Junos Fusion Enterprise Feature Guide

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

YEAR 2000 NOTICE

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

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About the Documentation

Documentation and Release Notes

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

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Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

Documentation Conventions

Table 1 on page xvii 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 xviii 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**
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`
Italic text like this	• Introduces or emphasizes important new terms. • Identifies guide names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS CLI User Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Encloses optional keywords or variables.	**stub <default-metric *metric*>;**
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	**broadcast | multicast** **(*string1* | *string2* | *string3*)**
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	**community name members [*community-ids*]**

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

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	

GUI Conventions

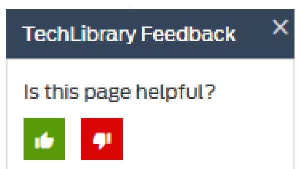
Table 2: Text and Syntax Conventions (continued)

Convention	Description	Examples
Bold text like this	Represents graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.
> (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 so that we can improve our documentation. You can use either of the following methods:

- Online feedback system—Click TechLibrary Feedback, on the lower right of any page on the Juniper Networks TechLibrary site, and do one of the following:

  - Click the thumbs-up icon if the information on the page was helpful to you.
  - Click the thumbs-down icon if the information on the page was not helpful to you or if you have suggestions for improvement, and use the pop-up form to provide 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).

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Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active Juniper Care or Partner Support Services 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 https://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf.
- Product warranties—For product warranty information, visit https://www.juniper.net/support/warranty/.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

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- Find CSC offerings: https://www.juniper.net/customers/support/
- Search for known bugs: https://prsearch.juniper.net/
- Find product documentation: https://www.juniper.net/documentation/
- Find solutions and answer questions using our Knowledge Base: https://kb.juniper.net/
- Download the latest versions of software and review release notes: https://www.juniper.net/customers/csc/software/
- Search technical bulletins for relevant hardware and software notifications: https://kb.juniper.net/InfoCenter/
- Join and participate in the Juniper Networks Community Forum: https://www.juniper.net/company/communities/
- Create a service request online: https://myjuniper.juniper.net

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

Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit https://myjuniper.juniper.net.
- 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 https://support.juniper.net/support/requesting-support/.

PART 1

Junos Fusion Enterprise

CHAPTER 1

Junos Fusion Enterprise Overview

Junos Fusion Enterprise Overview

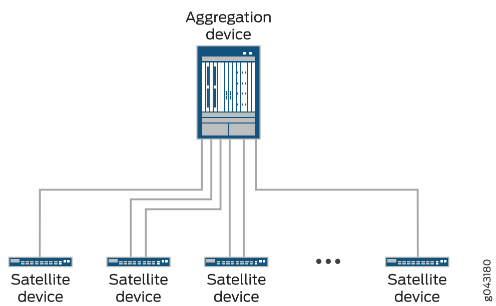
Junos Fusion provides a method of significantly expanding the number of available network interfaces on a device—called an *aggregation device*—by allowing the aggregation device to add interfaces through interconnections with *satellite devices*. The entire system—the interconnected aggregation device and satellite devices—is called a *Junos Fusion*. A Junos Fusion simplifies network topologies and administration because it appears to the larger network as a single, port-dense device that is managed using one IP address.

Junos Fusion Enterprise brings the Junos Fusion technology to enterprise switching networks. In a Junos Fusion Enterprise, EX9200 switches act as aggregation devices while EX2300, EX3400, EX4300 or QFX5100 switches act as satellite devices.

In a Junos Fusion Enterprise, each satellite device has at least one connection to the aggregation device. The aggregation device acts as the single point of management for all devices in the Junos Fusion Enterprise. The satellite devices provide network interfaces that send and receive network traffic.

Figure 1 on page 4 provides an illustration of a basic Junos Fusion Enterprise topology.

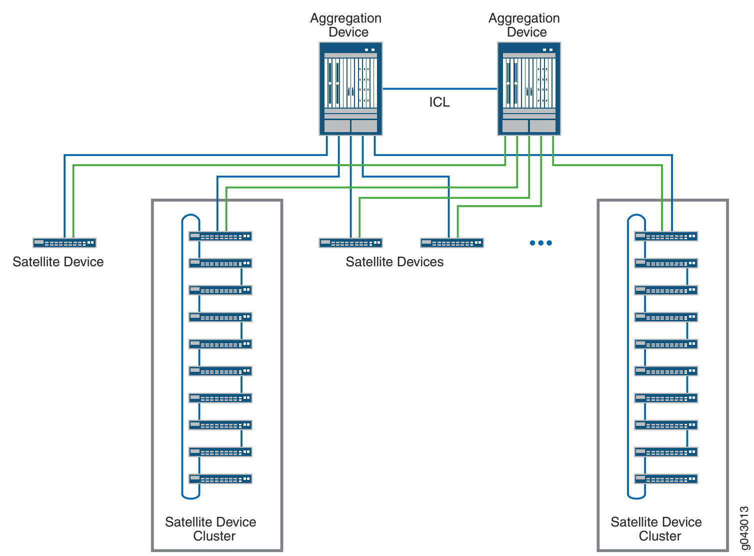
Figure 1: Basic Junos Fusion Enterprise Topology



Junos Fusion Enterprise supports up to two aggregation devices that can be multi-homed to each satellite device, as well as satellite device clustering, which allows multiple satellite devices to be clustered into a group and cabled into the Junos Fusion as a group instead of as individual satellite devices. A Junos Fusion Enterprise using two aggregation devices uses the ICCP protocol from MC-LAG to connect and maintain the Junos Fusion topology.

Figure 2 on page 4 provides an illustration of a more complex Junos Fusion Enterprise topology that is using multiple aggregation devices as well as satellite device clustering.

Figure 2: Junos Fusion Topology with Dual Aggregation Devices and Satellite Device Clusters



An EX9200 switch acting as an aggregation device in a Junos Fusion Enterprise is responsible for almost all management tasks, including interface configuration for every satellite device interface in the topology. The aggregation device runs Junos OS software for the entire Junos Fusion Enterprise, and the network-facing interfaces on the satellite devices—called *extended ports*—are configured from the aggregation device and support features that are supported by the version of Junos OS running on the aggregation device.

The satellite devices and the aggregation device maintain the control plane for the Junos Fusion Enterprise using multiple internal satellite management protocols. Network traffic can be forwarded between satellite devices through the aggregation device. Junos Fusion Enterprise supports the IEEE 802.1BR standard.

Junos Fusion Enterprise provides the following benefits:

- Simplified network topology—You can combine multiple devices into a topology that appears to the larger network as a single device, and then manage the device from a single IP address.
- Port density—You can configure a large number of network-facing interfaces into a topology that operates as a single network device.
- Manageability—You can manage a Junos Fusion that supports a large number of network-facing interfaces from a single point. The single point of management, the aggregation device, runs Junos OS software for the entire Junos Fusion.
- Flexibility—You can easily expand the size of your Junos Fusion by adding satellite devices to the Junos Fusion as your networking needs grow.
- Investment protection—In environments that need to expand because the capabilities of the existing hardware are maximized, a Junos Fusion can be a logical upgrade option because it enables the network to evolve with minimal disruption to the existing network and without having to remove the existing, previously purchased devices from the network.

Related Documentation

- Network Configuration Example: Enabling Junos Fusion Enterprise on an Enterprise Campus Network
- Understanding Junos Fusion Enterprise Components on page 5
- Understanding Junos Fusion Ports on page 17
- Understanding the Flow of Data Packets in a Junos Fusion Topology on page 37
- Configuring or Expanding a Junos Fusion Enterprise on page 45

Understanding Junos Fusion Enterprise Components

This topic describes the components of a Junos Fusion Enterprise. It covers:

- Understanding Software in a Junos Fusion Enterprise on page 12
- Understanding Interface Naming in a Junos Fusion on page 12
- Understanding Feature Configuration in a Junos Fusion Enterprise on page 13

Junos Fusion Topology

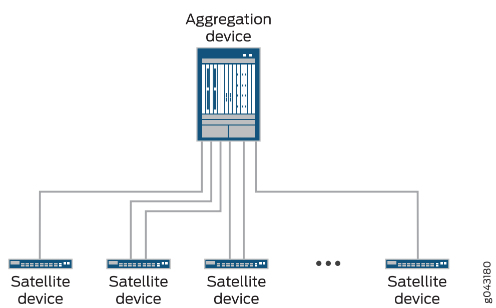
A basic Junos Fusion topology is composed of an aggregation device and multiple satellite devices. Each satellite device has at least one connection to the aggregation device. The satellite devices provide interfaces that send and receive network traffic. Network traffic can be forwarded over the aggregation device within the Junos Fusion.

The satellite devices and the aggregation device maintain the control plane for the Junos Fusion using multiple internal satellite management protocols. Junos Fusion supports the IEEE 802.1BR standard.

The aggregation device acts as the management points for all devices in the Junos Fusion. All Junos Fusion management responsibilities, including interface configuration for every satellite device interface in the Junos Fusion, are handled by the aggregation device. The aggregation device runs Junos OS software for the entire Junos Fusion, and the interfaces on the satellite devices are configured from the aggregation device and mostly support features that are supported by the version of Junos OS running on the aggregation device.

See Figure 3 on page 6 for an illustration of a basic Junos Fusion topology.

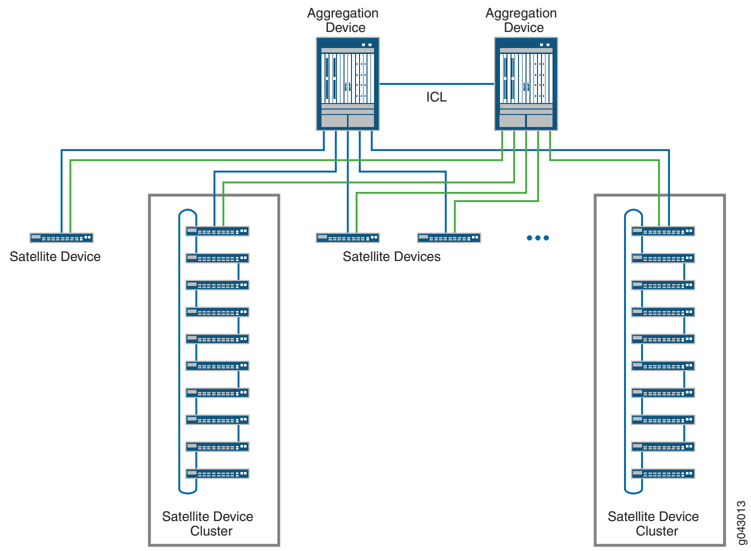
Figure 3: Basic Junos Fusion Topology



Junos Fusion Enterprise supports multihomed dual aggregation device topologies and satellite device clusters. A multihomed topology with two aggregation devices provides load balancing and redundancy to the Junos Fusion Enterprise topology. A satellite device cluster allows you to group multiple satellite devices into a single group, and connect the group to the Junos Fusion as a group instead of as single standalone devices. Dual aggregation device topologies and satellite device clustering are discussed in more detail in “Dual Aggregation Device Topologies” on page 7 and “Satellite Device Clustering” on page 8.

Figure 4 on page 7 shows a complex Junos Fusion Enterprise topology using dual aggregation devices and satellite device clusters.

Figure 4: Junos Fusion Topology with Dual Aggregation Devices and Satellite Device Clusters



Aggregation Devices

This section discusses aggregation devices and contains the following sections:

Aggregation Devices Overview

An aggregation device:

- Is an EX9200 switch in a Junos Fusion Enterprise.
- Has at least one connection to each satellite device or satellite device cluster.
- Runs Junos OS software.
- Manages the entire Junos Fusion. All Junos Fusion configuration management is handled on the aggregation device or devices, including interface configuration of the satellite device interfaces.

The hardware specifications for aggregation devices in a Junos Fusion Enterprise are discussed in greater detail in Understanding Junos Fusion Enterprise Software and Hardware Requirements.

Dual Aggregation Device Topologies

Junos Fusion Enterprise supports dual aggregation device topologies. The advantages of a dual aggregation device topology include:

- Load balancing. Traffic traversing the Junos Fusion Enterprise can be load balanced across both aggregation devices.

- Redundancy. The Junos Fusion Enterprise can pass traffic even in the unexpected event of an aggregation device failure.

A Junos Fusion Enterprise supports multiple aggregation devices using Multichassis Link Aggregation (MC-LAG) groups and the Inter-Chassis Control Protocol (ICCP).

A Junos Fusion Enterprise with dual aggregation devices is configured as an MC-LAG with one redundancy group. The redundancy group includes two peering chassis IDs—the aggregation devices—and all satellite devices in the Junos Fusion Enterprise. The aggregation devices are connected using an interchassis link (ICL) in the MC-LAG topology.

NOTE: **Direct attach copper (DAC) cable connections cannot be used to configure an ICL connecting aggregation devices in a Junos Fusion Enterprise topology.**

ICCP runs inside the Junos Fusion on all dual aggregation topologies. ICCP parameters are automatically configured in a Junos Fusion Enterprise by the automatic ICCP provisioning feature, which simplifies the ICCP configuration procedure. ICCP configuration can be customized, however. See *Configuring Multichassis Link Aggregation on EX Series Switches* for information on configuring ICCP parameters.

Figure 4 on page 7 provides an illustration of a dual aggregation device topology.

Satellite Devices

Satellite Devices Overview

A satellite device:

- Is an EX2300, EX3400, EX4300 or QFX5100 switch in a Junos Fusion Enterprise.
- Runs a version of satellite software after being converted into a satellite device.
- Has either a direct connection to an aggregation device, or is part of a satellite device cluster that is cabled to an aggregation device.
- Provides network interfaces to send and receive traffic for the Junos Fusion.
- Is managed and configured by the aggregation device.

The hardware specifications for satellite devices in a Junos Fusion Enterprise are discussed in greater detail in Understanding Junos Fusion Enterprise Software and Hardware Requirements.

Satellite Device Clustering

Satellite device clustering allows you to connect up to ten satellite devices into a single cluster, and connect the satellite device cluster to the aggregation device as a single group instead of as individual satellite devices.

Satellite device clustering is particularly useful in scenarios where optical cabling options between buildings are limited and in scenarios where you want to preserve optical interfaces for other purposes. If you have, for instance, two buildings that have limited optical interfaces between each other and you want to put an aggregation device in one building and ten satellite devices in the other building, you can group the ten satellite devices into a cluster and connect the cluster to the aggregation device with a single cable.

See “Understanding Satellite Device Clustering in a Junos Fusion” on page 13 for additional information on satellite device clustering.

Cascade Ports

A *cascade port* is a port on an aggregation device that sends and receives control and network traffic from an attached satellite device or satellite device cluster. All traffic passed between a satellite device or cluster and the aggregation device in a Junos Fusion traverses the cascade port.

The link that connects an aggregation device to a satellite device has an interface on each end of the link. The interface on the aggregation device end of the link is a cascade port. The interface on the satellite device end of the link is an uplink port.

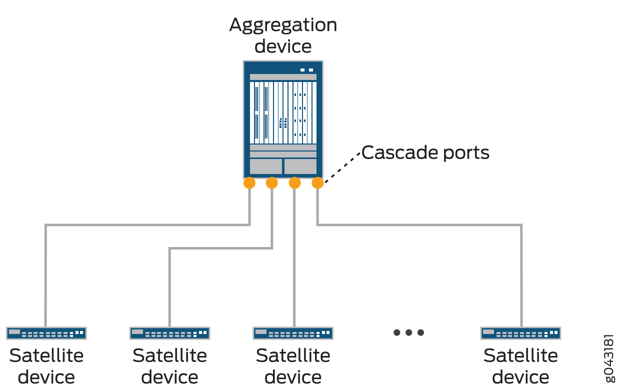
Satellite devices are added to a Junos Fusion by configuring the interface on the aggregation device end of a link into a satellite device.

A cascade port is typically a 10-Gbps interface with an SFP+ transceiver or a 40-Gbps interface with a QSFP+ transceiver, but any interface on the aggregation device that connects to the satellite device can be converted into a cascade port.

Direct attach copper (DAC) cable connections cannot be configured as cascade ports.

The location of the cascade ports in a Junos Fusion are illustrated in Figure 5 on page 9.

Figure 5: Cascade Ports



The hardware specifications for cascade ports for a Junos Fusion Enterprise are discussed in greater detail in Understanding Junos Fusion Enterprise Software and Hardware Requirements.

Uplink Ports

An *uplink port* is a physical interface on a satellite device that provides a connection to an aggregation device. All network and control traffic on a satellite device that is transported to an aggregation device is sent or received on the satellite device's uplink port.

The link that connects an aggregation device to a satellite device has an interface on each end of the link. The interface on the aggregation device end of the link is a cascade port. The interface on the satellite device end of the link is an uplink port. Uplink ports are automatically created when a cascade port is configured on the aggregation device end of the link.

Each satellite device model (EX4300, EX2300, EX3400 and QFX5100) has a set of default uplink ports that the device uses to connect to the aggregation device and, in the case of a satellite device cluster, to other satellite devices. The set of uplink (and clustering) ports may be overridden by configuring an uplink port policy for the device. The uplink port policy must include at least one default uplink port. See "Configuring Uplink Port Policies on a Junos Fusion" on page 82 for more information on uplink port policies.

An uplink port is typically a 10-Gbps SFP+ interface or a 40-Gbps QSFP+ interface, but any 1-Gbps interface that connects a satellite device to an aggregation device can become an uplink port if it is included in an uplink port policy.

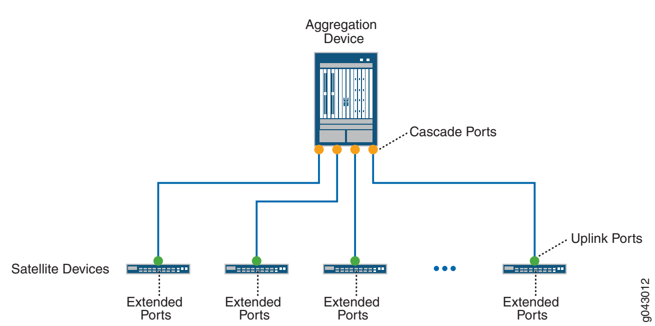
A single satellite device can have multiple uplink port connections to an aggregation device. The multiple uplink port connections to a single aggregation device provide redundancy and additional bandwidth for satellite device to aggregation device connections.

Satellite devices in a Junos Fusion with dual aggregation devices must have at least one uplink port connection to each aggregation device.

In a satellite device cluster, some cluster member satellite devices do not have uplink port connections to the aggregation device. Satellite devices in a satellite device cluster pass traffic to the aggregation device using another cluster member's uplink port.

Figure 6 on page 10 labels the uplink port location in a Junos Fusion Enterprise.

Figure 6: Junos Fusion Enterprise Ports



Extended Ports

An *extended port* is a network-facing port on a satellite device that transmits and receives network traffic for the Junos Fusion.

Network traffic received on an extended port is passed, when appropriate, to the aggregation device over the uplink port to cascade port link.

Each network-facing port on a satellite device in a Junos Fusion is also an extended port. A single cascade port is associated with multiple extended ports.

Figure 6 on page 10 labels the extended ports location in a Junos Fusion Enterprise.

Clustering Ports

Clustering ports are interfaces that interconnect satellite devices in the same satellite device cluster.

See "Understanding Satellite Device Clustering in a Junos Fusion" on page 13 for more information on clustering ports.

Understanding FPC Identifiers and Assignment in a Junos Fusion

In a Junos Fusion, each satellite device—including each member satellite device in a satellite device cluster—must have a Flexible PIC Concentrator identifier (FPC ID).

The FPC ID is in the range of 65-254, and is used for Junos Fusion configuration, monitoring, and maintenance. Interface names—which are identified using the *type-fpc / pic / port* format—use the FPC ID as the *fpc* variable when the satellite device is participating in a Junos Fusion. For instance, built-in port 2 on PIC 0 of a satellite device—a Gigabit Ethernet interface on a satellite device that is using 101 as its FPC ID— uses **ge-101/0/2** as its interface name.

A Junos Fusion provides two methods of assigning an FPC identifier:

- Unique ID-based FPC identification
- Connectivity-based FPC identification

In unique ID-based FPC identification, the FPC ID is mapped to the serial number or MAC address of the satellite device. For instance, if a satellite device whose serial number was **ABCDEFGHIJKL** was assigned to FPC ID 110 using unique ID-based FPC identification, the satellite device with the serial number **ABCDEFGHIJKL** will always be associated with FPC ID 110 in the Junos Fusion. If the satellite device with the serial number **ABCDEFGHIJKL** connects to the aggregation device using a different cascade port, the FPC ID for the satellite device remains 110.

In connectivity-based FPC identification, the FPC ID is mapped to the cascade port. For instance, connectivity-based FPC identification can be used to assign FPC ID 120 to the satellite device that connects to the aggregation device using cascade port **xe-0/0/2**. If the existing satellite device that connects to cascade port **xe-0/0/2** is replaced by a new satellite device, the new satellite device connected to the cascade port assumes FPC ID 120.

Unique ID-based FPC identification is configured using the **serial-number** or **system-id** statement in the [edit *chassis* **satellite-management fpc** *slot-id*] hierarchy.

Connectivity-based FPC identification is configured using the **cascade-ports** statement in the [edit *chassis* **satellite-management fpc** *slot-id*] hierarchy.

FPC ID configurations must be identical between aggregation devices in a Junos Fusion Enterprise with two aggregation devices. A satellite device that has two FPC IDs because of mismatched aggregation device configurations goes offline until the configuration issue is fixed.

If a prospective satellite device is connected to a Junos Fusion without having a configured FPC slot ID, the prospective satellite device does not participate in the Junos Fusion until an FPC ID is associated with it. The **show chassis satellite unprovision** output includes a list of satellite devices that are not participating in a Junos Fusion because of an FPC ID association issue.

Understanding Software in a Junos Fusion Enterprise

In a Junos Fusion, the aggregation device is responsible for all configuration and management within the Junos Fusion and runs Junos OS software.

The satellite devices, meanwhile, run satellite software that has the built-in intelligence to extend features on the Junos OS software onto the satellite device.

The role of Junos OS and satellite software is discussed in greater detail in "Understanding Software in a Junos Fusion Enterprise" on page 22.

You can see software version compatibility information for any Junos Fusion Enterprise using the Junos Fusion Hardware and Software Compatibility Matrices.

The software specifications for a Junos Fusion Enterprise are discussed in greater detail in Understanding Junos Fusion Enterprise Software and Hardware Requirements.

Understanding Interface Naming in a Junos Fusion

Network interfaces in Junos OS are specified as follows:

- *type-fpc / pic / port*

In a Junos Fusion, the interface names on the satellite devices follow this naming convention, where:

- The *type* does not change for the interface when it becomes part of a Junos Fusion. The *type* for a 10-Gbps interface, for instance, remains **xe** regardless of whether the interface is or is not in a Junos Fusion.

  You will see internally created **sd** interfaces in a Junos Fusion. The **sd** interfaces map to uplink ports and are used internally by the Junos Fusion to process some types of traffic.

- The *fpc* identifier in a Junos Fusion, which is user-configurable, is the FPC slot identifier. See "Understanding FPC Identifiers and Assignment in a Junos Fusion" on page 11.

For instance, built-in port 2 on PIC 0—a Gigabit Ethernet interface that is acting as an extended port—on the satellite device numbered as FPC slot 101 would be identified as:

ge-101/0/2

Understanding Feature Configuration in a Junos Fusion Enterprise

In a Junos Fusion, the aggregation device is responsible for all configuration and management within the Junos Fusion and runs Junos OS software.

In a Junos Fusion with one aggregation device, all configuration—whether it's a command that enables a feature globally or enables a feature on a specific extended port—is done on the lone aggregation device.

In a Junos Fusion with two aggregation devices, the configuration of any command must match between aggregation devices. If a command is enabled differently on the aggregation devices, the command might be implemented in an unpredictable manner or may not be implemented at all.

A Junos Fusion Enterprise with dual aggregation devices is an MC-LAG topology. MC-LAG topologies support commitment synchronization, a feature that allows users to configure commands on one device within a group and then share that group with other devices. In a Junos Fusion Enterprise with dual aggregation devices, commitment synchronization can be used to ensure identical configuration between aggregation devices by sharing configuration between aggregation devices.

See “Understanding Configuration Synchronization in a Junos Fusion” on page 25.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- Network Configuration Example: Enabling Junos Fusion Enterprise on an Enterprise Campus Network
- Junos Fusion Hardware and Software Compatibility Matrices

Understanding Satellite Device Clustering in a Junos Fusion

This topic describes satellite device clustering in a Junos Fusion. It covers:

Satellite Device Clustering Overview

Satellite device clustering allows you to connect up to ten satellite devices into a single cluster, then connect the satellite device cluster to the aggregation device as a single group instead of as individual satellite devices.

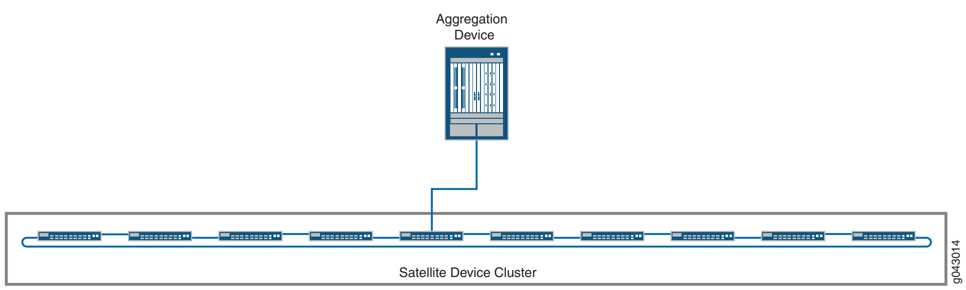
Satellite device clustering is particularly useful in scenarios where optical cabling options between buildings are limited and in scenarios where you want to preserve optical interfaces for other purposes. If you have, for instance, two buildings that have limited optical interfaces between each other and you want to put an aggregation device in one building and ten satellite devices in the other building, you can group the ten satellite devices into a cluster and connect the cluster to the aggregation device with a single cable.

Satellite Device Cluster Topology

A satellite device cluster must be cabled into a ring topology. No other cabling topologies are supported for a satellite device cluster.

Figure 7 on page 14 shows a picture of a sample satellite device cluster connected to a single aggregation device.

Figure 7: Satellite Device Cluster Topology



Satellite Device Cluster Names and Identifiers

In a Junos Fusion, each satellite device cluster is named and assigned a number. The number is called the *cluster identifier*, or *cluster ID*.

The cluster name and ID are used by the aggregation device to identify a cluster for configuration, monitoring, and troubleshooting purposes.

The cluster name and ID are set using the **set chassis satellite-management cluster *cluster-name* cluster-id *cluster-id-number*** statement.

Satellite Device Cluster Uplink Interfaces

A satellite device cluster must have at least one member with an uplink interface connection to the aggregation device.

In a dual aggregation device topology using satellite device clustering, each satellite device cluster must have at least one uplink interface connection to both aggregation devices. The uplink interfaces to the aggregation devices can be on any member satellite devices in each satellite device cluster.

NOTE: Junos Fusion Provider Edge supports only one aggregation device.

A satellite device cluster supports multiple uplink interfaces. The uplink interfaces can be on any satellite devices that are members of the satellite device cluster. The advantages of configuring multiple uplink interfaces for a satellite device cluster is resiliency—all traffic can be forwarded to another uplink interface if an uplink interface fails—and efficiency—multiple uplink interfaces can reduce the number of hops that traffic takes across a cluster before it is forwarded to an aggregation device.

Cluster Interfaces

Clustering ports are interfaces that interconnect satellite devices in the same satellite device cluster.

Traffic originating from an access device connected to an extended port travels over cluster interfaces to get to an uplink port. Traffic from an aggregation device travels to a satellite device uplink port then over cluster interfaces before it is delivered to an access device connected to an extended port.

Cluster interfaces are typically 10-Gbps SFP+ interfaces. 10-Gbps SFP+ and 40-Gbps QSFP+ interfaces can be used as cluster interfaces. Other interfaces cannot be used as cluster interfaces by default. To use other interfaces as cluster interfaces, you must configure a candidate uplink port policy.

See "Configuring Uplink Port Policies on a Junos Fusion" on page 82 for additional information on candidate uplink port policies.

Satellite Device Cluster Software Management

All satellite devices in a satellite device cluster are associated with a single satellite software upgrade group, which is automatically created when a satellite device cluster is configured as part of a Junos Fusion. The satellite software upgrade group is named after the satellite device cluster name, and ensures that all satellite devices in the cluster run the same version of satellite software.

See "Understanding Software in a Junos Fusion Enterprise" on page 22 for additional information on software management for a satellite device cluster.

See Understanding Junos Fusion Enterprise Software and Hardware Requirements for information on software requirements for satellite devices in a satellite device cluster.

FPC Identifiers and Extended Port Interfaces in a Satellite Device Cluster

Each satellite device in a satellite device cluster has a unique FPC identifier (FPC ID), in the same way that a satellite device that is not part of a cluster has a unique FPC ID.

For this reason, all interface naming for satellite device cluster member switches is not impacted by cluster membership. If a switch is assigned FPC ID 103, for instance, the aggregation device views the satellite device as FPC 103 regardless of whether it is or is not part of a satellite device cluster.

The FPC ID is used in the FPC slot name for an extended port interface; for instance, ge-103/0/2. An extended port is any network-facing interface on a satellite device. As with FPC ID naming, extended port interface names are not impacted by satellite device cluster membership status.

NOTE: Satellite devices in a cluster are configured using the unique ID-based FPC identification method of FPC identifier assignment. For more information, see *Understanding FPC Identifiers and Assignment in a Junos Fusion* in "Understanding Junos Fusion Enterprise Components" on page 5.

Understanding 40-Gbps Interfaces with QSFP+ Transceiver Roles for Satellite Devices in a Satellite Device Cluster

40-Gbps QSFP+ interfaces on satellite devices in a satellite device cluster can be used as clustering ports to cable to other satellite devices in the cluster or as uplink ports to cable the satellite device cluster to the aggregation device.

40-Gbps QSFP+ interfaces on EX2300, EX3400, EX4300 and QFX5100 satellite devices are default uplink ports. Please see Table 3 on page 16for the default uplink ports for satellite devices. When these devices are part of a satellite device cluster, the default uplink ports cannot be configured as extended ports to pass network traffic unless they have a direct connection to the aggregation device or if there is an uplink port policy configured that excludes them from acting as uplink ports.

Table 3: Default Uplink Interfaces for Junos Fusion Enterprise Satellite Devices

Device Type	Default Uplink Interfaces
EX2300 (4 ports on PIC1)	1/0 through 1/3
EX3400 (4 ports each on PIC1 and PIC2)	1/0 through 1/3 and 2/0 through 2/3
EX4300-24T (4 ports each on PIC1 and PIC2)	1/0 through 1/3 and 2/0 through 2/3
EX4300-32F (4 ports on PIC 0, 2 ports on PIC 1 and 8 ports on PIC 2)	0/32 through 0/35 1/0 through 1/1 2/0 through 2/7
EX4300-48T (4 ports each on PIC1 and PIC2)	1/0 through 1/3 and 2/0 through 2/3
EX4300-48T-BF (4 ports each on PIC1 and PIC2)	1/0 through 1/3 and 2/0 through 2/3
EX4300-48T-DC (4 ports each on PIC1 and PIC2)	1/0 through 1/3 and 2/0 through 2/3
EX4300-48T-DC-BF (4 ports each on PIC1 and PIC2)	1/0 through 1/3 and 2/0 through 2/3

Table 3: Default Uplink Interfaces for Junos Fusion Enterprise Satellite Devices (continued)

Device Type	Default Uplink Interfaces
QFX5100-48S-6Q (6 QSFP+ ports)	0/48 through 0/53
QFX5100-48T-6Q (6 QSFP+ ports)	0/48 through 0/53

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- Understanding Junos Fusion Enterprise Components on page 5
- Configuring Uplink Port Policies on a Junos Fusion on page 82

Understanding Junos Fusion Ports

In a Junos Fusion topology, cascade, uplink, and extended ports are components that play key roles. Figure 8 on page 18 and Figure 9 on page 19 show sample Junos Fusion topologies, which serve as points of reference for this discussion of cascade, uplink, and extended ports.

In the Junos Fusion topology shown in Figure 8 on page 18, two aggregation devices and two satellite devices are deployed. The aggregation devices are connected to each other through a multichassis link aggregation group (MC-LAG). Each satellite device is connected to its respective aggregation device through one or two links.

In the Junos Fusion Data Center topology shown in Figure 9 on page 19, four aggregation devices and four satellite devices are deployed. The four aggregation devices form an EVPN core fabric wherein each satellite device is multihomed to each aggregation device. Also, in this topology, some hosts are single-homed to a satellite device, and other hosts are multihomed to two satellite devices.

On the aggregation devices in each illustration, each link is connected to a cascade port (for example, CP1 on Aggregation device 1), while on the satellite devices, each link is connected to an uplink port (for example, UP1 on Satellite device 1). Hosts 1 through 4 are connected to Satellite device 1 through extended ports EP1 through EP4, and so on.

