch EX0 and the second EX Series switch EX1.

Table 88: QFX3600-I Interconnect Device-to-EX Series Switch Port Mappings for Copper-Based Control Plane

Interconnect Device	EX Series Switch EX0	EX Series Switch EX1
IC0	IC0, management port C0 to port 16 (ge-0/0/16) on the EX Series switch	IC0, management port C1 to port 16 (ge-0/0/16) on the EX Series switch
IC1	IC1, management port C0 to port 17 (ge-0/0/17) on the EX Series switch	IC1, management port C1 to port 17 (ge-0/0/17) on the EX Series switch
IC2	IC2, management port C0 to port 18 (ge-0/0/18) on the EX Series switch	IC2, management port C1 to port 18 (ge-0/0/18) on the EX Series switch

Table 88: QFX3600-I Interconnect Device-to-EX Series Switch Port Mappings for Copper-Based Control Plane (*continued*)

Interconnect Device	EX Series Switch EX0	EX Series Switch EX1
IC3	IC3, management port C0 to port 19 (ge-0/0/19) on the EX Series switch	IC3, management port C1 to port 19 (ge-0/0/19) on the EX Series switch

To connect each QFX3600-I Interconnect device to the copper-based control plane network:

1. Connect the first QFX3600-I Interconnect device.
 - a. Connect one end of the first RJ-45 patch cable to the management port labeled **C0**.
 - b. Connect the other end of that cable to port ge-0/0/16 on the first EX Series switch.
 - c. Connect one end of the second RJ-45 patch cable to the management port labeled **C1**.
 - d. Connect the other end of that cable to port ge-0/0/16 on the *second* EX Series switch.
2. Connect the second QFX3600-I Interconnect device.
 - a. Connect one end of the first RJ-45 patch cable to the management port labeled **C0**.
 - b. Connect the other end of that cable to port ge-0/0/17 on the first EX Series switch.
 - c. Connect one end of the second RJ-45 patch cable to the management port labeled **C1**.
 - d. Connect the other end of that cable to port ge-0/0/17 on the *second* EX Series switch.
3. Connect the third QFX3600-I Interconnect device if used.
 - a. Connect one end of the first RJ-45 patch cable to the management port labeled **C0**.
 - b. Connect the other end of that cable to port ge-0/0/18 on the first EX Series switch.
 - c. Connect one end of the second RJ-45 patch cable to the management port labeled **C1**.
 - d. Connect the other end of that cable to port ge-0/0/18 on the *second* EX Series switch.
4. Connect the fourth QFX3600-I Interconnect device if used.
 - a. Connect one end of the first RJ-45 patch cable to the management port labeled **C0**.
 - b. Connect the other end of that cable to port ge-0/0/19 on the first EX Series switch.
 - c. Connect one end of the second RJ-45 patch cable to the management port labeled **C1**.
 - d. Connect the other end of that cable to port ge-0/0/19 on the *second* EX Series switch.

Related Documentation

- [Connecting a QFX3500 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 357](#)
- [Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device on page 397](#)
- [Connecting a QFX3600 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 354](#)
- [Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device on page 393](#)
- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 338](#)

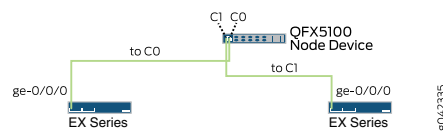
Connecting a QFX5100 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX5100 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 EX Series switch. See [Figure 77 on page 351](#) for an example of control plane cabling.



NOTE: You may not mix EX4200 and EX4300 switches in the same QFabric system.

Figure 77: QFX5100 Node Device Copper-Based Control Plane Connections for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX5100 Node device must be connected to two EX Series switches.

Use the following QFX5100 Node devices and EX Series 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)

- Either an EX4200-24T switches with an SFP+ uplink module installed or an EX4300-48T with an SFP+ uplink module installed.

Before you begin to connect a QFX5100 Node device to the copper-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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#) and [“Installing and Connecting a QFX5100 Device” on page 315](#).
- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.
- Interconnect the two EX Series switches. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).



NOTE: Use either EX4200-24T switches with an SFP+ uplink module installed or use an EX4300-48T with an SFP+ uplink module installed.

- Ensure that you have two RJ-45 patch cables available for each Node device. For cable specifications, see [“Cable Specifications for Copper-Based Control Plane Connections for the QFabric System” on page 250](#).
- Use [Table 89 on page 352](#) to determine the QFX5100 Node device-to-EX Series switch port mappings. Specific ports have been reserved on the EX Series switch to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.



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 (Node0) is connected to port 0 (ge-0/0/0) on the first EX Series switch EX0 and the second EX Series switch EX1.

Table 89: QFX5100 Node Device-to-EX Series Switch Port Mappings for Copper-Based Control Plane

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node 0	Node0, management port C0 to port 0 (ge-0/0/0)	Node0, management port C1 to port 0 (ge-0/0/0)
Node 1	Node1, management port C0 to port 1 (ge-0/0/1)	Node1, management port C1 to port 1 (ge-0/0/1)
Node 2	Node2, management port C0 to port 2 (ge-0/0/2)	Node2, management port C1 to port 2 (ge-0/0/2)

Table 89: QFX5100 Node Device-to-EX Series Switch Port Mappings for Copper-Based Control Plane (*continued*)

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node 3	Node3, management port C0 to port 3 (ge-0/0/3)	Node3, management port C1 to port 3 (ge-0/0/3)
Node 4	Node4, management port C0 to port 4 (ge-0/0/4)	Node4, management port C1 to port 4 (ge-0/0/4)
Node 5	Node5, management port C0 to port 5 (ge-0/0/5)	Node5, management port C1 to port 5 (ge-0/0/5)
Node 6	Node6, management port C0 to port 6 (ge-0/0/6)	Node6, management port C1 to port 6 (ge-0/0/6)
Node 7	Node7, management port C0 to port 7 (ge-0/0/7)	Node7, management port C1 to port 7 (ge-0/0/7)
Node 8	Node8, management port C0 to port 8 (ge-0/0/8)	Node8, management port C1 to port 8 (ge-0/0/8)
Node 9	Node9, management port C0 to port 9 (ge-0/0/9)	Node9, management port C1 to port 9 (ge-0/0/9)
Node 10	Node10, management port C0 to port 10 (ge-0/0/10)	Node10, management port C1 to port 10 (ge-0/0/10)
Node 11	Node11, management port C0 to port 11 (ge-0/0/11)	Node11, management port C1 to port 11 (ge-0/0/11)
Node 12	Node12, management port C0 to port 12 (ge-0/0/12)	Node12, management port C1 to port 12 (ge-0/0/12)
Node 13	Node13, management port C0 to port 13 (ge-0/0/13)	Node13, management port C1 to port 13 (ge-0/0/13)
Node 14	Node14, management port C0 to port 14 (ge-0/0/14)	Node14, management port C1 to port 14 (ge-0/0/14)
Node 15	Node15, management port C0 to port 15 (ge-0/0/15)	Node15, management port C1 to port 15 (ge-0/0/15)

To connect a QFX5100 Node device to the copper-based QFX3000-M QFabric system control plane network:

1. Connect one end of the first RJ-45 patch cable to the first management port (labeled **C0**) on the Node device management panel.
2. Connect the other end of that cable to the appropriate port on the EX Series switch. See [Table 89 on page 352](#).

3. Connect one end of the second RJ-45 patch cable to the second management port (labeled **C1**) on the Node device management panel.
4. Connect the other end of that cable to the appropriate port on the *second* EX Series switch. This should be the same 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 EX Series switch, you connect the second cable to ge-0/0/0 on the second EX Series switch.
5. Repeat this procedure for each QFX5100 Node device.

Related Documentation

- [Connecting a QFX3600-I Interconnect Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 347](#)
- [Connecting a QFX5100 Node Device to a QFX3600-I Interconnect Device on page 389](#)
- [Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device on page 397](#)
- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 338](#)

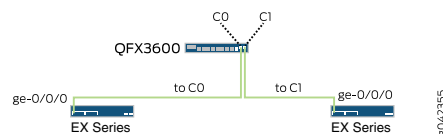
Connecting a QFX3600 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX3600 Node devices have two 1000BASE-T management ports (labeled **C0** and **C1**) with RJ-45 connectors. For a copper-based control plane network, use the 1000BASE-T management ports to connect the QFX3600 Node device to each EX Series switch (see [Figure 78 on page 354](#)).



NOTE: You may not mix EX4200 and EX4300 switches in the same QFabric system.

Figure 78: QFX3600 Node Device Copper-Based Control Plane Connections for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX3600 Node device must be connected to two EX Series switches.

Before you begin to connect a QFX3600 Node device to the copper-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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).
- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.
- Interconnect the two EX Series switches. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).



NOTE: Use either an EX4200-24T switch with an SFP+ uplink module installed or use an EX4300-48T switch with an SFP+ uplink module installed.

- Ensure that you have two RJ-45 patch cables available for each Node device. For cable specifications, see [“Cable Specifications for Copper-Based Control Plane Connections for the QFabric System” on page 250](#).
- Use [Table 90 on page 355](#) to determine the QFX3600 Node device-to-EX Series switch port mappings. Specific ports have been reserved on the EX Series switch to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.



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 (Node0) is connected to port 0 (ge-0/0/0) on the first EX Series switch EX0 and port 0 (ge-0/0/0) on the second EX Series switch EX1.

Table 90: QFX3600 Node Device-to-EX Series Switch Port Mappings for Copper-Based Control Plane

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node 0	Node0, management port C0 to port 0 (ge-0/0/0)	Node0, management port C1 to port 0 (ge-0/0/0)
Node 1	Node1, management port C0 to port 1 (ge-0/0/1)	Node1, management port C1 to port 1 (ge-0/0/1)
Node 2	Node2, management port C0 to port 2 (ge-0/0/2)	Node2, management port C1 to port 2 (ge-0/0/2)
Node 3	Node3, management port C0 to port 3 (ge-0/0/3)	Node3, management port C1 to port 3 (ge-0/0/3)
Node 4	Node4, management port C0 to port 4 (ge-0/0/4)	Node4, management port C1 to port 4 (ge-0/0/4)

Table 90: QFX3600 Node Device-to-EX Series Switch Port Mappings for Copper-Based Control Plane (*continued*)

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node 5	Node5, management port C0 to port 5 (ge-0/0/5)	Node5, management port C1 to port 5 (ge-0/0/5)
Node 6	Node6, management port C0 to port 6 (ge-0/0/6)	Node6, management port C1 to port 6 (ge-0/0/6)
Node 7	Node7, management port C0 to port 7 (ge-0/0/7)	Node7, management port C1 to port 7 (ge-0/0/7)
Node 8	Node8, management port C0 to port 8 (ge-0/0/8)	Node8, management port C1 to port 8 (ge-0/0/8)
Node 9	Node9, management port C0 to port 9 (ge-0/0/9)	Node9, management port C1 to port 9 (ge-0/0/9)
Node 10	Node10, management port C0 to port 10 (ge-0/0/10)	Node10, management port C1 to port 10 (ge-0/0/10)
Node 11	Node11, management port C0 to port 11 (ge-0/0/11)	Node11, management port C1 to port 11 (ge-0/0/11)
Node 12	Node12, management port C0 to port 12 (ge-0/0/12)	Node12, management port C1 to port 12 (ge-0/0/12)
Node 13	Node13, management port C0 to port 13 (ge-0/0/13)	Node13, management port C1 to port 13 (ge-0/0/13)
Node 14	Node14, management port C0 to port 14 (ge-0/0/14)	Node14, management port C1 to port 14 (ge-0/0/14)
Node 15	Node15, management port C0 to port 15 (ge-0/0/15)	Node15, management port C1 to port 15 (ge-0/0/15)

To connect a QFX3600 Node device to the copper-based QFX3000-M QFabric system control plane network (see [Figure 78 on page 354](#)):

1. Connect one end of the first RJ-45 patch cable to the first 1000BASE-T management port (labeled **C0**) on the Node device front panel.
2. Connect the other end of that cable to the appropriate port on the EX Series switch. See [Table 90 on page 355](#).
3. Connect one end of the second RJ-45 patch cable to the second 1000BASE-T management port (labeled **C1**) on the Node device front panel.
4. Connect the other end of that cable to the appropriate port on the *second* EX Series switch. This should be the same 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 EX Series switch, you connect the second cable to ge-0/0/0 on the second EX Series switch.

5. Repeat this procedure for each QFX3600 Node device.

Related Documentation

- [Connecting a QFX3600-I Interconnect Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 347](#)
- [Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device on page 393](#)
- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 338](#)

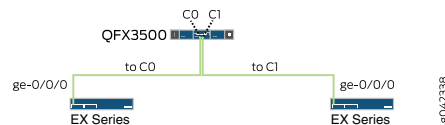
Connecting a QFX3500 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX3500 Node devices have two management ports labeled **C0** and **C1**. Use the management ports to connect the QFX3500 Node device to each EX Series switch (see [Figure 79 on page 357](#)).



NOTE: You may not mix EX4200 and EX4300 switches in the same QFabric system.

Figure 79: QFX3500 Node Device Copper-Based Control Plane Connections for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX3500 Node device must be connected to two EX Series switches.

Use the following QFX3500 Node devices and EX Series switches for a copper-based QFX3000-M QFabric system control plane network:

- QFX3500 Node devices with a 1000BASE-T management board installed. The 1000BASE-T management board provides two 1000BASE-T management ports (labeled **C0** and **C1**) with RJ-45 connectors.
- Either an EX4200-24T switch with an SFP+ uplink module installed or an EX4300-48T switch with an SFP+ uplink module installed.

Before you begin to connect a QFX3500 Node device to the copper-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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).
- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.
- Interconnect the two EX Series switches using the SFP+ uplink module. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).
- Ensure that you have two RJ-45 patch cables available for each Node device. For cable specifications, see [“Cable Specifications for Copper-Based Control Plane Connections for the QFabric System” on page 250](#).
- Use [Table 91 on page 358](#) to determine the QFX3500 Node device-to-EX Series switch port mappings. Specific ports have been reserved on the EX Series switch to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.



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 (Node0) is connected to port 0 (ge-0/0/0) on the first EX Series switch EX0 and the second EX Series switch EX1.

Table 91: QFX3500 Node Device-to-EX Series Switch Port Mappings for Copper-Based Control Plane

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node 0	Node0, management port C0 to port 0 (ge-0/0/0)	Node0, management port C1 to port 0 (ge-0/0/0)
Node 1	Node1, management port C0 to port 1 (ge-0/0/1)	Node1, management port C1 to port 1 (ge-0/0/1)
Node 2	Node2, management port C0 to port 2 (ge-0/0/2)	Node2, management port C1 to port 2 (ge-0/0/2)
Node 3	Node3, management port C0 to port 3 (ge-0/0/3)	Node3, management port C1 to port 3 (ge-0/0/3)
Node 4	Node4, management port C0 to port 4 (ge-0/0/4)	Node4, management port C1 to port 4 (ge-0/0/4)
Node 5	Node5, management port C0 to port 5 (ge-0/0/5)	Node5, management port C1 to port 5 (ge-0/0/5)

Table 91: QFX3500 Node Device-to-EX Series Switch Port Mappings for Copper-Based Control Plane (*continued*)

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node 6	Node6, management port C0 to port 6 (ge-0/0/6)	Node6, management port C1 to port 6 (ge-0/0/6)
Node 7	Node7, management port C0 to port 7 (ge-0/0/7)	Node7, management port C1 to port 7 (ge-0/0/7)
Node 8	Node8, management port C0 to port 8 (ge-0/0/8)	Node8, management port C1 to port 8 (ge-0/0/8)
Node 9	Node9, management port C0 to port 9 (ge-0/0/9)	Node9, management port C1 to port 9 (ge-0/0/9)
Node 10	Node10, management port C0 to port 10 (ge-0/0/10)	Node10, management port C1 to port 10 (ge-0/0/10)
Node 11	Node11, management port C0 to port 11 (ge-0/0/11)	Node11, management port C1 to port 11 (ge-0/0/11)
Node 12	Node12, management port C0 to port 12 (ge-0/0/12)	Node12, management port C1 to port 12 (ge-0/0/12)
Node 13	Node13, management port C0 to port 13 (ge-0/0/13)	Node13, management port C1 to port 13 (ge-0/0/13)
Node 14	Node14, management port C0 to port 14 (ge-0/0/14)	Node14, management port C1 to port 14 (ge-0/0/14)
Node 15	Node15, management port C0 to port 15 (ge-0/0/15)	Node15, management port C1 to port 15 (ge-0/0/15)

To connect a QFX3500 Node device to the copper-based QFX3000-M QFabric system control plane network (see [Figure 79 on page 357](#)):

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 port on the EX Series switch. See [Table 91 on page 358](#).
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 port on the *second* EX Series switch. This should be the same 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 EX Series switch, you connect the second cable to ge-0/0/0 on the second EX Series switch.
5. Repeat this procedure for each QFX3500 Node device.

- Related Documentation**
- [Connecting a QFX3600-I Interconnect Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 347](#)
 - [Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device on page 397](#)
 - [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
 - [Connecting QFX3100 Director Devices in a Director Group on page 338](#)

CHAPTER 14

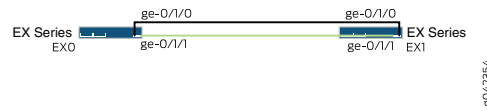
Cabling a Fiber-Based Control Plane for the QFX3000-M QFabric System

- [Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy on page 361](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 364](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
- [Connecting a QFX3100 Director Device to a Network for Out-of-Band Management on page 368](#)
- [Connecting a QFX5100-24Q Interconnect Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 369](#)
- [Connecting a QFX3600-I Interconnect Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 374](#)
- [Connecting a QFX5100 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 377](#)
- [Connecting a QFX3500 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 381](#)
- [Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 385](#)

Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or to two EX4300 switches. For redundancy and communication, you must connect the two EX Series switches using the Ethernet SFP+ uplink module ports configured as a link aggregation group (LAG) (see [Figure 69 on page 336](#)).

Figure 80: QFX3000-M QFabric System Control Plane—Inter-EX Series Switch LAG Connections



For an EX4200 control plane, use the 1-Gigabit Ethernet SFP+ uplink module ports; for an EX4300 control plane, use the 10-Gigabit Ethernet SFP+ uplink module ports. Do not mix EX4200 and EX4300 switches in the same control plane.

Specific ports have been reserved on the EX Series switches to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.

Before you begin to interconnect two EX Series switches for QFX3000-M 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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).
- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.



NOTE: For a copper-based control plane network, either use EX4200-24T switches with an SFP+ uplink module installed or use an EX4300-48T with an SFP+ uplink module installed. For a fiber-based control plane network, use EX4200-24F switches with an SFP+ uplink module installed or an EX4300-48P with an SFP+ uplink module installed.

- Install transceivers in ports 0 and 1 of the uplink module (see *Installing a Transceiver in an EX Series Switch*).
- For an EX4200 Switch control plane, ensure that you have installed 1-Gigabit Ethernet SFP transceivers in each EX4200 switch uplink module. For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4200 Switches” on page 214](#).
- For an EX4300 Switch control plane, ensure that you have installed 10-Gigabit Ethernet SFP+ transceivers in each EX4300 switch uplink module. For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4300 Switches” on page 193](#).
- Ensure that you have appropriate fiber-optic cables (see [“Pluggable Transceivers Supported on EX4200 Switches” on page 214](#) and [“Pluggable Transceivers Supported on EX4300 Switches” on page 193](#)).
- Ensure that you have taken the necessary precautions for safe handling of lasers (see *Laser and LED Safety Guidelines and Warnings for Switches*).

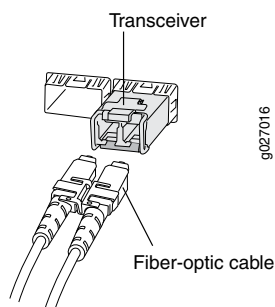
To interconnect two EX Series switches for QFabric system control plane redundancy (see [Figure 69 on page 336](#)):



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 of the first EX Series switch uplink module. Save the cap.
3. Insert the cable connector into the optical transceiver (see [Figure 70 on page 337](#)).

Figure 81: 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 of the *second* EX Series switch uplink module. Save the cap.
6. Insert the cable connector into the optical transceiver.
7. Repeat Step 1 through Step 6 to interconnect uplink module port 1 on both the EX Series switches.
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 269](#)
 - [Installing and Connecting a QFX3600 or QFX3600-I Device on page 281](#)
 - [Installing and Connecting a QFX3500 Device on page 299](#)

Connecting QFX3100 Director Devices in a Director Group

A QFabric system requires two QFX3100 Director devices interconnected as a QFX3100 Director *group* (see [Figure 71 on page 338](#) through [Figure 73 on page 339](#)).