Figure 8: Cascade, Uplink, and Extended Ports in a Junos Fusion Topology With Two Aggregation Devices and MC-LAG

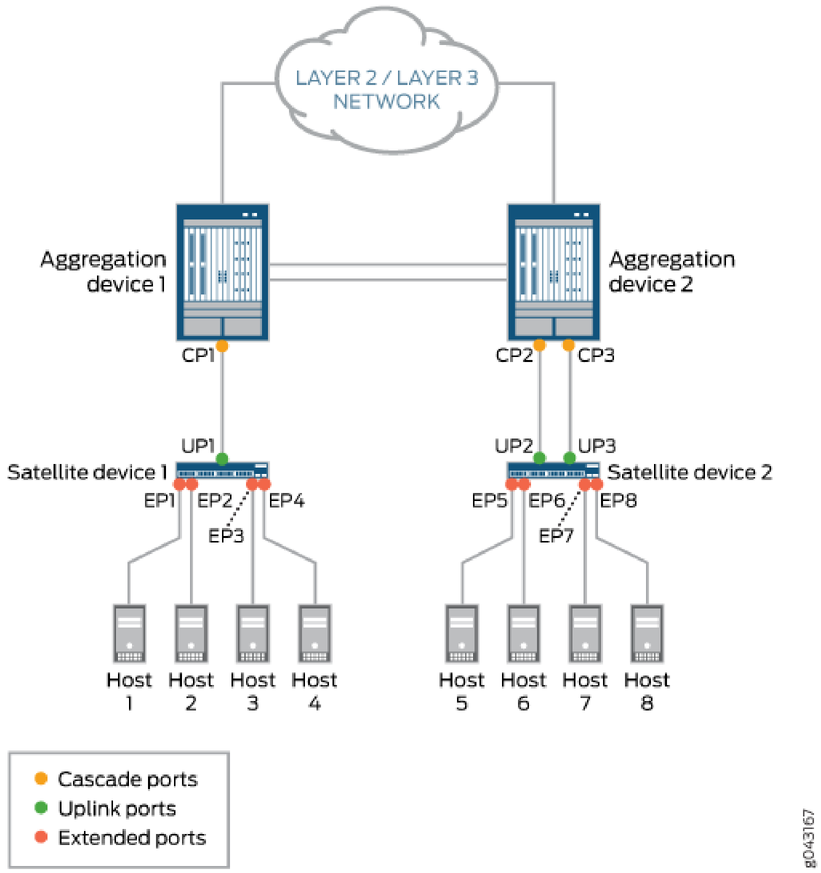
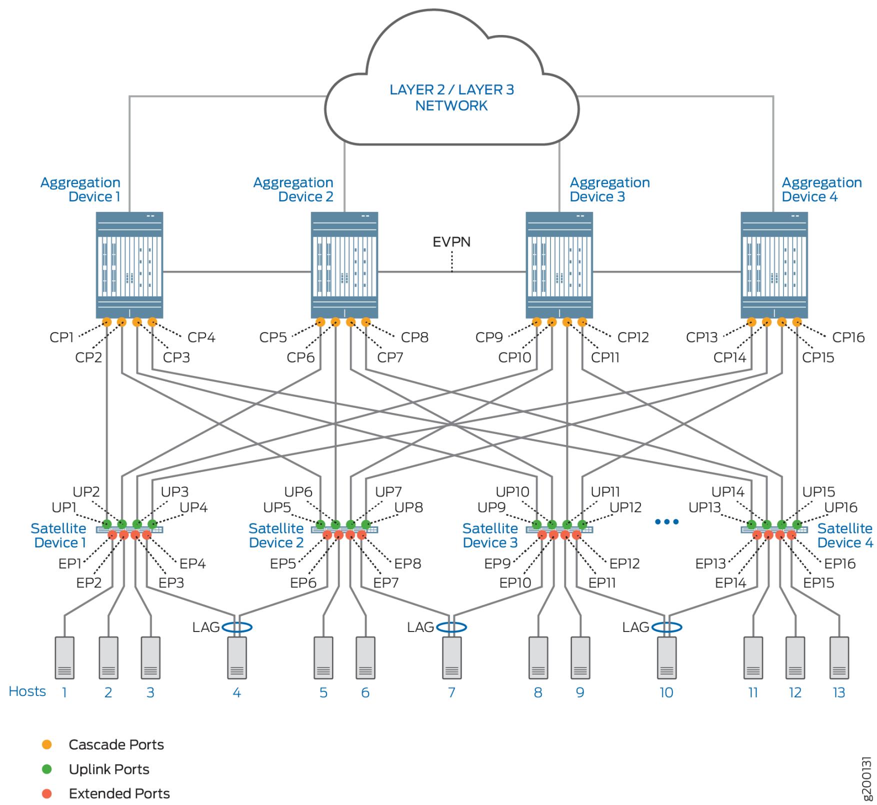


Figure 9: Cascade, Uplink, and Extended Ports in a Junos Fusion Data Center Topology With Four Aggregation Devices and EVPN



This topic provides the following information:

- Understanding Cascade Ports on page 19
- Understanding Uplink Ports on page 20
- Understanding Extended Ports on page 21

Understanding Cascade Ports

A *cascade port* is a physical interface on an aggregation device that provides a connection to a satellite device. A cascade port on an aggregation device connects to an uplink port on a satellite device.

On an aggregation device, you can set up one or more cascade port connections with a satellite device. For example, in the Junos Fusion topology shown in Figure 8 on page 18, Aggregation device 1 has one cascade port connection (CP1) to Satellite device 1, and Aggregation device 2 has two cascade port connections (CP2 and CP3) to Satellite device 2. In the Junos Fusion Data Center in Figure 9 on page 19, where EVPN multihoming is implemented, each aggregation device is connected to each satellite device through one cascade port. For example, on Aggregation device 1, cascade port CP1 is connected to the leftmost satellite device, cascade port CP2 is connected to the next satellite device, and so on.

When there are multiple cascade port connections to a satellite device, as shown in Figure 8 on page 18, the traffic handled by the ports is automatically load-balanced. For a packet destined for a satellite device, the cascade port over which to forward the packet is chosen based on a per-packet hash that is computed using key fields in the packet. To select the key fields to be used, you can specify the **hash-key** statement in the **[edit forwarding-options]** hierarchy or the **enhanced-hash-key** statement in the **[edit forwarding-options]**, **[edit logical-systems *logical-system-name* routing-instances *instance-name* forwarding-options]**, and **[edit routing-instances *instance-name* forwarding-options]** hierarchies.

NOTE: The 802.1BR tag is not included in the load-balancing hash computation for cascade ports.

In addition, a cascade port can handle the traffic for all extended ports on a particular satellite device. However, you cannot specify that a particular cascade port handle the traffic for a particular extended port.

After you configure an interface as a cascade port (for example, by issuing **set interfaces xe-0/0/1 cascade-port**), you cannot configure the interface as a Layer 2 interface (for example, by issuing **set interfaces xe-0/0/1 unit 0 family bridge**) or a Layer 3 interface (for example, **set interfaces xe-0/0/1 unit 0 family inet**). If you try to configure a cascade port as a Layer 2 or Layer 3 interface, you receive an error message.

On a cascade port, you can configure class-of-service (CoS) policies.

Understanding Uplink Ports

An *uplink port* is a physical interface on a satellite device that provides a connection to an aggregation device. An uplink port on a satellite device connects to a cascade port on an aggregation device.

After a cascade port is configured on the aggregation device end of a link, a corresponding uplink port is automatically created on the satellite device. From the aggregation device, you can monitor port and queue statistics for uplink ports. However, we do not recommend that you configure Layer 2 or Layer 3 forwarding features on uplink ports.

On a satellite device, you can set up one or more uplink port connections to an aggregation device. For example, in the Junos Fusion topology shown in Figure 8 on page 18, Satellite device 1 has one uplink port (UP1) to Aggregation device 1, and Satellite device 2 has two uplink ports (UP2 and UP3) to Aggregation device 2. In the Junos Fusion Data Center in Figure 9 on page 19, where EVPN multihoming is implemented, each satellite device is connected to each aggregation device through an uplink port. For example, on the leftmost satellite device, uplink port UP1 is connected to Aggregation device 1, uplink port UP2 is connected to Aggregation device 2, and so on.

When a satellite device has multiple uplink ports to an aggregation device, the traffic from the extended ports is automatically load-balanced among the uplink ports. For example, in the Junos Fusion topology shown in Figure 8 on page 18, the traffic from extended ports EP5 through EP8 is load balanced between uplink ports UP2 and UP3 to reach Aggregation device 2. In this situation, each packet is examined, and if an IPv4 or IPv6 header is found, a load-balancing algorithm chooses the uplink port based on the header (source and destination IP addresses, and source and destination TCP/UDP ports). If an IPv4 or IPv6 header is not found, the load-balancing algorithm chooses the uplink port based on the Layer 2 header (destination and source MAC addresses, Ethertype, and outer VLAN ID) of the packet.

Understanding Extended Ports

An *extended port* is a physical interface on a satellite device that provides a connection to servers or endpoints. To an aggregation device, a satellite device appears as an additional Flexible PIC Concentrator (FPC) and the extended ports on the satellite device appear as additional interfaces to be managed by the aggregation device.

On aggregation devices, you can configure extended ports by using the same Junos OS CLI and naming convention used for Junos OS interfaces on standalone routers and switches. The only difference is that when you specify an extended port name, the FPC slot number must be in the range of 100 through 254 in Junos OS Release 14.2 and in the range of 65 through 254 in Junos OS Release 16.1 and later.

For example, for the four extended ports shown on Satellite device 1 in Figure 8 on page 18 and the leftmost satellite device in Figure 9 on page 19, the FPC slot number could be 100, the PIC slot number could be 0, the first extended port could be 1, the second extended port could be 2, the third extended port could be 3, and the fourth extended port could be 4. The complete 10-Gigabit Ethernet extended port names could be as follows:

xe-100/0/1

xe-100/0/2

xe-100/0/3

xe-100/0/4

You can configure the following features on extended ports:

- Layer 2 bridging protocols
- Integrated routing and bridging (IRB)
- Firewall filters

NOTE: In a Junos Fusion Data Center with EVPN wherein VXLAN encapsulation is used, firewall filters with next-interface or next-ip actions are not supported.

- CoS policies

Related Documentation

- Understanding the Flow of Data Packets in a Junos Fusion Topology on page 37
- *hash-key*

- *enhanced-hash-key*

Understanding Software in a Junos Fusion Enterprise

This topic discusses the role of software in a Junos Fusion Enterprise. It covers:

Understanding Junos OS for the Aggregation Device in a Junos Fusion

An aggregation device in a Junos Fusion always runs Junos OS software and is responsible for almost all management tasks, including configuring all network-facing ports—the *extended ports*—on all satellite devices in the Junos Fusion. The extended ports in a Junos Fusion, therefore, typically support features that are supported by the version of Junos OS running on the aggregation device.

An aggregation device in a Junos Fusion runs the same Junos OS software regardless of whether it is or is not part of a Junos Fusion. Hence, Junos OS software is acquired, installed, and managed on an aggregation device in a Junos Fusion in the same manner that it is acquired, installed, and managed on a standalone device that is not part of a Junos Fusion.

Understanding Satellite Software for the Satellite Devices in a Junos Fusion

The satellite devices in a Junos Fusion run satellite software that has the built-in intelligence to extend features on the Junos OS software onto the satellite device. The satellite software is a Linux-based operating system that allows the satellite devices to communicate with the aggregation device for control plane data while also passing network traffic.

All satellite devices in a Junos Fusion must run satellite software that is compatible with the Junos OS software running on the aggregation device. See Junos Fusion Hardware and Software Compatibility Matrices for software compatibility requirements and links to the satellite software.

You can run the same version of satellite software on satellite devices that are different hardware platforms. For instance, if your Junos Fusion included EX2300 and EX4300 switches as satellite devices, the EX2300 and EX4300 switches acting as satellite devices could install the satellite software from the same satellite software package.

You can download satellite software from the software center for any satellite device. See the Junos Fusion Hardware and Software Compatibility Matrices, which provides software requirements as well as links to satellite device and Junos OS software.

Additionally, you have the option to order some switches with the satellite software preinstalled from the factory.

The satellite software packages are stored on the aggregation device after a satellite software package installation—which is typically managed from the aggregation device—has been executed. The satellite software packages remain in the file system even if the Junos OS on the aggregation device is upgraded. The satellite software on a satellite device can be updated individually or, more commonly, using satellite software upgrade-groups, which are discussed in more detail in this document.

A device cannot simultaneously run Junos OS and the satellite software. If you remove a satellite device from a Junos Fusion, you have to install the Junos OS onto the device before you can use it in your network as a standalone Junos switch.

Satellite software is sometimes referred to as satellite network operating system (SNOS) software in the command-line interface and in other documentation.

The satellite software requirements for a Junos Fusion Enterprise are discussed in Understanding Junos Fusion Enterprise Software and Hardware Requirements.

Understanding Satellite Software Upgrade Groups

A *satellite software upgrade group* is a group of satellite devices that are designated to upgrade to the same satellite software version. One Junos Fusion can contain multiple software upgrade groups, and multiple software upgrade groups should be configured in most Junos Fusions to avoid network downtimes during satellite software installations.

When a satellite device is added to a Junos Fusion, the aggregation device checks if the satellite device is using an FPC ID that is included in a satellite software upgrade group. If the satellite device is using an FPC ID that is part of a satellite software upgrade group, the device upgrades its satellite software to the version of software associated with the satellite software upgrade group - unless it is already running the defined version.

When the satellite software package associated with an existing satellite software group is changed, the satellite software for all member satellite devices is upgraded using a throttled upgrade. The throttled upgrade ensures that the aggregation device is not overwhelmed with providing satellite software simultaneously to many satellite devices.

When satellite devices of a satellite device cluster are upgraded, members of the same satellite device cluster download the software to be used and install the software at the same time as other members of the cluster. This ensures that cluster members run the same version of software as each other in case there are incompatibilities between satellite software versions.

The two most common methods of installing satellite software onto a Junos switch—autoconverting a device into a satellite device when it is cabled into an aggregation device and manually converting a device that is cabled into an aggregation device into a satellite device—require the presence of a configured satellite software upgrade group.

Software upgrade groups are configured and managed on the aggregation device.

Understanding Satellite Software Requirements for a Satellite Device Cluster

All satellite devices in a satellite device cluster are associated with a single satellite software upgrade group, which is automatically created when a satellite device cluster is configured as part of a Junos Fusion. The satellite software upgrade group uses the same name as the satellite device cluster name, and ensures that all satellite devices in the cluster run the same version of satellite software.

The automatically created software upgrade group for the satellite device cluster is managed like any other software upgrade group.

Understanding Satellite Software Requirements in a Dual Aggregation Device Topology

In a Junos Fusion with dual aggregation devices, you must ensure that only one version of satellite software is associated with each satellite software upgrade group.

When configuring a Junos Fusion into a dual aggregation topology, do one of the following to ensure satellite software is properly maintained:

- Configure all satellite software upgrade groups on one of the aggregation devices.
- Configure the exact same satellite software upgrade group—a satellite software upgrade group with the same name and same FPC ID associations—on both aggregation devices.

If there is a mismatch between satellite software upgrade group membership or satellite software version for a satellite software upgrade group, satellite software is not upgraded on any satellite devices in the upgrade group until the configuration and version association is addressed.

Understanding the Platform Specific Satellite Software Image

The platform specific satellite software package is required to install satellite software onto an EX2300, EX3400 or EX4300 switch that is not connected to an aggregation device. Use the platform specific satellite software package when you want to manually install satellite software on a switch using the **request chassis device-mode satellite *URL-to-satellite-software*** command before you interconnect that switch into a Junos Fusion Enterprise.

NOTE: **Platform specific satellite software is not required for QFX5100 switches.**

You can identify the platform specific satellite software by looking for the satellite-ppc prefix in the satellite software image name; for example, satellite-ppc-3.0R1.1-signed.tgz. To find the image that is compatible with your satellite device, please refer to Junos Fusion Hardware and Software Compatibility Matrices.

Related Documentation

- Junos Fusion Hardware and Software Compatibility Matrices

- Understanding Junos Fusion Enterprise Software and Hardware Requirements on page 26
- Configuring or Expanding a Junos Fusion Enterprise on page 45

Understanding Configuration Synchronization in a Junos Fusion

All configuration and management for a Junos Fusion are done from the aggregation devices. which run Junos OS software.

In a Junos Fusion with one aggregation device, all configuration—whether it's a configuration statement that enables a feature globally or enables a feature on a specific extended port—is done from the lone aggregation device.

A Junos Fusion with multiple aggregation devices often requires that the configuration of a feature—for example, an extended port, and entities such as routing instances and VLANs that include the extended port—must match on all aggregation devices. If a configuration statement for the feature—in this case, the extended port—is specified differently on one aggregation device, the statement on that particular aggregation device might be implemented in an unpredictable manner or might not be implemented at all.

Junos Fusion supports configuration synchronization, a feature that allows users to specify configuration statements within a group on one aggregation device and then share that group with other aggregation devices.

We strongly recommend using configuration synchronization to configure software features in multiple aggregation device topologies. Configuration synchronization ensures configuration consistency by sharing the exact same configuration between aggregation devices. Configuration synchronization also simplifies administration of a Junos Fusion by allowing users to enter configuration statements once in a configuration group and apply the configuration group to all aggregation devices rather than repeating a configuration procedure manually on each aggregation device.

For more information about configuration synchronization, see "Enabling Configuration Synchronization Between Aggregation Devices in a Junos Fusion" on page 77, Understanding MC-LAG Configuration Synchronization, and Synchronizing and Committing MC-LAG Configurations.

See Enabling Junos Fusion Enterprise on an Enterprise Campus Network for a sample Junos Fusion Enterprise topology configured largely using configuration synchronization. See Enterprise Data Center: Junos Fusion Data Center Architecture for a sample Junos Fusion Data Center topology largely configured using configuration synchronization.

Configuration Synchronization and Aggregation Devices with Two Routing Engines in a Junos Fusion Data Center with EVPN

QFX10008 and QFX10016 switches, which support two Routing Engines, can function as aggregation devices in a Junos Fusion Data Center with EVPN. When a configuration group is applied to a QFX10008 or QFX10016 switch, the configuration must be shared with both Routing Engines on the switch.

You can identify each Routing Engine by configuring an IP address for the Routing Engine in slot 0 (re0) and another IP address for the Routing Engine in slot 1 (re1). We recommend using management interface em0.0 for both re0 and re1, which you can configure using configuration groups for re0 and re1. For example:

```
[edit]
user@aggregation-device-1# set groups re0 interfaces em0 unit 0 family inet address
172.16.75.10/24
user@aggregation-device-1# set groups re1 interfaces em0 unit 0 family inet address
172.16.75.20/24
```

When applying a configuration group to a Routing Engine, you must specify the IP address assigned to the Routing Engine. For example, if a Junos Fusion Data Center with an EVPN architecture has four QFX10008 switches that serve as aggregation devices, you can apply a configuration group named overlay to Routing Engines re0 and re1 on each aggregation device as follows. This configuration is performed on aggregation device-1 (ad-1):

```
[edit]
user@aggregation-device-1# set groups overlay when peers 172.16.75.10 (ad-1, re0)
user@aggregation-device-1# set groups overlay when peers 172.16.75.20 (ad-1, re1)
user@aggregation-device-1# set groups overlay when peers 172.16.75.30 (ad-2, re0)
user@aggregation-device-1# set groups overlay when peers 172.16.75.40 (ad-2, re1)
user@aggregation-device-1# set groups overlay when peers 172.16.75.50 (ad-3, re0)
user@aggregation-device-1# set groups overlay when peers 172.16.75.60 (ad-3, re1)
user@aggregation-device-1# set groups overlay when peers 172.16.75.70 (ad-4, re0)
user@aggregation-device-1# set groups overlay when peers 172.16.75.80 (ad-4, re1)
```

Related Documentation

- Enabling Configuration Synchronization Between Aggregation Devices in a Junos Fusion on page 77

Understanding Junos Fusion Enterprise Software and Hardware Requirements

This topic describes the software and hardware requirements for a Junos Fusion Enterprise. For Junos Fusion Provider Edge software and hardware requirements, see Understanding Junos Fusion Provider Edge Software and Hardware Requirements. For Junos Fusion Data Center software and hardware requirements, see Understanding Junos Fusion Data Center Software and Hardware Requirements.

It covers:

Aggregation Device to Satellite Device Software Compatibility

A Junos Fusion Enterprise includes an aggregation device or devices running Junos OS and satellite devices running satellite software. The version of Junos OS running on the aggregation device must be compatible with the satellite software versions running on the satellite device in order for the Junos Fusion Enterprise to function.

See Junos Fusion Hardware and Software Compatibility Matrices for software compatibility information for any Junos Fusion Enterprise.

NOTE: When you upgrade the satellite software version to a release later than the recommend versions listed in the Junos Fusion Hardware and Software Compatibility Matrices, your Junos Fusion system will only benefit from the satellite software fixes. To acquire the full benefits of a satellite software release, including satellite software fixes and new features, we recommend you upgrade both the aggregation device software and its compatible satellite device software for a complete upgrade.

Aggregation Devices

This section details the hardware and software requirements for an aggregation device in a Junos Fusion Enterprise. It covers:

Aggregation Device Hardware Models

Table 4 on page 27 lists the hardware platforms that are supported as aggregation devices for a Junos Fusion Enterprise. It also lists the supported satellite devices for each Junos OS Release supporting Junos Fusion Enterprise.

Table 4: Supported Aggregation Device Hardware and Supported Satellite Devices by Junos OS Release

Aggregation Device Hardware	Supported Satellite Devices by Junos OS Release
EX9204 Switch	16.1R1 (EX4300) 17.1R1 (EX2300, EX3400, EX4300) 17.3R1 (EX2300, EX3400, EX4300, QFX5100) 18.2R1 (EX2300, EX3400, EX4300, QFX5100, EX4600)
EX9208 Switch	16.1R1 (EX4300) 17.1R1 (EX2300, EX3400, EX4300) 17.3R1 (EX2300, EX3400, EX4300, QFX5100) 18.2R1 (EX2300, EX3400, EX4300, QFX5100, EX4600)

Table 4: Supported Aggregation Device Hardware and Supported Satellite Devices by Junos OS Release (continued)

Aggregation Device Hardware	Supported Satellite Devices by Junos OS Release
EX9214 Switch	16.1R1 (EX4300) 17.1R1 (EX2300, EX3400, EX4300) 17.3R1 (EX2300, EX3400, EX4300, QFX5100) 18.2R1 (EX2300, EX3400, EX4300, QFX5100, EX4600)
EX9251 Switch	18.1R1 (EX2300, EX3400, EX4300, QFX5100) 18.2R1 (EX2300, EX3400, EX4300, QFX5100, EX4600)
EX9253 Switch	18.2R1 (EX2300, EX3400, EX4300, QFX5100, EX4600)

Maximum Number of Aggregation Devices

A Junos Fusion Enterprise supports one or two aggregation devices.

Cascade Ports

A *cascade port* is a port on an aggregation device that sends and receives control and network traffic from an attached satellite device.

Table 5 on page 28 provides a list of line cards on an EX9200 switch that have interfaces that can be converted into cascade ports, and the initial Junos OS release that introduced cascade port support for interfaces on the line card.

Direct attach copper (DAC) cable connections cannot be configured as cascade ports.

BEST PRACTICE: A cascade port is typically a 10-Gbps interface with an SFP+ transceiver or a 40-Gbps interface with a QSFP+ transceiver, although other interfaces on the aggregation device can be converted into a cascade port.

Table 5: Line Cards on EX9200 Switch Cascade Port Support

Line Card	Switch Model	Initial Junos OS Release
EX9200-6QS (6-port 40-Gigabit Ethernet QSFP+, 24-port 10-Gigabit Ethernet SFP+ line card)	EX9204	16.1R1
	EX9208	16.1R1
	EX9214	16.1R1

Table 5: Line Cards on EX9200 Switch Cascade Port Support (continued)

Line Card	Switch Model	Initial Junos OS Release
EX9200-32XS (32-port SFP+ line card)	EX9204	16.1R1
	EX9208	16.1R1
	EX9214	16.1R1
EX9200-40T (40-port 10/100/1000BASE-T RJ-45 line card)	EX9204	16.1R1
	EX9208	16.1R1
	EX9214	16.1R1
EX9200-MPC (modular line card) The following MICs are supported: • EX9200-10XS-MIC • EX9200-20F-MIC • EX9200-40T-MIC	EX9204	17.1R1
	EX9208	17.1R1
	EX9214	17.1R1
EX9200-40F (40-port 100FX/1000BASE-X SFP line card)	EX9204	17.4R1
	EX9208	17.4R1
	EX9214	17.4R1
EX9200-40F-M (40-port 100FX/1000BASE-X SFP line card with MACsec)	EX9204	17.4R1
	EX9208	17.4R1
	EX9214	17.4R1
EX9200-40XS (40-port 10GbE SFP+ line card with MACsec)	EX9204	17.4R1
	EX9208	17.4R1
	EX9214	17.4R1

Table 5: Line Cards on EX9200 Switch Cascade Port Support (continued)

Line Card	Switch Model	Initial Junos OS Release
EX9200-12QS (12-port 10GbE/40GbE QSFP+ or 4-port 100GbE QSFP28 combo line card) NOTE: All ports can operate at 10-Gbps and 40-Gbps speeds. The ports are configured to operate at 10-Gbps speed by default.	EX9204	17.4R1
	EX9208	17.4R1
	EX9214	17.4R1
EX9253-6Q12C (12-port QSFP28 40GbE/100GbE and 6-port QSFP+ 40GbE line card)	EX9253	18.2R1
EX9253-6Q12C-M (12-port QSFP28 40GbE/100GbE and 6-port QSFP+ 40GbE line card with MACsec)	EX9253	18.2R1

Satellite Devices

This section details the hardware and software requirements for a satellite device in a Junos Fusion Enterprise. It covers:

Satellite Device Hardware Models

Table 6 on page 31 lists the EX2300 hardware platforms that are supported as satellite devices for a Junos Fusion Enterprise.

To find the required satellite software version, see Junos Fusion Hardware and Software Compatibility Matrices.

Table 6: Supported EX2300 Satellite Device Hardware and Initial Junos OS Release

Hardware	Initial Junos OS Release
EX2300-C-12P	15.1X53-D55
EX2300-C-12T	15.1X53-D55
EX2300-24P	15.1X53-D55
EX2300-24T	15.1X53-D55
EX2300-24T-DC	15.1X53-D55
EX2300-48P	15.1X53-D55
EX2300-48T	15.1X53-D55

Table 7 on page 31 lists the EX3400 hardware platforms that are supported as satellite devices for a Junos Fusion Enterprise.

To find the required satellite software version, see Junos Fusion Hardware and Software Compatibility Matrices.

Table 7: Supported EX3400 Satellite Device Hardware and Initial Junos OS Release

Hardware	Initial Junos OS Release
EX3400-24P	15.1X53-D55
EX3400-24T	15.1X53-D55
EX3400-24T-DC	15.1X53-D55
EX3400-48P	15.1X53-D55
EX3400-48T	15.1X53-D55
EX3400-48T-AFI	15.1X53-D55

Table 8 on page 31 lists the EX4300 hardware platforms that are supported as satellite devices for a Junos Fusion Enterprise.

To find the required satellite software version, see Junos Fusion Hardware and Software Compatibility Matrices.

Table 8: Supported EX4300 Satellite Device Hardware and Initial Junos OS Release

Hardware	Initial Junos OS Release
EX4300-24P	14.1X53-D43

Table 8: Supported EX4300 Satellite Device Hardware and Initial Junos OS Release (continued)

Hardware	Initial Junos OS Release
EX4300-24T	14.1X53-D43
EX4300-32F	14.1X53-D43
EX4300-48P	14.1X53-D43
EX4300-48T	14.1X53-D43
EX4300-48T-BF	14.1X53-D43
EX4300-48T-DC	14.1X53-D43
EX4300-48T-DC-BF	14.1X53-D43

Table 9 on page 32 lists the QFX5100 hardware platforms that are supported as satellite devices for a Junos Fusion Enterprise.

To find the required satellite software version, see Junos Fusion Hardware and Software Compatibility Matrices.

Table 9: Supported QFX5100 Satellite Device Hardware and Initial Junos OS Release

Hardware	Initial Junos OS Release
QFX5100-48S-6Q	14.1X53-D43
QFX5100-48T-6Q	14.1X53-D43

Table 10 on page 32 lists the EX4600 hardware platforms that are supported as satellite devices for a Junos Fusion Enterprise.

NOTE: The EX4600-EM-8F and QFX-EM-4Q expansion modules are not supported in a Junos Fusion Enterprise.

Table 10: Supported EX4600 Satellite Device Hardware and Initial Junos OS Release

Hardware	Initial Junos OS Release
EX4600-40F	14.1X53-D47

Satellite Device Firmware Requirements

Table 11 on page 33 lists the firmware requirements for satellite devices for a Junos Fusion Enterprise.

Table 11: Minimum Satellite Device Firmware Version Requirements

Satellite Device	Minimum U-boot Release	Minimum Loader Version	Minimum PoE Firmware
EX2300	1.3.2	NA	1.6.1.1.9
EX3400	1.3.0	NA	1.6.1.1.9
EX4300	NA	NA	2.6.3.9.2.1
EX4600	NA	NA	NA
QFX5100	NA	NA	NA

Satellite Device Software Requirements for Satellite Device Clustering

A standalone switch must be running the required satellite software before it can be added to a Junos Fusion Enterprise as a member of a satellite device cluster. A standalone switch running any version of satellite software below the minimum required version for that switch is not recognized by the aggregation device and cannot be added to a Junos Fusion Enterprise as a member of a satellite device cluster. To find the required satellite software version, see Junos Fusion Hardware and Software Compatibility Matrices.

If your switch is running a version of satellite or Junos OS software below the required minimum and you want to include the switch in a satellite device cluster, follow one of these procedures:

- if your switch is already cabled into a Junos Fusion and is able to upgrade to a version of satellite software that supports satellite device clustering, upgrade the satellite software on the switch before adding it to the satellite device cluster. See "Configuring or Expanding a Junos Fusion Enterprise" on page 45.
- If your switch is not cabled into a Junos Fusion, install a version of Junos OS that supports satellite device clustering using the procedure outlined in "Installing Junos OS Software on a Standalone Device Running Satellite Software" on page 144 before installing the switch into the satellite device cluster.

  Once the switch is running a version of Junos OS that supports satellite device clustering, you can install the required satellite software version manually or as part of the satellite software installation that occurs as part of the procedure for adding a satellite device to a Junos Fusion Enterprise.

NOTE: An aggregation device running Junos OS Release 16.1 is compatible with clustered satellite devices running SNOS version 2.0R1. If the aggregation device is running Junos OS Release 17.1, the clustered satellite devices must be running SNOS version 3.0R1. To upgrade an aggregation device from Junos OS Release 16.1 to Junos OS Release 17.1 (or to add EX2300 and EX3400 switches to your Junos Fusion Enterprise setup), you must first upgrade the EX4300 satellite devices to SNOS version 3.0R1 and then upgrade the aggregation device to Junos OS Release 17.1. See *Upgrading from Junos OS Release 16.1 to 17.1 in a JUNOS Fusion Enterprise System* in "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

Satellite Software to Junos OS Conversion Requirements

A satellite device can be removed from a Junos Fusion Enterprise and reinserted into a network as a switch running Junos OS. See *Removing a Satellite Device from a Junos Fusion*.

A device running satellite software must be converted to a version of Junos OS that supports satellite device conversion. The minimum Junos OS versions that support satellite device conversion are provided in this document.

The following list provides additional information for converting each type of switch from satellite software to Junos OS.

- EX2300 and EX3400 switches:
  - EX2300 and EX3400 switches cannot be converted from satellite software to Junos from an aggregation device. To convert the satellite software, remove the satellite device from the Junos Fusion Enterprise and perform the upgrade manually. See Installing Junos OS Software on a Standalone Device Running Satellite Software
  - EX2300 and EX3400 switches must be converted to Junos OS Release 15.1X53-D55 or later.
  - The target Junos OS image must be a signed version of Junos OS. The text string *-signed* text must be n the Junos OS image filename when the image is downloaded from the Software Center.
- EX4300 switches:
  - EX4300 switches must be converted to Junos OS Release 14.1X53-D43 or later.
  - The target Junos OS image must be a signed version of Junos OS. The text string *-signed* text must be n the Junos OS image filename when the image is downloaded.
- QFX5100 switches:
  - The QFX5100 switch must be converted to Junos OS Release 14.1X53-D43 or later.
  - The target Junos OS image must be a Preboot eXecution Environment (PXE) version of Junos OS. The PXE version of Junos OS includes *pxe* in the package name when it is downloaded from the Software Center—for example, the PXE image for Junos

OS Release 14.1X53-D43 is named *install-media-pxe-qfx-5-14.1X53-D43.3-domestic-signed.tgz*.

- The target Junos OS image must be a signed version of Junos OS. The text string *-signed* text must be n the Junos OS image filename when the image is downloaded.

- EX4600 switches:
  - The EX4600 switch must be converted to Junos OS Release 14.1X53-D47 or later.
  - The target Junos OS image must be a Preboot eXecution Environment (PXE) version of Junos OS. The PXE version of Junos OS includes *pxe* in the package name when it is downloaded from the Software Center—for example, *install-media-pxe-qfx-5-14.1X53-D47.<version>-domestic-signed.tgz*.
  - The target Junos OS image must be a signed version of Junos OS. The text string *-signed* text must be n the Junos OS image filename when the image is downloaded.

Power over Ethernet Requirements for a Satellite Device

A satellite device must be running Power over Ethernet (PoE) controller software version as specified in Table 11 on page 33.

To check the PoE controller software version, enter the **show chassis firmware detail** command and view the **PoE firmware** output.

For information on checking and upgrading the PoE controller software, see *Upgrading the PoE Controller Software*.

NOTE: PoE is not supported for QFX5100 satellite devices.

Maximum Number of Satellite Devices or Extended Ports

A Junos Fusion Enterprise supports up to 128 satellite devices or 6,000 extended port access interfaces.

Related Documentation

- Junos Fusion Hardware and Software Compatibility Matrices
- Configuring or Expanding a Junos Fusion Enterprise on page 45

Understanding ICCP in a Junos Fusion using Dual Aggregation Devices

This topic describes the Inter-Chassis Control Protocol (ICCP) in a Junos Fusion. It covers:

ICCP in a Junos Fusion Overview

Inter-Chassis Control Protocol (ICCP) is used in MC-LAG topologies to exchange control information between the devices in the topology. See Multichassis Link Aggregation Features, Terms, and Best Practices for additional information on ICCP.

A Junos Fusion with two aggregation devices is an MC-LAG topology, and is therefore always running ICCP as the control protocol. A Junos Fusion using a single aggregation device is not an MC-LAG topology and does not run ICCP.

A dedicated ICCP link is highly recommended in a Junos Fusion deployment, but is not required. ICCP traffic is transmitted across the ICL when an ICCP link is not configured. An ICCP link can be one link or an aggregated ethernet interface. In most Junos Fusion deployments, we recommend using a 40-Gbps link or an aggregated ethernet interface as the ICCP link.

Automatic ICCP Provisioning

Junos Fusion supports automatic ICCP provisioning, which automatically configures ICCP in a dual aggregation device setup without any user action. Automatic ICCP provisioning is enabled by default and is often the preferred method of enabling ICCP for a Junos Fusion in greenfield deployments that are not being integrated into an existing network. If you are installing your Junos Fusion in an environment that doesn't have to integrate into an existing campus network, you can usually ignore manual ICCP configuration processes and allow automatic ICCP provisioning to enable ICCP. Automatic ICCP provisioning is described in more detail in Understanding Automatic ICCP Provisioning and Automatic VLAN Provisioning of an Interchassis Link.

Many Junos Fusion installations occur in brownfield deployments and the Junos Fusion has to be integrated into an existing network. Brownfield deployments often have a need to maintain existing ICCP settings, in particular in scenarios where a Junos Fusion is replacing an MC-LAG topology or is supporting a network that includes other MC-LAG topologies. ICCP must be configured manually in these scenarios.

See Enabling Junos Fusion Enterprise on an Enterprise Campus Network for an example of a Junos Fusion Enterprise deployment that manually configures ICCP. See *Configuring Multichassis Link Aggregation on EX Series Switches* for comprehensive information on configuring ICCP manually.

Related Documentation

- Multichassis Link Aggregation Features, Terms, and Best Practices
- Configuring or Expanding a Junos Fusion Enterprise on page 45

Understanding the Flow of Data Packets in a Junos Fusion Topology

All Ethernet data packets that are exchanged between aggregation devices and satellite devices in a Junos Fusion topology include an E-channel tag (ETAG) header that carries an E-channel identifier (ECID) value. The ECID value, which is assigned by the aggregation device, identifies the source or destination extended port on one of the connected satellite devices.

In a sample Junos Fusion topology, where an aggregation device is connected to two satellite devices, the following Layer 2 unicast data packet flow scenarios can occur:

- Scenario 1—A host on one satellite device sends a packet to another host on the same satellite device. For example, Host 2 sends a unicast packet to Host 4. Both hosts are connected to Satellite device 1. (See Figure 10 on page 38.)
- Scenario 2—A host on one satellite device sends a packet to another host on the other satellite device. For example, Host 2, which is connected to Satellite device 1, sends a unicast packet to Host 7, which is connected to Satellite device 2. (See Figure 11 on page 39.).

Figure 10: Layer 2 Unicast Data Packet Flow Through a Junos Fusion Topology—Scenario 1

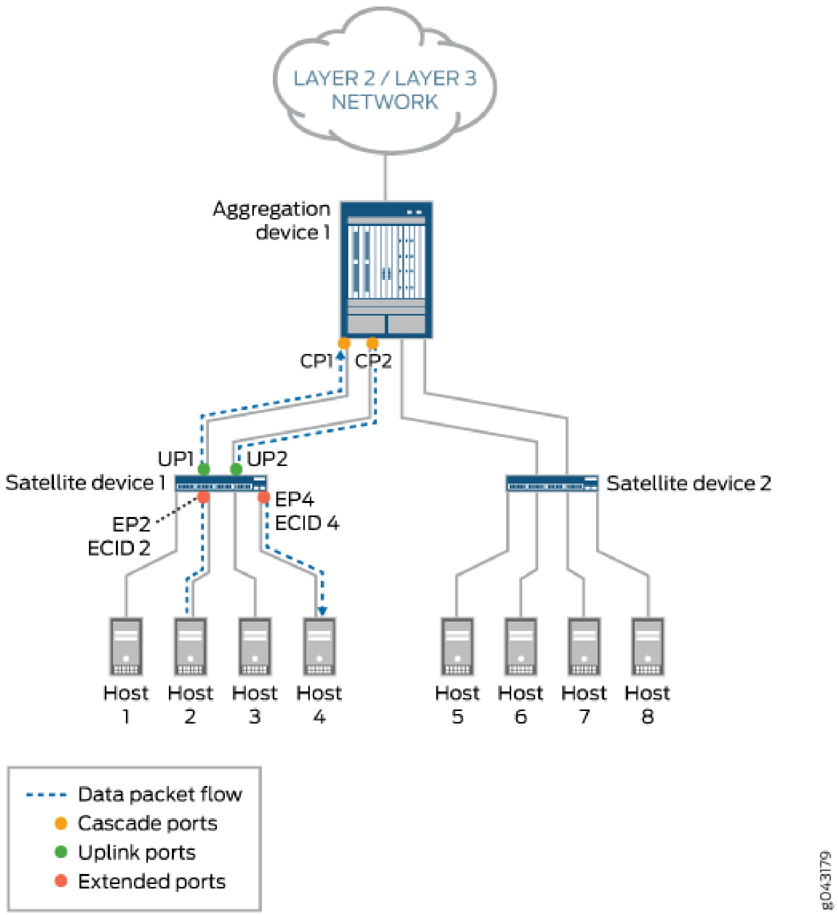
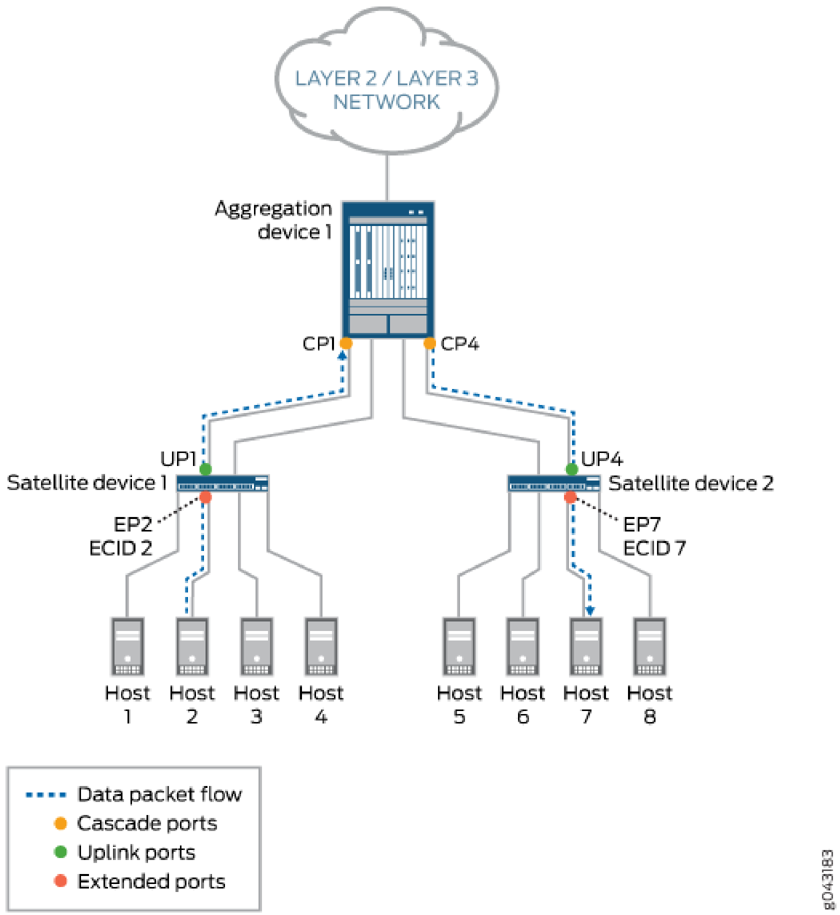


Figure 11: Layer 2 Unicast Data Packet Flow Through a Junos Fusion Topology—Scenario 2



In scenario 1, where Host 2 sends a unicast data packet to Host 4, the following events occur:

NOTE: Only the events that are performed by Junos Fusion components are listed. Events handled by components that are not specific to the Junos Fusion topology are excluded.

1. Extended port EP2 on Satellite device 1 receives the packet from Host 2.

2. Satellite device 1 inserts an ETAG header in the packet. The ETAG header carries the ECID value (ECID 2), which is assigned by Aggregation device 1 to extended port EP2.

3. On Satellite device 1, two uplink ports (UP1 and UP2) are connected to Aggregation device 1. As a result, traffic between the devices can be load-balanced. In this case,

uplink port UP1 is chosen to forward the packet to cascade port CP1 on Aggregation device 1.

4. On receiving the packet, Aggregation device 1 extracts the ECID value (ECID 2) from the ETAG header of the packet and learns that the packet is from extended port EP2 on Satellite device 1. Aggregation device 1 then removes the ETAG header from the packet.

5. Aggregation device 1 performs a lookup for Host 4. The result of the lookup is extended port EP4 on Satellite device 1.

6. On Aggregation device 1, two cascade ports (CP1 and CP2) are connected to Satellite device 1. As a result, traffic between the devices can be load-balanced. In this case, cascade port CP2 is chosen to forward the packet to uplink port UP2 on Satellite device 1.

7. The packet is forwarded to cascade port CP2, where a new ETAG header and ECID value (ECID 4), which is assigned by Aggregation device 1 to extended port EP4, is added.

8. The packet is received by uplink port UP2 on Satellite device 1.

9. Satellite device 1 extracts the ECID value (ECID 4) from the ETAG header of the packet, then maps ECID 4 to extended port EP4.

10. Host 4 receives the packet from extended port EP4.

In scenario 2, where Host 2 sends a unicast data packet to Host 7, the events that occur are the same as for scenario 1 except for the following:

- Event 5—Aggregation device 1 performs a lookup for Host 7. The result of the lookup is extended port EP7 on Satellite device 2.
- Event 6—On Aggregation device 1, two cascade ports (CP3 and CP4) are connected to Satellite device 2. As a result, traffic between the devices can be load-balanced. In this case, cascade port CP4 is chosen to forward the packet to uplink port UP4 on Satellite device 2.
- Event 7—The packet is forwarded to cascade port CP4, where a new ETAG header and ECID value (ECID 7), which is assigned by Aggregation device 1 to extended port EP7, is added.
- Event 8—The packet is received by uplink port UP4 on Satellite device 2.
- Event 9—Satellite device 2 extracts the ECID value (ECID 7) from the ETAG header of the packet, and then maps ECID 7 to extended port EP7.
- Event 10—Host 7 receives the packet from extended port EP7.

Related Documentation

- *Understanding Junos Fusion Provider Edge Components*
- Understanding Junos Fusion Enterprise Components on page 5

Understanding Satellite Policies in a Junos Fusion

Satellite Policies Overview

Satellite policies are used in a Junos Fusion to define how certain features are configured for standalone satellite devices within a Junos Fusion. Satellite policies can be used to configure standalone satellite devices or all satellite devices in a satellite device cluster.

Environment monitoring of the satellite devices, uplink failure detection for satellite device uplink ports, and remapping uplinks—with port pinning, uplink selection, and local port mirroring—are configured using satellite policies. See “Understanding Environment Monitoring Satellite Policies” on page 42, “Understanding Uplink Failure Detection Satellite Policies” on page 42, and “Understanding Satellite Policies for Remapping Uplink Traffic Flows on a Junos Fusion Data Center” on page 42.

Satellite policies are configured as independent policies on the aggregation device, and then associated with the Junos Fusion configuration.

Understanding Environment Monitoring Satellite Policies

You can configure an environment monitoring satellite policy in a Junos Fusion to configure how a Junos Fusion responds to link-down alarms on satellite devices.

In the environment monitoring satellite policy, you define how you want a link-down alarm from a satellite device to be handled by the Junos Fusion. The Junos Fusion can treat the link-down alarm as a yellow or red alarm, or it can be configured to ignore the alarm.

The environment monitoring policy provides the flexibility to define different alarm handling based on user preference. You can, for instance, assign environment monitoring policies to individual satellite devices based on FPC ID. You can also configure environment monitoring policies based on the product model of the satellite devices, if desired. You can, for instance, specify that all link-down alarms from EX4300 switches acting as satellite devices are treated as yellow alarms, while all link-down alarms from QFX5100 switches acting as satellite devices are treated as red alarms.

Environment monitoring satellite policies are configured using the environment-monitoring-policy statement in the **[edit policy-options satellite-policies]** hierarchy level.

An environment monitoring policy is applied for a single satellite device in a Junos Fusion using the environment-monitoring-policy statement in the [edit *chassis* satellite-management] or the [edit *chassis* satellite-management fpc *slot-id*] hierarchy levels.

You can configure a different environment monitoring policy for a single satellite device in the **fpc *slot-id*** when an environment monitoring policy for all satellite devices is configured. The environment monitoring policy for the FPC is enabled in cases when both an individual and global environment monitoring policy is configured.

Understanding Uplink Failure Detection Satellite Policies

Satellite policies are used to configure uplink failure detection on satellite device uplink ports within a Junos Fusion.

NOTE: **Uplink failure detection is supported only on Junos Fusion Data Center.**

For information on uplink failure detection within a Junos Fusion, see *Overview of Uplink Failure Detection on a Junos Fusion*.

Understanding Satellite Policies for Remapping Uplink Traffic Flows on a Junos Fusion Data Center

Satellite policies are used to configure the remapping of uplink traffic flows within a Junos Fusion Data Center. You can configure uplink port pinning and flow-based uplink selection to improve load-balancing of traffic flows across uplink ports. You can use local port mirroring to troubleshoot and monitor applications.

See *Understanding Remapping Uplink Traffic Flows on a Junos Fusion Data Center*.

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

Understanding Multicast Forwarding on a Junos Fusion Enterprise

Starting with Junos OS Release 17.1R1, multicast traffic forwarding is supported in Junos Fusion Enterprise. Multicast forwarding is supported only on the aggregation device (AD).

Overview of Multicast Forwarding

The AD performs ingress multicast replication to a set of extended ports. On the satellite device, multicast traffic is received for each of the extended ports. The following scenarios are supported for both IPv4 and IPv6 traffic:

- Layer 2 multicast with VLAN flooding—IGMP snooping and the Multicast Learner Discovery (MLD) protocol are configured on the AD to forward multicast traffic
- Layer 3 multicast—IGMP and PIM are configured on the AD to forward multicast traffic. Only versions 2 and 3 of IGMP are supported.

Configuring Layer 2 Multicast Forwarding in a Junos Fusion Enterprise

To configure Layer 2 multicast forwarding in a Junos Fusion Enterprise, configure IGMP snooping and MLD snooping on each VLAN. The following example shows the basic configuration required. Virtual router instances with integrated routing and bridging (IRB) interfaces are also supported.

```
protocols {
  igmp-snooping {
    vlan team-a {
      interface ge-101/0/0.0 {
        multicast-router-interface;
      }
      interface ge-101/0/1.0 {
        static {
          group 233.252.0.1;
        }
      }
    }
    vlan team-b;
  }
}
```

Configuring Layer 3 Multicast Forwarding in a Junos Fusion Enterprise

To configure Layer 3 multicast forwarding in a Junos Fusion Enterprise, enable PIM and IGMP. The following example shows the basic configuration required. Note that an IRB interface are also required as the multicast traffic is forwarded through IRB interfaces.

```
protocols {
   igmp {
      accounting;
      interface all;
      interface irb.40 {
         version 2;
      }
      interface irb.50 {
         static {
            group 233.252.0.1;
         }
      }
   }
   pim {
      rp {
         auto-rp discovery;
         static {
            address 192.0.2.1;
         }
      }
      interface all {
         mode sparse;
      }
   }
}
```

Related Documentation

- Junos Fusion Enterprise Overview on page 3

CHAPTER 2

Junos Fusion Enterprise Configuration

Configuring or Expanding a Junos Fusion Enterprise

This topic provides the instructions needed to configure a Junos Fusion Enterprise—a Junos Fusion using EX9200 switches as aggregation devices—and to add satellite devices or an aggregation device to an existing Junos Fusion Enterprise. It covers:

Preparing the Aggregation Devices

Ensure your aggregation devices are running a version of Junos OS software that is compatible with Junos Fusion Enterprise. Junos Fusion Enterprise support was introduced for EX9200 switches in Junos OS Release 16.1R1. See Junos Fusion Hardware and Software Compatibility Matrices to learn more about Junos OS software compatibility requirements and to obtain Junos OS and satellite software for your Junos Fusion Enterprise. See "Understanding Junos Fusion Enterprise Software and Hardware Requirements" on page 26 for additional information on Junos Fusion Enterprise hardware and software requirements.

If the aggregation device does not have the correct version of Junos OS installed, upgrade the Junos OS on both Routing Engines on your aggregation device.

NOTE: If your aggregation device is part of an existing Junos Fusion Enterprise installation with satellite device clusters that is running Junos OS Release 16.1 and you wish to upgrade to Junos OS Release 17.1 or later, please refer to the upgrade instructions in the 17.1R1 release notes.

The following procedure shows one method of upgrading Junos OS software. The instructions assume that you know the basics of Junos OS image file management and have already acquired the target Junos OS image. The target Junos OS image can be obtained using the Junos Fusion Hardware and Software Compatibility Matrices. This upgrade procedure causes avoidable system downtime.

The number of Junos OS software upgrade options available for EX9200 switches is beyond the scope of this document. For information on Junos OS software installation options for EX9200 switches, see the *Software Installation and Upgrade Guide*.

To upgrade Junos OS software, enter the following commands on the aggregation device:

`user@aggregation-device>` **request system software add *aggregation-device-package-name* re0**

`user@aggregation-device>` **request system software add *aggregation-device-package-name* re1**

After performing the upgrade, reboot both Routing Engines to complete the software upgrade.

`user@aggregation-device>` **request system reboot both-routing-engines**

Preparing a Switch Running Junos OS to Become a Satellite Device

Use this procedure to prepare all switches running Junos OS software to become satellite devices. This procedure must be performed on all satellite devices, regardless of whether the satellite device will be converted into a standalone satellite device or be part of a satellite device cluster.

This section can be skipped if your satellite device or all satellite devices in your satellite device cluster are already running satellite software.

NOTE: The following conditions must be met before a Junos switch that is running Junos OS Release 17.1R1 can be converted to a satellite device when the action is initiated from the aggregation device:

- The Junos switch can only be converted to SNOS 3.0 and higher.
- The Junos switch must be either set to factory default configuration, or the following command must be included in the configuration: **set chassis satellite-management auto-satellite-conversion**.

To prepare a switch running Junos OS software to become a satellite device:

1. Log into the device that will become a satellite device through the console port.

2. Ensure the device is running a version of Junos OS that allows it to be converted into a satellite device. See Junos Fusion Hardware and Software Compatibility Matrices and "Understanding Junos Fusion Enterprise Software and Hardware Requirements" on page 26 for information on minimum Junos OS requirements for satellite devices.

   NOTE: In case of difficulty moving to the required versions of U-boot and JLOADER, please contact the Juniper Networks Technical Assistance Center.

   If you need to upgrade Junos OS on your satellite device before proceeding, see the Junos Fusion Hardware and Software Compatibility Matrices to obtain the software. Upgrade Junos OS before converting your switch into a satellite device.

3. (Satellite devices providing interfaces for PoE only) If you plan on using the satellite device interfaces to provide PoE, check the satellite device's PoE firmware version:

   - Enter the **show chassis firmware detail** command to learn the PoE firmware version running on the device.

```
user@sd1-ex4300> show chassis firmware detail
FPC 0
   Boot SYSPLD              10
   PoE firmware             2.6.3.92.1
```



```
(additional output omitted)
```

- The satellite device must have the following minimum PoE versions to support PoE in a Junos Fusion Enterprise.

Table 12: Minimum PoE Firmware Versions

Satellite Device Platform	Minimum PoE Firmware Version
EX2300	1.6.1.1.9
EX3400	1.6.1.1.9
EX4300	2.6.3.92.1
QFX5100	No minimum version requirement

See Minimum Satellite Device Firmware Version Requirements table for additional information on firmware version requirements for devices in a Junos Fusion Enterprise.

- If your device meets the minimum PoE firmware requirement, proceed to the next step.

  If a PoE firmware update is required, upgrade the PoE firmware. See Upgrading the PoE Controller Software.

4. Zeroize the device:

```
[edit]
user@satellite-device# request system zeroize
```

NOTE: **The device reboots to complete the procedure for zeroizing the device.**

If you are not logged into the device using the console port connection, your connection to the device is lost after entering the **request system zeroize** command.

If you lose your connection to the device, log in using the console port.

5. (EX3400 and EX4300 switch uplink ports only) After the reboot is complete, convert the built-in 40-Gbps interfaces with QSFP+ transceivers from Virtual Chassis ports (VCPs) into network ports:

```
user@satellite-device> request virtual-chassis vc-port delete pic-slot 1 port port-number
```

For example, to convert all four built-in 40-Gbps interfaces with QSFP+ transceivers on an EX4300-24P switch into network ports:

```
user@satellite-device>request virtual-chassis vc-port delete pic-slot 1 port 0
user@satellite-device> request virtual-chassis vc-port delete pic-slot 1 port 1
user@satellite-device> request virtual-chassis vc-port delete pic-slot 1 port 2
```



```
user@satellite-device> request virtual-chassis vc-port delete pic-slot 1 port 3
```

The number of built-in 40-Gbps interfaces with QSFP+ transceivers varies by switch model. See the hardware documentation for your switch.

This step is required for the 40-Gbps interfaces with QSFP+ transceivers that will be used as uplink interfaces to directly connect to the aggregation device in a Junos Fusion Enterprise, because zeroizing the devices restores the default settings and 40-Gbps interfaces with QSFP+ transceivers on EX3400 and EX4300 switches are configured into VCPs by default. VCPs cannot be used as uplink ports to connect to aggregation devices in a Junos Fusion.

6. (EX3400 and EX4300 switches using direct attach copper (DAC) cables as clustering ports only) Disable auto-negotiation on interfaces that will be converted into clustering ports:

```
user@satellite-device# delete interfaces xe-0/1/0 ether-options auto-negotiation
user@satellite-device# delete interfaces xe-0/1/1 ether-options auto-negotiation
user@satellite-device# delete interfaces xe-0/1/1 ether-options auto-negotiation
user@satellite-device# delete interfaces xe-0/1/1 ether-options auto-negotiation
```

7. Commit the configuration.

```
user@satellite-device# commit
```

Configuring the FPC Slot IDs, Cascade Ports, and Satellite Device Clusters on the Junos Fusion

Use this procedure to configure FPC slot IDs, cascade ports, and satellite device clusters.

For more information on FPC slot IDs, cascade ports, and satellite device clusters, see "Understanding Junos Fusion Enterprise Components" on page 5.

This section provides separate instructions for configuring FPC slot IDs and cascade ports for standalone satellite devices and satellite devices in a satellite device cluster. A Junos Fusion Enterprise can and often does support standalone satellite devices and satellite device clusters in the same Junos Fusion topology.

This section covers the following procedures:

Configuring the FPC Slot ID and Cascade Ports for a Standalone Satellite Device

Use this procedure to configure the FPC slot IDs and cascade ports for standalone satellite devices, which are satellite devices that are not part of a satellite device cluster:

1. Configure the cascade ports, and commit the configuration.

A cascade port is a port on an aggregation device that connects to a satellite device or a satellite device cluster. Data and control traffic is passed between the aggregation device and the satellite devices over the cascade port link.

To configure a cascade port:

```
[edit]
user@aggregation-device# set interfaces interface-name cascade-port
```

where *interface-name* in the cascade port interface on the aggregation device.

For example, to configure interface xe-0/0/1 on the aggregation device into a cascade port:

```
[edit]
user@aggregation-device# set interfaces xe-0/0/1 cascade-port
```

Commit the configuration on both Routing Engines:

```
[edit]
user@aggregation-device# commit synchronize
```

or onto a single Routing Engine:

```
[edit]
user@aggregation-device# commit
```

2. Configure the FPC slot ID number of each satellite device.

   In a Junos Fusion Enterprise, each satellite device, including each satellite device in a satellite device cluster, must be mapped to an FPC identifier (FPC ID). The FPC ID is in the range of 65 through 255, and it is used for Junos Fusion Enterprise configuration, monitoring, and maintenance. Interface names—which are identified using the *type-fpc / pic / port* format—use the FPC ID as the *fpc* variable when the satellite device is participating in a Junos Fusion Enterprise.

   You can assign an FPC identifier to the satellite device based on either the satellite device's MAC address, serial number, or cascade port.

   - To map the FPC slot ID to a standalone satellite device's MAC address:

     ```
     [edit]
     user@aggregation-device# set chassis satellite-management fpc slot-id system-id
     mac-address
     ```

     where *slot-id* becomes the FPC slot ID of the satellite device and *mac-address* is the satellite device's MAC address. The FPC slot ID must be 65 or larger, and it functions as the FPC slot identifier.

     For example, to map FPC slot ID to the satellite device using MAC address 00:00:5E:00:53:00:

     ```
     [edit]
     user@aggregation-device# set chassis satellite-management fpc 110 system-id
     00:00:5E:00:53:00
     ```


NOTE: To find out the system MAC of the satellite device, use the **show chassis mac-addresses** command on the satellite device.

- To map the FPC slot ID to a standalone satellite device's serial number:

  `[edit]`
  `user@aggregation-device#` **set chassis satellite-management fpc *slot-id* serial-number *serial-number***

  where *slot-id* becomes the FPC slot ID of the satellite device and *serial-number* is the satellite device's serial number. The FPC slot ID must be 65 or larger, and it functions as the FPC slot identifier.

  For instance, to map FPC slot ID 101 to the satellite device using the serial number ABCDEFGHIJKL:

  `[edit]`
  `user@aggregation-device#` **set chassis satellite-management fpc 101 serial-number ABCDEFGHIJKL**

  NOTE: To find out the serial number of the satellite device, use the show chassis hardware command on the satellite device.

- To configure the FPC slot ID for a standalone satellite device—a satellite device not part of a satellite device cluster—to a cascade port, enter:

  `[edit]`
  `user@aggregation-device#` **set chassis satellite-management fpc *slot-id* cascade-ports *interface-name***

  where *slot-id* becomes the FPC slot ID of the satellite device, and *interface-name* is the name of the interface.

  For example, to configure the FPC slot ID of the satellite device that is connected to xe-0/0/1 to 101:

  `[edit]`
  `user@aggregation-device#` **set chassis satellite-management fpc 101 cascade-ports xe-0/0/1**

  If a prospective satellite device is connected to a Junos Fusion Enterprise without having a configured FPC slot ID, the prospective satellite device does not participate in the Junos Fusion Enterprise until an FPC ID is associated with it. The **show chassis satellite unprovision** output includes a list of satellite devices that are not participating in a Junos Fusion Enterprise because of an FPC ID association issue.

  The FPC slot ID configuration must match on both aggregation devices in dual-homed dual aggregation device topologies.

Configuring the FPC Slot ID, Cascade Ports, and Satellite Device Clusters for Satellite Devices in a Satellite Device Cluster

Use this procedure to configure the FPC slot IDs, cascade ports, and satellite device clusters for satellite devices in a satellite device cluster:

1. Configure the cascade ports, and commit the configuration.

   A cascade port is a port on an aggregation device that connects to a satellite device in a satellite device cluster. An aggregation device can have multiple cascade ports connecting to multiple satellite device member switches in the same satellite device cluster. Data and control traffic is passed between the aggregation device and the satellite devices over a cascade port link.

   BEST PRACTICE: **Use the show interfaces command to confirm your interface is up before configuring it into a cascade port.**

   To configure a cascade port:

   ```
   [edit]
   user@aggregation-device# set interfaces interface-name cascade-port
   ```

   For example, to configure interface xe-0/0/1 on the aggregation device into a cascade port:

   ```
   [edit]
   user@aggregation-device# set interfaces xe-0/0/1 cascade-port
   ```

   Commit the configuration on both Routing Engines:

   ```
   [edit]
   user@aggregation-device# commit synchronize
   ```

   or onto a single Routing Engine:

   ```
   [edit]
   user@aggregation-device# commit
   ```

2. Create the satellite device clusters, and assign a name and a cluster ID to each satellite device cluster:

   ```
   [edit]
   user@aggregation-device# set chassis satellite-management cluster cluster-name cluster-id
   cluster-id-number
   ```

   For instance, to create a satellite device cluster named **building-1** and assign it cluster ID 1:

   ```
   [edit]
   user@aggregation-device# set chassis satellite-management cluster building-1 cluster-id
   1
   ```


The *cluster-name* and *cluster-id-number* specified in this step must match on both aggregation devices in dual aggregation device topologies.

3. Define the cascade ports associated with the satellite device cluster.

   An aggregation device can have multiple cascade port connections to the satellite devices in the satellite device cluster, and it must have at least one cascade port connection to one of the satellite devices in the satellite device cluster.

   For example, to configure interfaces xe-0/0/1 and xe-0/0/2 on the aggregation device into cascade ports connecting to the satellite device cluster named **building-1**:

   ```
   [edit]
   user@aggregation-device# set chassis satellite-management cluster building-1
   cascade-ports xe-0/0/1
   user@aggregation-device# set chassis satellite-management cluster building-1
   cascade-ports xe-0/0/2
   ```

   NOTE: This step defines which aggregation device ports will be used as cascade ports with the satellite device cluster only.

   The aggregation device interfaces still must be configured into cascade ports, which is accomplished in step 1 of this procedure.

4. Configure the FPC slot ID number of each satellite device.

   In a Junos Fusion Enterprise, each satellite device, including each satellite device in a satellite device cluster, must be mapped to an FPC identifier (FPC ID). The FPC ID is in the range of 65 through 255, and it is used for Junos Fusion Enterprise configuration, monitoring, and maintenance. Interface names—which are identified using the *type-fpc / pic / port* format—use the FPC ID as the *fpc* variable when the satellite device is participating in a Junos Fusion Enterprise.

   - To map the FPC slot ID to the MAC address of a satellite device in a satellite device cluster:

     NOTE: You must map the FPC slot ID to the satellite device's MAC address when the satellite device is a member of a satellite device cluster.

     ```
     [edit]
     user@aggregation-device# set chassis satellite-management cluster cluster-name fpc
     slot-ID system-id mac-address
     ```

     where *cluster-name* is the name of the satellite device cluster, *slot-id* becomes the FPC slot ID of the satellite device, and *mac-address* is the satellite device's MAC address. The FPC slot ID must be 65 or larger, and it functions as the FPC slot identifier.

For instance, to map FPC slot ID 101 to the satellite device using MAC address 00:00:5E:00:53:00, FPC slot ID 102 to the satellite device using MAC address 00:00:5E:00:53:01, and FPC slot 103 to the satellite device using MAC address 00:00:5E:00:53:02 in the satellite device cluster named **building-1**:

```
[edit]
user@aggregation-device# set chassis satellite-management cluster building-1 fpc 101 system-id 00:00:5E:00:53:00
user@aggregation-device# set chassis satellite-management cluster building-1 fpc 102 system-id 00:00:5E:00:53:01user@aggregation-device# set chassis satellite-management cluster building-1 fpc 103 system-id 00:00:5E:00:53:02
```

NOTE: To find out the system MAC of the satellite device, use the **show chassis mac-addresses** command on the satellite device.

5. Assign a member ID to each satellite device in the satellite device cluster:

```
[edit]
user@aggregation-device# set chassis satellite-management cluster cluster-name fpc fpc-slot-ID member-id member-ID-number
```

For instance, to assign member ID numbers 1,2, and 3 to FPC ID numbers 101, 102, and 103 in the satellite device cluster named **building-1**:

```
[edit]
user@aggregation-device# set chassis satellite-management cluster building-1 fpc 101 member-id 1
user@aggregation-device# set chassis satellite-management cluster building-1 fpc 102 member-id 2
user@aggregation-device# set chassis satellite-management cluster building-1 fpc 103 member-id 3
```

The member ID assignments for a satellite device cluster must match on both Routing Engines in a dual aggregation device topology.

6. (Dual-homed dual aggregation device topologies only) Repeat this procedure to configure the FPC slot IDs, cascade ports, and satellite device clusters on the other aggregation device.

NOTE: The cluster name, ID and FPC information for each satellite device in the cluster must be the same on both aggregation devices.

Managing Software Upgrade Groups on the Aggregation Device

A satellite software upgrade group is a group of satellite devices that are designated to run the same satellite software version using the same satellite software package. One Junos Fusion Enterprise can contain multiple software upgrade groups, and multiple software upgrade groups should be configured in most Junos Fusion Enterprises to avoid network downtimes during satellite software installations.

When a satellite device is added to a Junos Fusion Enterprise, the aggregation device checks if the satellite device is using an FPC ID that is included in a satellite software upgrade group. If the satellite device is using an FPC ID that is part of a satellite software upgrade group, the device upgrades its satellite software to the version of software associated with the satellite software upgrade group - unless it is already running the defined version.

When the satellite software package associated with an existing satellite software group is changed, the satellite software for all member satellite devices is upgraded using a throttled upgrade. The throttled upgrade ensures that the aggregation device is not overwhelmed with providing satellite software simultaneously to many satellite devices.

The two most common methods for installing satellite software onto a Junos OS device—autoconverting a device into a satellite device when it is cabled into an aggregation device and manually converting a device that is cabled into an aggregation device into a satellite device—require that a satellite software upgrade group is configured.

Software upgrade groups are managed from the aggregation device. All satellite devices in a satellite device cluster are part of the same software upgrade group, and a software upgrade group with the name of the satellite device cluster is automatically created when the satellite device cluster is created.

To manage a software upgrade group:

1. Log into the aggregation device.

2. Download the satellite software onto both aggregation devices (recommended) or onto a remote server.

   The satellite software can be downloaded from the main Junos Fusion software download page:

   Junos Fusion - Download Software

3. (Standalone satellite device only) Create a satellite software upgrade group, and associate the standalone satellite device with the satellite software upgrade group:

   `[edit]`
   `user@aggregation-device#` **set chassis satellite-management upgrade-groups** ***upgrade-group-name*** **satellite** ***slot-id-number-or-range***

where *upgrade-group-name* is the name of the upgrade group, and the *slot-id-number-or-range* is the FPC slot ID number or range of numbers, of the satellite devices that are being added to the upgrade group.

NOTE: If you enter the name of an existing satellite software upgrade group as the *upgrade-group-name*, the specified satellite devices are added to the existing software upgrade group.

For example, to create a software upgrade group named **group1** that includes all satellite devices numbered 101 through 120:

```
[edit]
user@aggregation-device# set chassis satellite-management upgrade-groups group1
satellite 101-120
```

The satellite software upgrade group name and associated FPC slot ID configurations must match on both Routing Engines in a dual-homed dual aggregation device topology.

4. Commit the configuration to both Routing Engines on the aggregation device:

```
[edit]
user@aggregation-device# commit synchronize
```

If you are using an aggregation device with a single Routing Engine or want to commit the configuration to a single Routing Engine only:

```
[edit]
user@aggregation-device# commit
```

The configuration must be committed before associating a satellite software image with the satellite software upgrade group, which is done in Step 5.

5. Associate the satellite software upgrade group with a satellite software image.

   - Satellite device clusters:

     - Associate all satellite devices in the cluster with the automatically-created satellite software upgrade group:

       ```
       user@aggregation-device> request system software add package-name upgrade-group
       upgrade-group-name
       ```

       where *package-name* is the URL to the satellite software package, and *upgrade-group-name* is the name of the satellite device cluster.

       For example, to associate a satellite software image named **satellite-3.0R1.2-signed.tgz** that is currently stored in the **/var/tmp** directory on the aggregation device to the upgrade group named **building1**:

       ```
       user@aggregation-device> request system software add
       /var/tmp/satellite-3.0R1.2-signed.tgz upgrade-group building1
       ```


- Standalone satellite devices:
  - Associate the satellite device with the previously-configured satellite software upgrade group:

    `user@aggregation-device>` **request system software add *package-name* upgrade-group *upgrade-group-name***

    where *package-name* is the URL to the satellite software package, and *upgrade-group-name* is the name of the upgrade group that was assigned by the user earlier in this procedure.