Figure 82: QFX3100 Director Group Control Plane Connections for QFX3000-G QFabric System Using Copper-Based Control Plane

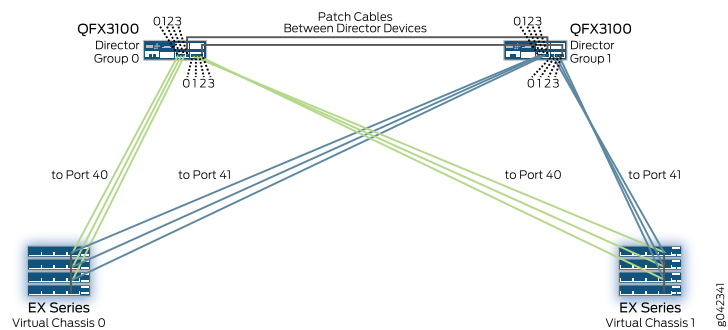


Figure 83: QFX3100 Director Group Control Plane Connections for QFX3000-G QFabric System Using Fiber-Based Control Plane

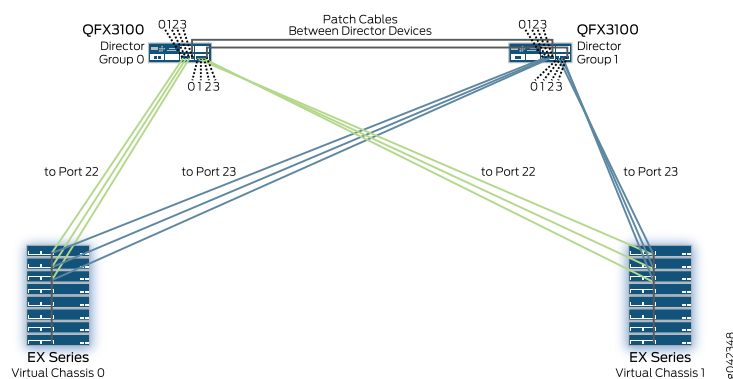
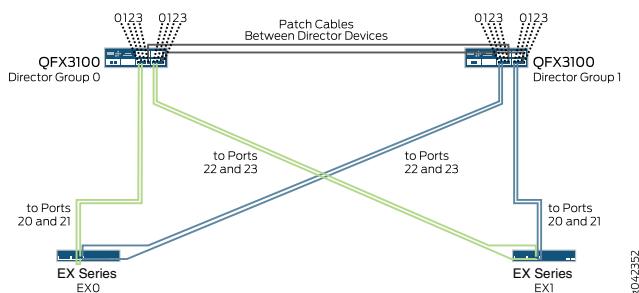


Figure 84: QFX3100 Director Group Control Plane Connections for QFX3000-M QFabric System



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 269](#), [Installing and Connecting a QFX3008-I Interconnect Device](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).



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 250](#) and [“Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 137](#).



CAUTION: The redundant patch cables interconnecting the Director devices are critical links required for the operation of the Director group. The two inter-Director device links must remain connected when the Director devices are online. Although a single inter-Director device can lose a link and regain its connection, the loss of both inter-Director device links causes one of the Director devices to become isolated from the Director group. In [Figure 71 on page 338](#) through [Figure 73 on page 339](#), these redundant patch cables are shown in red and connect port 3 to port 3.

To connect QFX3100 Director devices in a Director group (see [Figure 71 on page 338](#)):



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.

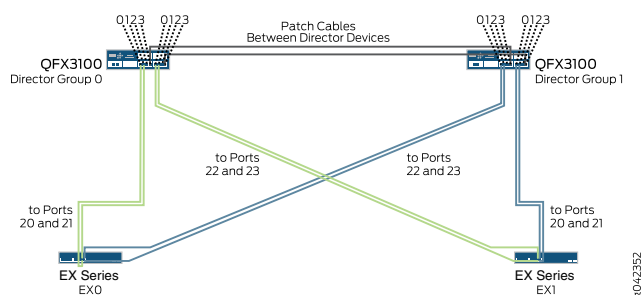
Related Documentation

- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-G QFabric System Control Plane Network](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-G QFabric System Control Plane Network](#)
- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
- [Troubleshooting QFX3100 Director Device Isolation](#)

Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 switches or to two EX4300 switches. QFX3100 Director devices have two 4-port network modules. Use the network module ports to connect the QFX3100 Director group to the EX Series switches (see [Figure 85 on page 366](#)).

Figure 85: QFX3100 Director Group to EX Series Switch Connections for QFX3000-M QFabric System



Use the following QFX3100 Director devices and EX Series 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.
- Either an EX4200-24F switch with an SFP+ uplink module installed or an EX4300-48P with an SFP+ uplink module installed.

Specific ports have been reserved on the EX Series switches to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.

Before you begin to connect a QFX3100 Director device to the fiber-based QFX3000-M 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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).
- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.
- Interconnect the two EX Series switches using the SFP+ uplink module ports. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).
- Connect the two QFX3100 Director devices to create a Director group. See [“Connecting QFX3100 Director Devices in a Director Group” on page 338](#).
- Ensure that you have installed 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 137](#).
- Install transceivers in ports 0 and 1 of the uplink module (see *Installing a Transceiver in an EX Series Switch*).
 - For an EX4200 Switch control plane, ensure that you have installed 1-Gigabit Ethernet SFP transceivers in each EX4200 switch uplink module. For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4200 Switches” on page 214](#).
 - For an EX4300 Switch control plane, ensure that you have installed 10-Gigabit Ethernet SFP+ transceivers in each EX4300 switch uplink module. For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4300 Switches” on page 193](#).
- 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-M QFabric control plane network (see [Figure 85 on page 366](#)):



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 85 on page 366](#)) to the two EX Series switches (labeled **EX0** and **EX1** in [Figure 85 on page 366](#)). You connect the first two ports (labeled **0** and **1**) on the first network module to the first EX Series switch (**EX0**). You connect the first two ports on the second network module (also labeled **0** and **1**) to the second EX Series switch (**EX1**). The ports used are the same on each switch.

Table 92: QFX3100 Director Device-to-EX Series Switch Control Plane Port Assignments for DG0

Network Module Port 0	Network Module Port 1	Network Module Port 3
EX Series switch port ge-0/0/20	EX Series switch port ge-0/0/21	Connect this port to the identical port on the other Director device. See “Connecting QFX3100 Director Devices in a Director Group” on page 338 .

2. Connect both network modules on the *second* Director device (labeled **DG1** in [Figure 85 on page 366](#)) to the two EX Series switches (labeled **EX0** and **EX1** in [Figure 85 on page 366](#)). You connect the first two ports on the first network module to the first EX Series switch (**EX0**). You connect the first two ports on the second network module to the second EX Series switch (**EX1**). The ports used are the same on each switch.

Table 93: Second QFX3100 Director Device-to-EX Series Switch Control Plane Port Assignments for DG1

Network Module Port 0	Network Module Port 1	Network Module Port 3
EX Series switch port ge-0/0/22	EX Series switch port ge-0/0/23	Connect this port to the identical port on the other Director device. See “Connecting QFX3100 Director Devices in a Director Group” on page 338 .

Related Documentation

- [Installing and Connecting a QFX3100 Director Device on page 269](#)

Connecting a QFX3100 Director Device to a Network for Out-of-Band Management

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 441](#).

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](#)
- [Connecting QFX3100 Director Devices to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 340](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
- [Connecting a QFX Series Device to a Management Console on page 277](#)

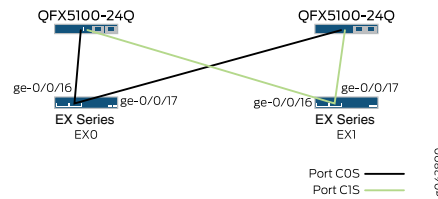
Connecting a QFX5100-24Q Interconnect Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX5100-24Q Interconnect devices have two management ports (labeled **C0** and **C1**), to connect the QFX5100-24Q Interconnect device to each EX Series switch (see [Figure 86 on page 370](#)).



NOTE: You may not mix EX4200 and EX4300 switches in the same QFabric system.

Figure 86: QFX5100-24Q Interconnect Device Fiber-Based Control Plane Connections for QFX3000-M QFabric System



Specific ports have been reserved on the EX Series switch 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.

Before you begin to connect a QFX5100-24Q Interconnect device to the fiber-based QFX3000-M 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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#), and [“Installing and Connecting a QFX5100 Device” on page 315](#).



NOTE: There can be a maximum of four Interconnect devices in the QFX3000-M QFabric system.

- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.



NOTE: For a fiber-based control plane network, use an EX4200-24F switch or an EX4300-48P switch with an SFP+ uplink module installed.

- Interconnect the two EX Series switches using the SFP+ uplink module ports. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in management ports **C0** and **C1** on each QFX5100-24Q 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 137](#).
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports (labeled **16** through **19**) you are using on each EX Series switch (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4200 Switches” on page 214](#) or [“Pluggable Transceivers Supported on EX4300 Switches” on page 193](#).

- 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 94 on page 371](#) to determine the QFX5100-24Q Interconnect device-to-EX Series switch port mappings. Specific ports have been reserved on the EX Series switch to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.



NOTE: The numerical identifiers for each Interconnect device below are not preassigned to the Interconnect devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Interconnect device (IC0) is connected to port 16 (ge-0/0/16) on the first EX Series switch EX0 and the second EX Series switch EX1.

Table 94: QFX3600-I Interconnect Device-to-EX Series Switch Port Mappings for Fiber-Based Control Plane

Interconnect Device	EX Series Switch EX0	EX Series Switch EX1
IC0	IC0, management port C0 to port 16 (ge-0/0/16)	IC0, management port C1 to port 16 (ge-0/0/16)
IC1	IC1, management port C0 to port 17 (ge-0/0/17)	IC1, management port C1 to port 17 (ge-0/0/17)
IC2	IC2, management port C0 to port 18 (ge-0/0/18)	IC2, management port C1 to port 18 (ge-0/0/18)
IC3	IC3, management port C0 to port 19 (ge-0/0/19)	IC3, management port C1 to port 19 (ge-0/0/19)

To connect each QFX5100-24Q 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.

1. Connect the first QFX5100-24Q Interconnect device.
 - a. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
 - b. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C0**. Save the cap.
 - c. Insert the cable connector into the optical transceiver.
 - d. Connect the other end of that cable to port ge-0/0/16 on the first EX Series switch.
 - e. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C1**. Save the cap.
 - f. Insert the cable connector into the optical transceiver.
 - g. Connect the other end of that cable to port ge-0/0/16 on the *second* EX Series switch.
2. Connect the second QFX5100-24Q Interconnect device.
 - a. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
 - b. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C0**. Save the cap.
 - c. Insert the cable connector into the optical transceiver.
 - d. Connect the other end of that cable to port ge-0/0/17 on the first EX Series switch.
 - e. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C1**. Save the cap.
 - f. Insert the cable connector into the optical transceiver.
 - g. Connect the other end of that cable to port ge-0/0/17 on the *second* EX Series switch.
3. Connect the third QFX5100-24Q Interconnect device if used.
 - a. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
 - b. Remove the rubber safety cap from the SFP optical transceiver in the management

port labeled **C0**. Save the cap.

- c. Insert the cable connector into the optical transceiver.
 - d. Connect the other end of that cable to port ge-0/0/18 on the first EX Series switch.
 - e. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C1**. Save the cap.
 - f. Insert the cable connector into the optical transceiver.
 - g. Connect the other end of that cable to port ge-0/0/18 on the *second* EX Series switch.
4. Connect the fourth QFX5100-24Q Interconnect device if used.
- a. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
 - b. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C0**. Save the cap.
 - c. Insert the cable connector into the optical transceiver.
 - d. Connect the other end of that cable to port ge-0/0/19 on the first EX Series switch.
 - e. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C1**. Save the cap.
 - f. Insert the cable connector into the optical transceiver.
 - g. Connect the other end of that cable to port ge-0/0/19 on the *second* EX Series switch.

**Related
Documentation**

- [Connecting a QFX3500 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 381](#)
- [Connecting a QFX3500 Node Device to an QFX5100-24Q Interconnect Device on page 399](#)
- [Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 385](#)
- [Connecting a QFX3600 Node Device to a QFX5100-24Q Interconnect Device on page 396](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 338](#)

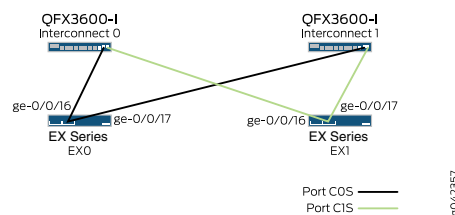
Connecting a QFX3600-I Interconnect Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX3600-I Interconnect devices have two SFP management ports labeled **C0S** and **C1S**. For a fiber-based control plane network, use the SFP management ports to connect the QFX3600-I Interconnect device to each EX Series switch (see [Figure 87 on page 374](#)).



NOTE: You may not mix EX4200 and EX4300 switches in the same QFabric system.

Figure 87: QFX3600-I Interconnect Device Fiber-Based Control Plane Connections for QFX3000-M QFabric System



Specific ports have been reserved on the EX Series switch 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.

Before you begin to connect a QFX3600-I Interconnect device to the fiber-based QFX3000-M 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 269, [“Installing and Connecting a QFX3600 or QFX3600-I Device”](#) on page 281, and [“Installing and Connecting a QFX3500 Device”](#) on page 299.



NOTE: There can be a maximum of four Interconnect devices in the QFX3000-M QFabric system.

- Install your EX4200 or EX4300 switches. See [Installing and Connecting an EX4200 Switch](#) or [Installing and Connecting an EX4300 Switch](#).



NOTE: For a fiber-based control plane network, use an EX4200-24F switch or an EX4300-48P switch with an SFP+ uplink module installed.

- Interconnect the two EX Series switches using the SFP+ uplink module ports. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy”](#) on page 335.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in management ports **C0S** and **C1S** on each QFX3600-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 137.
- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports (labeled **16** through **19**) you are using on each EX Series switch (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4200 Switches”](#) on page 214 or [“Pluggable Transceivers Supported on EX4300 Switches”](#) on page 193.
- 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 95 on page 375](#) to determine the QFX3600-I Interconnect device-to-EX Series switch port mappings. Specific ports have been reserved on the EX Series switch to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.



NOTE: The numerical identifiers for each Interconnect device below are not preassigned to the Interconnect devices that are shipped to you. They represent the order in which you connect the Node devices. For example, the first Interconnect device (IC0) is connected to port 16 (ge-0/0/16) on the first EX Series switch EX0 and the second EX Series switch EX1.

Table 95: QFX3600-I Interconnect Device-to-EX Series Switch Port Mappings for Fiber-Based Control Plane

Interconnect Device	EX Series Switch EX0	EX Series Switch EX1
IC0	IC0, management port C0S to port 16 (ge-0/0/16)	IC0, management port C1S to port 16 (ge-0/0/16)
IC1	IC1, management port C0S to port 17 (ge-0/0/17)	IC1, management port C1S to port 17 (ge-0/0/17)
IC2	IC2, management port C0S to port 18 (ge-0/0/18)	IC2, management port C1S to port 18 (ge-0/0/18)
IC3	IC3, management port C0S to port 19 (ge-0/0/19)	IC3, management port C1S to port 19 (ge-0/0/19)

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.

1. Connect the first QFX3600-I Interconnect device.
 - a. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
 - b. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C0S**. Save the cap.
 - c. Insert the cable connector into the optical transceiver.
 - d. Connect the other end of that cable to port ge-0/0/16 on the first EX Series switch.
 - e. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C1S**. Save the cap.
 - f. Insert the cable connector into the optical transceiver.
 - g. Connect the other end of that cable to port ge-0/0/16 on the *second* EX Series switch.
2. Connect the second QFX3600-I Interconnect device.
 - a. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
 - b. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C0S**. Save the cap.
 - c. Insert the cable connector into the optical transceiver.
 - d. Connect the other end of that cable to port ge-0/0/17 on the first EX Series switch.
 - e. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C1S**. Save the cap.
 - f. Insert the cable connector into the optical transceiver.
 - g. Connect the other end of that cable to port ge-0/0/17 on the *second* EX Series switch.
3. Connect the third QFX3600-I Interconnect device if used.
 - a. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
 - b. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C0S**. Save the cap.

- c. Insert the cable connector into the optical transceiver.
 - d. Connect the other end of that cable to port ge-0/0/18 on the first EX Series switch.
 - e. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C1S**. Save the cap.
 - f. Insert the cable connector into the optical transceiver.
 - g. Connect the other end of that cable to port ge-0/0/18 on the *second* EX Series switch.
4. Connect the fourth QFX3600-I Interconnect device if used.
 - a. If the fiber-optic cable connector is covered by a rubber safety cap, remove the cap. Save the cap.
 - b. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C0S**. Save the cap.
 - c. Insert the cable connector into the optical transceiver.
 - d. Connect the other end of that cable to port ge-0/0/19 on the first EX Series switch.
 - e. Remove the rubber safety cap from the SFP optical transceiver in the management port labeled **C1S**. Save the cap.
 - f. Insert the cable connector into the optical transceiver.
 - g. Connect the other end of that cable to port ge-0/0/19 on the *second* EX Series switch.

Related Documentation

- [Connecting a QFX3500 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 381](#)
- [Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device on page 397](#)
- [Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 385](#)
- [Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device on page 393](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 338](#)

Connecting a QFX5100 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network

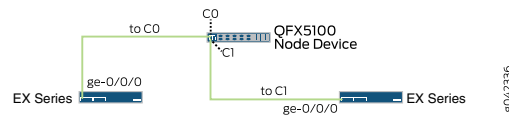
A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX5100 Node devices have an RJ-45 **C0** located under the **CON** port, and a small form-factor pluggable (SFP) cage **C1** that can be 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 EX Series switch. See [Figure 88 on page 378](#) for an example of this cabling.



NOTE: You may not mix EX4200 and EX4300 switches in the same QFabric system.

Figure 88: QFX5100 Node Device Fiber-Based Control Plane Connections for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX5100 Node device must be connected to two EX Series switches.

Use the following QFX5100 Node devices and EX Series switches for a fiber-based QFX3000-M QFabric system control plane network:

- QFX5100-48S Node devices with two 1 Gbps SFP modules installed in the management ports labeled **C0** and **C1**.
- Either an EX4200-24F switches with an SFP+ uplink module installed or an EX4300-48P with an SFP+ uplink module installed.

Before you begin to connect a QFX5100 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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#), and [“Installing and Connecting a QFX5100 Device” on page 315](#).
- Install your EX4200 or EX4300 switches. See [Installing and Connecting an EX4200 Switch](#) or [Installing and Connecting an EX4300 Switch](#).
- Interconnect the two EX Series switches. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).



NOTE: Use either EX4200-24F switches with an SFP+ uplink module installed or use an EX4300-48P with an SFP+ uplink module installed.

- Ensure that you have installed 1-Gigabit Ethernet SFP transceivers in management ports **C0** and **C1** 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 137.

- Follow the port assignments in [Table 94 on page 371](#) and ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports (labeled **0** through **15**) 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](#)” on page 214.
- 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 94 on page 371](#) to determine the QFX5100 Node device-to-EX Series switch port mappings. Specific ports have been reserved on the EX Series switch to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.



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 (Node0) is connected to port 0 (ge-0/0/0) on the first EX Series switch EX0 and port 0 (ge-0/0/0) on the second EX Series switch EX1.

Table 96: QFX5100 Node Device-to-EX Series Switch Port Mappings for Fiber-Based Control Plane

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node 0	Node0, management port C0 to port 0 (ge-0/0/0)	Node0, management port C1 to port 0 (ge-0/0/0)
Node 1	Node1, management port C0 to port 1 (ge-0/0/1)	Node1, management port C1 to port 1 (ge-0/0/1)
Node 2	Node2, management port C0 to port 2 (ge-0/0/2)	Node2, management port C1 to port 2 (ge-0/0/2)
Node 3	Node3, management port C0 to port 3 (ge-0/0/3)	Node3, management port C1 to port 3 (ge-0/0/3)
Node 4	Node4, management port C0 to port 4 (ge-0/0/4)	Node4, management port C1 to port 4 (ge-0/0/4)
Node 5	Node5, management port C0 to port 5 (ge-0/0/5)	Node5, management port C1 to port 5 (ge-0/0/5)
Node 6	Node6, management port C0 to port 6 (ge-0/0/6)	Node6, management port C1 to port 6 (ge-0/0/6)
Node 7	Node7, management port C0 to port 7 (ge-0/0/7)	Node7, management port C1 to port 7 (ge-0/0/7)

Table 96: QFX5100 Node Device-to-EX Series Switch Port Mappings for Fiber-Based Control Plane (*continued*)

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node 8	Node8, management port C0 to port 8 (ge-0/0/8)	Node8, management port C1 to port 8 (ge-0/0/8)
Node 9	Node9, management port C0 to port 9 (ge-0/0/9)	Node9, management port C1 to port 9 (ge-0/0/9)
Node 10	Node10, management port C0 to port 10 (ge-0/0/10)	Node10, management port C1 to port 10 (ge-0/0/10)
Node 11	Node11, management port C0 to port 11 (ge-0/0/11)	Node11, management port C1 to port 11 (ge-0/0/11)
Node 12	Node12, management port C0 to port 12 (ge-0/0/12)	Node12, management port C1 to port 12 (ge-0/0/12)
Node 13	Node13, management port C0 to port 13 (ge-0/0/13)	Node13, management port C1 to port 13 (ge-0/0/13)
Node 14	Node14, management port C0 to port 14 (ge-0/0/14)	Node14, management port C1 to port 14 (ge-0/0/14)
Node 15	Node15, management port C0 to port 15 (ge-0/0/15)	Node15, management port C1 to port 15 (ge-0/0/15)

To connect a QFX5100 Node device to the fiber-based QFX3000-M QFabric system control plane network (see [Figure 88 on page 378](#)):



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 EX Series switch. See [Table 94 on page 371](#).
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* 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 EX Series switch, you connect the second cable to ge-0/0/0 on the second EX Series switch.
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 QFX3600-I Interconnect Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 374](#)
- [Connecting a QFX5100 Node Device to a QFX3600-I Interconnect Device on page 389](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 338](#)

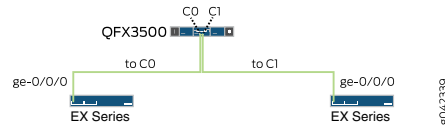
Connecting a QFX3500 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX3500 Node devices have two management ports labeled **C0** and **C1**. Use the management ports to connect the QFX3500 Node device to each EX Series switch (see [Figure 89 on page 382](#)).



NOTE: You may not mix EX4200 and EX4300 switches in the same QFabric system.

Figure 89: QFX3500 Node Device Fiber-Based Control Plane Connections for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX3500 Node device must be connected to two EX Series switches.

Use the following QFX3500 Node devices and EX Series switches for a fiber-based QFX3000-M 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**.
- Either an EX4200-24F switch with an SFP+ uplink module installed or an EX4300-48P switch 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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).
- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.
- Interconnect the two EX Series switches. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).
- 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 137](#).
- Follow the port assignments in [Table 97 on page 383](#) and ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports (labeled **0** through **15**) you are using on each EX Series switch (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4200 Switches” on page 214](#) or [“Pluggable Transceivers Supported on EX4300 Switches” on page 193](#).
- 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 97 on page 383](#) to determine the QFX3500 Node device-to-EX4200 switch port mappings. Specific ports have been reserved on the EX Series switch to connect

to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.