    For example, to associate a satellite software image named **satellite-3.0R1.2-signed.tgz** that is currently stored in the **/var/tmp** directory on the aggregation device to the upgrade group named **group1**:

    `user@aggregation-device>` **request system software add /var/tmp/satellite-3.0R1.2-signed.tgz upgrade-group group1**

Associating a satellite software image to a new satellite software package can trigger a satellite software upgrade. A throttled satellite software upgrade might begin after entering the **request system software add** command to associate a satellite software package with a satellite software upgrade group. A satellite software upgrade might also be triggered when a configuration that uses the satellite software upgrade group is committed.

6. (Dual-homed dual aggregation device topology only) Repeat Steps 1 through 4 using the exact same configuration—including the same *package-name* and *upgrade-group-name*—to configure software upgrade groups on the second aggregation device.

   The software upgrade group configurations must match in dual aggregation topologies for the satellite software upgrade to proceed. If you do not associate the software upgrade group on the second aggregation device with a satellite software version, then the satellite device software upgrade will be managed only by the other aggregation device. If you associate the software upgrade group on the second aggregation with a satellite software version, then the satellite software version must be the same on both aggregation devices.

Configuring the Dual Aggregation Device Topology (Dual Aggregation Device Topologies Only)

Use this procedure to connect and configure a second aggregation device into a Junos Fusion Enterprise topology.

Before you begin:

- Ensure that a Junos Fusion topology has already been configured, and that the topology includes a satellite software upgrade group.
- Ensure that the aggregation devices are already cabled together and that all cabling to all satellite devices has been completed for both aggregation devices. For information on cabling requirements, see "Understanding Junos Fusion Enterprise Software and Hardware Requirements" on page 26.

1. (Required only if aggregation device was previously configured into single home mode) Delete single home configuration mode:

   On aggregation device 1 and 2:

   ```
   [edit]
   user@aggregation-device# delete chassis satellite-management single-home
   ```

   NOTE: **Single home mode is not supported in a dual-aggregated device Junos Fusion Enterprise topology.**

2. Create and configure a redundancy group on the first aggregation device.

   A dual aggregation device topology in a Junos Fusion is a multichassis link aggregation group (MC-LAG) that uses the Inter-Chassis Communications Protocol (ICCP) to communicate between the aggregation devices. ICCP is typically used in an MC-LAG to exchange information between MC-LAG peers. The MC-LAG peers in a Junos Fusion dual aggregation topology are the aggregation devices.

   A redundancy group is required to enable ICCP in a Junos Fusion. A Junos Fusion topology supports one redundancy group that includes two member devices—the aggregation devices—while also including a configuration parameter that allows users to specify that the satellite devices or satellite clusters also belong to the redundancy group.

NOTE: All satellite devices, whether standalone satellites or satellite clusters, must be associated to a redundancy group on both aggregated devices; otherwise, they act as single-homed devices, which are not supported in a dual-aggregation device Junos Fusion Enterprise topology.

To create and configure the redundancy group on the first aggregation device:

a. Specify the redundancy group ID number on both aggregation devices. The redundancy group name is created and named as part of this process.

   The redundancy group ID number and name must match on both aggregation devices.

   On aggregation device 1 and 2:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set redundancy-group-name redundancy-group-id
redundancy-group-id-number
```

   For instance, to create a redundancy group named junos-fusion-campus-network that uses redundancy group ID 1 on aggregation device 1:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set junos-fusion-campus-network redundancy-group-id 1
```

   Repeat this procedure on aggregation device 2:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set junos-fusion-campus-network redundancy-group-id 1
```

b. Define the chassis ID number of the each aggregation device:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set chassis-id chassis-id-number
```

   For instance, to assign the aggregation device 1 the chassis ID of 1 for the junos-fusion-campus-network redundancy group:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set chassis-id 1
```

   To assign aggregation device 2 the chassis ID of 2 for the junos-fusion-campus-network redundancy group:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set chassis-id 2
```

   The chassis ID numbers cannot match and are used to create the ICL that interconnects the aggregation device in the Junos Fusion topology.

c. Define the peer chassis ID number—the chassis ID number of the other aggregation device—and interface to use for the ICL:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set redundancy-group-name peer-chassis-id
peer-chassis-id-number inter-chassis-link interface-name
```

For instance, to use the xe-0/0/1 interface on aggregation device 1 to create an ICL that connects to aggregation device 2:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set junos-fusion-campus-network peer-chassis-id 2
inter-chassis-link xe-0/0/1
```

To complete the configuration by defining the peer chassis ID and interface on aggregation device 2:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set junos-fusion-campus-network peer-chassis-id 1
inter-chassis-link xe-0/0/1
```

The ICL is used to pass traffic between the aggregation devices.

d. Define the satellite devices that are part of the redundancy group.

You can add a standalone satellite device or a satellite device cluster to the redundancy group in this step.

The satellite devices added to the redundancy group in this step must match on both redundancy groups.

All satellite devices in the Junos Fusion should be added to the redundancy group in this step.

- To add standalone satellite devices to the redundancy group:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set redundancy-group-name satellite
satellite-device-fpc-IDs
```

For instance, to include satellite devices using FPC IDs 100-140 in the redundancy group:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set junos-fusion-campus-network satellite 100-140
```

- To add a satellite device cluster to the redundancy group:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set redundancy-group-name cluster cluster-name
```

For instance, to include satellite device cluster **building-1** to the redundancy group:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set junos-fusion-campus-network cluster building-1
```

Repeat the same configuration steps on the other aggregation device.

For instance:

```
[edit chassis satellite-management redundancy-groups]
user@aggregation-device# set junos-fusion-campus-network satellite 100-140
user@aggregation-device# set junos-fusion-campus-network cluster building-1
```

3. (Recommended) Ensure at least one link besides the ICL is connecting the aggregation devices. This link automatically becomes the ICCP link.

   An ICCP link can be one link or an aggregated ethernet interface. In most Junos Fusion Enterprise deployments, we recommend using a 40-Gbps link or an aggregated ethernet interface as the ICCP link.

   An ICCP link is recommended but is optional because ICCP traffic is transmitted across the ICL when a dedicated ICCP link is not configured.

   ICCP configuration is not required. ICCP is automatically provisioned in a Junos Fusion using dual aggregation devices, by default. User configuration of ICCP is not required and is only recommended for expert users.

   If you configure an ICCP parameter in a Junos Fusion, the user-configured parameter overrides the automatically provisioned parameter for the configured parameter only.

   You can disable automatic ICCP provisioning using the no-auto-iccp-provisioning statement.

   If you decide to configure ICCP, you must configure matching configurations on both aggregation devices.

   NOTE: ICCP configuration is beyond the scope of this document. See *Configuring Multichassis Link Aggregation on EX Series Switches*.

4. Configure ICCP.

   ICCP can be configured in one of the following ways:

   - Automatic ICCP provisioning

     Automatic ICCP provisioning automatically configures ICCP in a dual aggregation device setup without any user action. Automatic ICCP provisioning is enabled by default and is often the preferred method of enabling ICCP for a Junos Fusion in greenfield deployments that are not being integrated into an existing network.

     No user action is required to configure ICCP if automatic ICCP provisioning is used.

   - Manual ICCP configuration.

     Manual ICCP configuration is typically used to integrate a Junos Fusion Enterprise into an existing network or by expert users that want to finely tune ICCP settings.

     Many Junos Fusion Enterprise installations occur in brownfield deployments and the Junos Fusion Enterprise has to be integrated into an existing Enterprise network. Brownfield deployments often have a need to maintain existing ICCP settings, in particular in scenarios where a Junos Fusion Enterprise is replacing an MC-LAG topology or is supporting a network that includes other MC-LAG topologies. ICCP must be configured manually in these scenarios.

See *Configuring Multichassis Link Aggregation on EX Series Switches* for the steps and options available to configure ICCP.

If you configure an ICCP parameter in a Junos Fusion, the user-configured parameter overrides the automatically provisioned parameter for the configured parameter only. You can disable all automatic ICCP provisioning using the no-auto-iccp-provisioning statement.

If you decide to manually configure ICCP, you must configure matching configurations on both aggregation devices.

Installing Satellite Software and Adding Satellite Devices to the Junos Fusion

Use this procedure to install satellite software onto a satellite device. A satellite device is not active in a Junos Fusion until satellite software is installed.

Before you begin:

- Ensure you have prepared your satellite device, as described in the “Preparing a Switch Running Junos OS to Become a Satellite Device” section.
- Ensure that the satellite software package is compatible with the aggregation device software. See *Junos Fusion Hardware and Software Compatibility Matrices* at https://www.juniper.net/support/downloads/solutions/fusion/.
- Ensure the minimum satellite device version requirements are met. For information on requirements, see “Understanding Junos Fusion Enterprise Software and Hardware Requirements” on page 26.
- Complete the other steps in this document—created cascade ports, associated FPC slot IDs with satellite devices, and created the satellite software upgrade groups—to ensure the satellite software can be successfully installed.

To install satellite software onto a satellite device and add it to the Junos Fusion Enterprise.

1. Decide how satellite software will be installed onto the satellite devices:
   - Autoconversion(Recommended)—Satellite software is installed onto satellite device automatically when it is cabled to the aggregation device.
   - Manual conversion—Satellite software is installed when user enters a CLI command from aggregation device to install satellite software.
   - Pre-installation—Satellite software is installed on satellite device before the satellite device is cabled into the Junos Fusion Enterprise.
2. Install the satellite software, or configure how it will be installed:
   - To enable autoconversion for a standalone satellite device or a satellite device in a satellite device cluster, enter the following commands from an aggregation device:

     ```
     [edit]
     ```


`user@aggregation-device#` **set chassis satellite-management auto-satellite-conversion satellite *slot-id***
`user@aggregation-device#` **commit**

For example, to automatically convert FPC **101** into a satellite device:

`[edit]`
`user@aggregation-device#` **set chassis satellite-management auto-satellite-conversion satellite 101**
`user@aggregation-device#` **commit**

In this example, autoconversion installs the satellite software associated with FPC slot 101, which was defined in the satellite software upgrade group configuration.

The process to install the satellite software onto the satellite device with the specified FPC slot ID does not begin until the configuration is committed.

- To manually install satellite software onto a satellite device, enter the following command from an aggregation device:

  `user@aggregation-device>` **request chassis satellite interface *interface-name* device-mode satellite**

  where *interface-name* is one of the following values:

  - standalone satellite device: the *interface-name* is the cascade port interface on the aggregation device.
  - satellite device in satellite device cluster that is directly cabled to the aggregation device: the *interface-name* is the cascade port interface on the aggregation device.
  - satellite device in satellite device cluster that is not directly cabled to an aggregation device: the *interface-name* is a clustering port—a port on a satellite device in a satellite device cluster that interconnects satellite devices—on a satellite device.

  For example, to manually configure the switch that is connecting the satellite device to interface xe-0/0/1 on the aggregation device into a satellite device:

  `user@aggregation-device>` **request chassis satellite interface xe-0/0/1 device-mode satellite**

  To manually configure a switch connecting to interface xe-101/2/0 on a satellite device in a satellite device cluster into a satellite device:

  `user@aggregation-device>` **request chassis satellite interface xe-101/2/0 device-mode satellite**

- To pre-install software onto a satellite device before connecting it into the Junos Fusion Enterprise:

  a. Copy a version of satellite software onto the satellite device running Junos OS.

     For EX2300, EX3400, and EX4300 switches, you must install a platform specific satellite software image in order to pre-install satellite software. See

Understanding the Platform Specific Satellite Software Image in "Understanding Software in a Junos Fusion Enterprise" on page 22.

Satellite software images can be downloaded from the Junos Fusion software download page.

b. Enter the following command from the satellite device:

`user@satellite-device>` **request chassis device-mode satellite *URL-to-satellite-software***

For instance, to install the satellite software package **satellite-ppc-3.0R1.2-signed.tgz** stored in the **/var/tmp/** folder on an EX4300 switch:

`user@satellite-device>` **request chassis device-mode satellite /var/tmp/satellite-ppc-3.0R1.2-signed.tgz**

c. Cable the satellite device directly to the aggregation device or into a satellite device cluster.

NOTE: The satellite device version is compared against the satellite device version associated with the software upgrade group upon insertion into the Junos Fusion. If the satellite device is running a version of satellite software that is different than it's associated satellite software upgrade group, the satellite software upgrade group installs the satellite software associated with the satellite software upgrade group onto the satellite device.

The procedure for adding a satellite device running satellite software into a Junos Fusion is also covered in "Adding a Switch Running Satellite Software to a Junos Fusion Enterprise" on page 75.

Related Documentation

- Junos Fusion Hardware and Software Compatibility Matrices
- Understanding Junos Fusion Enterprise Software and Hardware Requirements
- Verifying Connectivity, Device States, Satellite Software Versions, and Operations in a Junos Fusion on page 129
- Understanding Junos Fusion Enterprise Components on page 5
- Understanding Software in a Junos Fusion Enterprise on page 22

Junos Fusion Enterprise Installation Checklist

The checklist in Table 13 on page 65 summarizes the tasks you need to perform when installing a Junos Fusion Enterprise. This checklist should be used with the "Configuring or Expanding a Junos Fusion Enterprise” on page 45 document, which provides detailed step-by-step instructions for configuring a Junos Fusion Enterprise.

NOTE: If your aggregation device is part of an existing Junos Fusion Enterprise installation with satellite device clusters that is running Junos OS Release 16.1 and you want to upgrade to Junos OS Release 17.1 or later, please refer to the upgrade instructions in the Junos OS 17.1R1 Release Notes.

Table 13: Junos Fusion Enterprise Installation Checklist

Task	Additional Information	For More Information	Performed by and Date
Prepare Aggregation Device (Aggregation Devices)			
Install a supported version of Junos OS onto each aggregation device.	EX9200 switches can act as aggregation devices in a Junos Fusion Enterprise when running Junos OS Release 16.1R1 or later.	Junos Fusion main software download page and software support matrix: Junos Fusion - Download Software Junos Fusion Enterprise software requirements: Junos Fusion Hardware and Software Compatibility Matrices EX9200 switch software installation: *Software Installation and Upgrade Guide* Junos Fusion Enterprise software overview: “Understanding Software in a Junos Fusion Enterprise” on page 22	
Prepare Satellite Devices (Satellite Devices)			
Ensure each satellite device is running a version of Junos OS that allows it to be converted into a satellite device.	EX2300 and EX3400 switches must be running Junos OS Release 15.1X53-D55 or later to be converted into a satellite device. EX4300 switches must be running Junos OS Release 14.1X53-D43 or later to be converted into a satellite device. QFX5100 switches must be running Junos OS Release 14.1X53-D43 or later to be converted into a satellite device.	Satellite device software requirements: Junos Fusion Hardware and Software Compatibility Matrices Upgrading Junos OS on an EX2300, EX3400, or EX4300 switch: *Software Installation and Upgrade Guide* Upgrading Junos OS on a QFX5100 switch: *Installing Software Packages on QFX Series Devices*	
Zeroize each satellite device.	BEST PRACTICE: Perform this procedure from the console port. To zeroize a satellite device: **request system zeroize**	Zeroizing a switch: • *request system zeroize* • *Reverting to the Default Factory Configuration for the EX Series Switch*	

Table 13: Junos Fusion Enterprise Installation Checklist (continued)

Task	Additional Information	For More Information	Performed by and Date
(EX3400 and EX4300 switches only) Convert the built-in 40-Gbps interfaces from Virtual Chassis ports (VCPs) to network ports.	The number of built-in 40-Gbps interfaces with QSFP+ transceivers varies by EX4300 switch model. To convert four built-in 40-Gbps interfaces with QSFP+ transceivers on an EX4300 switch: **request virtual-chassis vc-port delete pic-slot 1 port 0** **request virtual-chassis vc-port delete pic-slot 1 port 1** **request virtual-chassis vc-port delete pic-slot 1 port 2** **request virtual-chassis vc-port delete pic-slot 1 port 3**	Deleting a VCP: *request virtual-chassis vc-port*	
Configure Cascade Ports and FPC slot IDs (Aggregation Devices)			
Configure cascade ports on the aggregation devices.	A cascade port is a port on the aggregation device that connects to a satellite device. To configure a cascade port: **set interfaces xe-0/0/1 cascade-port**	Cascade port overview: "Understanding Junos Fusion Enterprise Components" on page 5 Cascade port configuration: • Configuring or Expanding a Junos Fusion Enterprise on page 45 • **cascade-port**	
(Satellite device clusters only) Create and number the satellite device clusters. NOTE: You can skip this step if you are not using satellite device clusters.	Satellite device clustering allows you to connect up to ten satellite devices into a single cluster, then connect the satellite device cluster to the aggregation device as a single group instead of as individual satellite devices. This configuration must match on both aggregation devices. To create and number a satellite device cluster: **set chassis satellite-management cluster sd-cluster-building1 cluster-id 1**	Satellite device clustering overview: "Understanding Satellite Device Clustering in a Junos Fusion" on page 13 Satellite device clustering configuration: • Configuring or Expanding a Junos Fusion Enterprise on page 45 • **cluster-id**	

Table 13: Junos Fusion Enterprise Installation Checklist (continued)

Task	Additional Information	For More Information	Performed by and Date
(Satellite device clusters only) Associate the satellite device clusters with a cascade port.	To associate a cascade port with a satellite device cluster: **set chassis satellite-management cluster sd-cluster-building1 cascade-ports xe-0/0/1**	Satellite device clustering configuration: "Configuring or Expanding a Junos Fusion Enterprise" on page 45	
Configure the FPC slot Identifiers (IDs) using one of the following methods on both aggregation devices: • map FPC slot ID to a satellite device's MAC address (unique ID-based FPC identification) • map FPC slot ID to a satellite device's serial number (unique ID-based FPC identification) • map FPC slot ID with a cascade port (connectivity-based FPC identification)	Each satellite device in a Junos Fusion is identified by it's FPC slot ID. To map an FPC slot ID to a satellite device's MAC address: • Satellite device in a cluster: **set chassis satellite-management cluster sd-cluster-building1 fpc 101** system-id **00:00:5E:00:53:01** NOTE: You must map the FPC slot ID to the satellite device's MAC address when the satellite device is a member of a satellite device cluster. • Standalone satellite device: `[edit]` `user@aggregation-device#` **set chassis satellite-management fpc 101** system-id **00:00:5E:00:53:01** To map an FPC slot ID to a satellite device's serial number: **set chassis satellite-management fpc 101** serial-number **TA0123456789** To map an FPC slot ID to a cascade port: **set chassis satellite-management fpc 101 cascade-ports xe-0/0/1**	FPC slot ID overview: "Understanding Junos Fusion Enterprise Components" on page 5 Configuring FPC slot IDs: • Configuring or Expanding a Junos Fusion Enterprise on page 45 • system-id • serial-number • cascade-ports	

Table 13: Junos Fusion Enterprise Installation Checklist (continued)

Task	Additional Information	For More Information	Performed by and Date
(Satellite device clusters only) Assign a member ID to each satellite device in a satellite device cluster.	To assign a member ID to a satellite device in a satellite device cluster: **set chassis satellite-management cluster sd-cluster-building1 fpc 101 member-id 1** Satellite device cluster member ID configuration must match on both aggregation devices.	Satellite device clustering overview: "Understanding Satellite Device Clustering in a Junos Fusion" on page 13 Satellite device cluster member ID configuration: • Configuring or Expanding a Junos Fusion Enterprise on page 45 • **member-id**	
Satellite Software Upgrade Group (Aggregation Devices)			
Acquire the satellite software image and place it on the aggregation devices (recommended) or on a remote server.	The satellite software image is used to install satellite software onto satellite devices.	Junos Fusion main software download page: Junos Fusion - Download Software	

Table 13: Junos Fusion Enterprise Installation Checklist (continued)

Task	Additional Information	For More Information	Performed by and Date
Manage the satellite software upgrade groups. • (satellite devices that are part of a satellite device cluster) associate the satellite devices in a cluster with a satellite software image. • (standalone satellite devices) create the satellite software upgrade group and include the satellite device in it.	A satellite software upgrade group is used to upgrade the satellite software of all satellite devices in the upgrade group. A satellite device must be part of a satellite software upgrade group to install satellite software on satellite devices in most installation scenarios. All satellite devices in a satellite device cluster are automatically part of the same satellite software upgrade group. The satellite software upgrade group for the satellite devices in the cluster is automatically created and has the same name as the satellite device cluster. Satellite software upgrade group associations must match on both aggregation devices. • (satellite device cluster) To associate all satellite devices in the satellite device cluster with a satellite software image. For example: **request system software add /var/tmp/satellite-3.0R1.2-signed.tgz upgrade-group sd-cluster-building1** • (standalone satellite device) Create a satellite software upgrade group, and associate the satellite device with a satellite software image. For example: **set chassis satellite-management upgrade-groups standalone-satdevs-building1 satellite 130-139** **request system software add /var/tmp/satellite-3.0R1.2-signed.tgz upgrade-group standalone-satdevs-building1**	Satellite software upgrade group overview: “Understanding Software in a Junos Fusion Enterprise” on page 22 Satellite software upgrade group management: • Managing Satellite Software Upgrade Groups in a Junos Fusion on page 123 • **satellite** • Configuring or Expanding a Junos Fusion Enterprise on page 45 • **request system software add**	

Configuring the Second Aggregation Device (Dual Aggregation Device Topologies Only) (Aggregation Devices)

Table 13: Junos Fusion Enterprise Installation Checklist (continued)

Task	Additional Information	For More Information	Performed by and Date
Delete single home configuration mode on both aggregation devices.	To delete single home configuration mode on aggregation device 1: **delete chassis satellite-management single-home** Enter the same command on aggregation device 2: **delete chassis satellite-management single-home**	Dual aggregation device overview: "Understanding Junos Fusion Enterprise Components" on page 5 Deleting single home configuration: • Configuring or Expanding a Junos Fusion Enterprise on page 45 **single-home**	
Create and number the redundancy group on both aggregation devices.	To create and number the redundancy group on aggregation device 1: **set chassis satellite-management redundancy-groups junos-fusion-campus-network redundancy-group-id 1** Enter the same command on aggregation device 2:**set chassis satellite-management redundancy-groups junos-fusion-campus-network redundancy-group-id 1**	Dual aggregation device overview: "Understanding Junos Fusion Enterprise Components" on page 5 Dual aggregation device configuration: "Configuring or Expanding a Junos Fusion Enterprise" on page 45	
Define the chassis ID number on each aggregation device.	To define the chassis ID on aggregation device 1:**set chassis satellite-management redundancy-groups chassis-id 1** To define the chassis ID on aggregation device 2:**set chassis satellite-management redundancy-groups chassis-id 2**	Dual aggregation device overview: "Understanding Junos Fusion Enterprise Components" on page 5 Dual aggregation device configuration: "Configuring or Expanding a Junos Fusion Enterprise" on page 45	

Table 13: Junos Fusion Enterprise Installation Checklist (continued)

Task	Additional Information	For More Information	Performed by and Date
Define the peer chassis ID number and ICL interface on each aggregation device.	To define the peer chassis ID and ICL interface on aggregation device 1: **set chassis satellite-management redundancy-groups junos-fusion-campus-network peer-chassis-id 2 inter-chassis-link xe-0/0/1** To define the peer chassis ID and ICL interface on aggregation device 2: **set chassis satellite-management redundancy-groups junos-fusion-campus-network peer-chassis-id 1 inter-chassis-link xe-0/0/1**	Dual aggregation device overview: "Understanding Junos Fusion Enterprise Components" on page 5 Dual aggregation device configuration: "Configuring or Expanding a Junos Fusion Enterprise" on page 45	

Table 13: Junos Fusion Enterprise Installation Checklist (continued)

Task	Additional Information	For More Information	Performed by and Date
Add all satellite devices to the redundancy group on each aggregation device.	On aggregation device 1: **set chassis satellite-management redundancy-groups junos-fusion-campus-network satellite 130-131** **set chassis satellite-management redundancy-groups junos-fusion-campus-network cluster building-1** **set chassis satellite-management redundancy-groups junos-fusion-campus-network cluster building-2** Enter the same commands on aggregation device 2: **set chassis satellite-management redundancy-groups junos-fusion-campus-network satellite 130-131** **set chassis satellite-management redundancy-groups junos-fusion-campus-network cluster building-1** **set chassis satellite-management redundancy-groups junos-fusion-campus-network cluster building-2**	Dual aggregation device overview: “Understanding Junos Fusion Enterprise Components” on page 5 Dual aggregation device configuration: “Configuring or Expanding a Junos Fusion Enterprise” on page 45	

Table 13: Junos Fusion Enterprise Installation Checklist (continued)

Task	Additional Information	For More Information	Performed by and Date
Ensure ICCP is configured: • Automatic ICCP provisioning. If you are not integrating your Junos Fusion Enterprise into an existing Enterprise or campus network, ICCP is automatically provisioned. No user action is required. • Manual ICCP configuration. If you are integrating your Junos Fusion Enterprise into an existing Enterprise or campus network, you may have to modify some ICCP setting to ensure the Junos Fusion Enterprise functions properly in your environment.	• Automatic ICCP provisioning: No user action required. • Manual ICCP configuration. See *Configuring Multichassis Link Aggregation on EX Series Switches*.	ICCP overview: "Understanding ICCP in a Junos Fusion using Dual Aggregation Devices" on page 35 Manual ICCP configuration: • *Configuring Multichassis Link Aggregation on EX Series Switches*	

Adding Satellite Devices (Aggregation Devices)

Table 13: Junos Fusion Enterprise Installation Checklist (continued)

Task	Additional Information	For More Information	Performed by and Date
Install satellite software onto a satellite device that is currently running Junos OS using one of the following methods: • (Recommended) Autoconversion—Satellite software installed when satellite device cabled to aggregation device. • Manual conversion—Satellite software is installed when user enters CLI command to install satellite software. • Pre-installation—Satellite software is installed on satellite device before cabling it into the Junos Fusion. A switch may have satellite software pre-installed because it was ordered from the factory running satellite software, it was previously part of a different Junos Fusion, or a user manually installed satellite software onto the switch.	• To enable autoconversion: **set chassis satellite-management auto-satellite-conversion satellite 101** • To manually convert a satellite device: NOTE: This command is entered from an aggregation device. **request chassis satellite interface xe-0/0/1 device-mode satellite** • To manually install satellite software onto a satellite device: NOTE: This command is entered on the satellite device before it is configured into the Junos Fusion Enterprise. Please use the platform specific satellite software package appropriate for the platform as documented in *Understanding Platform-specific Satellite Software* in "Understanding Software in a Junos Fusion Enterprise" on page 22.	Satellite software installation methods overview: "Understanding Software in a Junos Fusion Enterprise" on page 22 Installing satellite software: • Configuring or Expanding a Junos Fusion Enterprise on page 45 • **satellite (Junos Fusion Automatic Satellite Conversion)** • **request chassis satellite interface** • **request chassis device-mode satellite**	

Related Documentation

- Junos Fusion Hardware and Software Compatibility Matrices
- Understanding Junos Fusion Enterprise Software and Hardware Requirements on page 26
- Configuring or Expanding a Junos Fusion Enterprise on page 45
- Understanding Junos Fusion Enterprise Components on page 5

Adding a Switch Running Satellite Software to a Junos Fusion Enterprise

Use this procedure to add a switch that is already running satellite software to an operational Junos Fusion Enterprise as a satellite device.

NOTE: To add a switch running satellite software version 2.0 to a satellite device cluster of a Junos Fusion Enterprise system:

1. Convert the switch to Junos OS. See "Installing Junos OS Software on a Standalone Device Running Satellite Software" on page 144.

2. Switch to the Junos Fusion Enterprise system. See the section *Installing Satellite Software and Adding Satellite Devices to the Junos Fusion* in "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

A switch could already be running satellite software because it was previously part of another Junos Fusion, or because a user manually installed the satellite software.

To add a switch running satellite software to a Junos Fusion Enterprise as a satellite device:

Before you begin:

- Ensure the version of satellite software on your switch is supported by the Junos Fusion Enterprise. See "Understanding Junos Fusion Enterprise Software and Hardware Requirements" on page 26.
- Ensure that a Junos Fusion Enterprise is configured and operational. For detailed information on setting up a Junos Fusion Enterprise, see "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

1. Log into the aggregation device.

2. Configure the link on the aggregation device into a cascade port, if you have not done so already.

   For example, to configure interface xe-0/0/1 on the aggregation device into a cascade port:

   ```
   [edit]
   user@aggregation-device# set interfaces xe-0/0/1 cascade-port
   ```

3. Associate an FPC slot ID with the satellite device.

   There are multiple methods of associating FPC slot IDs. See "Configuring or Expanding a Junos Fusion Enterprise" on page 45 for detailed information regarding FPC slot ID associations with satellite devices.

   Examples:

- To associate FPC slot ID 101 with the satellite device that is connected to xe-0/0/1:

  ```
  [edit]
  user@aggregation-device# set chassis satellite-management fpc 101 cascade-ports xe-0/0/1
  ```

- To associate FPC slot ID 101 with the satellite device using the serial number ABCDEFGHIJKL:

  ```
  [edit]
  user@aggregation-device# set chassis satellite-management fpc 101 serial-number ABCDEFGHIJKL
  ```

- To associate FPC slot ID 101 with the satellite device using MAC address 12:34:56:AB:CD:EF:

  ```
  [edit]
  user@aggregation-device# set chassis satellite-management fpc 101 system-id 12:34:56:AB:CD:EF
  ```

4. (Recommended) Configure the satellite switch into a satellite software upgrade group that uses the same version of satellite software that was manually installed onto the switch.

   This step is advisable, but not always required. Completing this step ensures that the satellite software on your device is not upgraded to the version of satellite software associated with the satellite software upgrade group upon installation.

5. Commit the configuration to both Routing Engines:

   ```
   [edit]
   user@aggregation-device# commit synchronize
   ```

   If you want to commit the configuration to a single Routing Engine:

   ```
   [edit]
   user@aggregation-device# commit
   ```

6. Cable the aggregation device to the satellite device using the assigned cascade port interface on the aggregation device that was assigned in Step 2.

   Cascade port interface support is discussed in "Understanding Junos Fusion Enterprise Software and Hardware Requirements" on page 26.

7. Power on the satellite device, if you have not already done so.

   NOTE: The satellite device can be powered on at any point in this procedure.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

- Understanding Junos Fusion Enterprise Software and Hardware Requirements on page 26

Enabling Configuration Synchronization Between Aggregation Devices in a Junos Fusion

A Junos Fusion using multiple aggregation devices often requires that the configuration of a feature—for example, an extended port, and entities such as routing instances and VLANs that include the extended port—must match on all aggregation devices. If a configuration statement for the feature—in this case, the extended port—is specified differently on one aggregation device, the statement on that aggregation device might be implemented in an unpredictable manner or might not be implemented at all.

Configuration synchronization can be used to ensure that configuration done in a configuration group is applied on all aggregation devices when committed. Configuration synchronization simplifies administration of a Junos Fusion by allowing users to enter configuration statements in a configuration group and apply the configuration group to all aggregation devices rather than repeating a configuration procedure manually on each aggregation device. Configuration synchronization also ensures configuration consistency in that the same configuration is applied to all aggregation devices.

We strongly recommend using configuration synchronization for software features that must be configured exactly the same on all aggregation devices.

In a Junos Fusion Data Center with EVPN, QFX10008 and QFX10016 switches, which support two Routing Engines, can function as aggregation devices. When applying a configuration group to aggregation devices that support two Routing Engines, you must apply the configuration group to each Routing Engine. For information about configuring an IP address for each Routing Engine, see "Understanding Configuration Synchronization in a Junos Fusion" on page 25.

The available group configuration options are beyond the scope of this document; see Understanding MC-LAG Configuration Synchronization and Synchronizing and Committing MC-LAG Configurations for additional information on using group configurations in an MC-LAG topology.

To enable configuration synchronization between aggregation devices in a Junos Fusion.

NOTE: For the sake of brevity, the examples in this procedure show the configuration on only two aggregation devices. Unless specifically called out, the examples for two aggregation devices also apply to topologies with four aggregation devices.

1. Ensure the aggregation devices are reachable from one another:

   Aggregation device 1:

```
user@ad1> ping ad2 rapid
PING ad2.host.example.net (192.168.255.41): 56 data bytes
!!!!!
mostly o--- ad2.example.net ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.317/0.331/0.378/0.024 ms
```

   Aggregation device 2:

```
user@ad2> ping ad1 rapid
PING ad1.host.example.net (192.168.255.40): 56 data bytes
!!!!!
--- ad1.example.net ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.317/0.331/0.378/0.024 ms
```

   If the devices cannot ping one another, try statically mapping the hostnames of each device’s management IP address and retry the ping.

   Aggregation device 1:

```
user@ad1# set system static-host-mapping inet 192.168.255.41
user@ad1# commit
user@ad1# run ping ad2 rapid
```

   Aggregation device 2:

```
user@ad2# set system static-host-mapping ad1 inet 192.168.255.40
user@ad2# commit
user@ad2# run ping ad1 rapid
```

   If the devices cannot ping one another after the hostnames are statically mapped, see Connecting and Configuring an EX9200 Switch (CLI Procedure) or the Installation and Upgrade Guide for EX9200 Switches.

2. Enable configuration synchronization:

   Aggregation device 1:


```
user@ad1# set system commit peers-synchronize
```

Aggregation device 2:

```
user@ad2# set system commit peers-synchronize
```

3. Configure each aggregation device so that the other aggregation devices are identified as configuration peers. Enter the authentication credentials of each peer aggregation device to ensure group configurations on one aggregation device are committed to the other aggregation devices.

   WARNING: The password *password* is used in this configuration step for illustrative purposes only. Use a more secure password in your device configuration.

   NOTE: This step assumes a user with an authentication password has already been created on each Juniper Networks switch acting as an aggregation device. For instructions on configuring username and password combinations, see Connecting and Configuring an EX9200 Switch (CLI Procedure).

   Aggregation device 1:

   ```
   user@ad1# set system commit peers ad2 user root authentication password
   ```

   Aggregation device 2:

   ```
   user@ad2# set system commit peers ad1 user root authentication password
   ```

4. Enable the Network Configuration (NETCONF) protocol over SSH:

   Aggregation device 1:

   ```
   user@ad1# set system services netconf ssh
   ```

   Aggregation device 2:

   ```
   user@ad2# set system services netconf ssh
   ```

5. Commit the configuration:

   Aggregation device 1:

   ```
   user@ad1# commit
   ```

Aggregation device 2:

```
user@ad2# commit
```

6. (Optional) Create a configuration group for testing to ensure configuration synchronization is working.

   Example for Junos Fusion Enterprise and Junos Fusion Data Center with aggregation devices that have one Routing Engine:

   Aggregation Device 1:

```
user@ad1# set groups TEST when peers [ad1 ad2]
user@ad1# set apply-groups TEST
```

   Aggregation Device 2:

```
user@ad2# set apply-groups TEST
```

   Example for Junos Fusion Data Center with EVPN architecture and QFX10008 or QFX10016 switches with two Routing Engines as aggregation devices:

   Aggregation Device 1:

```
user@ad1# set groups TEST when peers 172.16.75.10 (ad1, re0)
user@ad1# set groups TEST when peers 172.16.75.20 (ad1, re1)
user@ad1# set groups TEST when peers 172.16.75.30 (ad2, re0)
user@ad1# set groups TEST when peers 172.16.75.40 (ad2, re1)
user@ad1# set groups TEST when peers 172.16.75.50 (ad3, re0)
user@ad1# set groups TEST when peers 172.16.75.60 (ad3, re1)
user@ad1# set groups TEST when peers 172.16.75.70 (ad4, re0)
user@ad1# set groups TEST when peers 172.16.75.80 (ad4, re1)
user@ad1# set apply-groups TEST
```

   Aggregation Device 2:

```
user@ad2# set apply-groups TEST
```

   Aggregation Device 3:

```
user@ad2# set apply-groups TEST
```

   Aggregation Device 4:

```
user@ad2# set apply-groups TEST
```

7. (Optional) Configure and commit a group on aggregation device 1, and confirm it is implemented on aggregation device 2:

NOTE: This step shows how to change one interface configuration using groups. Interface ranges cannot be specified within groups and synchronized between configuration peers in a Junos Fusion to configure multiple interfaces simultaneously.

Aggregation device 1:

```
user@ad1# set groups TEST interfaces ge-0/0/1 description testing123
user@ad1# commit
```

Aggregation device 2:

```
user@ad2# show groups TEST
when {
    peers [ ad1 ad2 ];
}
interfaces {
    ge-0/0/1 {
        description testing123;
    }
}
user@ad2# run show interfaces ge-0/0/1
Physical interface: ge-0/0/1, Enabled, Physical link is Down
  Interface index: 235, SNMP ifIndex: 743
  Description: testing123
  (additional output removed for brevity)
```

Perform the same procedure to verify configuration synchronization from aggregation device 2 to aggregation device 1, if desired.

Delete the test configuration group on each aggregation device.

Aggregation device 1:

```
user@ad1# delete groups test
```

Aggregation device 2:

```
user@ad2# delete groups test
```

See Enabling Junos Fusion Enterprise on an Enterprise Campus Network for a sample Junos Fusion Enterprise topology configured largely using configuration synchronization. See Enterprise Data Center: Junos Fusion Data Center Architecture for a sample Junos Fusion Data Center topology largely configured using configuration synchronization.

Related Documentation

- Network Configuration Example: Configuring MC-LAG on EX9200 Switches in the Core for Campus Networks
- Synchronizing and Committing MC-LAG Configurations

- Understanding MC-LAG Configuration Synchronization
- Understanding Configuration Synchronization in a Junos Fusion on page 25
- Configuring or Expanding a Junos Fusion Enterprise on page 45

Configuring Uplink Port Policies on a Junos Fusion

Ports on a satellite device that can be used as uplink ports are called candidate uplink ports. Each satellite device model has a set of default candidate uplink ports that the device can use to connect to the aggregation device and, in the case of a satellite device cluster, to other satellite devices. You can override the default set of candidate uplink and clustering ports by defining a candidate uplink port policy for the device.

To configure a candidate uplink port policy, you must first configure an uplink port group. The uplink port group defines a set of candidate uplink ports on a satellite device. Uplink port groups are assigned to candidate uplink port policies, which are assigned to satellite devices.

NOTE: **The candidate uplink port policy must include at least one port from the default candidate uplink port. Otherwise, the aggregation device will not be able to communicate with the satellite device in order to provision the satellite device with the uplink port policy.**

- Configuring an Uplink Port Policy for a Standalone Satellite Device on page 82
- Configuring an Uplink Port Policy for a Satellite Device Cluster on page 83

Configuring an Uplink Port Policy for a Standalone Satellite Device

To configure an uplink port policy:

1. Create an uplink port group:

   ```
   [edit policy-options satellite-policies]
   user@switch# set port-group-alias port-group-alias-name
   ```

2. Configure the PICs that contain ports to be identified as candidate uplink ports:

   ```
   [edit policy-options satellite-policies port-group-alias port-group-alias-name]
   user@switch# set pic pic-number
   ```

3. Configure the ports on the PICs to be identified as candidate uplink ports:

   ```
   [edit policy-options satellite-policies port-group-alias port-group-alias-name
   pic pic-number]
   user@switch# set port [port-number | port-number-range | all]
   ```

4. Create a candidate uplink port policy:

   ```
   [edit policy-options satellite-policies]
   ```



```
user@switch# set candidate-uplink-port-policy policy-name
```

5. Assign the uplink port group to the candidate uplink port policy:

```
[edit policy-options satellite-policies candidate-uplink-port-policy
policy-name]
user@switch# set uplink-port-group group-name
```

Configuring an Uplink Port Policy for a Satellite Device Cluster

Candidate uplink port policies for a satellite device cluster can be applied at the cluster level, FPC level, or globally. Policies configured at the FPC-level take precedence over cluster and global policies. Policies configured at the cluster level take precedence over global policies.

1. Follow steps 1-3 in the procedure above to create an uplink port group.

2. Configure a candidate uplink port policy for a satellite cluster at the cluster level, FPC level, or global level:

   - To configure a policy at the cluster level:

     ```
     [edit]
     user@switch# set chassis satellite-management cluster cluster-name cluster-policy
     satellite-port-policy-name
     ```

   - To configure a policy at the FPC level:

     ```
     [edit]
     user@switch# set chassis satellite-management cluster cluster-name fpc fpc-number
     cluster-policy satellite-port-policy-name
     ```

   - To configure a policy at the global level:

     ```
     [edit]
     user@switch# set chassis satellite-management cluster-policy satellite-port-policy-name
     ```

3. Assign the uplink port group to the candidate uplink port policy:

```
[edit policy-options satellite-policies candidate-uplink-port-policy
policy-name]
user@switch# set uplink-port-group group-name
```

Related Documentation

- Understanding Satellite Policies in a Junos Fusion on page 41

Configuring Satellite Device Alarm Handling Using an Environment Monitoring Satellite Policy in a Junos Fusion

This topic shows how to configure the alarm levels for link-down events on a satellite device in a Junos Fusion.

To configure system alarm handling in a Junos Fusion using an environment monitoring satellite policy:

1. Log in to the aggregation device.

2. Create and name the environment monitoring satellite policy:

   [edit]
   user@aggregation-device# **set policy-options satellite-policies environment-monitoring-policy *policy-name***

   For example, to create an environment monitoring satellite policy named **linkdown-alarm-monitoring-1**:

   [edit]
   user@aggregation-device# **set policy-options satellite-policies environment-monitoring-policy linkdown-alarm-monitoring-1**

3. Configure the link-down alarm behavior for the Junos Fusion using one or both of the following methods:

   - Set the default link-down alarm to one setting whenever it is experienced in a Junos Fusion:

     [edit policy-options satellite-policies environment-monitoring-policy *policy-name*]
     user@aggregation-device# **set alarm linkdown [ignore | red | yellow]**

     For example, to set the default link-down alarm to ignore for **linkdown-alarm-monitoring-1**:

     [edit policy-options satellite-policies environment-monitoring-policy linkdown-alarm-monitoring-1]
     user@aggregation-device# **set alarm linkdown ignore**

   - Set the link-down alarm behavior for a specific satellite device hardware model using terms:

     [edit policy-options satellite-policies environment-monitoring-policy *policy-name*]
     user@aggregation-device# **set term *term-name* from product-model *model-name* alarm linkdown [ignore | red | yellow]**

     where *term-name* is the user-defined name of the term, and *model-name* defines the product model of the satellite device that uses the satellite policy.

You can apply environment monitoring satellite policies individually or globally. You can, therefore, create multiple policies using the instructions in this step and apply them to different satellite devices in your Junos Fusion, when needed.

You can use multiple terms in the same environment monitoring satellite policy.

For example, if you wanted to configure EX4300 switches acting as satellite devices to send yellow alarms when link-down errors occur while QFX5100 switches acting as satellite devices send red alarms for the same condition:

```
[edit policy-options satellite-policies environment-monitoring-policy
linkdown-alarm-monitoring-1]
user@aggregation-device# set term ex4300-yellow from product-model EX4300* alarm
linkdown yellow
user@aggregation-device# set term qfx5100-red from product-model QFX5100* alarm
linkdown red
```

4. Associate the environment monitoring satellite policy with a Junos Fusion configuration.
   - To associate an environment monitoring satellite policy for all satellite devices in a Junos Fusion:

     ```
     [edit chassis satellite-management]
     user@aggregation-device# set environment-monitoring-policy policy-name
     ```

     For example, to associate an environment monitoring satellite policy named **linkdown-alarm-monitoring-1** for all satellite devices in a Junos Fusion:

     ```
     [edit chassis satellite-management]
     user@aggregation-device# set environment-monitoring-policy
     linkdown-alarm-monitoring-1
     ```

   - To associate an environment monitoring satellite policy for select FPC IDs in a Junos Fusion:

     ```
     [edit chassis satellite-management fpc slot-id]
     user@aggregation-device# set environment-monitoring-policy policy-name
     ```

     For example, to associate an environment monitoring satellite policy named **linkdown-alarm-monitoring-1** for the satellite device associated with FPC ID 101 in a Junos Fusion:

     ```
     [edit chassis satellite-management fpc 101]
     user@aggregation-device# set environment-monitoring-policy
     linkdown-alarm-monitoring-1
     ```

   You can configure a different environment monitoring policy for a single satellite device using the **fpc *slot-id*** when an environment monitoring policy for all satellite devices is configured. The environment monitoring policy for the FPC is enabled in cases when both an individual and global environment monitoring policy are configured.

5. Commit the configuration to both Routing Engines:

   ```
   [edit]
   user@aggregation-device# commit synchronize
   ```

If you want to commit the configuration to the active Routing Engine only:

```
[edit]
user@aggregation-device# commit
```

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

CHAPTER 3

Junos Fusion Enterprise Configuration Statements

aging-timer (Junos Fusion)

Syntax

```
aging-timer aging-timer;
```

Hierarchy Level

```
[edit chassis satellite-management]
```

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Configure the aging timer on the aggregation device in a Junos Fusion.

The aging timer is used on the aggregation device to specify the amount of time, in minutes, to maintain the device state of an unreachable satellite device before deleting the satellite device from the Junos Fusion.

If the unreachable satellite device is discovered before the aging timer expires, the satellite device is reactivated in the Junos Fusion without having to restore its device state.

Default

The default aging time is 10 minutes.

Options

The remaining statements are explained separately.

Range: 2 through 60,000 minutes

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

alarm (Satellite Policies)

Syntax

```
alarm {
  linkdown [ignore | red | yellow]
}
```

Hierarchy Level

[edit policy-options satellite-policies environment-monitoring-policy *policy-name*]

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Configure the link down alarm that is sent within the Junos Fusion whenever a satellite device experiences a link-down error.

Default

Link-down alarms are not sent on satellite devices in a Junos Fusion until an environment monitoring policy is configured.

Options

The remaining statements are explained separately.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Satellite Device Alarm Handling Using an Environment Monitoring Satellite Policy in a Junos Fusion on page 84
- Understanding Satellite Policies in a Junos Fusion on page 41

alias (Junos Fusion)

Syntax

alias *alias*;

Hierarchy Level

[edit chassis satellite-management fpc *slot-id*]

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Configure an alias to label a satellite device.

Satellite device alias configuration is optional, but recommended. In a Junos Fusion, satellite device aliases assist with administration tasks, such as monitoring satellite devices using **show** command outputs, as well as with some configuration tasks that provide an option to identify a satellite device by its alias.

Default

Satellite devices are not assigned an alias, by default.

Options

alias—The user-defined text name of the alias.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

alias (Junos Fusion Satellite Device Clustering)

Syntax

alias *alias*;

Hierarchy Level

[edit chassis satellite-management cluster *cluster-name* fpc *slot-id*]

Release Information

Statement introduced in Junos OS Release 16.1R1.

Description

Configure an alias to label a satellite device in a satellite device cluster.

Satellite device alias configuration is optional, but recommended. In a Junos Fusion, satellite device aliases assist with administration tasks, such as monitoring satellite devices using **show** command outputs, as well as with some configuration tasks that provide an option to identify a satellite device by its alias.

Default

Satellite devices in a satellite device cluster are not assigned an alias, by default.

Options

alias—The user-defined text name of the alias.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

auto-satellite-conversion (Junos Fusion)

Syntax

```
auto-satellite-conversion {
  satellite [slot-id | range | all];
}
```

Hierarchy Level

```
[edit chassis satellite-management]
```

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Enable automatic satellite conversion in a Junos Fusion.

Automatic satellite conversion automatically configures a switch into a satellite device when it is cabled into the aggregation device.

Additional configuration steps are required to add satellite devices to a Junos Fusion using automatic satellite conversion. See *Configuring Junos Fusion Provider Edge* or "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

Options

The remaining statements are explained separately.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

bgp-peer

Syntax

bgp-peer *ip-address*;

Hierarchy Level

[edit routing-instances *name* protocols evpn mclag]

Release Information

Statement introduced in Junos OS Release 17.4R1 on MX Series routers, EX Series switches, and Junos Fusion Enterprise.

Description

Configure an aggregation device in a Junos Fusion Enterprise or a multichassis link aggregation group (MC-LAG) topology to interwork with an Ethernet VPN-MPLS (EVPN-MPLS) device.

Options

ip-address—IP address of the BGP peer. Typically, a BGP peer is identified by the IP address of the device's loopback interface.

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Understanding EVPN-MPLS Interworking with Junos Fusion Enterprise and MC-LAG on page 715

cascade-port

Syntax

```
cascade-port;
```

Hierarchy Level

[edit interfaces *interface-name*]

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Configure the specified interface on the aggregation device in a Junos Fusion into a cascade port.

Additional configuration is required to configure cascade ports on a Junos Fusion. See *Configuring Junos Fusion Provider Edge* or "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

Default

No interfaces are cascade ports, by default.

Options

interface-name—Specifies the name of the interface.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

cascade-ports

Syntax

```
cascade-ports interface-name;
```

Hierarchy Level

```
[edit chassis satellite-management fpc slot-id]
```

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Associate a cascade port with an FPC slot ID number in a Junos Fusion.

The FPC slot ID of the satellite device is determined by the value entered as the FPC *slot-id*. For instance, if the **set chassis satellite-management fpc 105 cascade-ports xe-0/0/1** statement is used to configure interface xe-0/0/1 into a cascade port, the satellite device that connects to interface xe-0/0/1 has an FPC slot ID of 105 in the Junos Fusion.

A Junos Fusion provides two methods of assigning an FPC identifier: Unique ID-based FPC identification and connectivity-based FPC identification. Unique ID-based FPC identification maps an FPC slot ID to a satellite device's MAC address or serial number, while connectivity-based FPC identification maps an FPC slot ID to a cascade port. This statement is used to assign an FPC ID using connectivity-based FPC identification by mapping an FPC slot ID to a cascade port.

In a Junos Fusion, each satellite device must be mapped to an FPC identifier (FPC ID). The FPC ID is used for Junos Fusion configuration, monitoring, and maintenance. Interface names—which are identified using the *type-fpc / pic / port* format—use the FPC ID as the *fpc* variable when the satellite device is participating in a Junos Fusion. For instance, built-in port 2—a Gigabit Ethernet interface on a satellite device that is using 101 as it's FPC ID— uses ge-101/0/2 as its interface name.

For additional information on the role of FPC slot IDs in a Junos Fusion, see *Understanding Junos Fusion Provider Edge Components* or "Understanding Junos Fusion Enterprise Components" on page 5.

Default

No FPC slot IDs are associated with satellite devices, by default.

Options

interface-name—Specifies the name of the interface.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

cascade-ports (Junos Fusion Satellite Device Cluster)

Syntax

cascade-ports *interface-name*;

Hierarchy Level

[edit chassis satellite-management cluster *cluster-name*]

Release Information

Statement introduced in Junos OS Release 16.1R1.

Description

Associate a cascade port with a satellite device cluster in a Junos Fusion.

This command defines which cascade ports are associated with a satellite device cluster only. An interface still needs to be converted into a cascade port before it performs cascade port functions. There are multiple ways to convert an interface on the aggregation device into a cascade port. See "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

Default

Cascade ports are not associated with satellite device clusters, by default.

Options

interface-name—Specifies the name of the interface on the aggregation device that is associated with the satellite device cluster.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

cluster (Junos Fusion)

Syntax

```
cluster cluster-name{
  cascade-ports interface-name;
  cluster-id cluster-id-number;
  fpc slot-id{
    alias alias;
    description description;
    member-id member-id-number;
    system-id mac-address;
  }
}
```

Hierarchy Level

[edit chassis satellite-management]

Release Information Statement introduced in Junos OS Release 16.1R1.

Description Create and name a satellite device cluster.

Default Satellite device clusters are not present, by default.

Options ***cluster-name***—Specifies the name of the satellite device cluster.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

cluster-id (Junos Fusion Satellite Device Cluster)

Syntax cluster-id *cluster-id-number*;

Hierarchy Level [edit chassis satellite-management cluster *cluster-name*]

Release Information Statement introduced in Junos OS Release 16.1R1.

Description Assign a cluster identification number to a satellite device cluster in a Junos Fusion.

The cluster identification number is used to identify a satellite device cluster in a Junos Fusion.

Default Cluster identification numbers are not assigned in a Junos Fusion, by default.

Options ***cluster-id-number***—Specifies the cluster identification number of the satellite device cluster in the Junos Fusion.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

description (Junos Fusion)

Syntax

```
description description;
```

Hierarchy Level

```
[edit chassis satellite-management fpc slot-id]
```

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Configure a description for the satellite device.

The description is optional and used for information purposes only.

Default

Satellite devices do not have descriptions, by default.

Options

description—A text description of the satellite device.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

description (Junos Fusion Satellite Device Cluster)

Syntax

description *description*;

Hierarchy Level

[edit chassis satellite-management cluster *cluster-name* fpc *slot-id*]

Release Information

Statement introduced in Junos OS Release 16.1R1.

Description

Configure a description for the satellite device in the satellite device cluster.

The description is optional and used for information purposes only.

Default

Satellite devices in satellite device clusters do not have descriptions, by default.

Options

description—A text description of the satellite device in the satellite device cluster.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

environment-monitoring-policy (satellite-management)

Syntax

```
environment-monitoring-policy policy-name;
```

Hierarchy Level

```
[edit chassis satellite-management]
[edit chassis satellite-management fpc slot-id]
```

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Enable an environment monitoring policy in a Junos Fusion.

You configure environment monitoring policies for a Junos Fusion in the [**edit policy-options environment-monitoring-policy *policy-name***] hierarchy.

You can configure an environment monitoring policy in a Junos Fusion for a single satellite device using the **fpc *slot-id*** option, or for all satellite devices in the Junos Fusion by not specifying the **fpc *slot-id*** option.

You can configure a different environment monitoring policy for a single satellite device using the **fpc *slot-id*** when an environment monitoring policy for all satellite devices is configured. The environment monitoring policy for the FPC is enabled in cases when both an individual and global environment monitoring policy are configured.

Default

No environment monitoring policies for the Junos Fusion are present.

If you enable an environment monitoring policy in a Junos Fusion without specifying the **fpc *slot-id*** option, the environment monitoring policy is applied for all satellite devices in the Junos Fusion.

Options

policy-name—Specifies the name of the environment monitoring policy.

The *policy-name* name is defined as part of the environment monitoring policy configuration procedure, which is handled in the [**edit policy-options environment-monitoring-policy *policy-name***] hierarchy.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Satellite Device Alarm Handling Using an Environment Monitoring Satellite Policy in a Junos Fusion on page 84
- Understanding Satellite Policies in a Junos Fusion on page 41

environment-monitoring-policy (satellite-policies)

Syntax

```
environment-monitoring-policy policy-name{
  alarm {
    linkdown [ignore | red | yellow]
  }
  term term-name{
    from {
      product-model model-name;
    }
  }
}
```

Hierarchy Level

```
[edit policy-options satellite-policies]
```

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Configure an environment monitoring satellite policy for a device or devices in a Junos Fusion.

An environment monitoring satellite policy is used to configure alarm behavior on satellite devices in a Junos Fusion.

The environment monitoring policy is applied to a Junos Fusion using the **environment-monitoring-policy** statement in the [edit *chassis* **satellite-management**] or [edit *chassis* **satellite-management fpc** *slot-id*] hierarchy levels.

Options

policy-name—Specifies the user-defined name of the environment monitoring policy.

The remaining statements are explained separately.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Satellite Device Alarm Handling Using an Environment Monitoring Satellite Policy in a Junos Fusion on page 84
- Understanding Satellite Policies in a Junos Fusion on page 41

fpc (Junos Fusion)

Syntax

```
fpc slot-id{
  alias alias;
  cascade-ports interface-name;
  description description;
  environment-monitoring-policy policy;
  serial-numberserial-number;
  system-id mac-address;
  uplink-failure-detection {
    candidate-uplink-policy policy;
  }
  local switching;
  selective-vlan-switching{
    routing-instance routing-instance;
  }
}
```

Hierarchy Level

```
[edit chassis satellite-management]
```

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.
local-switching and **selective-vlan-switching** introduced in Junos OS Release 17.2R1 for Junos Fusion Provider Edge.

Description

Configure an FPC identifier for a satellite device within a Junos Fusion, or modify the configuration of an existing satellite device in a Junos Fusion.

Options

slot-id—Specifies the FPC identifier of the device and functions as the FPC identifier in the interface name when configuring satellite device interfaces.

In a Junos Fusion Data Center, the *slot-id* must have a value in the range of 65 to 254.

In a Junos Fusion Enterprise or Junos Fusion Provider Edge, the *slot-id* must have a value of 34 or greater.

local switching—Enables local-switching for all the ports on the satellite device.

The remaining statements are explained separately.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

fpc (Junos Fusion Satellite Device Cluster)

Syntax

```
fpc slot-id{
   alias alias;
   description description;
   member-id member-id-number;
   system-id mac-address;
}
```

Hierarchy Level

[edit chassis satellite-management cluster *cluster-name*]

Release Information Statement introduced in Junos OS Release 16.1R1.

Description Configure an FPC identifier for a satellite device in a satellite device cluster for a Junos Fusion, or modify the configuration of an existing satellite device in a satellite device cluster in a Junos Fusion.

Options ***slot-id***—Specifies the FPC identifier of the device.

In a Junos Fusion, the *slot-id* must be 34 or larger, and functions as the FPC identifier in the interface name when configuring satellite device interfaces.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

linkdown (satellite-policies alarm)

Syntax

```
linkdown [ignore | red | yellow]
```

Hierarchy Level

```
[edit policy-options satellite-policies environment-monitoring-policy policy-name alarm]
```

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Configure the alarm behavior when an Ethernet link goes down on a satellite device in a Junos Fusion.

The configured alarm behavior can be applied to any satellite device in the Junos Fusion. The alarm behavior is applied to satellite devices using environment monitoring policies.

Options

ignore—Do not signal an alarm when an Ethernet link-down event occurs.

red—Raise a major alarm when an Ethernet link-down event occurs.

yellow—Raise a minor alarm when an Ethernet link-down event occurs.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring Satellite Device Alarm Handling Using an Environment Monitoring Satellite Policy in a Junos Fusion on page 84
- Understanding Satellite Policies in a Junos Fusion on page 41

mclag

Syntax

```
mclag {
  bgp-peer ip-address;
}
```

Hierarchy Level

```
[edit routing-instances name protocols evpn]
```

Release Information

Statement introduced in Junos OS Release 17.4R1 on MX Series routers, EX Series switches, and Junos Fusion Enterprise.

Description

Configure parameters that enable the interworking of Ethernet VPN-MPLS (EVPN-MPLS) with a Junos Fusion Enterprise or a multichassis link aggregation group (MC-LAG) topology.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

routing—To view this statement in the configuration.
routing-control—To add this statement to the configuration.

Related Documentation

- Understanding EVPN-MPLS Interworking with Junos Fusion Enterprise and MC-LAG on page 715

member-id (Junos Fusion Satellite Device Cluster)

Syntax

```
member-id member-ID-number;
```

Hierarchy Level

```
[edit chassis satellite-management cluster cluster-name fpc slot-id ]
```

Release Information Statement introduced in Junos OS Release 16.1R1.

Description Assign a member ID number to a satellite device in a satellite device cluster.

The member ID is used to identify the satellite device within the satellite device cluster.

Default Member ID numbers are not assigned in a satellite device cluster, by default.

Options ***member-ID-number***—Specifies the member ID of the satellite device in the satellite device cluster.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

no-auto-iccp-provisioning (Junos Fusion Redundancy Group)

Syntax

```
no-auto-iccp-provisioning;
```

Hierarchy Level

[edit chassis satellite-management redundancy-groups *redundancy-group-name*
peer-chassis-id *peer-chassis-id-number*]

Release Information Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.

Description Disable automatic ICCP provisioning of an interchassis link (ICL) for the redundancy group used to configure dual aggregation devices in a Junos Fusion topology.

Automatic ICCP provisioning of an interchassis link (ICL) simplifies configuration of a Junos Fusion with dual aggregation devices by automatically provisioning the ICCP configuration within the Junos Fusion, instead of requiring the user to manually configure all ICCP parameters. Automatic ICCP Provisioning of an interchassis link (ICL) is enabled by default for a Junos Fusion using a dual aggregation device topology; this statement disables automatic ICCP provisioning.

If this statement is entered, the user has to manually configure ICCP in the redundancy group used to configure dual aggregation devices in a Junos Fusion topology.

This statement is optional. You can manually configure any available ICCP configuration parameters in the redundancy group when automatic ICCP provisioning is enabled. In cases where a user configures an ICCP parameter when automatic ICCP provisioning is enabled, the user-configured ICCP configuration is used over the automatically-provisioned ICCP configuration parameter.

User configuration of ICCP in a Junos Fusion is not required. This statement is recommended for use by expert users only.

Default Automatic ICCP Provisioning is enabled by default in redundancy groups used to configure dual aggregation devices in a Junos Fusion topology.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- *Understanding Automatic ICCP Provisioning and Automatic VLAN Provisioning of an Interchassis Link*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

redundancy-group-id (Junos Fusion)

Syntax redundancy-group-id *redundancy-group-id-number*;

Hierarchy Level [edit chassis satellite-management redundancy-groups *redundancy-group-name*]

Release Information Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.

Description Defines a redundancy group ID number for a redundancy group in a Junos Fusion using dual aggregation devices.

A Junos Fusion using dual aggregation devices must have one redundancy group that includes both aggregation devices and all satellite devices. The redundancy group must be configured individually on each aggregation device. The redundancy group name and redundancy group ID number must match on the redundancy group configuration on each aggregation device in the Junos Fusion.

Default A redundancy group does not have a redundancy group ID number by default.

Options ***redundancy-group-id-number***—The user-defined redundancy group ID number.

Range: 1 through 255

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

redundancy-groups (Junos Fusion)

Syntax

```
redundancy-groups {
  chassis-id number;
  redundancy-group-name {
    redundancy-group-id redundancy-group-id-number;
    protocol {
      evpn {
        peer-ip [ IP address ]
      }
    }
    peer-chassis-id peer-chassis-id-number {
      inter-chassis-link interface-name;
      authentication-key string;
      liveness-detection {
      detection-time {
        threshold milliseconds;
      }
      minimum-interval milliseconds;
      minimum-receive-interval milliseconds;
      multiplier number;
      no-adaptation;
      transmit-interval {
        minimum-interval milliseconds;
        threshold milliseconds;
      }
      version (1 | automatic);
    }
    session-establishment-hold-time seconds;
    traceoptions;
    }
    no-auto-iccp-provisioning;
    no-auto-vlan-provisioning;
    satellite satellite-device-fpc-IDs;
    }
  }
}
```

Hierarchy Level

[edit chassis satellite-management]

Release Information

Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Configure a redundancy group for Junos Fusion. A Junos Fusion topology supports one redundancy group that includes up to four devices—the aggregation devices—while also including a configuration parameter that allows users to specify that the satellite devices also belong to the redundancy group.

In a Junos Fusion with MC-LAG, a redundancy group is required to enable ICCP. ICCP is automatically provisioned on the interchassis link, but you can manually configure the

ICCP parameters. Any ICCP parameter you configure overrides the default settings. You can also disable automatic ICCP provisioning.

In Junos Fusion Data Center with EVPN, a redundancy group configuration enables the EVPN protocol. ICCP configuration is not required when configuring Junos Fusion with EVPN.

Options The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*
- *Understanding Automatic ICCP Provisioning and Automatic VLAN Provisioning of an Interchassis Link*

satellite (Junos Fusion Automatic Satellite Conversion)

Syntax

satellite [*slot-id* | *range* | all];

Hierarchy Level

[edit chassis satellite-management auto-satellite-conversion]

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Specify the interface to enable automatic software conversion in a Junos Fusion.

The device that is cabled to the slot specified in this command is automatically converted into a satellite device.

Additional configuration steps are required to add satellite devices to a Junos Fusion using automatic satellite conversion. See “Configuring or Expanding a Junos Fusion Enterprise” on page 45 or *Configuring Junos Fusion Provider Edge*.

Options

slot-id—Specifies the FPC slot identifier of the device that will be automatically converted into a satellite device.

The FPC identifier must be mapped to a cascade port interface before this command is operational. See “Configuring or Expanding a Junos Fusion Enterprise” on page 45 or *Configuring Junos Fusion Provider Edge*.

range—Specifies a range of FPC slot identifiers that will automatically be converted into satellite devices. For instance, to specify that FPC IDs 103, 104, and 105 should be automatically converted into satellite devices, enter a *range* of **103-105**.

all—Specifies that all FPC slot identifiers in the Junos Fusion will automatically be converted into satellite devices.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

satellite (Junos Fusion Satellite Device Homing)

Syntax

satellite [*slot-id* |*slot-id-range* | all];

Hierarchy Level

[edit chassis satellite-management single-home]

Release Information

Statement introduced in Junos OS Release 14.2R3.
Statement introdcued in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introdcued in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Specify which satellite device links are single-homed to the aggregation device.

You must enter this statement to configure a Junos Fusion when the aggregation device is running Junos OS Release 14.2R3 or 14.2R4. You are not required to enter this command when the aggregation device is running Junos OS Release 14.2R5 or later.

Options

slot-id—Specifies that a link from a specified satellite device is single-homed to the aggregation device. The *slot-id* is the satellite device member number.

slot-id-range—Specifies that the links from a range of specified satellite devices are single-homed to the aggregation device. The *slot-id-range* includes the satellite device member numbers.

all—Specifies that all links from satellite devices are single-homed to the aggregation device.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

satellite (Junos Fusion Satellite Software Upgrade Groups)

Syntax

```
satellite [slot-id | range | all];
```

Hierarchy Level

[edit chassis satellite-management upgrade-groups *upgrade-group-name*]

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Specify the satellite device to add to the satellite software upgrade group.

This statement is entered on an aggregation device in a Junos Fusion. Software upgrade groups are configured and managed using the aggregation device.

Options

slot-id—Specifies the FPC slot identification number of the satellite device that is being added to the satellite software upgrade group.

range—Specifies a range of FPC slot identifiers to add to the satellite software upgrade group. For instance, to specify that FPC IDs 103, 104, and 105 should be automatically converted into satellite devices, enter a *range* of **103-105**.

all—Specifies that all FPC slot identifiers in the Junos Fusion are added to the satellite software upgrade group.

The remaining statements are explained separately.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

satellite-management (Junos Fusion)

Syntax

```
satellite-management {
  aging-timer aging-timer;
  auto-satellite-conversion {
    satellite [slot-id | range | all];
  }
  cluster cluster-name{
    cascade-ports interface-name;
    cluster-id cluster-id-number;
    fpc slot-id{
      alias alias;
      description description;
      member-id member-id-number;
      system-id mac-address;
    }
    }
  designated-event-forwarding
  environment-monitoring-policy policy;
  firewall
    family family-name {
      filter filter-name {
        term term-name {
          from {
            match-conditions;
          }
          then {
            action;
            action-modifiers;
          }
        }
      }
    }
  fpc slot-id{
    alias alias;
    cascade-ports interface-name;
    description description;
    environment-monitoring-policy policy;
    serial-numberserial-number;
    system-id mac-address;
    uplink-failure-detection {
      candidate-uplink-policy policy;
    }
  }
  psu {
    redundancy {
      n-plus-n;
    }
  }
  redundancy-groups {
    chassis-id number;
    redundancy-group-name {
      redundancy-group-id redundancy-group-id-number;
```

```
            peer-chassis-id peer-chassis-id-number {
                inter-chassis-link interface-name;
                no-auto-iccp-provisioning;
                no-auto-vlan-provisioning;
                satellite satellite-device-fpc-IDs;
            }
        }
    }
    single-home {
        satellite [slot-id |slot-id-range | all];
    }
    upgrade-groups upgrade-group-name {
        satellite [slot-id | range | all];
    }
    uplink-failure-detection {
        candidate-uplink-policy policy;
    }
}
```

Hierarchy Level

[edit chassis]

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Configure and manage a Junos Fusion.

If you enter the **delete chassis satellite-management** command to delete a Junos Fusion configuration, we recommend also rebooting the Routing Engines on your device to maximize device performance.

NOTE: In a Junos Fusion Data Center with EVPN wherein VXLAN encapsulation is used, firewall filters with next-interface or next-ip actions are not supported.

Options

The remaining statements are explained separately.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

serial-number (Junos Fusion)

Syntax

```
serial-number serial-number;
```

Hierarchy Level

```
[edit chassis satellite-management fpc slot-id]
```

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introdcued in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introdcued in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Bind the specified FPC slot ID to a satellite device based on the serial number.

A Junos Fusion provides two methods of assigning an FPC identifier: Unique ID-based FPC identification and connectivity-based FPC identification. Unique ID-based FPC identification maps an FPC slot ID to a satellite device's MAC address or serial number, while unique ID-based FPC identification maps an FPC slot ID to a cascade port. This statement is used to assign an FPC ID using unique ID-based FPC identification by mapping the FPC slot ID to the satellite device's serial number.

In a Junos Fusion, each satellite device must be mapped to an FPC identifier (FPC ID). The FPC ID is used for Junos Fusion configuration, monitoring, and maintenance. Interface names—which are identified using the *type-fpc / pic / port* format—use the FPC ID as the *fpc* variable when the satellite device is participating in a Junos Fusion. For instance, built-in port 2—a Gigabit Ethernet interface on a satellite device that is using 101 as its FPC ID—uses ge-101/0/2 as its interface name.

For additional information on the role of FPC slot IDs in a Junos Fusion, see "Understanding Junos Fusion Enterprise Components" on page 5 or *Understanding Junos Fusion Provider Edge Components*.

If the serial number that is configured using this statement does not match the serial number of the satellite device, the device is not converted into a satellite device.

Default

No FPC slot IDs are associated with satellite devices, by default.

Options

serial-number—Specifies the serial number of the satellite device.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

single-home (Junos Fusion)

Syntax