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 (Node0) is connected to port 0 (ge-0/0/0) on the first EX Series switch EX0 and port 0 (ge-0/0/0) on the second EX Series switch EX1.

Table 97: QFX3500 Node Device-to-EX Series Switch Port Mappings for Fiber-Based Control Plane

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node0	Node0, management port C0 to port 0 (ge-0/0/0)	Node0, management port C1 to port 0 (ge-0/0/0)
Node1	Node1, management port C0 to port 1 (ge-0/0/1)	Node1, management port C1 to port 1 (ge-0/0/1)
Node2	Node2, management port C0 to port 2 (ge-0/0/2)	Node2, management port C1 to port 2 (ge-0/0/2)
Node3	Node3, management port C0 to port 3 (ge-0/0/3)	Node3, management port C1 to port 3 (ge-0/0/3)
Node4	Node4, management port C0 to port 4 (ge-0/0/4)	Node4, management port C1 to port 4 (ge-0/0/4)
Node5	Node5, management port C0 to port 5 (ge-0/0/5)	Node5, management port C1 to port 5 (ge-0/0/5)
Node6	Node6, management port C0 to port 6 (ge-0/0/6)	Node6, management port C1 to port 6 (ge-0/0/6)
Node7	Node7, management port C0 to port 7 (ge-0/0/7)	Node7, management port C1 to port 7 (ge-0/0/7)
Node8	Node8, management port C0 to port 8 (ge-0/0/8)	Node8, management port C1 to port 8 (ge-0/0/8)
Node9	Node9, management port C0 to port 9 (ge-0/0/9)	Node9, management port C1 to port 9 (ge-0/0/9)
Node10	Node10, management port C0 to port 10 (ge-0/0/10)	Node10, management port C1 to port 10 (ge-0/0/10)
Node11	Node11, management port C0 to port 11 (ge-0/0/11)	Node11, management port C1 to port 11 (ge-0/0/11)

Table 97: QFX3500 Node Device-to-EX Series Switch Port Mappings for Fiber-Based Control Plane (*continued*)

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node12	Node12, management port C0 to port 12 (ge-0/0/12)	Node12, management port C1 to port 12 (ge-0/0/12)
Node13	Node13, management port C0 to port 13 (ge-0/0/13)	Node13, management port C1 to port 13 (ge-0/0/13)
Node14	Node14, management port C0 to port 14 (ge-0/0/14)	Node14, management port C1 to port 14 (ge-0/0/14)
Node15	Node15, management port C0 to port 15 (ge-0/0/15)	Node15, management port C1 to port 15 (ge-0/0/15)

To connect a QFX3500 Node device to the fiber-based QFX3000-M QFabric system control plane network (see [Figure 89 on page 382](#)):



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 EX Series switch. See [Table 97 on page 383](#).
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* EX Series 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 EX Series switch, you connect the second cable to ge-0/0/0 on the second EX Series switch.
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 QFX3600-I Interconnect Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 374](#)
- [Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device on page 397](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 338](#)

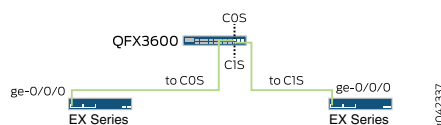
Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network

A QFX3000-M QFabric system control plane and management network is formed by connecting the QFX Series devices in your network to two EX4200 or two EX4300 switches. QFX3600 Node devices have two SFP management ports labeled **C0S** and **C1S**. For a fiber-based control plane network, use the SFP management ports to connect the QFX3600 Node device to each EX Series switch (see [Figure 90 on page 385](#)).



NOTE: You may not mix EX4200 and EX4300 switches in the same QFabric system.

Figure 90: QFX3600 Node Device Fiber-Based Control Plane Connections for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX3600 Node device must be connected to two EX Series switches.

Before you begin to connect a QFX3600 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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).
- Install your EX4200 or EX4300 switches. See *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.
- Interconnect the two EX Series switches. See [“Interconnecting Two EX Series Switches for QFX3000-M QFabric System Control Plane Redundancy” on page 335](#).



NOTE: Use either an EX4200-24F switch with an SFP+ uplink module installed or use an EX4300-48P switch with an SFP+ uplink module installed.

- 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 137](#).
- Follow the port assignments in [Table 98 on page 386](#) and ensure that you have installed 1-Gigabit Ethernet SFP transceivers in the ports (labeled **0** through **15**) you are using on each EX Series switch (see *Installing a Transceiver in an EX Series Switch*). For a list of supported transceivers, see [“Pluggable Transceivers Supported on EX4200 Switches” on page 214](#) or [“Pluggable Transceivers Supported on EX4300 Switches” on page 193](#).
- 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 98 on page 386](#) to determine the QFX3600 Node device-to-EX4200 switch port mappings. Specific ports have been reserved on the EX Series switch to connect to each of the QFX Series device types. Such design simplifies installation and facilitates timely deployment of a QFabric system.



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 (Node0) is connected to port **0** (ge-0/0/0) on the first EX Series switch EX0 and port **0** (ge-0/0/0) on the second EX Series switch EX1.

Table 98: QFX3600 Node Device-to-EX Series Switch Port Mappings for Fiber-Based Control Plane

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node0	Node0, management port C0S to port 0 (ge-0/0/0)	Node0, management port C1S to port 0 (ge-0/0/0)

Table 98: QFX3600 Node Device-to-EX Series Switch Port Mappings for Fiber-Based Control Plane (*continued*)

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node1	Node1, management port C0S to port 1 (ge-0/0/1)	Node1, management port C1S to port 1 (ge-0/0/1)
Node2	Node2, management port C0S to port 2 (ge-0/0/2)	Node2, management port C1S to port 2 (ge-0/0/2)
Node3	Node3, management port C0S to port 3 (ge-0/0/3)	Node3, management port C1S to port 3 (ge-0/0/3)
Node4	Node4, management port C0S to port 4 (ge-0/0/4)	Node4, management port C1S to port 4 (ge-0/0/4)
Node5	Node5, management port C0S to port 5 (ge-0/0/5)	Node5, management port C1S to port 5 (ge-0/0/5)
Node6	Node6, management port C0S to port 6 (ge-0/0/6)	Node6, management port C1S to port 6 (ge-0/0/6)
Node7	Node7, management port C0S to port 7 (ge-0/0/7)	Node7, management port C1S to port 7 (ge-0/0/7)
Node8	Node8, management port C0S to port 8 (ge-0/0/8)	Node8, management port C1S to port 8 (ge-0/0/8)
Node9	Node9, management port C0S to port 9 (ge-0/0/9)	Node9, management port C1S to port 9 (ge-0/0/9)
Node10	Node10, management port C0S to port 10 (ge-0/0/10)	Node10, management port C1S to port 10 (ge-0/0/10)
Node11	Node11, management port C0S to port 11 (ge-0/0/11)	Node11, management port C1S to port 11 (ge-0/0/11)
Node12	Node12, management port C0S to port 12 (ge-0/0/12)	Node12, management port C1S to port 12 (ge-0/0/12)
Node13	Node13, management port C0S to port 13 (ge-0/0/13)	Node13, management port C1S to port 13 (ge-0/0/13)
Node14	Node14, management port C0S to port 14 (ge-0/0/14)	Node14, management port C1S to port 14 (ge-0/0/14)
Node15	Node15, management port C0S to port 15 (ge-0/0/15)	Node15, management port C1S to port 15 (ge-0/0/15)

To connect a QFX3600 Node device to the fiber-based QFX3000-M QFabric system control plane network (see [Figure 90 on page 385](#)):



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 EX Series switch. See [Table 98 on page 386](#).
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* EX Series 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 EX Series switch, you connect the second cable to ge-0/0/0 on the second EX Series switch.
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 on page 374](#)
- [Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device on page 393](#)
- [Connecting QFX3100 Director Devices to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 366](#)
- [Connecting QFX3100 Director Devices in a Director Group on page 338](#)

Cabling the Data Plane for the QFX3000-M QFabric System

- [Connecting a QFX5100 Node Device to a QFX3600-I Interconnect Device on page 389](#)
- [Connecting a QFX5100 Node Device to a QFX5100-24Q Interconnect Device on page 391](#)
- [Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device on page 393](#)
- [Connecting a QFX3600 Node Device to a QFX5100-24Q Interconnect Device on page 396](#)
- [Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device on page 397](#)
- [Connecting a QFX3500 Node Device to an QFX5100-24Q Interconnect Device on page 399](#)

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

To form the data plane in a QFX3000-M QFabric system using the QFX5100 line of switches, you connect the QSFP+ uplink ports on the QFX5100 Node device to the QSFP+ ports on the QFX3600-I Interconnect device. See [Table 99 on page 389](#) for the available ports for connecting to the QFX5100-24Q and [Figure 91 on page 390](#) for a diagram of the cabling. For a description of the port ranges and interface numbering for data plane and control plane, see *Understanding Port Ranges and System Modes*.

Table 99: Port Numbering for Data Plane Connections

QFX5100 Node Device Model	Port Numbers
QFX5100-24Q	0 through 23
QFX5100-48S	48 through 53
QFX5100-48T	48 through 53

Figure 91: QFX5100 Node Device Data Plane Connects for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX5100 Node device must be connected to each QFX3600-I Interconnect device. For example, if you have two QFX3600-I Interconnect devices, then at least one uplink port on each QFX5100 Node device must be connected to each QFX3600-I Interconnect device. If you are connecting all four uplink ports to two QFX3600-I Interconnect devices, we recommend connecting two uplink ports to each Interconnect device.

Before you begin to cable the QFX3000-M QFabric data plane:

- Review “[Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series](#)” on page 137 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 137).

To connect a QFX5100 Node device to a QFX3600-I Interconnect device (see [Figure 91 on page 390](#)):



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 uplink port of the QFX5100 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 QFX3600-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. 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

- [Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 137](#)

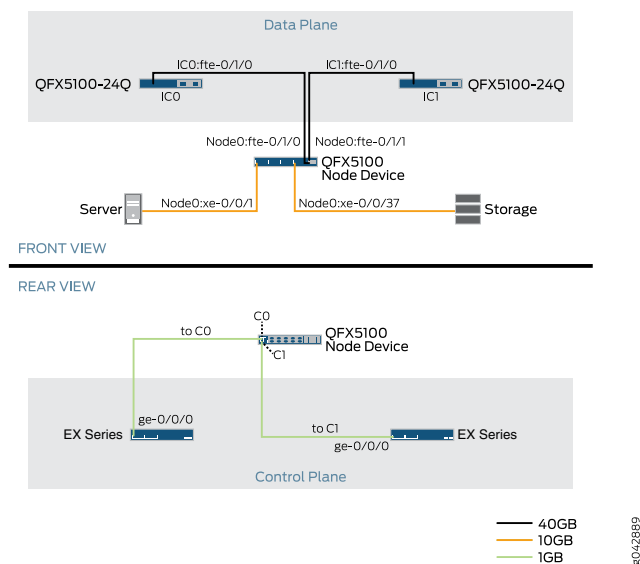
Connecting a QFX5100 Node Device to a QFX5100-24Q Interconnect Device

To form the data plane in a QFX3000-M QFabric system using the QFX5100 line of switches, you connect the QSFP+ uplink ports on the QFX5100 Node device to the QSFP+ ports on the QFX5100-24Q Interconnect device. See [Table 99 on page 389](#) for the available ports for connecting to the QFX5100-24Q and [Figure 92 on page 392](#) for a diagram of the cabling. For a description of the port ranges and interface numbering for data plane and control plane, see *Understanding Port Ranges and System Modes*.

Table 100: Port Numbering for Data Plane Connections

QFX5100 Node Device Model	Port Numbers
QFX5100-24Q	0 through 23
QFX5100-48S	48 through 53
QFX5100-48T	48 through 53

Figure 92: QFX5100 Node Device Data Plane Connections to an QFX5100-24Q Interconnect Device for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX5100 Node device must be connected to each QFX5100-24Q Interconnect device. For example, if you have two QFX5100-24Q Interconnect devices, then at least one uplink port on each QFX5100 Node device must be connected to each QFX5100-24Q Interconnect device. If you are connecting four uplink ports to two QFX5100-24Q Interconnect devices, we recommend connecting two uplink ports to each Interconnect device.

Before you begin to cable the QFX3000-M QFabric data plane:

- Review “[Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series](#)” on page 137 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 137).

To connect a QFX5100 Node device to a QFX5100-24Q Interconnect device (see [Figure 92 on page 392](#)):



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 uplink port of the QFX5100 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 QFX5100-24Q 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. 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

- [Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 137](#)

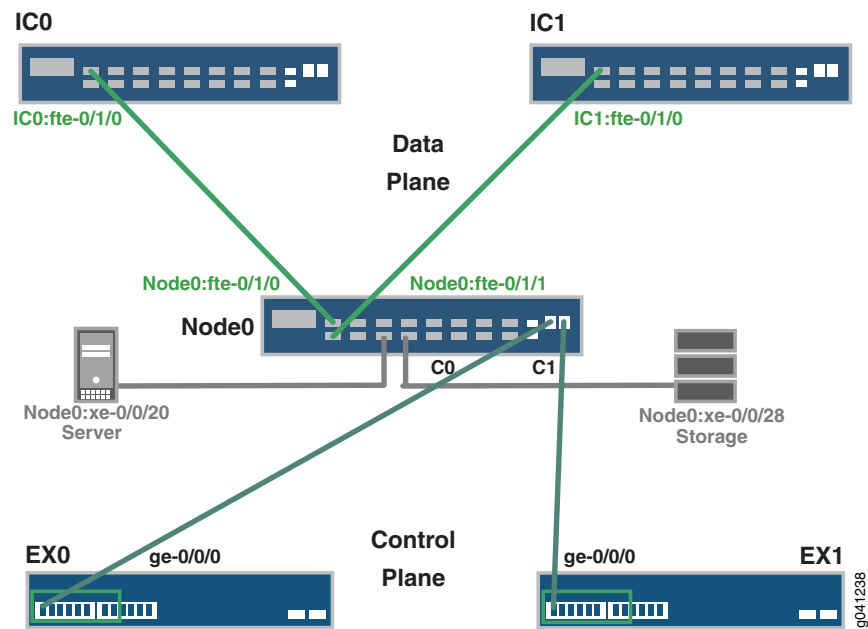
Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device

To form the data plane in a QFX3000-M QFabric system, you connect the QSFP+ uplink ports (labeled **Q0** through **Q7**) on the QFX3600 Node device to the QSFP+ ports (labeled **Q0** through **Q15**) on the QFX3600-I Interconnect device (see [Figure 93 on page 394](#)).



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 474).

Figure 93: QFX3600 Node Device Data Plane Connections for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX3600 Node device must be connected to each QFX3600-I Interconnect device. For example, if you have two QFX3600-I Interconnect devices, then at least one uplink port on each QFX3600 Node device must be connected to each QFX3600-I Interconnect device. If you are connecting all four uplink ports to two QFX3600-I Interconnect devices, we recommend connecting two uplink ports to each Interconnect device.

Before you begin to cable the QFX3000-M QFabric system data plane:

- Review [“Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series”](#) on page 137 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 137](#)).

To connect a QFX3600 Node device to a QFX3600-I Interconnect device (see [Figure 93 on page 394](#)):



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 uplink port of 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 QFX3600-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 137](#)
- [Configuring the Port Type on QFX3600 Node Devices on page 474](#)

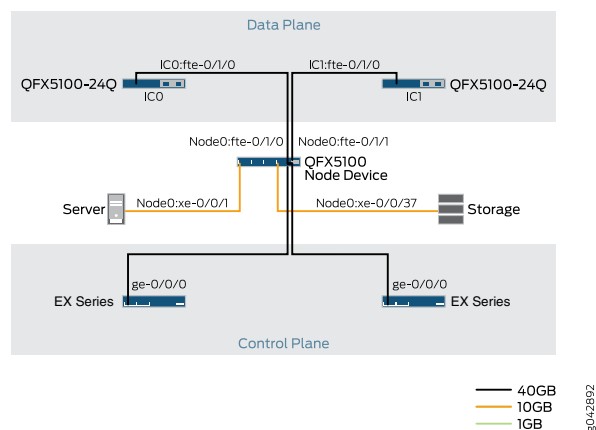
Connecting a QFX3600 Node Device to a QFX5100-24Q Interconnect Device

To form the data plane in a QFX3000-M QFabric system, you connect the QSFP+ uplink ports (labeled **Q0** through **Q7**) on the QFX3600 Node device to the QSFP+ ports (labeled **Q** through **23**) on the QFX5100-24Q Interconnect device (see [Figure 94 on page 396](#)).



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 474](#)).

Figure 94: QFX3600 Node Device Data Plane Connections to QFX5100-24Q for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX3600 Node device must be connected to each QFX5100-24Q Interconnect device. For example, if you have two QFX5100-24Q Interconnect devices, then at least one uplink port on each QFX3600 Node device must be connected to each QFX5100-24Q Interconnect device. If you are connecting all four uplink ports to two QFX5100-24Q Interconnect devices, we recommend connecting two uplink ports to each Interconnect device.

Before you begin to cable the QFX3000-M QFabric system data plane:

- Review [“Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 137](#) 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 137).

To connect a QFX3600 Node device to a QFX5100-24Q 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 uplink port of 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 QFX5100-24Q 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.

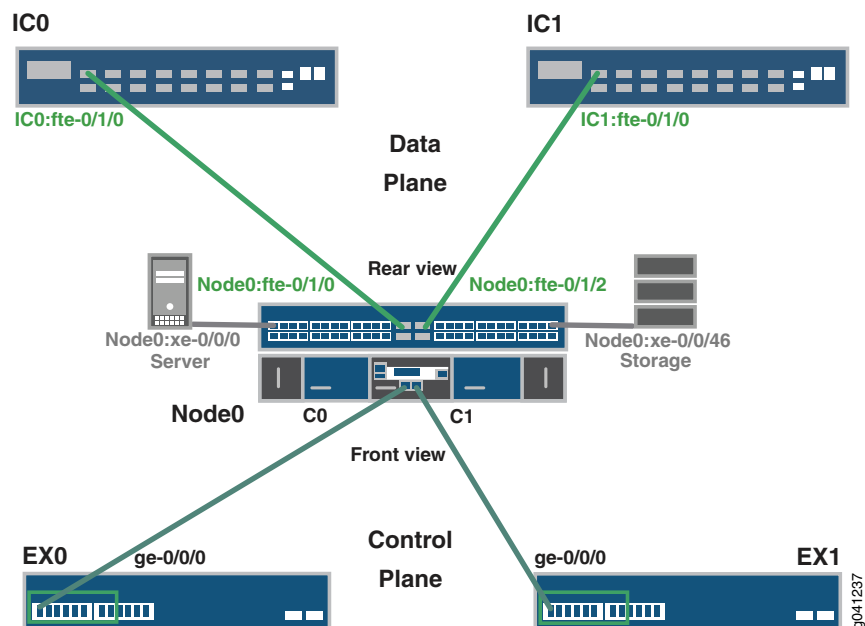
Related Documentation

- [Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 137](#)
- [Configuring the Port Type on QFX3600 Node Devices on page 474](#)

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

To form the data plane in a QFX3000-M QFabric system, you connect the QSFP+ uplink ports (labeled **Q0** through **Q3**) on the QFX3500 Node device to the QSFP+ ports (labeled **Q0** through **Q15**) on the QFX3600-I Interconnect device (see [Figure 95 on page 398](#)).

Figure 95: QFX3500 Node Device Data Plane Connections for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX3500 Node device must be connected to each QFX3600-I Interconnect device. For example, if you have two QFX3600-I Interconnect devices, then at least one uplink port on each QFX3500 Node device must be connected to each QFX3600-I Interconnect device. If you are connecting all four uplink ports to two QFX3600-I Interconnect devices, we recommend connecting two uplink ports to each Interconnect device.

Before you begin to cable the QFX3000-M QFabric data plane:

- Review [“Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series” on page 137](#) 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 137](#)).

To connect a QFX3500 Node device to a QFX3600 Interconnect device (see [Figure 95 on page 398](#)):



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 uplink port of 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 QFX3600-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. 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.

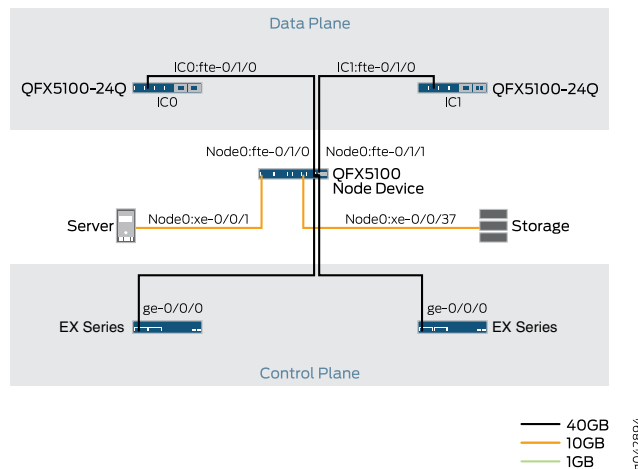
Related Documentation

- [Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 137](#)

Connecting a QFX3500 Node Device to an QFX5100-24Q Interconnect Device

To form the data plane in a QFX3000-M QFabric system, you connect the QSFP+ uplink ports (labeled **Q0** through **Q3**) on the QFX3500 Node device to the QSFP+ ports (labeled **Q** through **23**) on the QFX5100-24Q Interconnect device (see [Figure 95 on page 398](#)).