```
single-home {
  satellite [slot-id |slot-id-range | all];
}
```

Hierarchy Level

[edit chassis satellite-management]

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introdcued in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introdcued in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Specify that the links connecting the satellite device to the aggregation device are connected to the aggregation device only.

Options

The remaining statements are explained separately.

Required Privilege Level

admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

system-id (Junos Fusion)

Syntax system-id *mac-address*;

Hierarchy Level [edit chassis satellite-management fpc *slot-id*]

Release Information Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introdcued in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introdcued in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description Assign the specified FPC identifier to the satellite device based on the satellite device's MAC address.

For instance, if you wanted the satellite device using MAC address **01:02:03:AA:BB:CC** to be assigned FPC identifier 101, enter the **set chassis satellite-management fpc 101 system-id 01:02:03:AA:BB:CC** statement.

A Junos Fusion provides two methods of assigning an FPC identifier: Unique ID-based FPC identification and connectivity-based FPC identification. Unique ID-based FPC identification maps an FPC slot ID to a satellite device's MAC address or serial number, while connectivity-based FPC identification maps an FPC slot ID to a cascade port. This statement is used to assign an FPC ID using unique ID-based FPC identification by mapping the FPC slot ID to the satellite device's MAC address.

In a Junos Fusion, each satellite device must be mapped to an FPC identifier (FPC ID). The FPC ID is used for Junos Fusion configuration, monitoring, and maintenance. Interface names—which are identified using the *type-fpc / pic / port* format—use the FPC ID as the *fpc* variable when the satellite device is participating in a Junos Fusion. For instance, built-in port 2—a gigabit Ethernet interface on a satellite device that is using 101 as its FPC ID— uses ge-101/0/2 as its interface name.

For additional information on the role of FPC slot IDs in a Junos Fusion, see *Understanding Junos Fusion Provider Edge Components* or "Understanding Junos Fusion Enterprise Components" on page 5.

If the serial number that is configured using this statement does not match the serial number of the satellite device, the device is not converted into a satellite device.

If the MAC address that is configured using this statement does not match the MAC address of the satellite device, the device is not converted into a satellite device.

Default No FPC slot IDs are associated with satellite devices, by default.

Options ***mac-address***—Specifies the MAC address of the satellite device.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

system-id (Junos Fusion Satellite Device Cluster)

Syntax

```
system-id mac-address;
```

Hierarchy Level

```
[edit chassis satellite-management cluster cluster-name fpc slot-id ]
```

Release Information Statement introduced in Junos OS Release 16.1R1.

Description Assign the specified FPC identifier to the satellite device in the satellite device cluster based on the satellite device's MAC address.

For instance, if you wanted the satellite device using MAC address **01:02:03:AA:BB:CC** in the satellite device cluster named **building-1** to be assigned FPC identifier 101, enter the **set chassis satellite-management cluster building-1 fpc 101 system-id 01:02:03:AA:BB:CC** statement.

If the MAC address that is configured using this statement does not match the MAC address of the satellite device, the device is not converted into a satellite device.

Default No FPC slot ID numbers are associated with satellite devices, by default.

Options ***mac-address***—Specifies the MAC address of the satellite device.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation
- Configuring or Expanding a Junos Fusion Enterprise on page 45

upgrade-groups (Junos Fusion)

Syntax

```
upgrade-groups upgrade-group-name {
  satellite [slot-id | range | all];
}
```

Hierarchy Level

```
[edit chassis satellite-management]
```

Release Information

Statement introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Statement introdcued in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introdcued in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Create and name a satellite software upgrade group for a Junos Fusion, or specify an existing satellite software upgrade group to configure.

A satellite software upgrade group is a group of satellite devices that are designated to upgrade to the same satellite software version using the same satellite software package. One Junos Fusion can contain multiple software upgrade groups, and multiple software upgrade groups should be configured in most Junos Fusions to avoid network downtimes during satellite software installations.

The two most common methods of installing satellite software in a Junos Fusion—autoconverting a device into a satellite device when it is cabled into an aggregation device and manually converting a device that is cabled into an aggregation device into a satellite device—require a configured satellite software upgrade group.

Software upgrade groups are configured and managed from the aggregation device.

To associate a satellite software package with a satellite software upgrade group, use the **request system software add *package-name* upgrade-group *upgrade-group-name*** command.

This statement is entered on an aggregation device in a Junos Fusion. Software upgrade groups are configured and managed from the aggregation device.

The software upgrade group configurations must match exactly—including the same *package-name* and *upgrade-group-name*—in every Junos Fusion with dual aggregation devices to avoid satellite device downtime.

All satellite devices in a satellite device cluster are associated with a single satellite software upgrade group, which is automatically created when a satellite device cluster becomes part of a Junos Fusion. The satellite software upgrade group is named after the satellite device cluster name, and ensures that all satellite devices in the cluster run the same version of satellite software. See "Understanding Software in a Junos Fusion Enterprise" on page 22 for additional information on software management for a satellite device cluster.

Default

No satellite software upgrade groups are present, by default.

A satellite software upgrade group with the name of the satellite device cluster is created automatically when a satellite device cluster is created.

Options ***upgrade-group-name***—Specifies the user-defined name for the satellite software upgrade group.

The remaining statements are explained separately.

Required Privilege Level admin—To view this statement in the configuration.
admin-control—To add this statement to the configuration.

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

CHAPTER 4

Junos Fusion Enterprise Administration

Managing Satellite Software Upgrade Groups in a Junos Fusion

This topic discusses maintaining satellite software upgrade groups in a Junos Fusion. For more information on the process for creating a satellite software upgrade group, see *Configuring Junos Fusion Provider Edge* or "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

A satellite software upgrade group is a group of satellite devices that are designated to upgrade to the same satellite software version using the same satellite software package. One Junos Fusion can contain multiple software upgrade groups, and multiple software upgrade groups should be configured in most Junos Fusions to avoid network downtimes during satellite software installations.

When a satellite device is added to a Junos Fusion, the aggregation device checks if the satellite device is using an FPC ID that is included in a satellite software upgrade group. If the satellite device is using an FPC ID that is part of a satellite software upgrade group, the device upgrades its satellite software to the version of software associated with the satellite software upgrade group - unless it is already running the defined version.

When the satellite software package associated with an existing satellite software group is changed, the satellite software for all member satellite devices is upgraded using a throttled upgrade. The throttled upgrade ensures that the aggregation device is not overwhelmed with providing satellite software simultaneously to many satellite devices.

The two most common methods of installing satellite software—autoconverting a device into a satellite device when it is cabled into an aggregation device and manually converting a device that is cabled into an aggregation device into a satellite device—require a configured satellite software upgrade group.

Software upgrade groups are configured and managed from the aggregation device. All satellite devices in a satellite device cluster are part of the same software upgrade group, and a software upgrade group with the name of the satellite device cluster is automatically created when the satellite device cluster is created.

Creating a Satellite Software Upgrade Group

If your satellite device is a member of a satellite device cluster, a satellite software upgrade group with the name of the satellite device cluster is automatically created when the satellite device cluster is created. This satellite software upgrade group must be used to manage the satellite software for all member satellite devices in the satellite device cluster.

For information on creating a satellite software upgrade group for a satellite device that is not part of a satellite device cluster, see *Configuring Junos Fusion Provider Edge* or "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

Adding Satellite Devices to a Satellite Software Upgrade Group

To add a satellite device to an existing satellite software upgrade group, enter the **set chassis satellite-management upgrade-groups** ***upgrade-group-name*** **satellite** ***slot-id-or-range*** command:

```
[edit]
user@aggregation-device# set chassis satellite-management upgrade-groups
upgrade-group-name satellite slot-id-or-range
```

where *upgrade-group-name* is the name of the existing satellite software upgrade group, and the *slot-id-or-range* is the FPC slot ID or range of FPC slot IDs of the satellite devices that are being added to the upgrade group.

For example, to add FPC slot IDs 121, 122, and 123 to a satellite software upgrade group named **group1**:

```
[edit]
user@aggregation-device# set chassis satellite-management upgrade-groups group1 satellite
121-123
```

Additionally, you can use the **all** statement as your *slot-id-or-range* to include all satellite devices in the Junos Fusion in the satellite software upgrade group.

For example, to add all satellite devices in the Junos Fusion to a satellite software upgrade group named **group1**:

```
[edit]
user@aggregation-device# set chassis satellite-management upgrade-groups group1 satellite all
```

Removing a Satellite Device from a Satellite Software Upgrade Group

To remove a satellite device from an existing satellite software upgrade group, enter the **delete chassis satellite-management upgrade-groups *upgrade-group-name* satellite *slot-id-or-range*** statement to delete the statements that initially added the member satellite devices to the satellite software upgrade group.

```
[edit]
user@aggregation-device# delete chassis satellite-management upgrade-groups upgrade-group-name satellite slot-id-or-range
```

where *upgrade-group-name* is the name of the existing satellite software upgrade group, and the *slot-id-or-range* is the FPC slot ID or range of FPC slot IDs of the satellite devices that are being added to the upgrade group.

In cases where you want to remove some FPC slot IDs that were configured within a range of FPC slot IDs, you might consider re-creating the satellite software group by first deleting it, then re-creating it. To delete the satellite software upgrade group:

```
[edit]
user@aggregation-device# delete chassis satellite-management upgrade-groups upgrade-group-name
```

You can then re-create the satellite software upgrade group and add satellite devices using the **set chassis satellite-management upgrade-groups *upgrade-group-name* satellite *slot-id-or-range*** statement:

```
[edit]
user@aggregation-device# set chassis satellite-management upgrade-groups upgrade-group-name satellite slot-id-or-range
```

For more information on the satellite software upgrade group creation process, see *Configuring Junos Fusion Provider Edge* or "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

Modifying the Satellite Software Used by a Satellite Software Upgrade Group

To associate a new satellite software image with the software upgrade group:

Before you begin:

- Ensure that a satellite software package is downloaded to the location where you will use it to install the satellite software.

```
user@aggregation-device> request system software add package-name upgrade-group upgrade-group-name
```


NOTE: A satellite software *upgrade-group-name* can be a user-configured upgrade group or the name of a satellite device cluster.

To associate a satellite software image named **satellite-2.0R1.2-signed.tgz** that is currently stored in the **/var/tmp/** directory from the aggregation device to the upgrade group named **group1**:

`user@aggregation-device>` **request system software add /var/tmp/satellite-2.0R1.2-signed.tgz upgrade-group group1**

To associate a satellite software package that was previously installed on the aggregation device with a software upgrade group:

`user@aggregation-device>` **request system software add version *version* upgrade-group group1**

For instance:

`user@aggregation-device>` **request system software add version 2.0R1.2 upgrade-group group1**

The satellite software upgrade group is associated with the software package after either of these commands are entered.

NOTE: A satellite software upgrade group can be a user-configured upgrade group or the name of a satellite device cluster.

If the group was already associated with a satellite software upgrade group, the previous satellite software package associated with the software group remains the second option for updating satellite software for the satellite software upgrade group. You can disassociate any satellite software package from a satellite software upgrade group using the instructions in the next section.

Deleting Associated Satellite Software from a Satellite Software Upgrade Group

This section describes how to delete a satellite software package association from a satellite software upgrade group.

This procedure is always optional. You can always update the satellite software associated with a satellite software upgrade group using the procedure in the previous section, without deleting the satellite software from the satellite software upgrade group.

When a new satellite software package is associated with a satellite software upgrade, the previous satellite software package remains associated with the upgrade group as a backup option. The satellite software upgrade group can be associated with up to two satellite software packages, so no other satellite software packages can be associated with the satellite software upgrade group.

This process disassociates the specified satellite software package from the list of potential packages used by a satellite software upgrade group. It is useful for maintenance purposes only, like if you wanted to ensure a satellite software upgrade group was never associated with a specific satellite software package.

To disassociate a satellite software image from a satellite software upgrade group:

`user@aggregation-device>` **request system software delete upgrade-group** ***upgrade-group-name***

where the *upgrade-group-name* is the name of the upgrade group that was assigned by the user.

For example, to delete the current satellite software image association to the upgrade group named **group1**:

`user@aggregation-device>` **request system software delete upgrade-group group1**

Deleting Satellite Software on the Aggregation Device

This section describes how to remove a satellite software package from a Junos Fusion system. This will remove the software from the aggregation device as well as any association with any satellite software upgrade groups. This should be done when another satellite software version is available and will free up the space occupied by the software being removed.

NOTE: We recommend deleting satellite software that is not in use to free up space on a QFX10000 acting as an aggregation device.

`user@aggregation-device>` **request system software delete version** ***version***

For example:

`user@aggregation-device>` **request system software delete version 2.0R1.2**

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

Upgrading Junos OS and Satellite Software in an Operational Junos Fusion Enterprise with Dual Aggregation Devices

You may have to upgrade Junos OS on the aggregation devices in your Junos Fusion Enterprise after initial setup.

To ensure consistent behavior and feature support in your Junos Fusion Enterprise, we strongly recommend that both aggregation devices—and both Routing Engines in the aggregation devices—run the same version of Junos OS.

Satellite software should also be upgraded after the Junos OS upgrade to ensure it is compatible with the upgraded Junos OS.

We recommend following this procedure to upgrade Junos OS in a Junos Fusion Enterprise using a dual aggregation device topology:

1. Upgrade the Junos OS software on the backup Routing Engine of one of the aggregation devices. Do not reboot the backup Routing Engine to complete the upgrade at this point of the procedure.

   See Junos Fusion Hardware and Software Compatibility Matrices for software compatibility information and to retrieve Junos OS images for EX9200 switches that can act as aggregation devices in a Junos Fusion Enterprise.

   This step is performed in this example by showing an upgrade to 17.2R1 with a Junos OS image that is installed in the local /var/tmp folder. See Understanding Software Installation on EX Series Switches for information on other procedures that can be used to upgrade Junos OS running on a Routing Engine on an EX9200 switch.

   ```
   user@ad2-ex9208> request system software add
   /var/tmp/junos-install-ex92xx-x86-64-17.1R2.7.tgz re1
   ```

2. Upgrade the Junos OS software on the master Routing Engine of the same aggregation device. Do not reboot the master Routing Engine to complete the upgrade at this point of the procedure.

   ```
   user@ad2-ex9208> request system software add
   /var/tmp/junos-install-ex92xx-x86-64-17.1R2.7.tgz re0
   ```

3. After steps 1 and 2 are completed successfully, reboot both Routing Engines simultaneously:

   ```
   user@ad2-ex9208> request system reboot both-routing-engines
   ```

4. Repeat the same procedure on the other aggregation device:

   ```
   user@ad1-ex9208> request system software add
   /var/tmp/junos-install-ex92xx-x86-64-17.1R2.7.tgz re1
   ```

   ```
   user@ad1-ex9208> request system software add
   /var/tmp/junos-install-ex92xx-x86-64-17.1R2.7.tgz re0
   ```

   ```
   user@ad1-ex9208> request system reboot both-routing-engines
   ```

5. After all Routing Engines on both aggregation devices have rebooted to complete the Junos OS upgrade, upgrade the satellite software on all satellite devices to the satellite software version that is compatible with the Junos OS running on the aggregation devices.

   To identify the version of satellite software that works with the new version of Junos OS, see Junos Fusion Hardware and Software Compatibility Matrices.

To install the new version of satellite software, see Installing Satellite Software and Adding Satellite Devices to the Junos Fusion and Modifying the Satellite Software Used by a Satellite Software Upgrade Group.

Related Documentation

- Junos Fusion Hardware and Software Compatibility Matrices
- Installing Satellite Software and Adding Satellite Devices to the Junos Fusion

Verifying Connectivity, Device States, Satellite Software Versions, and Operations in a Junos Fusion

This topic provides information on common procedures to verify connectivity, device states, satellite software versions, and other operations in a Junos Fusion. It covers:

Verifying a Junos Fusion Configuration

Purpose Verify that a device is recognized as a satellite device by the aggregation device.

Action Enter the **show chassis satellite** command and review the output.

NOTE: On a Junos Fusion Data Center with a QFX10000 switch in the aggregation device role, the number of the FPC in the interface name of the cascade ports is always 0.

user@aggregation-device> **show chassis satellite**

```
                           Device           Cascade      Port        Extended Ports
Alias               Slot   State            Ports        State       Total/Up
qfx5100-24q-01      100    Online           xe-0/0/1     online      9/2
                                            xe-1/3/0     online
qfx5100-24q-02      101    Online           xe-0/0/2     online      20/10
                                            xe-1/3/1     online
qfx5100-24q-03      102    Online           xe-0/0/3     online      16/4
                                            xe-1/3/2     online
qfx5100-24q-04      103    Online           xe-0/0/4     absent      13/3
                                            xe-1/3/3     online
```



```
ex4300-01        109    Online         xe-1/0/1     online      49/2
ex4300-02        110    Online         xe-1/0/2     online      49/2
```

Meaning Use the output of **show chassis satellite** to confirm the following connections in a Junos Fusion:

- Whether a satellite device is recognized at all by the aggregation device. If the satellite device does not appear in the **show chassis satellite** output, then it is not recognized by the aggregation device as a satellite device.
- The state of a particular satellite device, via the **Device State** output.
- The state of the cascade port connection, via the **Cascade State** output.

Verifying Basic Junos Fusion Connectivity

Purpose Verify that all satellite devices are recognized by the aggregation device, and that all cascade and extended ports are recognized.

Action Enter the **show chassis satellite** command on the aggregation device.

NOTE: On a Junos Fusion Data Center with a QFX10000 switch in the aggregation device role, the number of the FPC in the interface name of the cascade ports is always 0.

```
user@aggregation-device> show chassis satellite
                        Device         Cascade      Port        Extended Ports
Alias            Slot   State          Ports        State       Total/Up
qfx5100-24q-01   100    Online         xe-0/0/1     online      9/2
                                       xe-1/3/0     online
qfx5100-24q-02   101    Online         xe-0/0/2     online      20/12
                                       xe-1/3/1     online
qfx5100-24q-03   102    Online         xe-0/0/3     online      16/6
                                       xe-1/3/2     online
qfx5100-24q-04   103    Online         xe-0/0/4     online      16/4
                                       xe-1/3/3     online
qfx5100-24q-05   104    Online         xe-0/0/5     online      13/3
                                       xe-1/3/4     online
qfx5100-24q-06   105    Online         xe-0/0/6     online      24/15
                                       xe-1/3/5     online
qfx5100-24q-07   106    Online         xe-0/0/7     online      24/15
                                       xe-1/3/6     online
qfx5100-24q-08   107    Online         xe-0/0/8     online      21/12
                                       xe-1/3/7     online
ex4300-01        109    Online         xe-1/0/1     online      49/2
ex4300-02        110    Online         xe-1/0/2     online      49/2
ex4300-03        111    Online         xe-1/0/3     online      49/2
ex4300-04        112    Online         xe-1/0/4     online      49/11
ex4300-05        113    Online         xe-1/0/5     online      49/11
```



```
ex4300-06          114    Online          xe-1/0/6     online     49/11
ex4300-07          115    Online          xe-1/0/7     online     49/11
ex4300-08          116    Online          xe-1/1/0     online     49/11
ex4300-09          117    Online          xe-1/1/1     online     49/11
ex4300-10          118    Online          xe-1/1/2     online     49/11
ex4300-11          119    Online          xe-1/1/3     online     49/11
ex4300-12          120    Online          xe-1/1/4     online     49/11
ex4300-13          121    Online          xe-1/1/5     online     49/11
ex4300-14          122    Online          xe-1/1/6     online     49/11
ex4300-15          123    Online          xe-1/1/7     online     49/11
ex4300-16          124    Online          xe-1/2/1     online     49/11
ex4300-17          125    Online          xe-1/2/2     online     49/11
ex4300-18          126    Online          xe-1/2/3     online     49/2
ex4300-19          127    Online          xe-1/2/4     online     49/1
ex4300-20          128    Online          xe-1/2/5     online     49/1
ex4300-21          129    Online          xe-1/2/6     online     49/1
ex4300-22          130    Online          xe-1/2/7     online     49/1
```

Meaning The output confirms:

- Each listed satellite device—the satellite devices are listed by alias-name in the **Alias** column or by FPC slot ID in the **Slot** column—is recognized by the aggregation device, because the **Device State** output is **Online** for every listed satellite device.
- Each cascade port is operational, because **Port State** is **online** for every cascade port. The cascade port is the port on the aggregation device that connects to the satellite device.
- The number of available and active extended ports for each satellite device, using the **Extended Ports total** and **Extended Ports up** outputs. The number of extended ports varies by satellite devices, and in this output the total number of extended ports includes both network-facing extended ports as well as uplink ports.

Verifying the Satellite Device Hardware Model

Purpose Verify the hardware model of each satellite device in the Junos Fusion.

Action Enter the **show chassis satellite terse** command on the aggregation device.

user@aggregation-device> **show chassis satellite terse**

```
       Device                           Extended Ports
Slot   State            Model           Total/Up     Version
101    Online           QFX5100-48S-6Q  7/6          3.0R1.0
102    Online           QFX5100-48S-6Q  7/6          3.0R1.0
103    Online           QFX5100-48S-6Q  6/4          3.0R1.0
104    Online           QFX5100-48S-6Q  14/14        3.0R1.0
105    Online           QFX5100-48S-6Q  18/18        3.0R1.0
106    Online           QFX5100-48S-6Q  17/16        3.0R1.0
107    Online           EX4300-48T      52/6         3.0R1.0
108    Online           EX4300-48T      52/13        3.0R1.0
109    Online           EX4300-48T      51/13        3.0R1.0
110    Online           EX4300-48T      51/14        3.0R1.0
111    Online           EX4300-48T      51/13        3.0R1.0
```



```
112     Online          EX4300-48T       51/12       3.0R1.0
113     Online          EX4300-48T       51/13       3.0R1.0
114     Online          QFX5100-24Q-2P   17/13       3.0R1.0
```

Meaning The output shows the device model of each satellite device in the **Device Model** output, which are listed by FPC slot identification number using the **Slot** output.

This command is also useful for verifying the version satellite software running on each satellite device, as the version is listed in the **Version** output.

Verifying Cascade Port and Uplink Port State

Purpose Verify that the cascade port and uplink port interfaces are up.

Action Enter the **show chassis satellite interface** command:

```
user@aggregation-device> show chassis satellite interface


Interface         State        Type
lo0               Up           Loopback

sd-101/0/0        Up           Satellite

sd-102/0/0        Up           Satellite

sd-103/0/0        Up           Satellite

sd-104/0/0        Up           Satellite

sd-105/0/0        Up           Satellite

sd-106/0/0        Up           Satellite

sd-107/0/0        Up           Satellite

sd-108/0/0        Up           Satellite

sd-109/0/0        Up           Satellite

sd-110/0/0        Up           Satellite

sd-111/0/0        Up           Satellite

sd-112/0/0        Up           Satellite

sd-113/0/0        Up           Satellite

sd-114/0/0        Up           Satellite

xe-0/0/1          Up           Cascade

xe-0/0/2          Up           Cascade
```



```
xe-0/0/3           Up          Cascade
xe-0/0/4           Up          Cascade
xe-0/0/5           Up          Cascade
xe-0/0/6           Up          Cascade
xe-0/0/7           Up          Cascade
xe-0/0/8           Up          Cascade
xe-0/0/9           Up          Cascade
xe-0/2/0           Up          Cascade
xe-0/2/1           Up          Cascade
xe-0/2/2           Up          Cascade
xe-0/2/3           Up          Cascade
xe-0/2/4           Up          Cascade
xe-0/2/5           Up          Cascade
xe-0/2/6           Up          Cascade
xe-0/2/7           Up          Cascade
xe-1/0/1           Up          Cascade
xe-1/0/2           Up          Cascade
xe-1/0/3           Up          Cascade
xe-1/2/1           Up          Cascade
xe-1/2/2           Up          Cascade
xe-1/2/3           Up          Cascade
xe-2/0/0           Up          Cascade
xe-2/0/1           Up          Cascade
xe-2/0/2           Up          Cascade
xe-2/0/3           Up          Cascade
xe-2/0/4           Up          Cascade
xe-2/0/5           Up          Cascade
xe-2/0/6           Up          Cascade
xe-2/0/7           Up          Cascade
xe-2/1/0           Up          Cascade
```



```
xe-2/1/1            Up             Cascade
xe-2/1/2            Up             Cascade
xe-2/1/3            Up             Cascade
xe-2/1/4            Up             Cascade
xe-2/1/5            Up             Cascade
xe-2/1/6            Up             Cascade
xe-2/1/7            Up             Cascade
xe-2/2/0            Up             Cascade
xe-2/2/1            Up             Cascade
xe-2/2/2            Up             Cascade
xe-2/2/3            Up             Cascade
xe-2/2/4            Up             Cascade
xe-2/2/5            Up             Cascade
xe-2/2/6            Up             Cascade
xe-2/2/7            Up             Cascade
xe-2/3/0            Up             Cascade
xe-2/3/3            Dn             Cascade
xe-2/3/4            Up             Cascade
xe-2/3/5            Up             Cascade
xe-2/3/6            Up             Cascade
xe-2/3/7            Up             Cascade
```

Meaning The output shows:

- Whether the recognized port is up or down, using the **State** column output. The **State** column output is **Up** when the interface is up and **Dn** when the interface is down.

Verifying That a Cascade Port Recognizes a Satellite Device

Purpose Verify that a cascade port on an aggregation device recognizes a satellite device in the Junos Fusion. This procedure also provides a method of verifying the hardware and software information for each satellite device in the Junos Fusion.

Action Enter the **show chassis satellite neighbor** command:

```
user@aggregation-device> show chassis satellite neighbor
Interface   State      Port Info   System Name  Model           SW Version
xe-2/3/7    Init
xe-2/3/6    Init
xe-2/3/5    Init
xe-2/3/4    Init
xe-2/3/3    Dn
xe-2/3/0    Two-Way    xe-0/2/2        ex4300-29 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/2/7    Two-Way    xe-0/2/2        ex4300-28 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/2/6    Two-Way    xe-0/2/2        ex4300-27 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/2/5    Two-Way    xe-0/2/2        ex4300-26 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/2/4    Init
xe-2/2/3    Init
xe-2/2/2    Two-Way    xe-0/0/48:3 qfx5100-48s-06 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-2/2/1    Two-Way    xe-0/0/48:3 qfx5100-48s-05 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-2/2/0    Init
xe-2/1/7    Init
xe-2/1/6    Init
xe-2/1/5    Two-Way    xe-0/0/4:2  qfx5100-24q-09 QFX5100-24Q-2P 0.1I20150224_18
27_dc-builder
xe-2/1/4    Two-Way    xe-0/2/1        ex4300-31 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/1/3    Two-Way    xe-0/2/1        ex4300-30 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/1/2    Two-Way    xe-0/2/1        ex4300-29 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/1/1    Two-Way    xe-0/2/1        ex4300-28 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/1/0    Init
xe-2/0/7    Two-Way    xe-0/2/1        ex4300-26 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/0/6    Init
xe-2/0/5    Init
xe-2/0/4    Init
xe-2/0/3    Init
xe-2/0/2    Two-Way    xe-0/0/48:2 qfx5100-48s-04 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-2/0/1    Two-Way    xe-0/0/48:2 qfx5100-48s-03 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-2/0/0    Init
xe-1/2/3    Two-Way    xe-0/0/0:0  qfx5100-24q-09 QFX5100-24Q-2P 0.1I20150224_18
27_dc-builder
xe-1/2/2    Two-Way    xe-0/2/0        ex4300-31 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-1/2/1    Two-Way    xe-0/2/0        ex4300-30 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-1/0/3    Two-Way    xe-0/2/0        ex4300-29 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-1/0/2    Two-Way    xe-0/2/0        ex4300-28 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-1/0/1    Two-Way    xe-0/2/0        ex4300-27 EX4300-48T     0.1I20150224_182
7_dc-builder
```

```
xe-0/2/7    Two-Way    xe-0/0/0:1  qfx5100-24q-09 QFX5100-24Q-2P 0.1I20150224_18
27_dc-builder
xe-0/2/6    Init
xe-0/2/5    Init
xe-0/2/4    Two-Way    xe-0/0/48:1 qfx5100-48s-05 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/2/3    Two-Way    xe-0/0/48:1 qfx5100-48s-04 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/2/2    Two-Way    xe-0/0/48:1 qfx5100-48s-03 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/2/1    Init
xe-0/2/0    Init
xe-0/0/9    Two-Way    xe-0/2/0        ex4300-26 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-0/0/8    Two-Way    xe-0/2/0        ex4300-25 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-0/0/7    Two-Way    xe-0/0/48:0 qfx5100-48s-07 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/6    Two-Way    xe-0/0/48:0 qfx5100-48s-06 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/5    Two-Way    xe-0/0/48:0 qfx5100-48s-05 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/4    Two-Way    xe-0/0/48:0 qfx5100-48s-04 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/3    Two-Way    xe-0/0/48:0 qfx5100-48s-03 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/2    Two-Way    xe-0/0/48:0 qfx5100-48s-02 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/1    Init
```

Meaning The output confirms:

- The cascade ports on the aggregation device that are recognized by the Junos Fusion. All recognized cascade port interfaces are listed in the **Interface** output.
- The uplink ports on the satellite devices that are connected to the cascade ports. The cascade port on each satellite device is identified in the **Port Info** column, and the satellite device itself is identified in the **System Name** output.
- Whether the cascade port to uplink port connection has initialized, using the **State** output. The **State** output is **Two-Way** when the satellite device is properly initialized, and traffic can be passed between the aggregation device and the satellite device over the link.
- The hardware model of each satellite device in the **Model** column, and the satellite software running on each satellite device in the **SW Version** output.

Verifying Extended Port Operation

Purpose Verify that a specific extended port is recognized by the aggregation device, and is operational.

Action Enter the **show chassis satellite extended-port** command on the aggregation device:

```
user@aggregation-device> show chassis satellite extended-port
Legend for interface types:
   * -- Uplink interface
                             Rx            Tx            Admin/Op IFD
Name           State         Request State Request State State    Idx    PCID
et-100/0/2     AddComplete   None          Ready         Up/Dn    838    110
et-104/0/2     AddComplete   None          Ready         Up/Dn    813    110
et-107/0/23    AddComplete   None          Ready         Up/Up    544    194
ge-109/0/0     AddComplete   None          Ready         Up/Up    402    115
ge-109/0/1     AddComplete   None          Ready         Up/Dn    403    114
ge-109/0/10    AddComplete   None          Ready         Up/Dn    412    113
ge-109/0/11    AddComplete   None          Ready         Up/Dn    413    112
ge-109/0/12    AddComplete   None          Ready         Up/Dn    414    123
ge-109/0/13    AddComplete   None          Ready         Up/Dn    415    122
ge-109/0/14    AddComplete   None          Ready         Up/Dn    416    125
ge-109/0/15    AddComplete   None          Ready         Up/Dn    417    124
ge-109/0/16    AddComplete   None          Ready         Up/Dn    418    131
ge-109/0/17    AddComplete   None          Ready         Up/Dn    419    130
ge-109/0/18    AddComplete   None          Ready         Up/Dn    420    133
ge-109/0/19    AddComplete   None          Ready         Up/Dn    421    132
ge-109/0/2     AddComplete   None          Ready         Up/Dn    404    117
ge-109/0/20    AddComplete   None          Ready         Up/Dn    422    127
ge-109/0/21    AddComplete   None          Ready         Up/Dn    423    126
ge-109/0/22    AddComplete   None          Ready         Up/Dn    424    129
ge-109/0/23    AddComplete   None          Ready         Up/Dn    425    128
ge-109/0/24    AddComplete   None          Ready         Up/Dn    426    103
ge-109/0/25    AddComplete   None          Ready         Up/Dn    427    102
ge-109/0/26    AddComplete   None          Ready         Up/Dn    428    105
ge-109/0/27    AddComplete   None          Ready         Up/Dn    429    104
ge-109/0/28    AddComplete   None          Ready         Up/Dn    430    107
ge-109/0/29    AddComplete   None          Ready         Up/Dn    431    106
ge-109/0/3     AddComplete   None          Ready         Up/Dn    405    116
ge-109/0/30    AddComplete   None          Ready         Up/Dn    432    109
ge-109/0/31    AddComplete   None          Ready         Up/Dn    433    108
ge-109/0/32    AddComplete   None          Ready         Up/Dn    434    135
ge-109/0/33    AddComplete   None          Ready         Up/Dn    435    134
ge-109/0/34    AddComplete   None          Ready         Up/Dn    436    137
ge-109/0/35    AddComplete   None          Ready         Up/Dn    437    136
ge-109/0/36    AddComplete   None          Ready         Up/Dn    438    144
ge-109/0/37    AddComplete   None          Ready         Up/Dn    439    143
ge-109/0/38    AddComplete   None          Ready         Up/Dn    440    146
ge-109/0/39    AddComplete   None          Ready         Up/Dn    441    145
ge-109/0/4     AddComplete   None          Ready         Up/Dn    406    119
ge-109/0/40    AddComplete   None          Ready         Up/Dn    442    140
ge-109/0/41    AddComplete   None          Ready         Up/Dn    443    139
ge-109/0/42    AddComplete   None          Ready         Up/Dn    444    142
ge-109/0/43    AddComplete   None          Ready         Up/Dn    445    141
ge-109/0/44    AddComplete   None          Ready         Up/Dn    446    148
ge-109/0/45    AddComplete   None          Ready         Up/Dn    447    147
ge-109/0/46    AddComplete   None          Ready         Up/Dn    448    150
ge-109/0/47    AddComplete   None          Ready         Up/Dn    449    149
ge-109/0/5     AddComplete   None          Ready         Up/Dn    407    118
ge-109/0/6     AddComplete   None          Ready         Up/Dn    408    121
ge-109/0/7     AddComplete   None          Ready         Up/Dn    409    120
ge-109/0/8     AddComplete   None          Ready         Up/Dn    410    111
ge-109/0/9     AddComplete   None          Ready         Up/Dn    411    110
ge-110/0/0     AddComplete   None          Ready         Up/Up    728    115
ge-110/0/1     AddComplete   None          Ready         Up/Dn    729    114
```

Meaning The output confirms:

- That an extended port is recognized by the aggregation device. All extended ports are listed in the **Name** column of the output.
- That the listed extended ports have been added to the Junos Fusion, as shown by the **AddComplete** output in the **State** column.
- The administrative and operational state of each extended port. An extended port is operating correctly when the **Admin State** and **Op State** outputs are both in the **Up** state.

Verifying the Satellite Software Version

Purpose Verify the satellite software versions available on the aggregation device in a Junos Fusion.

Action Enter the **show chassis satellite software** command on the aggregation device.

user@aggregation-device> **show chassis satellite software**

```
Version                          Platforms           Group
3.0R1.1                           i386 ppc            group1
                                                     group2
                                                     group3
                                                     group4
                                                     group5
3.0R1.0                           i386 ppc
```

For more detailed output, you can also enter the **show chassis satellite software detail** on the aggregation device.