Figure 96: QFX3500 Node Device Data Plane Connections for QFX3000-M QFabric System



CAUTION: For redundancy, each QFX3500 Node device must be connected to each QFX5100-24Q Interconnect device. For example, if you have two QFX5100-24Q Interconnect devices, then at least one uplink port on each QFX3500 Node device must be connected to each QFX5100-24Q Interconnect device. If you are connecting all four uplink ports to two QFX5100-24Q Interconnect devices, we recommend connecting two uplink ports to each Interconnect device.

Before you begin to cable the QFX3000-M QFabric data plane:

- Review ["Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series" on page 137](#) 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 137](#)).

To connect a QFX3500 Node device to a QFX5100-24Q Interconnect device (see [Figure 95 on page 398](#)):



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 uplink port of 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 QFX5100-24Q 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. 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**

- [Interface Specifications for SFP, SFP+, and QSFP+ Transceivers for the QFX Series on page 137](#)

PART 3

Configuration

- [Initial Setup on page 405](#)
- [QFabric System Configuration on page 447](#)
- [QFabric System Licensing on page 491](#)
- [Configuration Statements on page 499](#)

Initial Setup

- [QFabric System Initial and Default Configuration Information on page 405](#)
- [Converting the Device Mode for a QFabric System Component on page 408](#)
- [Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane on page 414](#)
- [Importing a QFX3000-M QFabric System Control Plane EX Series Switch Configuration with a USB Flash Drive on page 439](#)
- [Generating the MAC Address Range for a QFabric System on page 440](#)
- [Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 441](#)

QFabric System Initial and Default Configuration Information

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 408](#))
- 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*.
- To set up a copper or fiber-based control plane cabling, topology, and configuration for the QFX3000-M QFabric system, see [“Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane” on page 414](#).
- 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 441](#)), 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 440](#) 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 451](#))
- 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 460](#))
- 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 470](#))
- Configuring a network Node group to connect the QFabric system to external networks (see [“Configuring Node Groups for the QFabric System” on page 470](#))

- Configuring the port type on QFX3600 Node devices (see [“Configuring the Port Type on QFX3600 Node Devices” on page 474](#))
- 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 491](#) and [“Adding New Licenses \(CLI Procedure\)” on page 493](#))

Related Documentation

- *QFX3000-G QFabric System Installation Overview*
- [QFX3000-M QFabric System Installation Overview on page 97](#)
- [Converting the Device Mode for a QFabric System Component on page 408](#)
- *Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane*
- *Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane on page 414*
- [Generating the MAC Address Range for a QFabric System on page 440](#)
- [Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 441](#)
- [Understanding QFabric System Administration Tasks and Utilities on page 447](#)
- [Gaining Access to the QFabric System Through the Default Partition on page 451](#)
- [Configuring Aliases for the QFabric System on page 460](#)
- [Configuring Node Groups for the QFabric System on page 470](#)
- [Configuring the Port Type on QFX3600 Node Devices on page 474](#)
- [Generating the License Keys for a QFabric System on page 491](#)
- [Adding New Licenses \(CLI Procedure\) on page 493](#)

Converting the Device Mode for a QFabric System Component

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 101 on page 408](#) shows the device modes available for various devices.

Table 101: Support for device mode options

Device mode	QFX3500	QFX3600	QFX5100
Interconnect device	N/A	Supported	Supported for QFX3000-M
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 569](#)
- [show chassis device-mode on page 601](#)
- *Software Installation Overview*
- *Connecting a QFX3500 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network*
- *Connecting a QFX3600 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network*
- *Connecting a QFX5100 Node Device to a Copper-Based QFX3000-G QFabric System Control Plane Network*
- *Connecting a QFX3500 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network*
- *Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network*
- *Connecting a QFX5100 Node Device to a Fiber-Based QFX3000-G QFabric System Control Plane Network*
- *Connecting a QFX3500 Node Device to a QFX3008-I Interconnect Device*
- *Connecting a QFX3600 Node Device to a QFX3008-I Interconnect Device*
- *Connecting a QFX5100 Node Device to a QFX3008-I Interconnect Device*
- [Connecting a QFX3500 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 357](#)
- [Connecting a QFX3600 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 354](#)
- [Connecting a QFX5100 Node Device to a Copper-Based QFX3000-M QFabric System Control Plane Network on page 351](#)
- [Connecting a QFX3500 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 381](#)
- [Connecting a QFX3600 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 385](#)
- [Connecting a QFX5100 Node Device to a Fiber-Based QFX3000-M QFabric System Control Plane Network on page 377](#)
- [Connecting a QFX3500 Node Device to a QFX3600-I Interconnect Device on page 397](#)
- [Connecting a QFX3600 Node Device to a QFX3600-I Interconnect Device on page 393](#)
- [Connecting a QFX5100 Node Device to a QFX3600-I Interconnect Device on page 389](#)

Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane

This example shows you how to connect QFabric system components and configure EX4200 switches used for the QFX3000-M QFabric system control plane network. Proper wiring of Director devices, Interconnect devices, and Node devices to the EX Series 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.



NOTE: EX4200 or EX4300 switch configuration is the same for both the copper-based and fiber-based QFX3000-M QFabric system control plane networks. Hence, a separate example for configuring EX4300 switches or the fiber-based control plane network is not provided.

However, because you cannot mix and match fiber and copper in the same control plane network, you must select only one type of control plane for each QFX3000-M QFabric system you install. The primary focus of this example is a copper-based control plane network with EX4200-24T switches. Before you use this example to configure a fiber-based control plane network with EX4200 switches, ensure that you have installed and wired the QFabric system hardware and EX4200 switches as required for a fiber-based control plane network (see [“QFX3000-M QFabric System Installation Overview” on page 97](#)). Before you use this example to configure a copper or fiber-based control plane network with EX4300 switches, ensure that you have installed and wired the QFabric system hardware and EX4300 switches as required in *Installing and Connecting an EX4300 Switch*.

- [Requirements on page 414](#)
- [Overview on page 415](#)
- [Configuration on page 423](#)
- [Verification on page 435](#)

Requirements

This example uses the following hardware and software components:

- One QFX3000-M QFabric system containing:
 - Two QFX3100 Director devices with 1000BASE-T network modules installed
 - Two QFX3600-I Interconnect devices
 - Eight QFX3500 Node devices with a 1000BASE-T management board installed
- Two EX4200-24T switches with SFP+ uplink module installed



NOTE: Instead of two EX4200-24T switches, you can use two EX4300-48T switches for a copper-based control plane network. For a fiber-based control plane network, you can use two EX4200-24F switches or two EX4300-48P switches.

- Junos OS Release 13.2X52-D10 for the QFabric system components
- Junos OS Release 12.3R6.6 for the EX Series switches

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 269](#), [“Installing and Connecting a QFX3600 or QFX3600-I Device” on page 281](#), and [“Installing and Connecting a QFX3500 Device” on page 299](#).
- Rack, mount, and install your control plane EX Series switches. For more information, see *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.

Overview

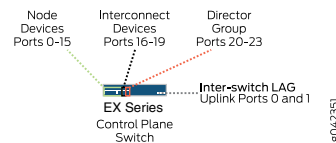
The QFX3000-M QFabric system control plane network connects the Director group, Interconnect devices, and Node devices in a QFabric system across a pair of redundant EX Series switches. By separating the management control plane from the data plane, the QFabric system can scale efficiently. The copper-based control plane network uses Gigabit Ethernet cabling and connections between components, and two 1-Gigabit Ethernet connections configured in a link aggregation group (LAG) between the redundant EX Series switches.

Specific ports have been reserved on the EX Series switches 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 EX Series switch configuration included as part of this example. The standard configuration can scale from the 8 Node devices shown in this example to a maximum of 16 Node devices.

Topology

[Figure 97 on page 416](#) shows the general port ranges where QFabric system devices must be connected to the EX Series switches. For each EX Series switch, connect ports **0** through **15** to Node devices, ports **16** through **19** to Interconnect devices, ports **20** through **23** to Director devices, and uplink ports **0** and **1** to the other control plane switch as an inter-switch LAG. [Table 102 on page 416](#) shows the details of the QFabric system component-to-EX Series switch port mappings.

Figure 97: QFX3000-M QFabric System Control Plane—EX Series Switch 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, 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 EX Series switches in a QFX3000-M QFabric system.

Table 102 on page 416 shows the specific mappings of QFabric system control plane network ports from the QFabric system components to the EX Series switches.



NOTE: The uplink ports 2 and 3 on the EX Series switches are reserved for future use.

Table 102: QFX3000-M QFabric System Copper-Based Control Plane—QFabric Component-to-EX Series Switch Port Mappings

EX Series Switch 1 (EX0)	EX Series Switch 2 (EX1)	QFabric System Component
Node0, management port C0 to port 0 (ge-0/0/0)	Node0, management port C1 to port 0 (ge-0/0/0)	Node device 0
Node1, management port C0 to port 1 (ge-0/0/1)	Node1, management port C1 to port 1 (ge-0/0/1)	Node device 1
Node2, management port C0 to port 2 (ge-0/0/2)	Node2, management port C1 to port 2 (ge-0/0/2)	Node device 2
Node3, management port C0 to port 3 (ge-0/0/3)	Node3, management port C1 to port 3 (ge-0/0/3)	Node device 3
Node4, management port C0 to port 4 (ge-0/0/4)	Node4, management port C1 to port 4 (ge-0/0/4)	Node device 4

Table 102: QFX3000-M QFabric System Copper-Based Control Plane—QFabric Component-to-EX Series Switch Port Mappings (*continued*)

EX Series Switch 1 (EX0)	EX Series Switch 2 (EX1)	QFabric System Component
Node5, management port C0 to port 5 (ge-0/0/5)	Node5, management port C1 to port 5 (ge-0/0/5)	Node device 5
Node6, management port C0 to port 6 (ge-0/0/6)	Node6, management port C1 to port 6 (ge-0/0/6)	Node device 6
Node7, management port C0 to port 7 (ge-0/0/7)	Node7, management port C1 to port 7 (ge-0/0/7)	Node device 7
Node8, management port C0 to port 8 (ge-0/0/8)	Node8, management port C1 to port 8 (ge-0/0/8)	Node device 8
Node9, management port C0 to port 9 (ge-0/0/9)	Node9, management port C1 to port 9 (ge-0/0/9)	Node device 9
Node10, management port C0 to port 10 (ge-0/0/10)	Node10, management port C1 to port 10 (ge-0/0/10)	Node device 10
Node11, management port C0 to port 11 (ge-0/0/11)	Node11, management port C1 to port 11 (ge-0/0/11)	Node device 11
Node12, management port C0 to port 12 (ge-0/0/12)	Node12, management port C1 to port 12 (ge-0/0/12)	Node device 12
Node13, management port C0 to port 13 (ge-0/0/13)	Node13, management port C1 to port 13 (ge-0/0/13)	Node device 13
Node14, management port C0 to port 14 (ge-0/0/14)	Node14, management port C1 to port 14 (ge-0/0/14)	Node device 14
Node15, management port C0 to port 15 (ge-0/0/15)	Node15, management port C1 to port 15 (ge-0/0/15)	Node device 15
IC0, management port C0 to port 16 (ge-0/0/16)	IC0, management port C1 to port 16 (ge-0/0/16)	Interconnect device 0
IC1, management port C0 to port 17 (ge-0/0/17)	IC1, management port C1 to port 17 (ge-0/0/17)	Interconnect device 1
IC2, management port C0 to port 18 (ge-0/0/18)	IC2, management port C1 to port 18 (ge-0/0/18)	Interconnect device 2
IC3, management port C0 to port 19 (ge-0/0/19)	IC3, management port C1 to port 19 (ge-0/0/19)	Interconnect device 3
DG0 module 0, port 0 to port 20 (ge-0/0/20)	DG0 module 1, port 0 to port 20 (ge-0/0/20)	Director device 0

Table 102: QFX3000-M QFabric System Copper-Based Control Plane—QFabric Component-to-EX Series Switch Port Mappings (*continued*)

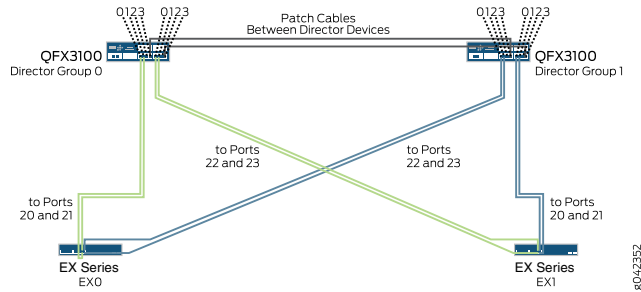
EX Series Switch 1 (EX0)	EX Series Switch 2 (EX1)	QFabric System Component
DG0 module 0, port 1 to port 21 (ge-0/0/21)	DG0 module 1, port 1 to port 21 (ge-0/0/21)	Director device 0
DG1 module 0, port 0 to port 22 (ge-0/0/22)	DG1 module 1, port 0 to port 22 (ge-0/0/22)	Director device 1
DG1 module 0, port 1 to port 23 (ge-0/0/23)	DG1 module 1, port 1 to port 23 (ge-0/0/23)	Director device 1
EX0, uplink port 0 to EX1, uplink port 0 (ge-0/1/0)	EX1, uplink port 0 to EX0, uplink port 0 (ge-0/1/0)	Inter-EX Series switch LAG
EX0, uplink port 1 to EX1, uplink port 1 (ge-0/1/1)	EX1, uplink port 1 to EX0, uplink port 1 (ge-0/1/1)	Inter-EX Series switch LAG
Reserved Uplink port 2 (ge-0/1/2)	Reserved Uplink port 2 (ge-0/1/2)	Future use
Reserved Uplink port 3 (ge-0/1/3)	Reserved Uplink port 3 (ge-0/1/3)	Future use

Next, connect the Director devices to the EX Series switches. In general, you want to accomplish the following:

- Connect two ports from one network module in a Director device to the first EX Series switch, and two ports from the second network module to the second EX Series switch.
- 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 98 on page 419](#) shows the specific ports on the Director group that you must connect to the EX Series switches and interconnect between the Director devices.

Figure 98: QFX3000-M QFabric System Control Plane—Director Group to EX Series Switch Connections



In this specific example, connect ports **0** and **1** from module **0** on Director device DG0 to ports **20** and **21** on EX Series switch EX0 (ge-0/0/20 and ge-0/0/21), and connect ports **0** and **1** from module **1** to ports **20** and **21** on the *second* EX Series switch EX1 (ge-0/0/20 and ge-0/0/21).

For Director device DG1, connect ports **0** and **1** from module **0** to ports **22** and **23** on EX Series switch EX0 (ge-0/0/22 and ge-0/0/23), and connect ports **0** and **1** from module **1** to ports **22** and **23** on the *second* EX Series switch EX1 (ge-0/0/22 and ge-0/0/23).

To form the Director group, connect port **3** on module **0** on Director device DG0 to port **3** on module **0** on Director device DG1. Similarly, connect port **3** on module **1** on Director device DG0 to port **3** on module **1** on Director device DG1. [Table 103 on page 419](#) shows the port mappings for the Director group in this example.

Table 103: Director Group Port Mappings

Director Device	EX Series Switch EX0	EX Series Switch EX1
DG0	<ul style="list-style-type: none"> DG0 module 0, port 0 to port 20 on EX0 (ge-0/0/20) DG0 module 0, port 1 to port 21 on EX0 (ge-0/0/21) DG0 module 0, port 3 to module 0, port 3 on DG1 	<ul style="list-style-type: none"> DG0 module 1, port 0 to port 20 on EX1 (ge-0/0/20) DG0 module 1, port 1 to port 21 on EX1 (ge-0/0/21) DG0 module 1, port 3 to module 1, port 3 on DG1
DG1	<ul style="list-style-type: none"> DG1 module 0, port 0 to port 22 on EX0 (ge-0/0/22) DG1 module 0, port 1 to port 23 on EX0 (ge-0/0/23) DG1 module 0, port 3 to module 0, port 3 on DG0 	<ul style="list-style-type: none"> DG1 module 1, port 0 to port 22 on EX1 (ge-0/0/22) DG1 module 1, port 1 to port 23 on EX1 (ge-0/0/23) DG1 module 1, port 3 to module 1, port 3 on DG0

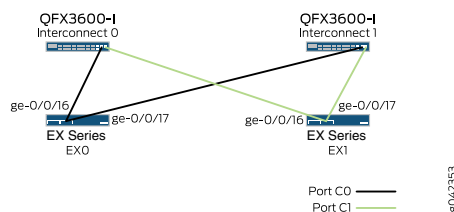
In the software, the ports of each network module on a Director device are reversed, numbered from right to left, and incremented sequentially across modules. If you issue interface operational commands directly on the Director device, note the following port mappings as shown in [Table 104 on page 420](#):

Table 104: 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 99 on page 420 shows the specific ports on the QFX3600-I Interconnect devices that you must connect to the EX Series switches. In general, connect the first management port in an Interconnect device to the first EX Series switch, and the second management port to the second EX Series switch.

Figure 99: QFX3000-M QFabric System Control Plane—Interconnect Device to EX Series Switch Connections



In this specific example, for both Interconnect devices IC0 and IC1, connect management port **C0** to EX Series switches EX0 and EX1 and management port **C1** to EX Series switches EX0 and EX1. Connect the management port **C0** cables to port 16 on EX Series switches EX0 and EX1 (ge-0/0/16), and connect the management port **C1** cables to port 17 on EX Series switches EX0 and EX1 (ge-0/0/17). Table 105 on page 420 shows the port mappings for the Node devices in this example.

Table 105: Interconnect Device Port Mappings

Interconnect Device	EX Series Switch EX0	EX Series Switch EX1
IC0	IC0, management port C0 to port 16 (ge-0/0/16)	IC0, management port C1 to port 16 (ge-0/0/16)
IC1	IC1, management port C0 to port 17 (ge-0/0/17)	IC1, management port C1 to port 17 (ge-0/0/17)

Figure 100 on page 421, Figure 101 on page 421, and Figure 102 on page 421 show the specific ports on the Node devices that you must connect to the EX Series switches when using a copper-based control plane. In general, connect the first management port from a Node device to the first EX Series switch, and the second management port to the second EX Series switch.

Figure 100: QFX3000-M QFabric System Control Plane—QFX3500 Node Device to EX Series Switch Connections

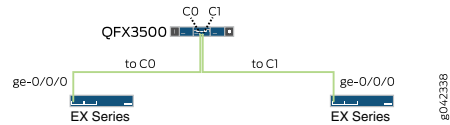


Figure 101: QFX3000-M QFabric System Control Plane—QFX3600 Node Device to EX Series Switch Connections

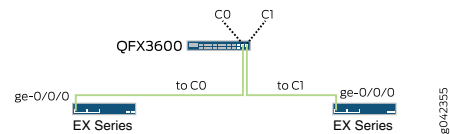
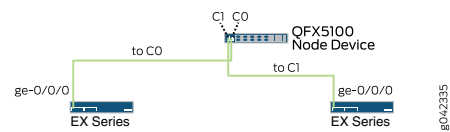


Figure 102: QFX3000-M QFabric System Control Plane—QFX5100 Node Device to EX Series Switch Connections



When implementing a fiber-based control plane, refer to [Figure 103 on page 421](#), [Figure 104 on page 421](#), and [Figure 105 on page 421](#) for the proper control plane connections.

Figure 103: QFX3000-M QFabric System Fiber-Based Control Plane—QFX3500 Node Device to EX Series Switch Connections

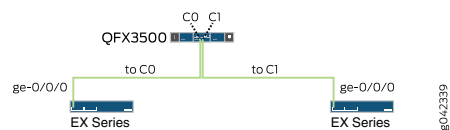


Figure 104: QFX3000-M QFabric System Fiber-Based Control Plane—QFX3600 Node Device to EX Series Switch Connections

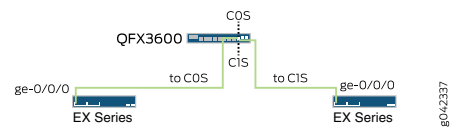
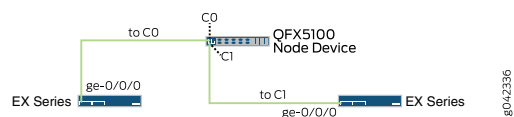


Figure 105: QFX3000-M QFabric System Fiber-Based Control Plane—QFX5100 Node Device to EX Series Switch Connections



In this specific example, for Node device Node0, connect management port **C0** (also known as me5) to EX Series switch EX0 port **0** (ge-0/0/0), and connect management port **C1** (also known as me6) to the *second* EX Series switch EX1 port **0** (ge-0/0/0).

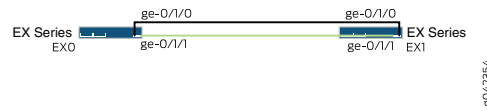
For the remaining seven Node devices, connect management port **C0** to the *ge-0/0/X* port on EX Series switch EX0 that matches the Node device number. Similarly, connect management port **C1** to the port on the *second* EX Series switch EX1 that matches the Node device number. For example, you would connect Node device Node5 to port **5** (ge-0/0/5). [Table 106 on page 422](#) shows the full set of port mappings for the Node devices in this example.

Table 106: Node Device to EX Series Switch Port Mappings

Node Device	EX Series Switch EX0	EX Series Switch EX1
Node0	Node0, management port C0 to port 0 (ge-0/0/0)	Node0, management port C1 to port 0 (ge-0/0/0)
Node1	Node1, management port C0 to port 1 (ge-0/0/1)	Node1, management port C1 to port 1 (ge-0/0/1)
Node2	Node2, management port C0 to port 2 (ge-0/0/2)	Node2, management port C1 to port 2 (ge-0/0/2)
Node3	Node3, management port C0 to port 3 (ge-0/0/3)	Node3, management port C1 to port 3 (ge-0/0/3)
Node4	Node4, management port C0 to port 4 (ge-0/0/4)	Node4, management port C1 to port 4 (ge-0/0/4)
Node5	Node5, management port C0 to port 5 (ge-0/0/5)	Node5, management port C1 to port 5 (ge-0/0/5)
Node6	Node6, management port C0 to port 6 (ge-0/0/6)	Node6, management port C1 to port 6 (ge-0/0/6)
Node7	Node7, management port C0 to port 7 (ge-0/0/7)	Node7, management port C1 to port 7 (ge-0/0/7)

[Figure 106 on page 423](#) shows the specific uplink ports on the first EX Series switch that you must connect to the second EX Series switch. These connections create a link aggregation group (LAG) that provides redundancy and resiliency for the EX Series switch portion of the control plane. In general, connect each 1-Gigabit Ethernet uplink port from the first EX Series switch to the corresponding 1-Gigabit Ethernet uplink port on the second EX Series switch.