```
Software package version: 3.0R1.6
Platforms supported by package: i386 ppc arm arm563xx
  Platform      Host Version  Models Supported
  i386          3.0.3         QFX5100-24Q-2P
                              QFX5100-48C-6Q
                              QFX5100-48S-6Q
                              QFX5100-48T-6Q
                              QFX5100-96S-8Q
                              QFX5100-48SH-6Q
                              QFX5100-48TH-6Q
  ppc           1.1.2         EX4300-24P
                              EX4300-24T
                              EX4300-48P
                              EX4300-48T
                              EX4300-48T-BF
                              EX4300-48T-DC
                              EX4300-48T-DC-BF
  arm           1.0.0         EX2300-24P
                              EX2300-24T-DC
                              EX2300-C-12T
                              EX4300-C-12P
  arm563xx      1.0.0         EX3400-24P
```



```
                              EX3400-24T
                              EX3400-48T
                              EX3400-48P
Current Groups: group1
                group2
                group3
                group4
                group5
```

Meaning The version of satellite software installed is displayed in the **Version** or **Software package version** column, and the satellite software upgrade group associated with each version of satellite software is listed in the **Group** or **Current Groups** output.

Verifying the Devices and Software Used in a Satellite Software Upgrade Group

Purpose Verify the satellite software upgrade groups in the Junos Fusion, and which satellite devices are part of which satellite software upgrade groups.

A satellite software upgrade group can be a user configured group or the name of a satellite device cluster.

Action Enter the **show chassis satellite upgrade-group** command on the aggregation device.

show chassis satellite upgrade-group

```
user@aggregation-device> show chassis satellite upgrade-group
                                                Group              Device
Group         Sw-Version                        State      Slot    State
__ungrouped__
group1        3.0R1.1                           in-sync    107     version-in-sync

                                                           108     version-in-sync

                                                           109     version-in-sync

                                                           110     version-in-sync

                                                           111     version-in-sync

                                                           112     version-in-sync

                                                           113     version-in-sync
group2        3.0R1.1                           in-sync    102     version-in-sync

                                                           103     version-in-sync

                                                           104     version-in-sync

                                                           105     version-in-sync

                                                           106     version-in-sync

                                                           114     version-in-sync
```

Meaning The output shows that two satellite software upgrade groups—**ex4300** and **qfx**—have been created, and that both are using satellite software version 1.0R1.1. The **Group Slot** output shows which satellite devices—listed by FPC slot ID number—are in which software group, and the **Device State** output showing **version-in-sync** confirms that the satellite devices are running the satellite software that is associated with the satellite software upgrade group.

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

Converting a Satellite Device in a Junos Fusion to a Standalone Device

In the event that you need to convert a satellite device to a standalone device, you will need to download and install a new Junos OS software package on the satellite device. The satellite device stops participating in the Junos Fusion topology once the software installation starts.

The following steps explain how to convert a satellite device that is participating in a Junos Fusion to a standalone device running Junos OS. If you have a standalone switch that is not part of a Junos Fusion but is running satellite software, and you want the switch to run Junos OS software, see “Installing Junos OS Software on a Standalone Device Running Satellite Software” on page 144.

NOTE: The QFX5100-48SH and QFX5100-48TH switch models are shipped from the factory with satellite device software. You cannot convert these switches to become standalone devices.

Conversion of EX2300 and EX3400 switches from satellite devices to standalone devices cannot be initiated from the aggregation device. To install Junos OS software on an EX2300 or EX3400 switch acting as a satellite device, see “Installing Junos OS Software on a Standalone Device Running Satellite Software” on page 144.

Download Junos OS Software

Before you install a new Junos OS software package on a satellite device, make sure you download the correct software package for that device:

- If the satellite device is a QFX5110, QFX5200 or EX4300 switch, you install a standard, signed **jinstall** version of Junos OS.

- If the satellite device is a QFX5100 switch that can be converted to a standalone device, you must install a Preboot eXecution Environment (PXE) version of Junos OS. The PXE version of Junos OS software supports the same feature set as the other Junos OS software packages for a release, but is specially engineered to install Junos OS onto a device running satellite software. The PXE Junos OS package name uses the format **install-media-pxe-qfx-5-*version*-domestic.tgz**.
- For Junos Fusion systems running Junos OS Release 17.2R1 and later, if the satellite device is a QFX5100 switch that can be converted to a standalone device, you must install a signed PXE version of Junos OS to convert the satellite device running satellite software to a standalone device running Junos OS software. The signed PXE Junos OS package name uses the format **install-media-pxe-qfx-5-*version*-domestic-signed.tgz**.

To download the version of Junos OS that you want to run on the satellite device after removing it from the Junos Fusion:

1. Using a Web browser, navigate to the Junos OS software download URL on the Juniper Networks webpage:

   https://www.juniper.net/support/downloads

2. Log in to the Juniper Networks authentication system using the username (generally your e-mail address) and password supplied by Juniper Networks representatives.

3. Select **By Technology > Junos Platform > Junos Fusion** from the drop-down list and select the switch platform series and model for your satellite device.

4. Select the version of Junos OS that you want to run on the satellite device after removing it from the Junos Fusion.

5. Review and accept the End User License Agreement.

6. Download the software to a local host.

7. Copy the software to the routing platform or to your internal software distribution site.

Disable the Automatic Conversion Configuration

Before removing a satellite device from an operational Junos Fusion, you must disable the configuration for automatic satellite conversion. If automatic satellite conversion is enabled for the FPC slot ID, the Junos OS installation cannot proceed.

For example, the following installation on an EX4300 satellite device is blocked:

```
[edit]
user@aggregation-device> request chassis satellite install fpc-slot 103
/var/tmp/jinstall-ex-4300-14.1X53-D43.7-domestic-signed.tgz
Convert satellite device to Junos standalone device? [yes,no] (no) yes
```

```
Verified jinstall-ex-4300-14.1X53-D43.7-domestic.tgz signed by
PackageProductionEc_2017 method ECDSA256+SHA256
Satellite 103 is configured in the auto-satellite-conversion list
Please remove it from the list before converting to standalone
```

You can check the automatic satellite conversion configuration by entering the **show** statement at the [**edit chassis satellite-management auto-satellite-conversion**] hierarchy level.

1. If automatic satellite conversion is enabled for the satellite device's FPC slot ID, remove the FPC slot ID from the automatic satellite conversion configuration.

   `[edit]`
   `user@aggregation-device#` **delete chassis satellite-management auto-satellite-conversion satellite *slot-id***

   For example, to remove FPC slot ID 103 from the Junos Fusion.

   `[edit]`
   `user@aggregation-device#` **delete chassis satellite-management auto-satellite-conversion satellite 103**

2. Commit the configuration.

   - To commit the configuration to a single Routing Engine only:

     `[edit]`
     `user@aggregation-device#` **commit**

   - To commit the configuration to all Routing Engines in multiple-aggregation device topology:

     `[edit]`
     `user@aggregation-device#` **commit synchronize**

Install Junos OS Software on the Satellite Device

1. To install the Junos OS software on the satellite device to convert the device to a standalone device, use the following CLI command:

```
[edit]
user@aggregation-device> request chassis satellite install fpc-slot slot-id
URL-to-software-package
```

For example, to install a software package stored in the **var/tmp** folder on the aggregation device onto an EX4300 switch acting as the satellite device using FPC slot 103:

```
[edit]
user@aggregation-device> request chassis satellite install fpc-slot 103
/var/tmp/jinstall-ex-4300-14.1X53-D43.7-domestic-signed.tgz
Convert satellite device to Junos standalone device? [yes,no] (no) yes

Verified jinstall-ex-4300-14.1X53-D43.7-domestic.tgz signed by
PackageProductionEc_2017 method ECDSA256+SHA256
Initiating Junos standalone conversion on device 103...
Response from device: Conversion started
```

NOTE: If you are converting a QFX5100 switch and the Junos Fusion is running a Junos OS release earlier than 17.2R1, you must install the unsigned PXE software package on the QFX5100 switch:

```
[edit]
user@aggregation-device> request chassis satellite install fpc-slot 103
/var/tmp/install-media-pxe-qfx-5-14.1X53-D43.7-domestic.tgz
```

The satellite device stops participating in the Junos Fusion topology once the software installation starts. The software upgrade starts after this command is entered.

2. To check the progress of the conversion, issue the **show chassis satellite fpc-slot** command:

```
[edit]
user@aggregation-device> show chassis satellite fpc-slot 103 extensive
                       Device           Cascade      Port      Extended
Alias             Slot State            Ports        State     Ports
ex4300-24t-16     103  Online           xe-1/0/3     online    52/29
    xe-2/0/3      online

When                 Event                          Action
Nov 30 15:48:22.914  Rx SW-Update JSON-RPC response Conversion started
Nov 30 15:47:54.375  Start-SW-Update                Junos conversion
```

3. Wait for the reboot that accompanies the software installation to complete.

4. When you are prompted to log back into your device, uncable the device from the Junos Fusion topology. See *Removing a Transceiver*. Your device has been removed from Junos Fusion.

   NOTE: The device uses a factory-default configuration after the Junos OS installation is complete.

Release History Table

Release	Description
17.2R1	For Junos Fusion systems running Junos OS Release 17.2R1 and later, if the satellite device is a QFX5100 switch that can be converted to a standalone device, you must install a signed PXE version of Junos OS to convert the satellite device running satellite software to a standalone device running Junos OS software.

Related Documentation

- *Understanding Software in a Junos Fusion Provider Edge*
- Understanding Software in a Junos Fusion Enterprise on page 22
- *Understanding Software in a Junos Fusion Data Center*

Installing Junos OS Software on a Standalone Device Running Satellite Software

This process should be used when you have a standalone switch running satellite software and you want the switch to run Junos OS software. A standalone device is running satellite software for one of the following reasons:

- It was removed from a Junos Fusion without following the instructions in "Converting a Satellite Device in a Junos Fusion to a Standalone Device" on page 140, which include a Junos OS installation.
- Satellite software was installed on the device but the device was never provisioned into a Junos Fusion.

NOTE: If you are removing a satellite device from a Junos Fusion, you must first make sure that automatic satellite conversion is disabled for the satellite device's FPC slot ID. See "Converting a Satellite Device in a Junos Fusion to a Standalone Device" on page 140.

To install Junos OS onto a QFX5100, QFX5100 or QFX5200 switch running satellite software:

- Select a Junos OS image that meets the satellite software to Junos OS conversion requirements. See Junos Fusion Hardware and Software Compatibility Matrices for satellite software to Junos OS conversion requirements.
- Copy the Junos OS image onto a USB flash drive and use the USB flash drive to install the Junos OS. See Performing a Recovery Installation Using an Emergency Boot Device.

To install Junos OS onto an EX4300 switch running satellite software:

1. Log in to the console port of your switch.
2. Power off the switch, and power it back on.
3. While the switch is powering back on, enter the UBoot prompt (=>) by pressing Ctrl+C on your keyboard.
4. From the Uboot prompt, set the operating system environment mode on the switch to Junos. Save the configuration and reset the kernel:

   ```
   => setenv osmode junos
   => setenv snos_previous_boot 0
   => save
   => reset
   ```

   After the reset operation completes, the loader prompt (**loader>**) appears.
5. Install Junos OS using a USB flash drive from the loader prompt. See *Booting an EX Series Switch Using a Software Package Stored on a USB Flash Drive*.

To install Junos OS onto an EX2300 or EX3400 switch running satellite software:

- Log in to the satellite software (SNOS) on the switch to be converted back to Junos OS and use the following sequence of commands to install the Junos package:

```
#######################################
dd bs=512 count=1 if=/dev/zero of=/dev/sda
echo -e "o\nn\np\n1\n\n\nw" | fdisk /dev/sda
mkfs.vfat /dev/sda1
fw_setenv target_os
reboot
##################################
>>Get to the loader prompt
##################################
loader> install --format tftp://<tftp server>/<Junos package name>
```

Related Documentation

- Understanding Junos Fusion Enterprise Software and Hardware Requirements on page 26
- Junos Fusion Hardware and Software Compatibility Matrices
- Converting a Satellite Device in a Junos Fusion to a Standalone Device on page 140

CHAPTER 5

Junos Fusion Enterprise Operational Commands

- show chassis satellite extended-port
- show chassis satellite interface
- show chassis satellite neighbor
- show chassis satellite redundancy-group
- show chassis satellite redundancy-group devices
- show chassis satellite software
- show chassis satellite statistics
- show chassis satellite unprovision
- show chassis satellite upgrade-group
- show chassis satellite-cluster
- show chassis satellite-cluster route
- show chassis satellite-cluster statistics
- show chassis temperature-thresholds
- show interfaces extensive satellite-device
- show interfaces satellite-device
- show interfaces statistics
- show interfaces terse satellite-device
- show system core-dumps

request chassis device-mode satellite

Syntax

```
request chassis device-mode satellite package-name
```

Release Information

Command introduced in Junos OS Release 14.1X53-D16.

Description

Manually install satellite software onto a switch before interconnecting the switch as a satellite device into a Junos Fusion.

There are other methods of installing satellite software onto a satellite device, and each Junos Fusion has individual requirements for manually installing satellite software. See *Configuring Junos Fusion Provider Edge* or "Configuring or Expanding a Junos Fusion Enterprise" on page 45 before manually installing satellite software.

This command is entered from a standalone device before it is configured into a satellite device in a Junos Fusion.

Options

package-name—The URL to the satellite software package.

Required Privilege Level

system-control

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output

request chassis device-mode satellite /var/tmp/satellite-3.0R1.1-signed.tgz on page 149

Sample Output

request chassis device-mode satellite /var/tmp/satellite-3.0R1.1-signed.tgz

```
user@satellite-device> request chassis device-mode satellite
/var/tmp/satellite-3.0R1.1-signed.tgz
```

request chassis satellite beacon

Syntax

```
request chassis satellite beacon
  <(off | on)>
  <fpc-slot slot-id (off | on)>
  <range range (off | on)>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion.

Description

This command is used to enable or disable the beacon LED on satellite devices in a Junos Fusion.

To display the status and colors of the beacon LEDs of the satellite devices in a Junos Fusion, use the **show chassis led satellite** command.

Options

off—Turn the beacon LED **off**.

on—Turn the beacon LED **on**.

range ***range***—Enable or disable the beacon LED in a range of FPC slot identifiers. For example, you can specify FPC slot identifiers 101, 102, and 103 by entering a range of 101-103.

fpc-slot ***slot-id***—Enable or disable beacon LED for the satellite device using the specified FPC slot identifier in the Junos Fusion. The *slot-id* is the FPC slot ID number.

Required Privilege Level

maintenance

Related Documentation

- show chassis led satellite on page 441
- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output

request chassis satellite beacon fpc-slot 136 on on page 150
request chassis satellite beacon range 101-103 off on page 150

Sample Output

request chassis satellite beacon fpc-slot 136 on

`user@aggregation-device>` **request chassis satellite beacon fpc-slot 136 on**

request chassis satellite beacon range 101-103 off

`user@aggregation-device>` **request chassis satellite beacon range 101-103 off**

request chassis satellite disable

Syntax

```
request chassis satellite disable
  <device-alias alias-name>
  <fpc-slot fpc-slot>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Disable the specified satellite device from the Junos Fusion.

When a satellite device is disabled from a Junos Fusion, all extended ports are immediately placed in the down state. The satellite device cannot send or receive traffic for the Junos Fusion until it is reenabled.

This command is useful whenever you need to disable a satellite device from a Junos Fusion, such as for troubleshooting scenarios. If you are removing a satellite device from a Junos Fusion to use the device elsewhere on the network, use the **request chassis satellite install** command to install Junos OS onto your satellite device before removing it from the Junos Fusion. See *Removing a Satellite Device from a Junos Fusion*.

You can reenable a satellite device that was disabled using this command using the **request chassis satellite enable** command.

Options

device-alias *alias-name*—Disable the satellite device with the specified alias name from the Junos Fusion.

fpc *fpc-slot*—Disable the satellite device with the specified FPC slot identifier from the Junos Fusion.

Required Privilege Level

system-control

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output

Sample Output

request chassis satellite disable device-alias satellite-01

```
user@aggregation-device> request chassis satellite disable device-alias satellite-01
```


Sample Output

request chassis satellite disable fpc-slot 101

`user@aggregation-device>` **request chassis satellite disable fpc-slot 101**

request chassis satellite enable

Syntax

```
request chassis satellite enable
  <device-alias alias-name>
  <fpc-slot fpc-slot>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Enable the specified device as a satellite device in a Junos Fusion.

This command is typically not used in any standard Junos Fusion initial configuration procedure. This command is typically needed in cases where the satellite device or cascade port has been disabled and needs to be re-enabled.

Options

device-alias *alias-name*—Enable the satellite device with the specified alias name in the Junos Fusion.

fpc *fpc-slot*—Enable the device with the specified FPC slot ID as a satellite device in the Junos Fusion.

Required Privilege Level

system-control

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

request chassis satellite enable device-alias satellite-01 on page 153
request chassis satellite enable fpc-slot 101 on page 153

Sample Output

request chassis satellite enable device-alias satellite-01

```
user@aggregation-device> request chassis satellite enable device-alias satellite-01
```

Sample Output

request chassis satellite enable fpc-slot 101

```
user@aggregation-device> request chassis satellite enable fpc-slot 101
```

request chassis satellite file-copy

Syntax

```
request chassis satellite file-copy [remote | local] <source-URL> <destination-URL>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Copy a file between a satellite device and an aggregation device in a Junos Fusion.

Options

local—Indicate that the file-copy from satellite-device has been initiated by a local user.

remote—Indicate that the file-copy from satellite-device has been initiated by a remote user.

source-URL—Specify the URL of the file that is copied.

If no device is specified as the *source-URL*, the file is copied from the aggregation device.

To specify a satellite device in the *source-URL*, enter **sd*slot-id-number*** at the beginning of the *source-URL*. For example, enter **sd101:/var/tmp/filename.txt** to specify that filename.txt in the /var/tmp directory on the satellite device using FPC slot ID number 101 is the *source-URL*.

destination-URL—Specify the destination URL where the file is copied into.

If no device is specified as the *destination-URL*, the file is copied into the aggregation device.

To specify a satellite device in the *destination-URL*, enter **sd*slot-id-number*** at the beginning of the *destination-URL*. For example, enter **sd101:/var/tmp/** to specify the /var/tmp directory on the satellite device using FPC slot ID number 101 as the *source-URL*.

Required Privilege Level

system-control

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

request chassis satellite file-copy on page 155

Sample Output

request chassis satellite file-copy

`user@aggregation-device>` **request chassis satellite file-copy /var/tmp/file_name sd101:/var/tmp/**

request chassis satellite install

Syntax

```
request chassis satellite install package-name
  [fpc-slot fpc-slot | device-alias device-alias]
  <no-confirm>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Install a version of Junos OS software onto a satellite device in a Junos Fusion.

Any device operating as a satellite device in a Junos Fusion is running satellite software. A device running satellite software cannot operate as a standalone network device until it is running a version of Junos OS software.

You would typically enter this command to install Junos OS onto a satellite device before removing the satellite device from a Junos Fusion. Installing the Junos OS software onto the satellite device before removing it from the Junos Fusion allows you to more easily install the device elsewhere in your network.

If you are using the automatic satellite conversion feature to convert devices into satellite devices in your Junos Fusion, remove the FPC slot ID to the satellite device from the automatic satellite conversion configuration before using this command to install the Junos OS software. You can update the automatic satellite conversion feature using the **set chassis** satellite-management auto-satellite-conversion satellite ***slot-id*** configuration statement.

You must install a PXE version of compatible Junos OS to convert the satellite device running satellite software to a standalone device running Junos OS software on QFX5100 switches acting as satellite devices. The PXE version of Junos OS is the software that includes **pxe** in the Junos OS package name when it is downloaded from the Software Center—for example, the PXE image for Junos OS Release 14.1X53-D16 is named **install-media-pxe-qfx-5-14.1X53-D16.2.tgz**.

For Junos Fusion systems running Junos OS Release 17.2R1 and later, you must install a signed PXE version of Junos OS to convert the satellite device running satellite software to a standalone device running Junos OS software. The signed PXE Junos OS package name uses the format **install-media-pxe-qfx-5-*version*-domestic-signed.tgz**.

The device uses a factory-default configuration after the Junos OS installation is complete. No Junos OS configuration is modified and the previous Junos OS configuration is not restored after the Junos OS software installation.

Options

package-name—Specify the URL to the Junos OS image to install onto the satellite device.

fpc *fpc-slot*—Install the Junos OS software onto the satellite device with the specified FPC slot ID in the Junos Fusion.

device-alias ***device-alias***—Install the Junos OS software onto the satellite device with the alias name in the Junos Fusion.

no-confirm—(Optional) Install the Junos OS software onto the satellite device immediately without further confirmation prompting.

Required Privilege Level

system-control

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

Sample Output

request chassis satellite install /var/tmp/jinstall-ex-4300-14.1X53-D16.1-domestic-signed.tgz fpc-slot 101 (EX4300 switch as satellite device)

`user@aggregation-device>` **request chassis satellite install /var/tmp/jinstall-ex-4300-14.1X53-D16.1-domestic-signed.tgz fpc-slot 101**

```
Response from device:
    Conversion Started
```

request chassis satellite install /var/tmp/install-media-pxe-qfx-5-14.1X53-D16.2.tgz fpc-slot 102 (QFX5100 switch as satellite device)

`user@aggregation-device>` **request chassis satellite install /var/tmp/install-media-pxe-qfx-5-14.1X53-D16.2.tgz fpc-slot 102**

```
Response from device:
    Conversion Started
```

request chassis satellite interface

Syntax

```
request chassis satellite interface interface-name
  device-mode satellite
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Change the device mode for a device.

This command is used to change a device into a satellite device for a Junos Fusion. After interconnecting a device to an aggregation device in a Junos Fusion, enter this command from the aggregation device to begin the manual satellite device conversion procedure.

Other configuration steps, such as configuring the cascade port and creating a satellite software upgrade group, must be completed before this command can be used to convert a device into a satellite device. See *Configuring Junos Fusion Provider Edge* or "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

Options

interface-name—Specify the name of the cascade port interface on the aggregation device that connects to the device that will be converted into a satellite device.

Required Privilege Level

system-control

Related Documentation

- *Configuring Junos Fusion Provider Edge*
- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output

request chassis satellite interface xe-0/0/1 device-mode satellite on page 158

Sample Output

request chassis satellite interface xe-0/0/1 device-mode satellite

```
user@aggregation-device> request chassis satellite interface xe-0/0/1 device-mode satellite
```

request chassis satellite login

Syntax

```
request chassis satellite login
  <fpc-slot fpc-slot>
  <interface-name interface-name>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Log in to the satellite device from the aggregation device.

This command is typically used to log in to the satellite device by expert users for debugging purposes. You can perform all configuration and administration tasks in a Junos Fusion from the aggregation device.

Options

fpc ***fpc-slot***—Log in to the satellite device with the specified FPC slot ID.

interface-name ***interface-name***—Log in to the satellite device connected to the specified interface. The *interface-name* is the cascade port on the aggregation device.

Required Privilege Level

system-control

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

request chassis satellite login fpc-slot 101 on page 159

Sample Output

request chassis satellite login fpc-slot 101

```
user@aggregation-device> request chassis satellite login fpc-slot 101
```

request chassis satellite reboot

Syntax

```
request chassis satellite reboot
  <fpc-slot fpc-slot>
  <range range>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Reboot the satellite device or devices from the aggregation device in a Junos Fusion.

Options

fpc *fpc-slot*—Reboot the satellite device with the specified FPC slot identifier.

range *range*—Reboot all satellite devices in a range of FPC slot identifiers.

For instance, you can reboot the satellite devices using FPC slot identifiers 101, 102, and 103 by entering a *range* of **101-103**.

Required Privilege Level

system-control

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

request chassis satellite reboot fpc 101 on page 160
request chassis satellite reboot range 101-103 on page 160

Sample Output

request chassis satellite reboot fpc 101

```
user@aggregation-device> request chassis satellite reboot fpc 101
```

Sample Output

request chassis satellite reboot range 101-103

```
user@aggregation-device> request chassis satellite reboot range 101-103
```


request chassis satellite restart

Syntax

```
request chassis satellite restart
  [fpc-slot fpc-slot | range range]
  &lt;process-name&gt;
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Restart a process on a satellite device or devices from the aggregation device in a Junos Fusion.

You would typically restart a process in a Junos Fusion for troubleshooting or debugging purposes.

This command is intended for use by expert users for debugging purposes.

Options

fpc ***fpc-slot***—Restart the specified process on the satellite device in the specified FPC slot ID only.

range—Restart the process on the satellite devices in the specified range of FPC slot IDs only.

For instance, if you want to reboot the satellite devices using FPC slot IDs 101, 102, and 103, you can enter a *range* of **101-103**.

process-name—Restart the specified process on the specified FPC slot ID or range of FPC slot IDs.

Required Privilege Level

system-control

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

request chassis satellite shell-command

Syntax

```
request chassis satellite shell-command
  [fpc-slot fpc-slot |range ]
  <remote-command>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Run a UNIX shell command for a satellite device from the aggregation device in a Junos Fusion.

Options

fpc *fpc-slot*—Run the shell command on the satellite device using the specified FPC slot identifier only.

range—Run the shell command on the satellite devices in the specified range of FPC slot identifiers only.

For instance, you can run the shell command on the satellite devices in FPC slot identifiers 101, 102, and 103 by entering a *range* of **101-103**.

remote-command—Specify the UNIX shell command to run on the satellite device or devices.

Required Privilege Level

system-control

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

request system software add

List of Syntax

Syntax

```
request system  software add package-name
<best-effort-load>
<delay-restart>
<device-alias alias-name>
<force>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<satellite slot-id>
<set [package-name1 package-name2]>
<unlink>
<upgrade-group [all |upgrade-group-name]>
<upgrade-with-config>
<satellite slot-id>
<validate>
<version version-string>
```

Syntax (EX Series Switches)

```
request system  software add package-name
<best-effort-load>
<delay-restart>
<force>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<set [package-name1 package-name2]>
<upgrade-with-config>
<validate>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (TX Matrix Router)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<lcc number | scc>
<no-copy>
```



```
<no-validate>
<re0 | re1>
<reboot>
<set [package-name1 package-name2]>
<unlink>
<upgrade-with-config>
<validate>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (TX Matrix Plus Router)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<lcc number | sfc number>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<set [package-name1 package-name2]>
<unlink>
<upgrade-with-config>
<validate>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (MX Series Router)

```
request system  software add package-name
<best-effort-load>
<delay-restart>
<device-alias alias-name>
<force>
<member member-id>
<no-copy>
<no-validate>
<re0 | re1>
<reboot>
<satellite slot-id>
<set [package-name1 package-name2]>
<upgrade-group [all |upgrade-group-name]>
<unlink>
<upgrade-with-config>
<validate>
<version version-string>
<validate-on-host hostname>
<validate-on-routing-engine routing-engine>
```

Syntax (QFX Series)

```
request system software add package-name
<best-effort-load>
<component all>
<delay-restart>
```

```
<force>
<force-host>
<no-copy>
<partition>
<reboot>
<unlink>
<upgrade-with-config>
```

Syntax (OCX Series)

```
request system software add package-name
<best-effort-load>
<delay-restart>
<force>
<force-host>
<no-copy>
<no-validate>
<reboot>
<unlink>
<upgrade-with-config>
<validate>
```

Syntax (Junos OS Evolved)

```
request system software add package-name
<force>
<no-validate>
<reboot>
<restart>
```

Release Information

Command introduced before Junos OS Release 7.4.
best-effort-load and **unlink** options added in Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.
Command introduced in Junos OS Release 11.1 for the QFX Series.
set [*package-name1 package-name2*] option added in Junos OS Release 11.1 for EX Series switches. Added in Junos OS Release 12.2 for M Series, MX Series, and T Series routers.

NOTE: On EX Series switches, the **set [*package-name1 package-name2*]** option allows you to install only two software packages on a mixed EX4200 and EX4500 Virtual Chassis, whereas, on M Series, MX Series, and T Series routers, the **set [*package-name1 package-name2 package-name3*]** option allows you to install multiple software packages and software add-on packages at the same time.

upgrade-with-config and **upgrade-with-config-format *format*** options added in Junos OS Release 12.3 for M Series routers, MX Series routers, and T Series routers, EX Series Ethernet switches, and QFX Series devices.
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

device-alias, **satellite**, **upgrade-group**, and **version** options introduced in Junos OS Release 14.2R3 for Junos Fusion.
validate-on-host and **validate-on-routing-engine** options added in Junos OS Release 15.1F3 for PTX5000 routers and MX240, MX480, and MX960 routers.
upgrade-with-config-format ***format*** option deleted in Junos OS Release 16.1 for M Series routers, MX Series routers, and T Series routers, EX Series Ethernet switches, and QFX Series devices.
The following options are deprecated in Junos OS Evolved Release 18.3R1: **best-effort-load**, **delay-restart**, **no-copy**, **on-primary**, (**re0** | **re1**), **set**, **unlink**, **validate**, **validate-on-host**, and **validate-on-routing-engine**.

Description For Junos OS Evolved, the **request system software add** command has a built-in feature not to start the upgrade if a reboot is pending after an upgrade or rollback.

NOTE: We recommend that you always download the software image to **/var/tmp** only. On EX Series and QFX Series switches, you must use the **/var/tmp** directory. Other directories are not supported.

Install a software package or bundle on the router or switch.

For information on valid filename and URL formats, see *Format for Specifying Filenames and URLs in Junos OS CLI Commands*.

CAUTION: Any configuration changes performed after inputting the **request system software add** command will be lost when the system reboots with an upgraded version of Junos OS.

NOTE: Starting from Junos OS Release 17.2R1, PTX10008 routers do not support the **request system software add** command. Starting from Junos OS Release 17.4R1, PTX10016 routers do not support the **request system software add** command. Use the **request vmhost software add** command instead of the **request system software add** command on the PTX10008 and PTX10016 routers to install or upgrade the Junos OS software package or bundle on the router. See *request vmhost software add*.

NOTE: When graceful Routing Engine switchover (GRES) is enabled on a device, you must perform a unified in-service software upgrade (ISSU) operation to update the software running on the device. With GRES enabled, if you attempt to perform a software upgrade by entering the **request system software add** ***package-name*** command, an error message is displayed stating that only in-service software upgrades are supported when GRES is configured. In such a case, you must either remove the GRES configuration before you attempt the upgrade or perform a unified ISSU.

NOTE: Starting with Junos OS Release 15.1F3, the statement **request system software add** installs a software package for the guest OS only for the PTX5000 router with RE-DUO-C2600-16G, and for MX240, MX480, and MX960 routers with RE-S-1800X4-32G-S.

Starting with Junos OS Release 15.1F5, the statement **request system software add** installs a software package for the guest OS only for the MX2010 and MX2020 routers with REMX2K-1800-32G-S.

On these routers, in order to install both Junos software and host software packages, use the **request vmhost software add** command.

Options ***package-name***—Location from which the software package or bundle is to be installed.

NOTE: In Junos OS, ***package-name*** can be wither the URL of a remote location or the pathname of a local package. But Junos OS Evolved does not support a remote iso for upgrade, so “URL” is removed from the help string in the CLI.

For example:

- **/var/tmp/*****package-name***—For a software package or bundle that is being installed from a local directory on the router or switch.
- ***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 (not available for limited editions).
  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.

- Do not use the scp protocol in the request system software add command to download and install a software package or bundle from a remote location. The previous statement does not apply to the QFabric switch. The software upgrade is handled by the management process (mgd), which does not support scp.
  Use the file copy command to copy the software package or bundle from the remote location to the /var/tmp directory on the hard disk:
  file copy scp://*source/package-name* /var/tmp
  Then install the software package or bundle using the request system software add command:
  request system software add /var/tmp/*package-name*

best-effort-load—(Optional) Activate a partial load and treat parsing errors as warnings instead of errors.

component all—(QFabric systems only) (Optional) Install the software package on all of the QFabric components.

delay-restart—(Optional) Install a software package or bundle, but do not restart software processes.

device-alias *alias-name*—(Junos Fusion only) (Optional) Install the satellite software package onto the specified satellite device using the satellite device's alias name.

force—(Optional) Force the addition of the software package or bundle (ignore warnings).

force-host—(Optional) Force the addition of the host software package or bundle (ignore warnings) on the QFX5100 device.

lcc ***number*** —(TX Matrix routers and TX Matrix Plus routers only) (Optional) In a routing matrix based on the TX Matrix router, install a software package or bundle on a T640 router that is connected to the TX Matrix router. In a routing matrix based on the TX Matrix Plus router, install a software package or bundle on a 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.

member ***member-id***—(MX Series routers only) (Optional) Install a software package on the specified Virtual Chassis member. Replace ***member-id*** with a value of 0 or 1.

partition —(QFX3500 switches only) (Optional) Format and repartition the media before installation.

satellite ***slot-id***—(Junos Fusion only) (Optional) Install the satellite software package onto the specified satellite device using the satellite devices FPC slot identifier.

scc—(TX Matrix routers only) (Optional) Install a software package or bundle on a Routing Engine on a TX Matrix router (or switch-card chassis).

sfc ***number***—(TX Matrix Plus routers only) (Optional) Install a software package or bundle on a Routing Engine on a TX Matrix Plus router. Replace *number* with 0.

no-copy—(Optional) Install a software package or bundle, but do not save copies of the package or bundle files.

no-validate—(Optional) When loading a software package or bundle with a different release, suppress the default behavior of the **validate** option.

NOTE: Software packages from unidentified providers cannot be loaded. To authorize providers, include the **provider-id** statement at the **[edit system extensions provider]** hierarchy level.

re0 | re1—(Optional) On routers or switches that support dual or redundant Routing Engines, load a software package or bundle on the Routing Engine in slot 0 (re0) or the Routing Engine in slot 1 (re1).

reboot—(Optional) After adding the software package or bundle, reboot the system. On a QFabric switch, the software installation is not complete until you reboot the component for which you have installed the software.

set [*package-name1 package-name2*]—(Mixed EX4200 and EX4500 Virtual Chassis, M Series, MX Series, and T Series routers only) (Optional) Install multiple packages at same time:

- In the case of mixed EX4200 and EX4500 Virtual Chassis, install two software packages—a package for an EX4200 switch and the same release of the package for an EX4500 switch—to upgrade all member switches in a mixed EX4200 and EX4500 Virtual Chassis.
- In the case of M Series, MX Series, and T Series routers, install multiple (two or more) software packages and software add-on packages at the same time. The variable ***package-name*** can either be a list of installation packages, each separated by a blank space, or the full URL to the directory or tar file containing the list of installation packages.

In each case, ***installation-package*** can either be a list of installation packages, each separated by a blank space, or the full URL to the directory or tar file containing the list of installation packages.

Use the **request system software add set** command to retain any SDK configuration by installing the SDK add-on packages along with the core Junos OS installation package.

unlink—(Optional) On M Series, T Series, and MX Series routers, use the unlink option to remove the software package from this directory after a successful upgrade is completed.

upgrade-group [all |*upgrade-group-name*]—(Junos Fusion only) (Required to configure a Junos Fusion using autoconversion or manual conversion) Associate a satellite software image with a satellite software upgrade group. The satellite software package is associated with the specified satellite software upgrade group using the *upgrade-group-name*, or for all satellite software upgrade groups in a Junos Fusion when the all keyword is specified.

A satellite software upgrade group is a group of satellite devices in a Junos Fusion that are designated to upgrade to the same satellite software version using the same satellite software package. See *Understanding Software in a Junos Fusion Provider Edge*, “Understanding Software in a Junos Fusion Enterprise” on page 22, and “Managing Satellite Software Upgrade Groups in a Junos Fusion” on page 123.

upgrade-with-config—(Optional) Install one or more configuration files.

NOTE: **Configuration files specified with this option must have the extension .text or .xml and have the extension specified. Using the extension .txt will not work.**

validate—(Optional) Validate the software package or bundle against the current configuration as a prerequisite to adding the software package or bundle. This is the default behavior when the software package or bundle being added is a different release.

NOTE: The **validate** option only works on systems that do not have **graceful-switchover** (GRES) enabled. To use the **validate** option on a system with GRES, either disable GRES for the duration of the installation, or install using the command **request system software in-service-upgrade**, which requires nonstop active routing (NSR) to be enabled when using GRES.

validate-on-host *hostname*—(Optional) Validate the software package by comparing it to the running configuration on a remote Junos OS host. Specify a host, replacing ***hostname*** with the remote hostname. You can optionally provide the username that will be used to log in to the remote host by specifying the hostname in the format **user@hostname**.

validate-on-routing-engine *routing-engine*—(Optional) Validate the software bundle or package by comparing it to the running configuration on a Junos OS Routing Engine on the same chassis. Specify a Routing Engine, replacing ***routing-engine*** with the routing engine name.

Additional Information

Before upgrading the software on the router or switch, when you have a known stable system, issue the **request system snapshot** command to back up the software, including the configuration, to the **/altroot** and **/altconfig** file systems. After you have upgraded the software on the router or switch and are satisfied that the new package or bundle is successfully installed and running, issue the **request system snapshot** command again to back up the new software to the **/altroot** and **/altconfig** file systems.

NOTE: The **request system snapshot** command is currently not supported on the QFabric system. Also, you cannot add or install multiple packages on a QFabric system.

After you run the **request system snapshot** command, you cannot return to the previous version of the software because the running and backup copies of the software are identical.

If you are upgrading more than one package at the same time, delete the operating system package, jkernel, last. Add the operating system package, jkernel, first and the routing software package, jroute, last. If you are upgrading all packages at once, delete and add them in the following order:


```
user@host> request system software add /var/tmp/jbase
user@host> request system software add /var/tmp/jkernel
user@host> request system software add /var/tmp/jpfe
user@host> request system software add /var/tmp/jdocs
user@host> request system software add /var/tmp/jroute
user@host> request system software add /var/tmp/jcrypto
```

By default, when you issue the **request system software add** ***package-name*** command on a TX Matrix master Routing Engine, all the T640 master Routing Engines that are connected to it are upgraded to the same version of software. If you issue the same command on the TX Matrix backup Routing Engine, all the T640 backup Routing Engines that are connected to it are upgraded to the same version of software.

Likewise, when you issue the **request system software add** ***package-name*** command on a TX Matrix Plus master Routing Engine, all the T1600 or T4000 master Routing Engines that are connected to it are upgraded to the same version of software. If you issue the same command on the TX Matrix Plus backup Routing Engine, all the T1600 or T4000 backup Routing Engines that are connected to it are upgraded to the same version of software.

Before installing software on a device that has one or more custom YANG data models added to it, back up and remove the configuration data corresponding to the custom YANG data models from the active configuration. For more information see *Managing YANG Packages and Configurations During a Software Upgrade or Downgrade*.

Required Privilege Level

maintenance

Related Documentation

- *Format for Specifying Filenames and URLs in Junos OS CLI Commands*
- request system software delete on page 177
- request system software rollback on page 182
- request system storage cleanup on page 187
- *Installing Software Packages on QFX Series Devices*
- *Upgrading Software on a QFabric System*
- Managing Satellite Software Upgrade Groups in a Junos Fusion on page 123
- *request system software add (Maintenance)*
- *Routing Matrix with a TX Matrix Plus Router Solutions Page*

List of Sample Output

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software add validate

user@host> **request system software add validate /var/tmp/ jinstall-7.2R1.7-domestic-signed.tgz**

```
Checking compatibility with configuration
Initializing...
Using jbase-7.1R2.2
Using /var/tmp/jinstall-7.2R1.7-domestic-signed.tgz
Verified jinstall-7.2R1.7-domestic.tgz signed by PackageProduction_7_2_0
Using /var/validate/tmp/jinstall-signed/jinstall-7.2R1.7-domestic.tgz
Using /var/validate/tmp/jinstall/jbundle-7.2R1.7-domestic.tgz
Checking jbundle requirements on /
Using /var/validate/tmp/jbundle/jbase-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jkernel-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jcrypto-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jpfe-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jdocs-7.2R1.7.tgz
Using /var/validate/tmp/jbundle/jroute-7.2R1.7.tgz
Validating against /config/juniper.conf.gz
mgd: commit complete
Validation succeeded
Validating against /config/rescue.conf.gz
mgd: commit complete
Validation succeeded
Installing package '/var/tmp/jinstall-7.2R1.7-domestic-signed.tgz' ...
Verified jinstall-7.2R1.7-domestic.tgz signed by PackageProduction_7_2_0
Adding jinstall...

WARNING:     This package will load JUNOS 7.2R1.7 software.
WARNING:     It will save JUNOS configuration files, and SSH keys
WARNING:     (if configured), but erase all other files and information
WARNING:     stored on this machine.  It will attempt to preserve dumps
WARNING:     and log files, but this can not be guaranteed.  This is the
WARNING:     pre-installation stage and all the software is loaded when
WARNING:     you reboot the system.

Saving the config files ...
Installing the bootstrap installer ...

WARNING:     A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY. Use the
WARNING:     'request system reboot' command when software installation is
WARNING:     complete. To abort the installation, do not reboot your system,
WARNING:     instead use the 'request system software delete jinstall'
WARNING:     command as soon as this operation completes.

Saving package file in /var/sw/pkg/jinstall-7.2R1.7-domestic-signed.tgz ...
Saving state for rollback ...
```

request system software add /var/tmp/ no-validate

user@host> **request system software add no-validate /var/tmp/junos-install-mx-x86-32-15.1R1.9.tgz**

```
Installing package '/var/tmp/junos-install-mx-x86-32-15.1R1.9.tgz' ...
Verified manifest signed by PackageProductionEc_2015
Verified manifest signed by PackageProductionRSA_2015
```



```
Verified contents.iso
Verified issu-indb.tgz
Verified junos-x86-32.tgz
Verified kernel
Verified metatags
Verified package.xml
Verified pkgtools.tgz
camcontrol: not found
camcontrol: not found
Verified manifest signed by PackageProductionEc_2015
Saving the config files ...
NOTICE: uncommitted changes have been saved in
/var/db/config/juniper.conf.pre-install
Saving package file in
/var/sw/pkg/junos-install-x86-32-domestic-20150618.043753_builder_junos_151_r1.tgz
 ...
Saving state for rollback ...
```

request system software add no-copy no-validate reboot

user@host> **request system software add no-copy no-validate junos-install-srx-x86-64-17.3R1.tgz reboot**

```
Verified junos-install-srx-x86-64-17.3R1 signed by PackageProductionEc_2017 method
 ECDSA256+SHA256
Verified manifest signed by PackageProductionEc_2017 method ECDSA256+SHA256
Checking PIC combinations
Verified fips-mode signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding fips-mode-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jail-runtime signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jail-runtime-x86-32-20170725.352915_builder_stable_10 ...
Verified jdocs signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jdocs-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jfirmware signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jfirmware-x86-32-17.3R1 ...
Verified jpfe-X signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-X-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jpfe-X960 signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-X960-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jpfe-common signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-common-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jpfe-fips signed by PackageProductionEc_2017 method ECDSA256+SHA256
Verified jpfe-wrlinux signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jpfe-wrlinux-x86-32-20170728.153050_builder_junos_173_r1 ...
Verified jsd-jet-1 signed by PackageProductionEc_2017 method ECDSA256+SHA256
Adding jsd-x86-32-17.3R1-jet-1 ...
```

request system software add validate-on-host

user@host> **request system software add validate-on-host user@xyz :/var/tmp/jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz**

```
user@host> request system software add validate-on-host user@xyz
:/var/tmp/jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz
Extracting JUNOS version from package...
Connecting to remote host xyz...
Password:
Sending configuration to xyz...
Validating configuration on xyz...
```



```
PACKAGETYPE: not found
Checking compatibility with configuration
Initializing...
Using jbase-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jruntime-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jkernel-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jroute-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jcrypto-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using jweb-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using /var/packages/jtools-15.1-20150516_ib_15_2_psd.0
Verified manifest signed by PackageDevelopmentEc_2015
Using /var/tmp/config.tgz
Hardware Database regeneration succeeded
Validating against /config/juniper.conf.gz
mgd: warning: schema: init: 'logical-systems-vlans' contains-node 'juniper-config
 vlans': not found
mgd: commit complete
Validation succeeded
Installing package
'/var/tmp/jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz' ...
Verified jinstall-15.1-20150516_ib_15_2_psd.0-domestic.tgz signed by
PackageDevelopmentEc_2015
Adding jinstall...

WARNING:     The software that is being installed has limited support.
WARNING:     Run 'file show /etc/notices/unsupported.txt' for details.


WARNING:     This package will load JUNOS 15.1-20150516_ib_15_2_psd.0 software.
WARNING:     It will save JUNOS configuration files, and SSH keys
WARNING:     (if configured), but erase all other files and information
WARNING:     stored on this machine.  It will attempt to preserve dumps
WARNING:     and log files, but this can not be guaranteed.  This is the
WARNING:     pre-installation stage and all the software is loaded when
WARNING:     you reboot the system.

Saving the config files ...
NOTICE: uncommitted changes have been saved in
/var/db/config/juniper.conf.pre-install
Installing the bootstrap installer ...

WARNING:     A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY. Use the
WARNING:     'request system reboot' command when software installation is
WARNING:     complete. To abort the installation, do not reboot your system,
WARNING:     instead use the 'request system software delete jinstall'
WARNING:     command as soon as this operation completes.

Saving package file in
/var/sw/pkg/jinstall-15.1-20150516_ib_15_2_psd.0-domestic-signed.tgz ...
Saving state for rollback ...
```


Sample Output

request system software add (Mixed EX4200 and EX4500 Virtual Chassis)

`user@switch>` **request system software add set [/var/tmp/jinstall-ex-4200-11.1R1.1-domestic-signed.tgz /var/tmp/jinstall-ex-4500-11.1R1.1-domestic-signed.tgz]**

```
...
```

request system software add component all (QFabric Systems)

`user@switch>` **request system software add /pbdata/packages/jinstall-qfabric-12.2X50-D1.3.rpm component all**

```
...
```

request system software add upgrade-group (Junos Fusion)

`user@aggregation-device>` **request system software add /var/tmp/satellite-3.0R1.1-signed.tgz upgrade-group group1**

request system software delete

List of Syntax

Syntax on page 177
Syntax (TX Matrix Router) on page 177
Syntax (Junos OS Evolved) on page 177

Syntax

request system software delete *software-package*
<force>
<reboot>
<set [*package-name package-name*]>
<upgrade-group [all |*upgrade-group-name*]>
<version *version-string*>

Syntax (TX Matrix Router)

request system software delete *software-package*
<force>
<lcc *number* | scc>
<reboot>
<set [*package-name package-name*]>

Syntax (Junos OS Evolved)

request system software delete
<force>
<reboot>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.
Command introduced in Junos OS Release 11.1 for the QFX Series.
set [*package-name package-name*] option added in Junos OS Release 12.2 for M Series, MX Series, and T Series routers.
reboot option introduced in Junos OS Release 12.3.
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
upgrade-group, and **version** options introduced in Junos OS Release 14.2R3 for Junos Fusion.

Description

Remove a software package or bundle from the router or switch.

CAUTION: **Before removing a software package or bundle, make sure that you have already placed the new software package or bundle that you intend to load onto the router or switch.**

Options

package-name—(Only for Junos OS Evolved) Name of the Junos OS Evolved package running on the device. You can see this package name by using the **request system software list** command.

software-package—(Not available on Junos OS Evolved) Software package or bundle name.

You can delete any or all of the following software bundles or packages:

- **jbase**—(Optional) Junos base software suite
- **jcrypto**—(Optional, in domestic version only) Junos security software
- **jdocs**—(Optional) Junos online documentation file
- **jkernel**—(Optional) Junos kernel software suite
- **jpfe**—(Optional) Junos Packet Forwarding Engine support
- **jroute**—(Optional) Junos routing software suite
- **junos**—(Optional) Junos base software

NOTE: On EX Series switches, some of the package names are different than those listed. To see the list of packages that you can delete on an EX Series switch, enter the command **show system software**.

force—(Optional) Ignore warnings and force removal of the software.

lcc *number*—(TX Matrix routers and TX Matrix Plus routers only) (Optional) In a routing matrix, delete a software package or bundle on a T640 router indicated by **lcc *number*** that is connected to the TX Matrix router. In a routing matrix, delete a software package or bundle on a router indicated by **lcc *number*** 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.

re0 | re1—(Optional) On routers or switches that support dual or redundant Routing Engines, delete a software package or bundle on the Routing Engine in slot 0 (re0) or the Routing Engine in slot 1 (re1).

reboot—As of Junos OS 12.3 and greater, automatically reboot upon completing the **request system software delete** command.

scc—(TX Matrix routers only) (Optional) Remove an extension or upgrade package from the TX Matrix router (or switch-card chassis).

set [*package-name package-name*]—(M Series, MX Series, and T Series routers only) (Optional) Install multiple software packages or software add-on packages at the same time.

sfc *number*—(TX Matrix Plus routers only) (Optional) Remove an extension or upgrade package from the TX Matrix Plus router. Replace *number* with 0.

upgrade-group [all |*upgrade-group-name*]—(Junos Fusion only) Delete the satellite software image association with the specified satellite software upgrade group.

A satellite software upgrade group is a group of satellite devices in the same Junos Fusion that are designated to upgrade to the same satellite software version using the same satellite software package.

version *version-string*—(Junos Fusion only) (Optional) Delete a satellite software package association with a satellite software upgrade group by selecting the satellite software package's version.

Additional Information

Before upgrading the software on the router or switch, when you have a known stable system, issue the **request system snapshot** command to back up the software, including the configuration, to the /altroot and /altconfig file systems (on routers) or the /, /altroot, /config, /var, and /var/tmp file systems (on switches). After you have upgraded the software on the router or switch and are satisfied that the new packages are successfully installed and running, issue the **request system snapshot** command again to back up the new software to the /altroot and /altconfig file systems (on routers) or the /, /altroot, /config, /var, and /var/tmp file systems (on switches). After you run the **request system snapshot** command, you cannot return to the previous version of the software, because the running and backup copies of the software are identical.

Required Privilege Level

maintenance

Related Documentation

- request system software add on page 163
- request system software rollback on page 182
- *request system software validate*
- *Routing Matrix with a TX Matrix Plus Router Solutions Page*

List of Sample Output

request system software delete jdocs on page 180
request system software delete (Junos OS Evolved) on page 180

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software delete jdocs

The following example displays the system software packages before and after the **jdocs** package is deleted through the **request system software delete** command:

`user@host>` **show system software**

```
Information for jbase:

Comment:
JUNOS Base OS Software Suite [7.2R1.7]


Information for jcrypto:

Comment:
JUNOS Crypto Software Suite [7.2R1.7]


Information for jdocs:

Comment:
JUNOS Online Documentation [7.2R1.7]


Information for jkernel:

Comment:
JUNOS Kernel Software Suite [7.2R1.7]

...
```

`user@host>` **show system software**

```
Information for jbase:

Comment:
JUNOS Base OS Software Suite [7.2R1.7]


Information for jcrypto:

Comment:
JUNOS Crypto Software Suite [7.2R1.7]


Information for jkernel:

Comment:
JUNOS Kernel Software Suite [7.2R1.7]

...
```

request system software delete (Junos OS Evolved)

`user@host>` **request system software delete junos-evo-install-qfx-fixed-x86-64-18.3I20180911102422**

```
Removing version 'junos-evo-install-qfx-fixed-x86-64-18.3I20180911102422'.
Software ... done.
Data ... done.
Version 'junos-evo-evo-qfx-fixed-x86-64-18.3I20180911102422' removed successfully.
```

request system software rollback

List of Syntax

Syntax on page 182
Syntax (EX Series Switches) on page 182
Syntax (TX Matrix Router) on page 182
Syntax (TX Matrix Plus Router) on page 182
Syntax (MX Series Router) on page 182
Syntax (Junos OS Evolved) on page 182

Syntax

```
request system software rollback
```

Syntax (EX Series Switches)

```
request system software rollback
<all-members>
<local>
<member member-id>
<reboot>
```

Syntax (TX Matrix Router)

```
request system software rollback
<lcc number | scc>
<reboot>
```

Syntax (TX Matrix Plus Router)

```
request system software rollback
<lcc number | sfc number>
<reboot>
```

Syntax (MX Series Router)

```
request system software rollback
<all-members>
<device-alias alias-name>
<local>
<member member-id
<reboot>
<satellite slot-id>
<upgrade-group [all |upgrade-group-name]>
```

Syntax (Junos OS Evolved)

```
request system software rollback
<no-validate>
<package-name version>
<reboot>
<validate>
<with-old-snapshot-config>
```

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

Command introduced in Junos OS Release 11.1 for the QFX Series.
Command behavior changed in Junos OS Release 12.1.
reboot option introduced in Junos OS Release 12.3.
device-alias, **satellite**, and **upgrade-group** options introduced in Junos OS Release 14.2R3 for Junos Fusion.
force option deprecated in Junos OS Release 15.1 for Junos OS with Upgraded FreeBSD.

NOTE: To determine which platforms run Junos OS with Upgraded FreeBSD, see the table listing the platforms currently running Junos OS with upgraded FreeBSD in *Release Information for Junos OS with Upgraded FreeBSD*.

validate and **no-validate** options introduced for Junos OS Evolved Release 18.3R1.
package-name ***version*** option introduced for Junos OS Evolved Release 18.3R1.
with-old-snapshot-config option introduced for Junos OS Evolved Release 18.3R1.

Description This command reverts to the last successfully installed package before the **request system software (add | delete)** command. It uses the copy stored in the **/var/sw/pkg** directory.

Additional Information

- On Junos Fusion, the **request system software rollback** command can be used to roll back the version of satellite software associated with a satellite software upgrade group. Rolling back the version of satellite software associated with a satellite software upgrade group triggers a satellite software upgrade.
- On M Series and T Series routers, if **request system software add <jinstall> reboot** was used for the previous installation, then **request system software rollback** has no effect. In this case, use **jinstall** to reinstall the required package.
- On M Series and T Series routers, if **request system software add <sdk1>** was used for the previous installation, then **request system software rollback** removes the last installed SDK package (**sdk1** in this example).
- On SRX Series devices with dual root systems, when **request system software rollback** is run, the system switches to the alternate root. Each root can have a different version of Junos OS. Roll back takes each root back to the previously installed image.
- On QFX3500 and QFX3600 devices in a mixed Virtual Chassis, when the **request system software rollback** command is issued, the system does not rollback to the image stored in the alternate partition.
- On QFX5100 switches, the **reboot** option has been removed. To reboot the switch after a software rollback, issue the **request system reboot** command as a separate, secondary command.
- On Junos OS Evolved, the **reboot** command is required in order to complete the rollback.

Options

all-members—(EX4200 switches and MX Series routers only) (Optional) Attempt to roll back to the previous set of packages on all members of the Virtual Chassis configuration.

device-alias ***alias-name***—(Junos Fusion only) (Optional) Rollback the satellite software package onto the specified satellite device using the satellite devices FPC slot identifier.

lcc ***number***—(TX Matrix routers and TX Matrix Plus routers only) (Optional) On a TX Matrix router, attempt to roll back to the previous set of packages on a T640 router connected to the TX Matrix router. On a TX Matrix Plus router, attempt to roll back to the previous set of packages on a connected router 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) Attempt to roll back to the previous set of packages on the local Virtual Chassis member.

member ***member-id***—(EX4200 switches and MX Series routers only) (Optional) Attempt to roll back to the previous set of packages on 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.

no-validate | validate—(Only for Junos OS Evolved) Check compatibility with current configuration, yes or no.

none—For all versions of Junos OS up to and including Junos OS 11.4, revert to the set of software as of the last successful **request system software add**. As of Junos OS 12.1 and later, revert to the last known good state before the most recent **request system software (add | delete)** command.

package-name ***version***—(Junos OS Evolved only) Select any installed version for the rollback. The **request system software rollback** command uses the version instead of the package-name. you can see the available versions by using the **show system software list** command. If a version is not specified, the system rolls back to the default rollback version (the one with the '<' before it on the **show system software list** command output). You can specify any previous Junos OS Evolved release as long as it is not the one that is currently running or the rollback version.

reboot—(Optional) For Junos OS 12.3 and later, the system reboots automatically to complete the rollback. However, for Junos OS Evolved, you must explicitly specify the **reboot** option to complete the rollback.

satellite ***slot-id***—(Junos Fusion only) (Optional) Roll back the satellite software package onto the specified satellite device using the satellite devices FPC slot identifier.

scc—(TX Matrix routers only) (Optional) Attempt to roll back to the previous set of packages on the TX Matrix router (or switch-card chassis).

sfc ***number***—(TX Matrix Plus routers only) (Optional) Attempt to roll back to the previous set of packages on the TX Matrix Plus router. Replace *number* with 0.

upgrade-group [all |*upgrade-group-name*]—(Junos Fusion only) Roll back the satellite software image associated with the specified satellite software upgrade group, or for all satellite software upgrade groups in the Junos Fusion when **all** is entered.

validate | no-validate—(Junos OS Evolved only).

with-old-snapshot-config—(Optional) (Junos OS Evolved only) Rolls back system to the specified version with the old snapshot of the configuration used in that version. Otherwise, the rollback, by default, takes the current configuration.

Required Privilege Level

maintenance

Related Documentation

- *request system software abort*
- request system software add on page 163
- request system software delete on page 177
- *request system software validate*
- *request system configuration rescue delete*
- *request system configuration rescue save*
- *Routing Matrix with a TX Matrix Plus Router Solutions Page*

List of Sample Output

request system software rollback on page 186

Output Fields

When you enter this command, you are provided feedback on the status of your request.

Sample Output

request system software rollback

user@host> **request system software rollback**

```
Verified SHA1 checksum of ./jbase-7.2R1.7.tgz
Verified SHA1 checksum of ./jdocs-7.2R1.7.tgz
Verified SHA1 checksum of ./jroute-7.2R1.7.tgz
Installing package './jbase-7.2R1.7.tgz' ...
Available space: 35495 require: 7335
Installing package './jdocs-7.2R1.7.tgz' ...
Available space: 35339 require: 3497
Installing package './jroute-7.2R1.7.tgz' ...
Available space: 35238 require: 6976
NOTICE: uncommitted changes have been saved in
/var/db/config/juniper.conf.pre-install
Reloading /config/juniper.conf.gz ...
Activating /config/juniper.conf.gz ...
mgd: commit complete
Restarting mgd ...
Restarting aprobed ...
Restarting apsd ...
Restarting cosd ...
Restarting fsad ...
Restarting fud ...
Restarting gcdrd ...
Restarting ilmid ...
Restarting irsd ...
Restarting l2tpd ...
Restarting mib2d ...
Restarting nasd ...
Restarting pppoed ...
Restarting rdd ...
Restarting rmopd ...
Restarting rtspd ...
Restarting sampled ...
Restarting serviced ...
Restarting snmpd ...
Restarting spd ...
Restarting vrrpd ...

WARNING: cli has been replaced by an updated version:
CLI release 7.2R1.7 built by builder on 2005-04-22 02:03:44 UTC
Restart cli using the new version ? [yes,no] (yes) yes

Restarting cli ...
user@host
```


request system storage cleanup

List of Syntax

Syntax

```
request system storage cleanup
<dry-run>
<no-confirm>
<re0 | re1 | routing-engine (backup | both | local | master | other)>
```

Syntax (EX Series Switches)

```
request system storage cleanup
<all-members>
<dry-run>
<local>
<member member-id>
<no-confirm>
<re0 | re1 | routing-engine (backup | both | local | master | other)>
<satellite [slot-id slot-id |device-alias alias-name]>
```

Syntax (MX Series Router)

```
request system storage cleanup
<all-members>
<dry-run>
<local>
<member member-id>
<no-confirm>
<re0 | re1 | routing-engine (backup | both | local | master | other)>
<satellite [slot-id slot-id |device-alias alias-name]>
```

Syntax (QFX Series)

```
request system storage cleanup
<component (serial number | UUID | all)>
<director-group name>
<dry-run>
<infrastructure name>
<interconnect-device name>
<name-tag name-tag>
<no-confirm>
<node-group name>
<prune>
<qfabric (component name) | dry-run | name-tag | repository)>
<repository (core | log)>
<re0 | re1 | routing-engine (backup | both | local | master | other)>
```

Syntax (SRX Series)

```
request system storage cleanup
```



```
<dry-run>
<no-confirm>
<re0 | re1 | routing-engine (backup | both | local | master | other)>
```

Syntax (Junos OS Evolved)

```
request system storage cleanup (dry-run | force-deep | no-confirm)
```

Release Information

Command introduced in Junos OS Release 7.4.
dry-run option introduced in Junos OS Release 7.6.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 9.2 for SRX Series.
Command introduced in Junos OS Release 11.1 for the QFX Series.
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
satellite option introduced in Junos OS Release 14.2R3.
no-confirm and **(re0 |re1 | routing-engine (backup | both | local | master | other))** options introduced in Junos OS 17.3R1.
force-deep options introduced in Junos OS Evolved Release 18.3R1.

Description

Free storage space on the router or switch by rotating log files and proposing a list of files for deletion. User input is required for file deletion. On a QFabric system, you can delete debug files located on individual devices or on the entire QFabric system.

The Junos OS Evolved implementation of the **request system storage cleanup** command is slightly different from the implementation on Junos OS:

- The user is prompted to specify the **dry-run** option:

  ```
  Please check the list of files to be deleted using the dry-run option.
  Continue anyway without checking? [yes,no] (yes)
  ```

  The command cleans up any ISO files on the system, rotates syslogs, clears trace file. It does not remove user-created files

- To delete any user-generated files as well, use the **force-deep** option.
- In Junos OS Evolved, the system computes the available space and emits o/p on console for reference.

Options

all-members—(EX4200 switches and MX Series routers only) (Optional) Delete files on the Virtual Chassis master Routing Engine only.

NOTE: To delete files on the other members of the Virtual Chassis configuration, log in to each backup Routing Engine and delete the files using the **request system storage cleanup local** command.

component (*UUID* | *serial number* | all)—(QFabric systems only) (Optional) Delete files located on individual QFabric system devices or on the entire QFabric system.

director-group *name*—(QFabric systems only) (Optional) Delete files on the Director group.

dry-run—(Optional) List files proposed for deletion (without deleting them).

force-deep—(Junos OS Evolved only) (Optional) Clear temporary user-generated files in **/home/*user*** and **/var/tmp** as well as any ISO files on the system, rotates syslogs, clears trace file. User is prompted to use the **dry-run** option.

infrastructure *name*—(QFabric systems only) (Optional) Delete files on the fabric control Routing Engine and fabric manager Routing Engine.

interconnect-device *name*—(QFabric systems only) Optional) Delete files on the Interconnect device.

local—(EX4200 switches and MX Series routers only) (Optional) Delete files on the local Virtual Chassis member.

member *member-id*—(EX4200 switches and MX Series routers only) (Optional) Delete files on 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.

name-tag *name-tag*—(QFabric systems only) (Optional) Delete debug files that match a specific regular expression.

node-group *name*—(QFabric systems only) (Optional) Delete files on the Node group.

no-confirm—(Optional) Do not ask for confirmation before doing the cleanup.

prune—(QFabric systems only) (Optional) Delete debug files located in either the core or log debug repositories of a QFabric system device.

qfabric component *name*—(QFabric systems only) (Optional) Delete debug files located in the debug repositories of a QFabric system device.

(re0 | re1 | routing-engine (backup | both | local | master | other))—(Optional) Request operation on system storage on RE0, RE1, or on specified Routing Engine by these classifications: backup, both, local, master, or other.

When Routing Engine is specified, the below message is shown before listing the files and deleting them.

```
Please check the list of files to be deleted using the dry-run option. i.e.
request system storage cleanup dry-run
Do you want to proceed ? [yes,no] (no)
```

repository (core | log)—(QFabric systems only) (Optional) Specify the repository on the QFabric system device for which you want to delete debug files.

satellite [slot-id *slot-id* | device-alias *alias-name*]—(Junos Fusion only) (Optional) Specify the satellite device in the Junos Fusion by FPC ID or device alias name for which you want to delete debug files.

Additional Information If logging is configured and being used, the **dry-run** option rotates the log files. In that case, the output displays the message "Currently rotating log files, please wait." If no logging is currently under way, the output displays only a list of files to delete.

Required Privilege Level maintenance

List of Sample Output

Output Fields Table 14 on page 190 describes the output fields for the **request system storage cleanup** command. Output fields are listed in the approximate order in which they appear.

Table 14: request system storage cleanup Output Fields

Field Name	Field Description
List of files to delete:	Shows list of files available for deletion.
Size	Size of the core-dump file.
Date	Last core-dump file modification date and time.
Name	Name of the core-dump file.
Directory to delete:	Shows list of directories available for deletion.
Repository scope:	Repository where core-dump files and log files are stored. The core-dump files are located in the **core** repository, and the log files are located in the **log** repository. The default **Repository scope** is shared since both the **core** and **log** repositories are shared by all of the QFabric system devices.

Table 14: request system storage cleanup Output Fields (continued)

Field Name	Field Description
Repository head:	Name of the top-level repository location.
Repository name:	Name of the repository: **core** or **log**.
Creating list of debug artifacts to be removed under:	Shows location of files available for deletion.
List of debug artifacts to be removed under:	Shows list of files available for deletion.

Sample Output

request system storage cleanup dry-run

user@host> **request system storage cleanup dry-run**

```
Currently rotating log files, please wait.
This operation can take up to a minute.

List of files to delete:

         Size Date         Name
  11.4K Mar  8 15:00 /var/log/messages.1.gz
  7245B Feb  5 15:00 /var/log/messages.3.gz
  11.8K Feb 22 13:00 /var/log/messages.2.gz
  3926B Mar 16 13:57 /var/log/messages.0.gz
  3962B Feb 22 12:47 /var/log/sampled.1.gz
  4146B Mar  8 12:20 /var/log/sampled.0.gz
  4708B Dec 21 11:39 /var/log/sampled.2.gz
  7068B Jan 16 18:00 /var/log/messages.4.gz
  13.7K Dec 27 22:00 /var/log/messages.5.gz
   890B Feb 22 17:22 /var/tmp/sampled.pkts
  65.8M Oct 26 09:10 /var/sw/pkg/jinstall-7.4R1.7-export-signed.tgz
  63.1M Oct 26 09:13 /var/sw/pkg/jbundle-7.4R1.7.tgz
```

request system storage cleanup

user@host> **request system storage cleanup**

```
Currently rotating log files, please wait.
This operation can take up to a minute.

List of files to delete:

         Size Date         Name
  11.4K Mar  8 15:00 /var/log/messages.1.gz
  7245B Feb  5 15:00 /var/log/messages.3.gz
  11.8K Feb 22 13:00 /var/log/messages.2.gz
  3926B Mar 16 13:57 /var/log/messages.0.gz
  11.6K Mar  8 15:00 /var/log/messages.5.gz
  7254B Feb  5 15:00 /var/log/messages.6.gz
  12.9K Feb 22 13:00 /var/log/messages.8.gz
```

```
  3726B Mar 16 13:57 /var/log/messages.7.gz
  3962B Feb 22 12:47 /var/log/sampled.1.gz
  4146B Mar  8 12:20 /var/log/sampled.0.gz
  4708B Dec 21 11:39 /var/log/sampled.2.gz
  7068B Jan 16 18:00 /var/log/messages.4.gz
  13.7K Dec 27 22:00 /var/log/messages.5.gz
   890B Feb 22 17:22 /var/tmp/sampled.pkts
  65.8M Oct 26 09:10 /var/sw/pkg/jinstall-7.4R1.7-export-signed.tgz
  63.1M Oct 26 09:13 /var/sw/pkg/jbundle-7.4R1.7.tgz

Delete these files ? [yes,no] (yes)
```

request system storage cleanup (Junos OS Evolved)

user@host> **request system storage cleanup**

```
Please check the list of files to be deleted using the dry-run option.
 Continue anyway without checking? [yes,no] (no)
```

request system storage cleanup dry-run (Junos OS Evolved)

user@host> **request system storage cleanup dry-run**

```
-------------------------------
node: re0
-------------------------------
=== Other candidate logs, traces, core files which would be removed  ===
total 0
-rw-r--r--    1 root root        0 Jun 14 11:38 /var/log/access.log
-rw-r--r--    1 root root     1243 Jun 14 11:55 /var/log/agentd-trace.log
-rw-r--r--    1 root root      638 Jun 14 11:54 /var/log/alarm-mgmtd-trace.log
-rw-r--r--    1 root root  3319611 Jun 14 13:40 /var/log/alarm-mgmtd.log
-rw-r--r--    1 root root      620 Jun 14 11:55 /var/log/alarmd-trace.log
-rw-r--r--    1 root root  3436048 