Figure 106: QFX3000-M QFabric System Control Plane—Inter-EX Series Switch LAG Connections



In this specific example, for EX Series switch EX0, connect uplink port 0 (ge-0/1/0) to EX Series switch EX1 uplink port 0 (ge-0/1/0). Then connect uplink port 1 (ge-0/1/1) on EX Series switch EX0 to uplink port 1 (ge-0/1/1) on EX Series switch EX1.

Table 107 on page 423 shows the port mappings for the EX Series switch LAG connections in this example.

Table 107: EX Series Switch LAG Port Mappings

EX0 and EX1	EX0	EX1
Uplink port 0	ge-0/1/0 to ge-0/1/0	ge-0/1/0 to ge-0/1/0
Uplink port 1	ge-0/1/1 to ge-0/1/1	ge-0/1/1 to ge-0/1/1

Configuration

- [xref target has no title]

CLI Quick Configuration

To configure the QFX3000-M QFabric system control plane EX Series switches quickly, copy the following commands, paste them in a text file, remove any line breaks, change any details necessary to match your network, and then copy and paste the commands into the EX Series switch CLI at the [edit] hierarchy level.

```

set groups qfabric chassis aggregated-devices ethernet device-count 3
set groups qfabric chassis alarm management-ethernet link-down ignore
set groups qfabric chassis lcd-menu fpc 0 menu-item maintenance-menu disable
set groups qfabric protocols rstp interface ae2.0 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 bpdv-block-on-edge
set groups qfabric protocols lldp interface all
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 chassis fpc 0 pic 1 sfpplus pic-mode 1g
set interfaces interface-range Node_Device_Interfaces member "ge-0/0/[0-15]"
set interfaces interface-range Node_Device_Interfaces description "QFabric Node Device"

```



```
set interfaces interface-range Node_Device_Interfaces mtu 9216
set interfaces interface-range Node_Device_Interfaces unit 0 family ethernet-switching
  port-mode access
set interfaces interface-range Node_Device_Interfaces unit 0 family ethernet-switching
  vlan members qfabric
set interfaces interface-range Interconnect_Device_Interfaces member "ge-0/0/[16-17]"
set interfaces interface-range Interconnect_Device_Interfaces description "QFabric
  Interconnect Device"
set interfaces interface-range Interconnect_Device_Interfaces mtu 9216
set interfaces interface-range Interconnect_Device_Interfaces unit 0 family
  ethernet-switching port-mode access
set interfaces interface-range Interconnect_Device_Interfaces unit 0 family
  ethernet-switching vlan members qfabric
set interfaces interface-range Director_Device_DG0_LAG_Interfaces member
  "ge-0/0/[20-21]"
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 speed
  1g
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-0/0/[22-23]"
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 speed
  1g
set interfaces interface-range Director_Device_DG1_LAG_Interfaces ether-options 802.3ad
  ae1
set interfaces interface-range Control_Plane_Inter_LAG_Interfaces member "ge-0/1/[0-1]"
set interfaces interface-range Control_Plane_Inter_LAG_Interfaces description "QFabric
  Control Plane (Inter - Switch LAG)"
set interfaces interface-range Control_Plane_Inter_LAG_Interfaces ether-options 802.3ad
  ae2
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 description "QFabric Control Plane (Inter-Switch LAG)"
set interfaces ae2 mtu 9216
set interfaces ae2 aggregated-ether-options link-speed 1g
set interfaces ae2 aggregated-ether-options lacp active
set interfaces ae2 unit 0 family ethernet-switching vlan members qfabric
set class-of-service classifiers ieee-802.1 onep_qfabric_classifier forwarding-class class_3
  loss-priority low code-points 110
set class-of-service classifiers ieee-802.1 onep_qfabric_classifier forwarding-class class_3
  loss-priority low code-points 111
set class-of-service classifiers ieee-802.1 onep_qfabric_classifier forwarding-class class_2
  loss-priority low code-points 100
set class-of-service classifiers ieee-802.1 onep_qfabric_classifier forwarding-class class_2
  loss-priority high code-points 101
set class-of-service classifiers ieee-802.1 onep_qfabric_classifier forwarding-class class_0
  loss-priority low code-points 010
```



```

set class-of-service classifiers ieee-802.1 onep_qfabric_classifier forwarding-class class_0
  loss-priority high code-points 001
set class-of-service classifiers inet-precedence IP_qfabric_classifier forwarding-class
  class_3 loss-priority low code-points 110
set class-of-service classifiers inet-precedence IP_qfabric_classifier forwarding-class
  class_3 loss-priority low code-points 111
set class-of-service classifiers inet-precedence IP_qfabric_classifier forwarding-class
  class_2 loss-priority low code-points 100
set class-of-service classifiers inet-precedence IP_qfabric_classifier forwarding-class
  class_2 loss-priority high code-points 101
set class-of-service classifiers inet-precedence IP_qfabric_classifier forwarding-class
  class_0 loss-priority low code-points 010
set class-of-service classifiers inet-precedence IP_qfabric_classifier forwarding-class
  class_0 loss-priority high code-points 001
set class-of-service forwarding-classes class class_3 queue-num 7
set class-of-service forwarding-classes class class_2 queue-num 2
set class-of-service forwarding-classes class class_0 queue-num 0
set class-of-service interfaces ge-*/0/* scheduler-map cpe_network_smap
set class-of-service interfaces ge-*/0/* unit 0 classifiers ieee-802.1 onep_qfabric_classifier
set class-of-service interfaces ge-*/0/* unit 0 classifiers inet-precedence
  IP_qfabric_classifier
set class-of-service interfaces ae* scheduler-map cpe_network_smap
set class-of-service interfaces ae* unit 0 classifiers ieee-802.1 onep_qfabric_classifier
set class-of-service interfaces ae* unit 0 classifiers inet-precedence IP_qfabric_classifier
set class-of-service scheduler-maps cpe_network_smap forwarding-class class_3
  scheduler scheduler_3
set class-of-service scheduler-maps cpe_network_smap forwarding-class class_2
  scheduler scheduler_2
set class-of-service scheduler-maps cpe_network_smap forwarding-class class_0
  scheduler scheduler_0
set class-of-service schedulers scheduler_3 buffer-size percent 30
set class-of-service schedulers scheduler_3 priority strict-high
set class-of-service schedulers scheduler_2 transmit-rate percent 75
set class-of-service schedulers scheduler_2 buffer-size percent 30
set class-of-service schedulers scheduler_2 priority low
set class-of-service schedulers scheduler_0 transmit-rate percent 25
set class-of-service schedulers scheduler_0 buffer-size percent 40
set class-of-service schedulers scheduler_0 priority low
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 me0 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

```


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 an EX Series switch for the QFX3000-M QFabric system control plane network:

1. Create a configuration group called `qfabric` to define global QFabric system control plane properties. Set up the number of aggregated Ethernet devices, configure alarm and LCD management, activate loop prevention and storm control, specify a global VLAN (VLAN 100) and 802.1q tunneling, define options for aggregated Ethernet interfaces, and apply the `qfabric` group settings to the configuration.

```
[edit]
user@switch# set groups qfabric chassis aggregated-devices ethernet device-count
3
user@switch# set groups qfabric chassis alarm management-ethernet link-down
ignore
user@switch# set groups qfabric chassis lcd-menu fpc 0 menu-item
maintenance-menu disable
user@switch# set groups qfabric protocols rstp interface ae2.0 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 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. Enable the EX Series switch SFP+ uplink module for 1-Gigabit Ethernet operation. Set the interface ranges where Node devices (0 through 15), Interconnect devices (16 and 17), and Director devices (20 through 23) connect to the control plane network through the EX Series switches. Configure the inter-EX Series switch LAG connections for the `ae2` interface and apply the `qfabric-int` and `qfabric-ae` configuration groups to the aggregated Ethernet interfaces (`ae0` and `ae1`) for the Director devices.

```
[edit]
user@switch# set chassis fpc 0 pic 1 sfpplus pic-mode 1g
user@switch# set interfaces interface-range Node_Device_Interfaces member
"ge-0/0/[0-15]"
user@switch# set interfaces interface-range Node_Device_Interfaces description
"QFabric Node Device"
user@switch# set interfaces interface-range Node_Device_Interfaces mtu 9216
```



```

user@switch# set interfaces interface-range Node_Device_Interfaces unit 0 family
ethernet-switching port-mode access
user@switch# set interfaces interface-range Node_Device_Interfaces unit 0 family
ethernet-switching vlan members qfabric
user@switch# set interfaces interface-range Interconnect_Device_Interfaces member
"ge-0/0/[16-17]"
user@switch# set interfaces interface-range Interconnect_Device_Interfaces
description "QFabric Interconnect Device"
user@switch# set interfaces interface-range Interconnect_Device_Interfaces mtu
9216
user@switch# set interfaces interface-range Interconnect_Device_Interfaces unit
0 family ethernet-switching port-mode access
user@switch# set interfaces interface-range Interconnect_Device_Interfaces unit
0 family ethernet-switching vlan members qfabric
user@switch# set interfaces interface-range Director_Device_DG0_LAG_Interfaces
member "ge-0/0/[20-21]"
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 speed 1g
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-0/0/[22-23]"
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 speed 1g
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_LAG_Interfaces
member "ge-0/1/[0-1]"
user@switch# set interfaces interface-range Control_Plane_Inter_LAG_Interfaces
description "QFabric Control Plane (Inter - Switch LAG)"
user@switch# set interfaces interface-range Control_Plane_Inter_LAG_Interfaces
ether-options 802.3ad ae2
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 description "QFabric Control Plane (Inter-Switch
LAG)"
user@switch# set interfaces ae2 mtu 9216
user@switch# set interfaces ae2 aggregated-ether-options link-speed 1g
user@switch# set interfaces ae2 aggregated-ether-options lacp active
user@switch# set interfaces ae2 unit 0 family ethernet-switching vlan members
qfabric

```

3. 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.

[edit]


```
user@switch# set class-of-service classifiers ieee-802.1 onep_qfabric_classifier
forwarding-class class_3 loss-priority low code-points 110
user@switch# set class-of-service classifiers ieee-802.1 onep_qfabric_classifier
forwarding-class class_3 loss-priority low code-points 111
user@switch# set class-of-service classifiers ieee-802.1 onep_qfabric_classifier
forwarding-class class_2 loss-priority low code-points 100
user@switch# set class-of-service classifiers ieee-802.1 onep_qfabric_classifier
forwarding-class class_2 loss-priority high code-points 101
user@switch# set class-of-service classifiers ieee-802.1 onep_qfabric_classifier
forwarding-class class_0 loss-priority low code-points 010
user@switch# set class-of-service classifiers ieee-802.1 onep_qfabric_classifier
forwarding-class class_0 loss-priority high code-points 001
user@switch# set class-of-service classifiers inet-precedence IP_qfabric_classifier
forwarding-class class_3 loss-priority low code-points 110
user@switch# set class-of-service classifiers inet-precedence IP_qfabric_classifier
forwarding-class class_3 loss-priority low code-points 111
user@switch# set class-of-service classifiers inet-precedence IP_qfabric_classifier
forwarding-class class_2 loss-priority low code-points 100
user@switch# set class-of-service classifiers inet-precedence IP_qfabric_classifier
forwarding-class class_2 loss-priority high code-points 101
user@switch# set class-of-service classifiers inet-precedence IP_qfabric_classifier
forwarding-class class_0 loss-priority low code-points 010
user@switch# set class-of-service classifiers inet-precedence IP_qfabric_classifier
forwarding-class class_0 loss-priority high code-points 001
user@switch# set class-of-service forwarding-classes class class_3 queue-num 7
user@switch# set class-of-service forwarding-classes class class_2 queue-num 2
user@switch# set class-of-service forwarding-classes class class_0 queue-num 0
user@switch# set class-of-service interfaces ge-*/0/* scheduler-map
cpe_network_smap
user@switch# set class-of-service interfaces ge-*/0/* unit 0 classifiers ieee-802.1
onep_qfabric_classifier
user@switch# set class-of-service interfaces ge-*/0/* unit 0 classifiers
inet-precedence IP_qfabric_classifier
user@switch# set class-of-service interfaces ae* scheduler-map cpe_network_smap
user@switch# set class-of-service interfaces ae* unit 0 classifiers ieee-802.1
onep_qfabric_classifier
user@switch# set class-of-service interfaces ae* unit 0 classifiers inet-precedence
IP_qfabric_classifier
user@switch# set class-of-service scheduler-maps cpe_network_smap
forwarding-class class_3 scheduler scheduler_3
user@switch# set class-of-service scheduler-maps cpe_network_smap
forwarding-class class_2 scheduler scheduler_2
user@switch# set class-of-service scheduler-maps cpe_network_smap
forwarding-class class_0 scheduler scheduler_0
user@switch# set class-of-service schedulers scheduler_3 buffer-size percent 30
user@switch# set class-of-service schedulers scheduler_3 priority strict-high
user@switch# set class-of-service schedulers scheduler_2 transmit-rate percent
75
user@switch# set class-of-service schedulers scheduler_2 buffer-size percent 30
user@switch# set class-of-service schedulers scheduler_2 priority low
user@switch# set class-of-service schedulers scheduler_0 transmit-rate percent
25
user@switch# set class-of-service schedulers scheduler_0 buffer-size percent 40
user@switch# set class-of-service schedulers scheduler_0 priority low
```


4. Configure settings to enable the EX Series switches to interoperate with your management network. Set a hostname, system services (such as Telnet), system log thresholds, management interface parameters, default routes, 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 me0 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
```

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 EX Series switches in your QFabric system control plane network.

```
[edit]
groups {
  qfabric {
    chassis {
      aggregated-devices {
        ethernet {
          device-count 3;
        }
      }
      alarm {
        management-ethernet {
          link-down ignore;
        }
      }
      lcd-menu {
        fpc 0 {
          maintenance-menu disable;
        }
      }
    }
  }
}
protocols {
  rstp {
    interface ae2.0 {
```



```
        mode point-to-point;
    }
    interface all {
        edge;
        no-root-port;
    }
    bpdu-block-on-edge;
}
lldp {
    interface all;
}
}
ethernet-switching-options {
    storm-control {
        interface all {
            bandwidth 10000;
        }
    }
}
vllans {
    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];
chassis {
```



```

fpc 0 {
  pic 1 {
    sfpplus {
      pic-mode 10g;
    }
  }
}
}
interfaces {
  interface-range Node_Device_Interfaces {
    member "ge-0/0/[0-15]";
    description "QFabric Node Device";
    mtu 9216;
    unit 0 {
      family ethernet-switching {
        port-mode access;
        vlan {
          members qfabric;
        }
      }
    }
  }
  interface-range Interconnect_Device_Interfaces {
    member "ge-0/0/[16-17]";
    description "QFabric Interconnect Device";
    mtu 9216;
    unit 0 {
      family ethernet-switching {
        port-mode access;
        vlan {
          members qfabric;
        }
      }
    }
  }
  interface-range Director_Device_DG0_LAG_Interfaces {
    member "ge-0/0/[20-21]";
    description "QFabric Director Device - DG0";
    ether-options {
      speed {
        1g;
      }
      802.3ad ae0;
    }
  }
  interface-range Director_Device_DG1_LAG_Interfaces {
    member "ge-0/0/[22-23]";
    description "QFabric Director Device - DG1";
    ether-options {
      speed {
        1g;
      }
      802.3ad ae1;
    }
  }
  interface-range Control_Plane_Inter_LAG_Interfaces {

```



```
member "ge-0/1/[0-1]";
description "QFabric Control Plane (Inter-Switch LAG)";
ether-options {
    802.3ad ae2;
}
}
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 {
    description "QFabric Control Plane (Inter-Switch LAG)";
    mtu 9216;
    aggregated-ether-options {
        link-speed 1g;
        lacp {
            active;
        }
    }
    unit 0 {
        family ethernet-switching {
            vlan {
                members qfabric;
            }
        }
    }
}
}
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;
    }
}
}
}

```


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 {
  me0 {
    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;
  }
}
```


To verify the syntax of your configuration prior to committing it, enter **commit check** from configuration mode. If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the EX Series switch configuration is working properly.

- [Verifying the QFX3000-M QFabric System Control Plane—EX Series Switch EX0 on page 435](#)
- [Verifying the QFX3000-M QFabric System Control Plane—EX Series Switch EX1 on page 436](#)

Verifying the QFX3000-M QFabric System Control Plane—EX Series Switch EX0

Purpose Verify that the control plane is properly connected on your first EX Series switch.

Action Connect to the Junos OS CLI of EX Series switch EX0, either from your management network or from the console port of the switch. In operational mode, enter the **show interfaces terse** command.

Sample Output

```
user@ex0> 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	up			
ge-0/0/16.0	up	up	eth-switch		
ge-0/0/17	up	up			
ge-0/0/17.0	up	up	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	up			
ge-0/0/20.0	up	up	aenet	-->	ae0.0
ge-0/0/21	up	up			
ge-0/0/21.0	up	up	aenet	-->	ae0.0
ge-0/0/22	up	up			
ge-0/0/22.0	up	up	aenet	-->	ae1.0
ge-0/0/23	up	up			
ge-0/0/23.0	up	up	aenet	-->	ae1.0
ge-0/1/0	up	up			
ge-0/1/0.0	up	up	aenet	-->	ae2.0
ge-0/1/1	up	up			
ge-0/1/1.0	up	up	aenet	-->	ae2.0
vcp-0	up	down			
vcp-0.32768	up	down			
vcp-1	up	down			
vcp-1.32768	up	down			
ae0	up	up			
ae0.0	up	up	eth-switch		
ae1	up	up			
ae1.0	up	up	eth-switch		
ae2	up	up			
ae2.0	up	up	eth-switch		
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	
dsc	up	up			
gre	up	up			
ipip	up	up			
lo0	up	up			
lo0.0	up	up	inet	127.0.0.1	--> 0/0
lsi	up	up			
me0	up	up			
me0.0	up	up	inet	192.168.157.26/24	
mtun	up	up			
pimd	up	up			
pime	up	up			
tap	up	up			
vlan	up	up			
vme	up	down			

Meaning 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-0/0/16 and ge-0/0/17 for the Interconnect devices; ge-0/0/20 through ge-0/0/23 for the Director devices; ge-0/0/0 through ge-0/0/7 for the Node devices; and ge-0/1/0 and ge-0/1/1 for the inter-EX Series switch connections), the control plane is properly connected.

Verifying the QFX3000-M QFabric System Control Plane—EX Series Switch EX1

Purpose Verify that the control plane is properly connected on your second EX Series switch.

Action Connect to the Junos OS CLI of EX Series switch EX1, either from your management network or from the console port of the switch. In operational mode, enter the **show interfaces terse** command.

Sample Output

```
user@ex1> 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	up			
ge-0/0/16.0	up	up	eth-switch		
ge-0/0/17	up	up			
ge-0/0/17.0	up	up	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	up			
ge-0/0/20.0	up	up	aenet	--> ae0.0	
ge-0/0/21	up	up			
ge-0/0/21.0	up	up	aenet	--> ae0.0	
ge-0/0/22	up	up			
ge-0/0/22.0	up	up	aenet	--> ae1.0	
ge-0/0/23	up	up			
ge-0/0/23.0	up	up	aenet	--> ae1.0	
ge-0/1/0	up	up			
ge-0/1/0.0	up	up	aenet	--> ae2.0	
ge-0/1/1	up	up			
ge-0/1/1.0	up	up	aenet	--> ae2.0	
vcp-0	up	down			


```

vcp-0.32768      up    down
vcp-1            up    down
vcp-1.32768      up    down
ae0              up    down
ae0.0            up    down    eth-switch
ae1              up    down
ae1.0            up    down    eth-switch
ae2              up    up
ae2.0            up    up    eth-switch
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
dsc              up    up
gre              up    up
ipip             up    up
lo0              up    up
lo0.0            up    up    inet    127.0.0.1        --> 0/0
lsi              up    up
me0              up    up
me0.0            up    up    inet    192.168.157.26/24
mtun             up    up
pimd             up    up
pime             up    up
tap              up    up
vlan             up    up
vme              up    down

```

Meaning 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-0/0/16 and ge-0/0/17 for the Interconnect devices; ge-0/0/20 through ge-0/0/23 for the Director devices; ge-0/0/0 through ge-0/0/7 for the Node devices; and ge-0/1/0 and ge-0/1/1 for the inter-EX Series switch connections), the control plane is properly connected.

Related Documentation

- [QFX3000-M QFabric System Installation Overview on page 97](#)
- [Installing and Connecting a QFX3100 Director Device on page 269](#)
- [Installing and Connecting a QFX3600 or QFX3600-I Device on page 281](#)
- [Installing and Connecting a QFX3500 Device on page 299](#)
- [Installing and Connecting an EX4200 Switch](#)
- [Understanding the QFabric System Control Plane on page 41](#)

Importing a QFX3000-M QFabric System Control Plane EX Series Switch Configuration with a USB Flash Drive

There are two methods of importing the configuration file to the QFX3000-M QFabric system control plane EX Series switches.

- Download the configuration file onto a USB flash drive from the Juniper Networks software download site before inserting the USB flash drive into the EX Series switch USB port
- Copy and paste the configuration from “[Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane](#)” on page 414.



NOTE: The EX Series switch configuration is the same for both the copper-based and fiber-based QFX3000-M QFabric system control plane networks.

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 269, “[Installing and Connecting a QFX3600 or QFX3600-I Device](#)” on page 281, and “[Installing and Connecting a QFX3500 Device](#)” on page 299.
- Rack, mount, and install your EX Series switches for the QFabric system control plane. For more information, see *Installing and Connecting an EX4200 Switch* or *Installing and Connecting an EX4300 Switch*.
- Select a USB flash drive that meets the EX Series switch USB port specifications. See *USB Port Specifications for an EX Series Switch*.
- Use a computer or other device to download the configuration file from the Internet and copy it to the USB flash drive.

To import the control plane EX Series switch configuration file onto 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. In the QFX Series box, select **QFX3000-M QFabric System**.

The QFX3000-M QFabric System - Download Software page appears.

3. Click the **Software** tab and select the software release number from the **Release** list that appears to the right of the Software tab.
A login screen appears.
4. In the QFabric System Control Plane Network section, select **QFX3000-M Control Plane Network Configuration**.
A login screen appears.
5. Enter your user ID and password and click **Login**.
6. Read the End User License Agreement, select the **I agree** option button, and then click **Proceed**.
7. Save the configuration file onto the USB flash drive using your computer or other device.
8. Insert the USB flash drive into the USB port on the EX Series switch.
9. Save the file to the `/var/home/username` directory on the EX Series switch.
10. Load the configuration file into the switch.

```
user@switch# load override filename
```
11. Commit the configuration.

```
user@switch# commit
```

Load complete
12. Remove the USB flash drive from the switch.

Related Documentation • [Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane on page 414](#)

Generating the MAC Address Range for a 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 441](#)). 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 441](#)

Performing the QFabric System Initial Setup on a QFX3100 Director Group

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 269.)

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 440 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 on page 442](#)
- [Restoring a Backup Configuration on page 445](#)

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 IPv4/Prefix	[10.94.200.9/24]
Director Group 1 IPv4/Prefix	[10.94.200.10/24]
Director Group IPv4 Gateway	[10.94.200.250]
Director Group 0 IPv6/Prefix	[2000:1:2:3::a5e:c809/64]
Director Group 1 IPv6/Prefix	[2000:1:2:3::a5e:c80a/64]
Director Group IPv6 Gateway	
[2000:0001:0002:0003:0226:88ff:fe7b:e880]	
QFabric Default Partition (IPv6 address)	[2000:1:2:3::0a5e:c802/64]
QFabric Serial ID	[qfsn-0123456789]
Director Device Password	[*****]



NOTE: Only addresses of the IP version(s) you entered will appear in the configuration.

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 704](#). 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 704](#)).

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 440](#)
- [Gaining Access to the QFabric System Through the Default Partition on page 451](#)
- [QFabric System Initial and Default Configuration Information on page 405](#)
- [Installing and Connecting a QFX3100 Director Device on page 269](#)
- [Performing a QFabric System Recovery Installation on the Director Group on page 704](#)
- [*request system software configuration-backup*](#)
- [device-authentication on page 504](#)

CHAPTER 17

QFabric System Configuration

- [Understanding QFabric System Administration Tasks and Utilities on page 447](#)
- [Gaining Access to the QFabric System Through the Default Partition on page 451](#)
- [Example: Configuring QFabric System Login Classes on page 452](#)
- [Configuring Aliases for the QFabric System on page 460](#)
- [Configuring Node Groups for the QFabric System on page 470](#)
- [Configuring the Port Type on QFX3600 Node Devices on page 474](#)
- [Configuring the QSFP+ Port Type on QFX5100 Devices on page 478](#)
- [Example: Configuring SNMP on page 480](#)
- [Example: Configuring System Log Messages on page 483](#)
- [Configuring Graceful Restart for QFabric Systems on page 485](#)
- [Optimizing the Number of Multicast Flows on QFabric Systems on page 489](#)

Understanding QFabric System Administration Tasks and Utilities

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, QFX3600, or QFX5100 device into a Node device so it can be deployed within a QFabric system. By default, QFX3500, QFX3600, and QFX5100 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, QFX3600, or QFX5100 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 or EX4300 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 or EX4300 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 or EX4300 switches to connect all components within the QFabric system. The two EX4200 or EX4300 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* for information about a QFX3000-G QFabric system with a copper-based control plane

- [“Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane” on page 414](#) 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 441](#). 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 441](#).

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 460](#).
- **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, such as a QFX3500 Node, a QFX3600 Node, or a QFX5100 Node. For example, 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 408](#)
- [Example: Configuring the Virtual Chassis for a Copper-Based QFX3000-G QFabric System Control Plane](#)
- [Example: Configuring EX Series Switches for the QFX3000-M QFabric System Control Plane on page 414](#)
- [show chassis fabric connectivity on page 646](#)
- [Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 441](#)
- [show fabric administration inventory director-group status on page 675](#)
- [show fabric administration inventory infrastructure on page 681](#)
- [show fabric administration inventory on page 670](#)
- [Configuring Aliases for the QFabric System on page 460](#)
- [Configuring Node Groups for the QFabric System on page 470](#)

Gaining Access to the QFabric System Through the Default Partition

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, QFX3600, or QFX5100 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:fpic/port).

Related Documentation

- [Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 441](#)
- [QFabric System Initial and Default Configuration Information on page 405](#)
- [Understanding Interfaces on the QFabric System on page 12](#)
-

Example: Configuring QFabric System Login Classes

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 453](#)
- [Overview on page 453](#)
- [Configuration on page 454](#)
- [Verification on page 456](#)

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 441](#).

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

- [\[xref target has no title\]](#)

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$31SrV0.efdBbk.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.efdBk.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 456](#)
- [Verifying qfabric-operator Access on page 458](#)
- [Verifying qfabric-user Access on page 459](#)

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 61](#)
 - [remote-debug-permission on page 525](#)
 - [request component login on page 572](#)
 - [Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 441](#)
 - [Junos OS Login Classes Overview](#)

Configuring Aliases for the 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

```

- 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

```

- 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

```

- 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 500](#)
 - [show fabric administration inventory on page 670](#)
 - [show fabric administration inventory director-group status on page 675](#)
 - [show fabric administration inventory interconnect-devices on page 684](#)
 - [show fabric administration inventory node-devices on page 686](#)
 - [Understanding the Director Group on page 21](#)
 - [Understanding Interconnect Devices on page 23](#)
 - [Understanding Node Devices on page 27](#)

Configuring Node Groups for the 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 688](#)
- [show fabric administration inventory node-devices on page 686](#)

- [Understanding Node Groups on page 31](#)
- [node-group \(Resources\) on page 522](#)

Configuring the Port Type on QFX3600 Node Devices

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 27](#)
- [Understanding Interfaces on the QFabric System on page 12](#)
- [pic on page 523](#)

Configuring the QSFP+ Port Type on QFX5100 Devices

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: On QFX5100-24Q switches, ports Q1 through Q7 are fixed FTE ports and cannot be changed.



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](#)

Example: Configuring SNMP

By default, SNMP is disabled on devices running Junos OS. This example describes the steps for configuring SNMP on the QFabric system.

- [Requirements on page 480](#)
- [Overview on page 480](#)
- [Configuration on page 481](#)

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 56](#)
 - *snmp*

Example: Configuring System Log Messages

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.

This example describes how to configure system log messages on the QFabric system.

- [Requirements on page 483](#)
- [Overview on page 483](#)
- [Configuration on page 484](#)

Requirements

This example uses the following hardware and software components:

- Junos OS Release 12.2
- QFabric system
- External servers that can be configured as system log message hosts

Overview

Component devices that generate system log message events may include Node devices, Interconnect devices, Director devices, and the control plane switches. The following configuration example includes these components in the QFabric system:

- Director software running on the Director group
- Control plane switches
- Interconnect device
- Multiple Node devices

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 syslog host 10.1.1.12 any error
set system syslog file qflogs
set system syslog file qflogs structured-data brief
set system syslog file qflogs archive size 1g
```

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 system messages from the QFabric Director device:

1. Specify a host, any facility, and the **error** severity level.

```
[edit system syslog]
user@switch# set host 10.1.1.12 any error
```



NOTE: You can configure more than one system log message server (host). The QFabric system sends the messages to each server configured.

2. (Optional) Specify a filename to capture log messages.



NOTE: On the QFabric system, a syslog file named **messages** is configured implicitly with facility and severity levels of **any any** and a file size of 100 MBs. Therefore, you cannot specify the filename **messages** in your configuration, and automatic command completion does not work for that filename.

```
[edit system syslog]
user@switch# set file qflogs structured-data brief
user@switch# set file qflogs
```

3. (Optional) Configure the maximum size of your system log message archive file. This example specifies an archive size of 1 GB.

```
[edit system syslog]
user@switch# set file qflogs archive size 1g
```

Results From configuration mode, confirm your configuration by entering the **show system** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.


```
[edit]
user@switch# show system
syslog {
  file qflogs {
  }
  host 10.1.1.12 {
    any error;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

- Related Documentation**
- [Understanding the Implementation of System Log Messages on the QFabric System on page 59](#)
 - [syslog \(QFabric System\) on page 529](#)
 - [show log on page 695](#)

Configuring Graceful Restart for QFabric Systems

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 485](#)
- [Configuring Graceful Restart Options for BGP on page 486](#)
- [Configuring Graceful Restart Options for OSPF and OSPFv3 on page 487](#)
- [Tracking Graceful Restart Events on page 488](#)

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 | ospfv3) 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 | ospfv3) 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 | ospfv3) 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 | ospfv3) 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 reenble the helper mode, delete the **helper-disable** statement from the configuration by using the **delete protocols ospf graceful-restart helper-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 488](#).



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

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 18

QFabric System Licensing

- [Generating the License Keys for a QFabric System on page 491](#)
- [Adding New Licenses \(CLI Procedure\) on page 493](#)
- [Deleting a License \(CLI Procedure\) on page 494](#)
- [Saving License Keys on page 495](#)
- [Verifying Junos OS License Installation on page 496](#)

Generating the License Keys for a 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 88](#).
- 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 441](#).
- 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 88](#)
- [Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 441](#)
- [Adding New Licenses \(CLI Procedure\) on page 493](#)
- *show version*

Adding New Licenses (CLI Procedure)

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 496](#).

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, repeat the same step.



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 494](#)
- [Junos OS Feature Licenses on page 87](#)
- [Verifying Junos OS License Installation on page 496](#)
- *request system license add*

Deleting a License (CLI Procedure)

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 496](#).



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 493](#)
- [Saving License Keys on page 495](#)
- [Junos OS Feature Licenses on page 87](#)
- [Verifying Junos OS License Installation on page 496](#)
- *request system license delete*

Saving License Keys

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 496](#).

- Related Documentation**
- [Adding New Licenses \(CLI Procedure\) on page 493](#)
 - [Deleting a License \(CLI Procedure\) on page 494](#)
 - [Junos OS Feature Licenses on page 87](#)
 - [Verifying Junos OS License Installation on page 496](#)

Verifying Junos OS License Installation

To verify Junos OS license management, perform the following tasks:

- [Displaying Installed Licenses on page 496](#)
- [Displaying License Usage on page 497](#)

Displaying Installed Licenses

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:

```

Feature name	Licenses used	Licenses installed	Licenses needed	Expiry
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

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 used	Licenses installed	Licenses needed	Expiry
Feature name				
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 19

Configuration Statements

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- [archive \(QFabric System\) on page 501](#)
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- [device-authentication on page 504](#)
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- [stale-routes-time \(Fabric Control\) on page 530](#)

aliases

Syntax	<pre>aliases { director-device <i>director-device-name</i> { <i>assigned-director-device-name</i>; } interconnect-device <i>interconnect-device-name</i> { <i>assigned-interconnect-device-name</i>; } node-device <i>node-device-name</i> { <i>assigned-node-device-name</i>; } }</pre>
Hierarchy Level	[edit fabric]
Release Information	<p>Statement introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>Options director-group and interconnect-device introduced in Junos OS Release 12.2 for the QFX Series.</p>
Description	<p>(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.</p> <p>The remaining statements are explained separately.</p>
<div>  <p>NOTE: The following rules apply to QFabric component alias naming:</p> <ul style="list-style-type: none"> • 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. </div>	
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Configuring Aliases for the QFabric System on page 460 • Understanding Node Devices on page 27

archive (QFabric System)

Syntax	<pre>archive { size <i>size</i>; }</pre>
Hierarchy Level	[edit system syslog file <i>filename</i>]
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	<p>size <i>size</i>—Maximum amount of system log message data that the QFabric system stores in the log file.</p> <p>Syntax: <i>xk</i> to specify the number of kilobytes, <i>xm</i> for the number of megabytes, or <i>xg</i> for the number of gigabytes</p> <p>Range: 65 KB through 1 GB</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• syslog on page 529

chassis (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

Syntax	<pre>device-authentication { (encrypted-password "password" plain-text-password); }</pre>
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.
<div> NOTE: Configuring this statement overrides the password for individual QFabric system components that was set during the initial QFabric system setup procedure.</div>	
Options	<p>encrypted-password "password"— Specify the MD5 or other encrypted authentication password. You can specify only one encrypted password.</p> <p>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.</p> <p>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.</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none">• Example: Configuring QFabric System Login Classes on page 452• Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 441

director-device (Aliases)

Syntax	<code>director-device <i>director-device-name</i> { <i>assigned-director-device-name</i>; }</code>
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.
<div>  NOTE: The following rules apply to QFabric component alias naming: <ul style="list-style-type: none"> 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 <code>all</code>, <code>fabric</code>, or <code>director-group</code> as an alias name. </div>	
Options	<p><i>director-device-name</i>—Specify a user-defined name for a QFabric system Director device.</p> <p><i>assigned-director-device-name</i>—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.</p>
Required Privilege Level	<p><code>admin</code>—To view this statement in the configuration.</p> <p><code>admin-control</code>—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Aliases for the QFabric System on page 460 Understanding the Director Group on page 21

fabric

```
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;
        }
    }
    flow-group {
        name name
    }
    node-device serial-ID | alias | node-device-name {
    }
    interconnect-device interconnect device name(s) {
    }
    }
    protocols {
        fabric-control {
            graceful-restart {
                restart-time seconds;
                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 670](#)
- [Understanding QFabric System Administration Tasks and Utilities on page 447](#)

fabric-control

Syntax	<pre>fabric-control { graceful-restart { restart-time <i>seconds</i>; stale-routes-time <i>seconds</i>; } }</pre>
Hierarchy Level	[edit fabric protocols]
Release Information	Statement introduced in Junos OS Release 13.2X52-D10 for the QFX Series.
Description	<p>Specify attributes for the fabric control protocol.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Understanding Routing Engines in the QFabric System on page 22

file (QFabric System)

Syntax	<pre>file <i>filename</i> { archive { size <i>maximum-file-size</i>; } explicit-priority; <i>facility severity</i>; match "<i>regular-expression</i>"; structured-data { brief; } }</pre>
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	<p><i>facility</i>—Class of messages to log. To specify multiple classes, include multiple <i>facility severity</i> statements.</p> <p><i>filename</i>—Filename that you specify with the show log command.</p> <p>Default: Filename messages</p> <p><i>severity</i>—Severity of the messages that belong to the facility specified by the paired <i>facility</i> name. Messages with severities at the specified level and higher are logged.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• syslog on page 529

graceful-restart (Enabling Globally)

Syntax	<pre> graceful-restart { disable; helper-disable; maximum-helper-recovery-time <i>seconds</i>; maximum-helper-restart-time <i>seconds</i>; notify-duration <i>seconds</i>; recovery-time <i>seconds</i>; restart-duration <i>seconds</i>; stale-routes-time <i>seconds</i>; }</pre>
Hierarchy Level	<pre> [edit logical-systems <i>logical-system-name</i> routing-options], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> routing-options], [edit routing-options], [edit routing-instances <i>routing-instance-name</i> routing-options]</pre>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced for QFX switches in Junos OS Release 13.2X51-D15</p> <p>Statement introduced for QFX Virtual Chassis and Virtual Chassis Fabric in Junos OS Release 14.1X53-D30</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>
Description	<p>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.</p>



NOTE:

- 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.
- LDP sessions flap when **graceful-restart** configurations change.


Default	Graceful restart is disabled by default.
Options	The remaining statements are explained separately.
Required Privilege Level	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>

- 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 485](#)

graceful-restart (Fabric Control)

Syntax	<pre>graceful-restart { restart-time seconds; stale-routes-time seconds; }</pre>
Hierarchy Level	[edit fabric protocols fabric-control]
Release Information	Statement introduced in Junos OS Release 13.2X52-D10 for the QFX Series.
Description	<p>Configure graceful restart parameters for the fabric control in a QFabric system.</p> <p>The remaining statements are explained separately.</p>
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 22

graceful-restart (Protocols BGP)

Syntax	<pre> graceful-restart { disable; restart-time <i>seconds</i>; stale-routes-time <i>seconds</i>; } </pre>
Hierarchy Level	[edit logical-systems <i>logical-system-name</i> protocols bgp], [edit logical-systems <i>logical-system-name</i> protocols bgp group <i>group-name</i>], [edit logical-systems <i>logical-system-name</i> protocols bgp group <i>group-name</i> neighbor <i>address</i>], [edit protocols bgp], [edit protocols bgp group <i>group-name</i>], [edit protocols bgp group <i>group-name</i> neighbor <i>address</i>]
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. Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Description	<p>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.</p> <p>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.</p> <hr/> <div>  <p>NOTE: If you configure graceful restart after a BGP session has been established, the BGP session restarts and the peers negotiate graceful restart capabilities.</p> </div> <hr/> <p>Configure graceful restart globally at the [edit routing-options] or [edit routing-instances <i>instance-name</i> 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.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none"> • <i>Configuring Graceful Restart Options for BGP</i> • Configuring Graceful Restart for QFabric Systems on page 485 • <i>Junos OS High Availability Library for Routing Devices</i>

graceful-restart (Protocols OSPF)

Syntax	<pre>graceful-restart { disable; helper-disable (standard restart-signaling both); no-strict-lsa-checking; notify-duration <i>seconds</i>; restart-duration <i>seconds</i>; }</pre>
Hierarchy Level	<pre>[edit logical-systems <i>logical-system-name</i> protocols (ospf ospf3)], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (ospf ospf3)], [edit protocols (ospf ospf3)], [edit routing-instances <i>routing-instance-name</i> protocols ospf]</pre>
Release Information	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Support for the no-strict-lsa-checking statement introduced in Junos OS Release 8.5.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Support for the helper mode standard, restart-signaling, and both options introduced in Junos OS Release 11.4.</p> <p>Statement introduced in Junos OS Release 12.1 for the QFX Series.</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>
Description	<p>Configure graceful restart for OSPF.</p> <p>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.</p>
Options	<p>disable—Disable graceful restart for OSPF.</p> <p>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.</p> <p>Default: Helper mode is enabled by default. For OSPFv2, both standard and restart-signaling based helper modes are enabled by default.</p> <p>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.</p>



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*
- *Junos OS High Availability Library for Routing Devices*

interconnect-device (Chassis)

```
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)

Syntax	<code>interconnect-device <i>interconnect-device-name</i> { <i>assigned-interconnect-device-name</i>; }</code>
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.
<div>  NOTE: The following rules apply to QFabric component alias naming: <ul style="list-style-type: none"> 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 <code>all</code>, <code>fabric</code>, or <code>director-group</code> as an alias name. </div>	
Options	<p><i>interconnect-device-name</i>—Specify a user-defined name for a QFabric system Interconnect device.</p> <p><i>assigned-interconnect-device-name</i>—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.</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> Configuring Aliases for the QFabric System on page 460 Understanding Interconnect Devices on page 23

multicast (QFabric Routing Options)

Syntax	<pre>multicast { fabric-optimized-distribution no-make-before-break; }</pre>
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	<ul style="list-style-type: none">• Understanding the QFabric System Data Plane on page 45

network-domain

Syntax	<pre>network-domain;</pre>
Hierarchy Level	[edit fabric resources node-group <i>node-group-name</i>]
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 <i>network Node group</i> , 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 <i>server Node group</i> , 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	<ul style="list-style-type: none">• Configuring Node Groups for the QFabric System on page 470• Understanding Node Groups on page 31

no-make-before-break

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 <i>make-before-break</i> 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	<ul style="list-style-type: none">• Understanding the QFabric System Data Plane on page 45

node-device (Aliases)

Syntax	<code>node-device <i>node-device-name</i> { <i>assigned-node-device-name</i>; }</code>
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	<i>node-device-name</i> —Specify a user-defined name for a QFabric system Node device. <i>assigned-node-device-name</i> —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	<ul style="list-style-type: none">• Configuring Aliases for the QFabric System on page 460• Understanding Node Devices on page 27

node-device (Chassis)

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)

Syntax	<code>node-device <i>node-device-name</i>;</code>
Hierarchy Level	<code>[edit fabric resources node-group <i>node-group-name</i>]</code>
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	<ul style="list-style-type: none">• Configuring Node Groups for the QFabric System on page 470• Understanding Node Groups on page 31

node-group (Chassis)

```
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-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)

Syntax	<code>node-group <i>node-group-name</i> { <i>network-domain</i>; node-device <i>node-device-name</i>; }</code>
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	<code>admin</code> —To view this statement in the configuration. <code>admin-control</code> —To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Node Groups for the QFabric System on page 470• Understanding Node Groups on page 31

pic (Port)

```
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 474](#)

protocols (Fabric)

Syntax

```
protocols {  
  fabric-control {  
    graceful-restart {  
      restart-time seconds;  
      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 22](#)


remote-debug-permission

Syntax	remote-debug-permission (qfabric-admin qfabric-operator qfabric-user);
Hierarchy Level	[edit system login user <i>username</i> authentication] [edit system root-authentication]
Release Information	Statement introduced in Junos OS Release 14.1X53-D20 for OCX Series switches. 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	<p>qfabric-admin—Permits a user to log in to individual QFabric system components, view operations, and change component configurations.</p> <p>qfabric-operator—Permits a user to log in to individual QFabric system components and view component operations.</p> <p>qfabric-user—Prevents a user from logging in to individual QFabric system components.</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring QFabric System Login Classes on page 452 • request component login on page 572 • Understanding QFabric System Login Classes on page 61

resources

Syntax	<pre>resources { node-group <i>node-group-name</i> { network-domain; node-device <i>node-device-name</i>; } }</pre>
Hierarchy Level	[edit fabric]
Release Information	Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	<p>(QFabric systems only) Define resources within a QFabric system and handle a variety of component assignments.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	admin—To view this statement in the configuration. admin-control—To add this statement to the configuration.
Related Documentation	<ul style="list-style-type: none">• Configuring Node Groups for the QFabric System on page 470• Understanding Node Groups on page 31

restart-time (Fabric Control)

Syntax	<code>restart-time seconds;</code>
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	<p>Configure the duration of the graceful restart period for the fabric control Routing Engine.</p> <p>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.</p> <p>Configure a restart time of 600 seconds if the number of VLAN members (vmembers) exceeds 32k.</p>
	<div>  <p>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.</p> </div>
Options	<p>seconds—Duration of the graceful restart period.</p> <p>Default: 300 seconds</p> <p>Range: 300 to 900 seconds</p>
Required Privilege Level	<p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • <i>Understanding Bridging and VLANs</i> • Understanding Routing Engines in the QFabric System on page 22

routing-options (QFabric System)

Syntax	<pre>routing-options { multicast { no-make-before-break; } }</pre>
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	<ul style="list-style-type: none">• Understanding the QFabric System Data Plane on page 45

syslog (QFabric System)

Syntax	<pre> syslog { file <i>filename</i> { archive { size <i>maximum-file-size</i>; } explicit-priority; <i>facility severity</i>; match "<i>regular-expression</i>"; structured-data; } filter all { <i>facility severity</i>; match "<i>regular-expression</i>"; } host <i>hostname</i> { explicit-priority; <i>facility severity</i>; facility-override <i>facility</i>; log-prefix <i>string</i>; match "<i>regular-expression</i>"; structured-data; } } </pre>
Hierarchy Level	[edit system]
Release Information	Statement introduced in Junos OS Release 11.3 for the QFX Series.
Description	<p>Configure system log messages for the QFabric system.</p> <p>The remaining statements are explained separately.</p>
Required Privilege Level	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
Related Documentation	<ul style="list-style-type: none"> • Understanding the Implementation of System Log Messages on the QFabric System on page 59 • Directing System Log Messages to a Remote Machine

stale-routes-time (Fabric Control)

Syntax	<code>stale-routes-time <i>seconds</i>;</code>
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	<i>seconds</i> —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	<ul style="list-style-type: none">• <i>Understanding Bridging and VLANs</i>• Understanding Routing Engines in the QFabric System on page 22

PART 4

Administration

- [Software Upgrade and Recovery on page 533](#)
- [Operational Mode Commands on page 565](#)

Software Upgrade and Recovery

- [Performing a Nonstop Software Upgrade on the QFabric System on page 533](#)
- [Verifying Nonstop Software Upgrade for QFabric Systems on page 538](#)
- [Upgrading Software on a QFabric System on page 558](#)
- [Performing System Backup and Recovery for a QFabric System on page 562](#)

Performing a Nonstop Software Upgrade on the 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 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 on page 535](#)
- [Downloading Software Files Using a Browser on page 535](#)
- [Retrieving Software Files for Download on page 536](#)
- [Performing a Nonstop Software Upgrade for Director Devices in a Director Group on page 536](#)
- [Performing a Nonstop Software Upgrade for Interconnect Devices and Other Fabric-Related Components on page 536](#)
- [\(Optional\) Creating Upgrade Groups for Node Groups on page 537](#)
- [Performing a Nonstop Software Upgrade on a Node Group on page 537](#)

Backing Up the Current Configuration Files

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



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 712](#).
- 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

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



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

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

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

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 485](#)
- [Understanding Nonstop Software Upgrade for QFabric Systems on page 49](#)
- [Verifying Nonstop Software Upgrade for QFabric Systems on page 538](#)
- [request system software nonstop-upgrade on page 589](#)

Verifying Nonstop Software Upgrade for QFabric Systems



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 on page 538](#)
- [Verifying a Fabric Nonstop Software Upgrade on page 551](#)
- [Verifying a Redundant Server Node Group Nonstop Software Upgrade on page 553](#)
- [Verifying a Network Node Group Nonstop Software Upgrade on page 556](#)

Verifying a Director Group Nonstop Software Upgrade

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
```

- 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
```

- 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
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 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 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 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
```

- 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

```

- 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

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

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
install-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

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

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 533](#)
- [Understanding Nonstop Software Upgrade for QFabric Systems on page 49](#)
- [show chassis nonstop-upgrade node-group on page 669](#)
- [show fabric administration inventory on page 670](#)
- [show fabric administration inventory director-group status on page 675](#)
- [show fabric administration inventory infrastructure on page 681](#)
- [show fabric administration inventory interconnect-devices on page 684](#)
- [show fabric administration inventory node-groups on page 688](#)

Upgrading Software on a 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 on page 558](#)
- [Downloading Software Files Using a Browser on page 558](#)
- [Retrieving Software Files for Download on page 559](#)
- [Installing the Software Package on the Entire QFabric System on page 559](#)

Backing Up the Current Configuration Files

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



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 712](#).

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

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



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 704](#)
- *Upgrading Jloader Software on QFX Series Devices*
- *request system software add*
- *Installation and Upgrade Guide*

Performing System Backup and Recovery for a 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 588](#)
 - [request system software system-backup on page 596](#)

CHAPTER 21

Operational Mode Commands

- [QFabric System Operational Mode Commands on page 566](#)
- [Filtering Operational Mode Command Output in a QFabric System on page 568](#)
- [request chassis device-mode](#)
- [request chassis fabric fpc](#)
- [request component login](#)
- [request fabric administration director-group change-master](#)
- [request fabric administration remove](#)
- [request fabric administration system mac-pool add](#)
- [request fabric administration system mac-pool delete](#)
- [request system halt](#)
- [request system reboot](#)
- [request system software format-qfabric-backup](#)
- [request system software nonstop-upgrade](#)
- [request system software system-backup](#)
- [set chassis display message](#)
- [show chassis device-mode](#)
- [show chassis ethernet-switch interconnect-device cb](#)
- [show chassis ethernet-switch interconnect-device fpc](#)
- [show chassis fabric connectivity](#)
- [show chassis fabric device](#)
- [show chassis lcd](#)
- [show chassis nonstop-upgrade node-group](#)
- [show fabric administration inventory](#)
- [show fabric administration inventory director-group status](#)
- [show fabric administration inventory infrastructure](#)
- [show fabric administration inventory interconnect-devices](#)
- [show fabric administration inventory node-devices](#)
- [show fabric administration inventory node-groups](#)

- [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

Table 108 on page 566 summarizes the command line interface (CLI) commands that you can use to monitor and troubleshoot the QFabric system operations.

Table 108: 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 108: QFabric System Operational Mode Commands (*continued*)

Task	Command
Display information about the operating mode of the device.	<code>show chassis device-mode</code>
Display the status of Ethernet switching in the Control Board of an Interconnect device.	<code>show chassis ethernet-switch interconnect-device cb</code>
Display the status of Ethernet switching in the Flexible PIC Controller (FPC) of an Interconnect device.	<code>show chassis ethernet-switch interconnect-device fpc</code>
Display the status of the data plane connections in the QFabric system.	<code>show chassis fabric connectivity</code>
Display the fabric management status of devices in your QFabric system.	<code>show chassis fabric device</code>
Display information shown on the LCD screen of a QFabric system device.	<code>show chassis lcd</code>
Display the status of a nonstop software upgrade for a Node group.	<code>show chassis nonstop-upgrade node-group</code>
Display all devices that belong to the QFabric system.	<code>show fabric administration inventory</code>
Display the Director devices that belong to a QFabric system Director group.	<code>show fabric administration inventory director-group status</code>
Display the services running on the Director group for the QFabric system.	<code>show fabric administration inventory infrastructure</code>
Display the Interconnect devices that belong to a QFabric system.	<code>show fabric administration inventory interconnect-devices</code>
Display the Node devices that belong to the QFabric system.	<code>show fabric administration inventory node-devices</code>
Display the Node groups and the corresponding Node devices that belong to the QFabric system.	<code>show fabric administration inventory node-groups</code>
Display all devices that belong to the QFabric system.	<code>show fabric inventory</code>
Display the MAC addresses that belong to a QFabric system Director group.	<code>show fabric administration system mac-pool</code>
Display the Director device that hosts the QFabric CLI session.	<code>show fabric session-host</code>
Display the system log messages in the specified file.	<code>show log</code>
Display the status of a QFabric system software upgrade.	<code>show system software upgrade status</code>

Filtering Operational Mode Command Output in a 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 566](#)
 - [Using the Pipe \(| \) Symbol to Filter Junos OS Command Output](#)

request chassis device-mode

Syntax	request chassis device-mode (interconnect-device node-device standalone)
Release Information	Command introduced in Junos OS Release 11.2 for the QFX Series. <i>interconnect-device</i> 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.
<div>  NOTE: <ul style="list-style-type: none"> 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. </div>	
Options	<p>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.</p> <p>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.</p> <p>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.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> Converting the Device Mode for a QFabric System Component on page 408 show chassis device-mode on page 601 Understanding Interconnect Devices on page 23 Understanding Node Devices on page 27 Understanding the QFabric System Hardware Architecture on page 17
List of Sample Output	request chassis device-mode interconnect-device (Starting in Node Device or Standalone Mode) on page 570

[request chassis device-mode node-device \(Starting in Interconnect Device or Standalone Mode\) on page 570](#)

[request chassis device-mode standalone \(Starting in Interconnect Device or Node Device Mode\) on page 570](#)

[request chassis device-mode standalone \(Starting in Standalone Mode\) on page 570](#)

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

Syntax	<code>request chassis fabric fpc interconnect-device <i>interconnect-device-name</i> slot <i>slot-number</i> (offline online)</code>
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	<p>interconnect-device <i>interconnect-device-name</i>—Set the Interconnect device containing the FPC you want to bring either offline or online.</p> <p>slot <i>slot-number</i>—Set the specific FPC slot on the Interconnect device.</p> <p>offline—Set the Interconnect device FPC to offline for removal.</p> <p>online—Set the Interconnect device FPC to online after installation.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> • request chassis fpc • show chassis fabric connectivity on page 646 • show chassis fabric device on page 653 • Understanding Interconnect Devices on page 23
List of Sample Output	request chassis fabric fpc online on page 571 request chassis fabric fpc offline on page 571
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

Syntax	<code>request component login <i>component-name</i></code>
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	<i>component-name</i> —Specify the QFabric system component to which you wish to log in.
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> • Example: Configuring QFabric System Login Classes on page 452 • remote-debug-permission on page 525 • Understanding QFabric System Login Classes on page 61
List of Sample Output	request component login (with qfabric-admin Privileges) on page 572 request component login (with qfabric-operator Privileges) on page 573 request component login (with qfabric-user Privileges) on page 573

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

Syntax	<code>request fabric administration director-group change-master (director-device <i>director-device-name</i>)</code>
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	<p>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.</p> <p>director-device <i>director-device-name</i>—Specify which Director device should become the primary device within the Director group.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none">• show fabric administration inventory director-group status on page 675• Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 441• Understanding the Director Group on page 21
List of Sample Output	request fabric administration director-group change-master on page 574


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

Syntax	<code>request fabric administration remove (interconnect-device <i>interconnect-device-name</i> node-device <i>node-device-name</i>)</code>
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.
<div>  NOTE: <ul style="list-style-type: none"> 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. </div>	
Options	<p>interconnect-device <i>interconnect-device-name</i>—Remove a disconnected Interconnect device from the QFabric system inventory.</p> <p>node-device <i>node-device-name</i>—Remove a disconnected Node device from the QFabric system inventory.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> show fabric administration inventory on page 670 show fabric administration inventory interconnect-devices on page 684 show fabric administration inventory node-devices on page 686 show fabric administration inventory node-groups on page 688
List of Sample Output	request fabric administration remove interconnect-device on page 575 request fabric administration remove node-device on page 576

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


Syntax	<code>request fabric administration system mac-pool add mac-base <i>starting-mac-address</i> count <i>number-of-mac-address</i></code>
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	<p>mac-base <i>starting-mac-address</i>—Set the starting MAC address for a pool of addresses assigned to the QFabric system.</p> <p>count <i>number-of-mac-address</i>—Set the total number of MAC addresses in the specified address pool assigned to the QFabric system.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> • request fabric administration system mac-pool delete on page 578 • show fabric administration system mac-pool on page 690
List of Sample Output	request fabric administration system mac-pool add mac-base starting-mac-address count on page 577
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

Syntax	<code>request fabric administration system mac-pool delete mac-base <i>starting-mac-address</i></code>
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.
<div> 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.</div>	
Options	mac-base <i>starting-mac-address</i> —Specify the starting MAC address for a pool of addresses you wish to remove from the QFabric system.
Additional Information	After you issue the <code>request fabric administration system mac-pool delete</code> command, issue the <code>show fabric administration system mac-pool</code> command to verify that the MAC address range has been deleted.
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none">• request fabric administration system mac-pool add on page 577• show fabric administration system mac-pool on page 690
List of Sample Output	request fabric administration system mac-pool delete mac-base on page 578

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

List of Syntax	Syntax on page 579 Syntax (EX Series Switches) on page 579 Syntax (PTX Series) on page 579 Syntax (TX Matrix Router) on page 579 Syntax (TX Matrix Plus Router) on page 579 Syntax (MX Series Router) on page 580 Syntax (QFX Series) on page 580
Syntax	<pre>request system halt <at <i>time</i>> <backup-routing-engine> <both-routing-engines> <other-routing-engine> <in <i>minutes</i>> <media (compact-flash disk removable-compact-flash usb)> <message "<i>text</i>"></pre>
Syntax (EX Series Switches)	<pre>request system halt <all-members> <at <i>time</i>> <backup-routing-engine> <both-routing-engines> <in <i>minutes</i>> <local> <media (external internal)> <member <i>member-id</i>> <message "<i>text</i>"> <other-routing-engine> <slice <i>slice</i>></pre>
Syntax (PTX Series)	<pre>request system halt <at <i>time</i>> <backup-routing-engine> <both-routing-engines> <other-routing-engine> <in <i>minutes</i>> <media (compact-flash disk)> <message "<i>text</i>"></pre>
Syntax (TX Matrix Router)	<pre>request system halt <all-lcc lcc <i>number</i> scc> <at <i>time</i>> <backup-routing-engine> <both-routing-engines> <other-routing-engine> <in <i>minutes</i>> <media (compact-flash disk)> <message "<i>text</i>"></pre>
Syntax (TX Matrix Plus Router)	<pre>request system halt <all-chassis all-lcc lcc <i>number</i> sfc <i>number</i>></pre>

	<pre><at <i>time</i>> <backup-routing-engine> <both-routing-engines> <other-routing-engine> <in <i>minutes</i>> <media (compact-flash disk)> <message "<i>text</i>"></pre>
Syntax (MX Series Router)	<pre>request system halt <all-members> <at <i>time</i>> <backup-routing-engine> <both-routing-engines> <in <i>minutes</i>> <local> <media (external internal)> <member <i>member-id</i>> <message "<i>text</i>"> <other-routing-engine></pre>
Syntax (QFX Series)	<pre>request system halt <all-members> <at <i>time</i>> <both-routing-engines> <director-device <i>director-device-id</i>> <in <i>minutes</i>> <local> <media > <member <i>member-id</i>> <message "<i>text</i>"> <other-routing-engine> <slice <i>slice</i>></pre>
Release Information	<p>Command introduced before Junos OS Release 7.4.</p> <p>other-routing-engine option introduced in Junos OS Release 8.0.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>sfc option introduced for the TX Matrix Plus router in Junos OS Release 9.6.</p> <p>Command introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>director-device option introduced for QFabric systems in Junos OS Release 12.2.</p> <p>backup-routing-engine option introduced in Junos OS Release 13.1.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>
Description	Stop the router or switch software.



NOTE: When you issue this command on an individual component—for example, a Node device—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, issue this command with the **member** option on the Node device CLI, because you cannot issue this command from the QFabric CLI. Also, issuing this command might cause traffic loss on an individual component.

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 584](#)
- [request system halt \(In 2 Hours\) on page 584](#)
- [request system halt \(Immediately\) on page 584](#)
- [request system halt \(At 1:20 AM\) on page 584](#)

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

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

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	<ul style="list-style-type: none">• Performing System Backup and Recovery for a QFabric System on page 562• request system software system-backup on page 596• Performing a QFabric System Recovery Installation on the Director Group on page 704
List of Sample Output	request system software format-qfabric-backup on page 588
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

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 533](#)
- [Verifying Nonstop Software Upgrade for QFabric Systems on page 538](#)
- [show chassis nonstop-upgrade node-group on page 669](#)

List of Sample Output

[request system software nonstop-upgrade director-group on page 590](#)
[request system software nonstop-upgrade fabric on page 592](#)
[request system software nonstop-upgrade node-group \(Redundant Server Node Group\) on page 593](#)
[request system software nonstop-upgrade node-group \(Server Node Group\) on page 594](#)

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
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 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 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 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

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 562](#).

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 562](#)
- [request system software format-qfabric-backup on page 588](#)
- *save*
- *request system software configuration-backup*
- [Performing a QFabric System Recovery Installation on the Director Group on page 704](#)

List of Sample Output [request system software system-backup on page 597](#)
[request system software system-backup usb-create on page 597](#)

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

List of Syntax	Syntax on page 598 Syntax (TX Matrix Router) on page 598 Syntax (TX Matrix Plus Router) on page 598
Syntax	set chassis display message " <i>message</i> " <permanent>
Syntax (TX Matrix Router)	set chassis display message " <i>message</i> " (<i>lcc number</i> <i>scc</i>) <permanent>
Syntax (TX Matrix Plus Router)	set chassis display message " <i>message</i> " (<i>fpc-slot slot-number</i> <i>lcc number</i> <i>sfc number</i>) <permanent>
Release Information	Command introduced before Junos OS Release 7.4. Command introduced in Junos OS Release 9.0 for EX Series switches. <i>sfc</i> 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 59](#)

List of Sample Output

[set chassis display message \(Creating\) on page 599](#)
[set chassis display message \(Deleting\) on page 600](#)

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


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.
	<div>  <p>NOTE: Issue the <code>show chassis device-mode</code> command only when your management station is connected directly to the device over a console port connection.</p> </div>
Options	There are no options for this command.
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> • Converting the Device Mode for a QFabric System Component on page 408 • request chassis device-mode on page 569 • Understanding Interconnect Devices on page 23 • Understanding Node Devices on page 27
List of Sample Output	show chassis device-mode (Interconnect Device Mode) on page 602 show chassis device-mode (Interconnect Device Mode, but Node Device-Ready) on page 602 show chassis device-mode (Interconnect Device Mode, but Standalone-Ready) on page 602 show chassis device-mode (Node Device Mode) on page 602 show chassis device-mode (Node Device Mode, but Interconnect Device-Ready) on page 602 show chassis device-mode (Node Device Mode, but Standalone-Ready) on page 602 show chassis device-mode (Standalone Mode) on page 602 show chassis device-mode (Standalone Mode, but Interconnect Device-Ready) on page 602 show chassis device-mode (Standalone Mode, but Node Device-Ready) on page 603
Output Fields	Table 109 on page 602 lists the output fields for the <code>show chassis device-mode</code> command. Output fields are listed in the approximate order in which they appear.

Table 109: 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

Syntax	<code>show chassis ethernet-switch interconnect-device <i>name</i> cb</code> <code><detail></code> <code><port <i>number</i>></code> <code><slot<i>number</i>></code>
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	<p>none—Display Ethernet switch information about each connected port on each online CB in the Interconnect device.</p> <p>detail—(Optional) Display detailed status information for all CBs or for the CB in the specified slot in the Interconnect device.</p> <p>port <i>number</i>—(Optional) Display Ethernet switch information about a specific port on a CB in the Interconnect device.</p> <p>slot <i>number</i>—(Optional) Display Ethernet switch information about a CB in a specific slot in the Interconnect device.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • chassis on page 502 • show chassis environment cb • show chassis ethernet-switch interconnect-device fpc on page 621
List of Sample Output	show chassis ethernet-switch interconnect-device cb on page 608 show chassis ethernet-switch interconnect-device cb detail on page 609 show chassis ethernet-switch interconnect-device cb detail slot port on page 615
Output Fields	Table 110 on page 604 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 110: show chassis ethernet-switch interconnect-device fpc Output Fields

Field Name	Field Description
Link is good on port n connected to device	<p>Information about the link between each port on the FPC's Ethernet switch and one of the following devices:</p> <ul style="list-style-type: none"> • FWD-SWITCH-0 • FWD-SWITCH-1 • CB0 • CB1

Table 110: show chassis ethernet-switch interconnect-device fpc Output Fields (*continued*)

Field Name	Field Description
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 <i>Junos OS System Basics Configuration Guide</i>).
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.
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 110: 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 110: 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	
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 110: 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 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 Xtns	0
TX Frame Excessive Deferral	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 Xtns    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 Xtns      0
TX Frame Excessive Deferral 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 Xmsns 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 Xmsns        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 Xms	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 Xmsns      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 Xtns	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

Syntax	show chassis ethernet-switch interconnect-device <i>name</i> fpc <detail> <port <i>number</i> > <slot <i>number</i> >
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	<p>none—Display Ethernet switch information about each connected port on each online FPC in the Interconnect device.</p> <p>detail—(Optional) Display detailed status information for all FPCs or for the FPC in the specified slot in the Interconnect device.</p> <p>port <i>number</i>—(Optional) Display Ethernet switch information about a specific port on an FPC in the Interconnect device.</p> <p>slot <i>number</i>—(Optional) Display Ethernet switch information about an FPC in a specific slot in the Interconnect device.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • chassis on page 502 • show chassis environment fpc • show chassis ethernet-switch interconnect-device cb on page 604
List of Sample Output	<p>show chassis ethernet-switch interconnect-device fpc on page 625</p> <p>show chassis ethernet-switch interconnect-device fpc detail on page 627</p> <p>show chassis ethernet-switch fpc detail slot on page 634</p> <p>show chassis ethernet-switch fpc interconnect-device port on page 641</p> <p>show chassis ethernet-switch fpc interconnect-device detail port on page 642</p>
Output Fields	Table 110 on page 604 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 111: 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: <ul style="list-style-type: none"> • 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 <i>Junos OS System Basics Configuration Guide</i>).
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 111: 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 111: 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 111: 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 Xmsns     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 Xmsns     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 Xmsns 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 Xmsns 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 Xmsns    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 Xtns        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 Xms	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 Xms	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: CBO

```

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 Xtns    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 Xmsns  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

Syntax	<code>show chassis fabric connectivity (device slot)</code>
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	<p>none—Display the status of all data plane connections in your QFabric system.</p> <p>device—Display the status of the data plane connections for a specific device.</p> <p>slot—Display the status of the data plane connections for a specific Flexible PIC Concentrator (FPC) slot on a specific device.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> • request chassis fabric fpc on page 571 • show chassis fabric device on page 653 • Understanding Interconnect Devices on page 23
List of Sample Output	<p>show chassis fabric connectivity on page 647</p> <p>show chassis fabric connectivity device on page 650</p> <p>show chassis fabric connectivity device device-name slot on page 651</p>
Output Fields	Table 112 on page 646 lists the output fields for the show chassis fabric connectivity command. Output fields are listed in the approximate order in which they appear.

Table 112: show chassis fabric connectivity Output Fields

Field Name	Field Description
Device ID	Hardware serial identifier of the QFabric system component.
Type	Model name of the QFabric system component. Values include qfx3008-i (QFX3008-I Interconnect device), qfx3000-m Interconnect (QFX3600-I or QFX5100-24Q Interconnect device), and supported Node device names such as qfx3600-16q (a QFX3600 Node device), qfx3500 (a QFX3500 Node device), and qfx5100-24q-2p (a QFX5100 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: qfx3008-i
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: qfx3008-i
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

```

```

user@qfabric> show chassis fabric connectivity device IC-BBAP0735
Device ID: IC-BBAP0735, Type: qfx3000-m Interconnect

```

```

Fabric: Incoming links:
P4782-C:fte-0/1/1          -> IC-BBAP0735:fte-0/1/0        Ok
P1442-C:fte-0/1/1          -> IC-BBAP0735:fte-0/1/1        Ok
P5606-C:fte-0/1/1          -> IC-BBAP0735:fte-0/1/2        Ok
P2132-C:fte-0/1/1          -> IC-BBAP0735:fte-0/1/4        Ok
P6445-C:fte-0/1/1          -> IC-BBAP0735:fte-0/1/5        Ok
P6079-C:fte-0/1/1          -> IC-BBAP0735:fte-0/1/6        Ok

Fabric: Outgoing links:
IC-BBAP0735:fte-0/1/0      -> P4782-C:fte-0/1/1          Ok
IC-BBAP0735:fte-0/1/1      -> P1442-C:fte-0/1/1          Ok
IC-BBAP0735:fte-0/1/2      -> P5606-C:fte-0/1/1          Ok
IC-BBAP0735:fte-0/1/4      -> P2132-C:fte-0/1/1          Ok
IC-BBAP0735:fte-0/1/5      -> P6445-C:fte-0/1/1          Ok
IC-BBAP0735:fte-0/1/6      -> P6079-C:fte-0/1/1          Ok

```

show chassis fabric connectivity device device-name slot

```

user@qfabric> show chassis fabric connectivity device A0010 slot 3
Device ID: A0010, Type: qfx3008-i
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

Syntax	<code>show chassis fabric device <i>device-name</i></code>
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	<p>none—Display the fabric management status for all devices in your QFabric system.</p> <p><i>device-name</i>—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.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> • request chassis fabric fpc on page 571 • show chassis fabric connectivity on page 646 • show fabric administration inventory on page 670 • Understanding Interconnect Devices on page 23
List of Sample Output	show chassis fabric device on page 653
Output Fields	<p>Table 113 on page 653 lists the output fields for the show chassis fabric device command. Output fields are listed in the approximate order in which they appear.</p>

Table 113: show chassis fabric device Output Fields

Field Name	Field Description
Device ID	Hardware serial identifier of the QFabric system component.
Type	Model name of the QFabric system component. Values include qfx3008-i (QFX3008-I Interconnect device), qfx3000-m Interconnect (QFX3600-I or QFX5100-24Q Interconnect device), and supported Node device names such as qfx3600-16q (a QFX3600 Node device), qfx3500 (a QFX3500 Node device), and qfx5100-24q-2p (a QFX5100 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

List of Syntax	show chassis lcd (EX Series) on page 655 show chassis lcd (QFX Series) on page 655 show chassis lcd (OCX Series) on page 655
show chassis lcd (EX Series)	<pre>show chassis lcd <fpc-slot <i>fpc-slot-number</i>> <menu <(all-members local member <i>member-id</i>)>></pre>
show chassis lcd (QFX Series)	<pre>show chassis lcd <fpc-slot <i>fpc-slot-number</i>> <interconnect-device <i>device-id</i>> <node-device <i>device-id</i>></pre>
show chassis lcd (OCX Series)	<pre>show chassis lcd <fpc-slot <i>fpc-slot-number</i>></pre>
Release Information	<p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>menu option introduced in Junos OS Release 10.2 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Command introduced in Junos OS Release 13.1 for QFabric systems.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>
Description	<p>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, OCX Series 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.</p>
Options	<p>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.</p> <p>fpc-slot <<i>fpc-slot-number</i>>—(Optional) Display the information as follows:</p> <ul style="list-style-type: none"> (EX3200, EX3300, EX4200, and EX4500 switches, QFX Series, or OCX Series) Display the information that appears on the LCD panel for either an FPC slot with no <i>fpc-slot-number</i> 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 <i>fpc-slot-number</i>. Output for these options is the same as for the none option. <p>Also display the status of the currently selected port parameter of the Status LED for each network port.</p> <ul style="list-style-type: none"> (EX Series Virtual Chassis member switches or XRE200 External Routing Engines) If no <i>fpc-slot-number</i> 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 <i>fpc-slot-number</i> value is specified (it equals the <i>member-id</i> 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 598](#)

List of Sample Output

[show chassis lcd \(Two-Member EX4200 Virtual Chassis\) on page 658](#)
[show chassis lcd fpc-slot 1 \(EX4200 Virtual Chassis\) on page 659](#)
[show chassis lcd \(EX8200 Switch\) on page 659](#)
[show chassis lcd fpc-slot 2 \(EX8200 Switch\) on page 661](#)
[show chassis lcd menu \(EX4200 Switch\) on page 661](#)

[show chassis lcd menu \(EX8200 Switch\) on page 662](#)
[show chassis lcd \(QFX3500 Switches\) on page 662](#)
[show chassis lcd \(XRE200 External Routing Engine in EX8200 Virtual Chassis\) on page 662](#)
[show chassis lcd interconnect-device \(QFabric Systems\) on page 665](#)
[show chassis lcd node-device \(QFabric Systems\) on page 667](#)

Output Fields Table 114 on page 657 lists the output fields for the **show chassis lcd** command. Output fields are listed in the approximate order in which they appear.

Table 114: show chassis lcd Output Fields

Field Name	Field Description
membernumber (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)	<p>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.</p> <p>On EX6200 switches, EX8200 switches, and XRE200 External Routing Engines, no slot number is displayed.</p> <p>On XRE200 External Routing Engines, this field appears under the member number field for each member device in the EX8200 Virtual Chassis.</p>
LCD screen	<p>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:</p> <ul style="list-style-type: none"> • 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)	<p>State of the currently selected port parameter of the Status LED for the interface. The Status LED port parameters are:</p> <p>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.</p> <ul style="list-style-type: none"> • ADM—Administrative • SPD—Speed • DPX—Duplex • NA—Not applicable. • POE—Power over Ethernet
fpcx	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

Syntax	show chassis nonstop-upgrade node-group <i>node-group-name</i>
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	<ul style="list-style-type: none"> • Performing a Nonstop Software Upgrade on the QFabric System on page 533 • request system software nonstop-upgrade on page 589
List of Sample Output	show chassis nonstop-upgrade node-group on page 669
Output Fields	Table 115 on page 669 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 115: show chassis nonstop-upgrade node-group Output Fields

Field Name	Field Description
Item	Node device slot number.
Status	State of Node device: <ul style="list-style-type: none"> • 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

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 441](#)
- [Configuring Aliases for the QFabric System on page 460](#)
- [Configuring Node Groups for the QFabric System on page 470](#)
- [show fabric administration inventory infrastructure on page 681](#)

- [show fabric administration inventory director-group status on page 675](#)
- [show fabric administration inventory node-devices on page 686](#)
- [show fabric administration inventory node-groups on page 688](#)
- [show fabric administration inventory interconnect-devices on page 684](#)
- [show fabric inventory on page 691](#)

List of Sample Output [show fabric administration inventory on page 672](#)
[show fabric administration inventory detail on page 673](#)
[show fabric administration inventory summary on page 674](#)

Output Fields [Table 116 on page 671](#) lists the output fields for the **show fabric administration inventory** command. Output fields are listed in the approximate order in which they appear.

Table 116: 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
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

Table 116: show fabric administration inventory Output Fields (*continued*)

Field Name	Field Description	Level of Output
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: <ul style="list-style-type: none"> • 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

Syntax	show fabric administration inventory director-group status (target <i>director-device-name</i> 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	<p>none—Display the status of all Director devices within a QFabric system.</p> <p>all—Display the status of all Director devices within a QFabric system.</p> <p>target <i>director-device-name</i>—Display the status of a specific Director device within a QFabric system.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> • request fabric administration director-group change-master on page 574 • Performing the QFabric System Initial Setup on a QFX3100 Director Group on page 441 • Understanding the Director Group on page 21
List of Sample Output	show fabric administration inventory director-group status on page 677 show fabric administration inventory director-group status target on page 679
Output Fields	Table 117 on page 675 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 117: 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 117: 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 dgX .
Up Time	Length of time the Director device has been operating.
Device Id/Alias	Name or identifier of the Director device.
Master Services	<p>Operational status of the database server, load balancer, and QFabric partition address.</p> <ul style="list-style-type: none"> • Database Server—Displays the state of the MySQL database process. The normal status is online (which indicates the MySQL process is running on the master Director device), and offline only in the rare case when the database is not accessible as expected. • Load Balancer Director—Displays the state of the Cluster Management service that determines which device becomes the master and which device becomes the backup in the Director group. Normally the status appears as online. If the status displays as offline, the system cannot assign the master and backup roles properly. <p>NOTE: Only the master Director device provides CLI services and listens for inventory events.</p> <ul style="list-style-type: none"> • QFabric Partition Address—Confirms that the IP address for the default partition is configured and stored correctly. The normal status is online (which indicates the IP address is available). If the IP address is missing, the status appears as offline and the system can experience issues if the Director group devices reboot. <p>NOTE: Use the default partition IP address for CLI access to your QFabric system.</p>
Director Group Managed Services	Operational status of the shared file system, network file system, virtual machine server, and DHCP load balancer. The Virtual Machine Server process starts VMs and balances them across the Director devices. Usually, the status is online , but offline indicates that VMs cannot be launched on a Director device (which negatively impacts the high availability of QFabric services).
Hard Drive Status	<p>Operational status of the Director device hard drive, including information about the volume identifier, physical identifiers, and SCSI identifiers. The system evaluates the health of the hard drive partition by checking the RAID controller, and then displays the results. Here are some general guidelines:</p> <ul style="list-style-type: none"> • The ideal value for the Volume ID field is optimal, which indicates the operating system can access the hard drive without any issues. If you remove the hard drive, or there is an issue accessing the disk, the status displays as DEGRADED. • Physical Id displays the partition access status. • Resync Progress should be 0% ideally. An increase in this percentage indicates that the health of the partition is decreasing. <p>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.</p>

Table 117: show fabric administration inventory director-group status Output Fields (*continued*)

Field Name	Field Description
Director Group Processes	<p>Operational status of the Director group processes, such as device managers, SSH, NFS, FTP, system log messages, and SNMP. Here are some additional details:</p> <ul style="list-style-type: none"> The Software Mirroring, Shared File System master, and Network File System fields indicate the status of the processes necessary to support the shared partition. The usual status is online, where data synchronization occurs as expected. offline indicates an abnormal situation when data is not synchronized between the Director devices. The Distributed Management field verifies the status of the process that communicates with the Node and Interconnect devices (for example, facilitating operational mode commands, configuration commit operations, and system log messages.). online is the expected state, and offline indicates there is a problem with this process. <p>NOTE: The distributed management process facilitates the distributed nature of a QFabric system.</p> <ul style="list-style-type: none"> When the SNMP Trap Forwarder field is online, the system is functioning as expected and SNMP traps are forwarded. When the state of this field becomes offline, SNMP traps are not forwarded Under normal conditions, the SNMP Process field appears as online for the master Director device and offline for the backup Director device. When the status is offline for the master Director device, SNMP queries fail. The Platform Management field verifies if the platform management service is active on the Director device. The usual status is online, where the service runs as expected. offline indicates the system cannot monitor the Director device.
Interface Link Status	<p>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.</p>

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
-----
Volume ID:0C72369323C3837B  optimal
Physical ID:0               online
Physical ID:1               online
Resync Progress Remaining:0  0%
Resync Progress Remaining:1  0%

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

```



```

-----
Volume ID:0C9BA4D5F21511B9      optimal
Physical ID:0                     online
Physical ID:1                     online
Resync Progress Remaining:0       0%
Resync Progress Remaining:1       0%

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                  offline
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

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	<p>none—Display all services running on the Director group, which are used to support the QFabric system.</p> <p>brief detail—(Optional) Display the specified level of output.</p> <p>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.</p> <p>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.</p> <p>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.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> • show fabric administration inventory on page 670
List of Sample Output	show fabric administration inventory infrastructure on page 682 show fabric administration inventory infrastructure fabric-controls on page 683 show fabric administration inventory infrastructure fabric-managers on page 683 show fabric administration inventory infrastructure diagnostic-routing-engines on page 683
Output Fields	Table 118 on page 681 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 118: 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.
Hostname	Name of the QFabric system component.

Table 118: show fabric administration inventory infrastructure Output Fields (*continued*)

Field Name	Field Description
PID	Process identifier for the component.
CPU-Use (%)	Percentage of CPU processing memory being used by the component.
Fabric control	<p>Name of the virtual Junos Routing Engines responsible for route selection within a QFabric system partition.</p> <p>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.</p>
Fabric manager	<p>Name of the virtual Junos Routing Engine that manages the QFabric system.</p> <p>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.</p>
Network Node group	Name of the virtual Junos Routing Engine instance that handles routing processes for a network Node group.
Diagnostic	<p>Name of the virtual Junos Routing Engine responsible for troubleshooting and diagnostic utilities within a QFabric system partition.</p> <p>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.</p>
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
------------	-------------	------	-----

dgl:

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

Syntax	<code>show fabric administration inventory interconnect-devices <i>interconnect-device-name</i></code>
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	<p>none—Display all Interconnect devices within a QFabric system.</p> <p><i>interconnect-device-name</i>—Display a specific Interconnect device within a QFabric system.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> • request chassis fabric fpc on page 571 • show chassis fabric connectivity on page 646 • show chassis fabric device on page 653 • show fabric administration inventory on page 670 • Understanding Interconnect Devices on page 23
List of Sample Output	<p>show fabric administration inventory interconnect-devices on page 685</p> <p>show fabric administration inventory interconnect-devices device-name on page 685</p>
Output Fields	Table 119 on page 684 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 119: 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

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 460](#)
 - [Configuring Node Groups for the QFabric System on page 470](#)
 - [show fabric administration inventory node-groups on page 688](#)
 - [show fabric administration inventory on page 670](#)
 - [Understanding Node Devices on page 27](#)

List of Sample Output [show fabric administration inventory node-devices on page 687](#)
[show fabric administration inventory node-devices device-name on page 687](#)

Output Fields [Table 120 on page 686](#) 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 120: 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.
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

Syntax	show fabric administration inventory node-groups <i>node-group-name</i>
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	<p>none—Display all Node groups within the QFabric system.</p> <p>node-group-name—Display information for a specific Node group within the QFabric system.</p>
Required Privilege Level	admin
Related Documentation	<ul style="list-style-type: none"> • Configuring Node Groups for the QFabric System on page 470 • show fabric administration inventory node-devices on page 686 • show fabric administration inventory on page 670
List of Sample Output	<p>show fabric administration inventory node-groups on page 689</p> <p>show fabric administration inventory node-groups node-group-name on page 689</p>
Output Fields	Table 121 on page 688 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 121: show fabric administration inventory node-groups Output Fields

Field Name	Field Description
Node group	Name of the Node groups associated with the partition.
Item	<p>Type of QFabric system component being viewed.</p> <ul style="list-style-type: none"> • 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.
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

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	<ul style="list-style-type: none"> • request fabric administration system mac-pool add on page 577 • request fabric administration system mac-pool delete on page 578
List of Sample Output	show fabric administration system mac-pool on page 690
Output Fields	Table 122 on page 690 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 122: 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

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 441](#)
- [Configuring Aliases for the QFabric System on page 460](#)
- [Configuring Node Groups for the QFabric System on page 470](#)
- [show fabric administration inventory on page 670](#)

List of Sample Output [show fabric inventory on page 692](#)
[show fabric inventory infrastructure fabric-controls on page 693](#)

[show fabric inventory node-devices on page 693](#)

[show fabric inventory node-groups on page 693](#)

Output Fields [Table 123 on page 692](#) lists the output fields for the **show fabric inventory** command. Output fields are listed in the approximate order in which they appear.

Table 123: 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

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	<ul style="list-style-type: none">• Understanding the Director Group on page 21• show fabric administration inventory director-group status on page 675
List of Sample Output	show fabric session-host on page 694
Output Fields	Table 124 on page 694 lists the output fields for the show fabric session-host command. Output fields are listed in the approximate order in which they appear.

Table 124: 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

List of Syntax	Syntax on page 695 Syntax (QFX Series and OCX Series) on page 695 Syntax (TX Matrix Routers) on page 695
Syntax	<pre>show log <filename user <username>></pre>
Syntax (QFX Series and OCX Series)	<pre>show log filename <device-type (device-id device-alias)></pre>
Syntax (TX Matrix Routers)	<pre>show log <all-lcc lcc number scc> <filename user <username>></pre>
Release Information	<p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Option <i>device-type (device-id device-alias)</i> is introduced in Junos OS Release 13.1 for the QFX Series.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>
Description	List log files, display log file contents, or display information about users who have logged in to the router or switch.
Options	<p>none—List all log files.</p> <p><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 <i>number</i> 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).</p> <p>device-type—(QFabric system only) (Optional) Display log messages for only one of the following device types:</p> <ul style="list-style-type: none"> • 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 696](#)
[show log filename on page 696](#)
[show log filename \(QFabric System\) on page 697](#)
[show log user on page 697](#)

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 rcv 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 rcv 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 rcv len 48 V9 seq 150 op add Type ifaddr index 24 devindex
43
Oct  1 18:00:19 KRT rcv 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_REO_ 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_REO_ 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

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 <i>component all</i> style upgrades.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"> • Performing a Nonstop Software Upgrade on the QFabric System on page 533 • Verifying Nonstop Software Upgrade for QFabric Systems on page 538 • Upgrading Software on a QFabric System on page 558 • request system software nonstop-upgrade on page 589
List of Sample Output	show system software upgrade status (Nonstop Software Upgrade) on page 698 show system software upgrade status (Component All Upgrade) on page 699
Output Fields	Table 125 on page 698 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 125: 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: <ul style="list-style-type: none"> • 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 <i>component all</i> 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

- [QFabric System Troubleshooting on page 703](#)

QFabric System Troubleshooting

- [Performing System Backup and Recovery for a QFabric System on page 703](#)
- [Performing a QFabric System Recovery Installation on the Director Group on page 704](#)
- [Performing a Recovery Installation on page 712](#)
- [Creating an Emergency Boot Device on page 714](#)

Performing System Backup and Recovery for a 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 588](#)
- [request system software system-backup on page 596](#)

Performing a QFabric System Recovery Installation on the Director Group

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 705
- Performing a Recovery Installation Using a Juniper Networks External USB Flash Drive with Preloaded Software on page 707

(Optional) Creating an Emergency Boot Device Using a Juniper Networks External Blank USB Flash Drive

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 *Switchingbox*, 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**
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 707 to continue with the recovery installation.

Performing a Recovery Installation Using a Juniper Networks External USB Flash Drive with Preloaded Software

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 441](#)
 - [Upgrading Software on a QFabric System on page 558](#)
 - *request system software configuration-backup*
 - *request system software configuration-restore*

Performing a Recovery Installation

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.

You can also use a system snapshot as a bootup option when your Junos OS or configuration is damaged. The system snapshot feature takes a “snapshot” of the files currently used to run the device—the complete contents of the `/config` directories, which include the running Juniper Networks Junos OS, the active configuration, and the rescue configuration, as well as the host OS—and copies all of these files into an external USB flash drive. See *Understanding System Snapshot*.

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 714](#) 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 not 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 714](#)

Creating an Emergency Boot Device

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: 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 device:

```
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:

```
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)
```




NOTE: The device automatically create a recovery Junos OS image.

The “Select a recovery image” menu appears on the console when one of these switches is booted and unable to load a version of Junos OS. You can follow the instructions in the “Select a recovery image” menu to load the Junos OS image for one of these switches.

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 712](#)
- [Performing a QFabric System Recovery Installation on the Director Group on page 704](#)
- *Performing a Recovery Installation Using an Emergency Boot Device*

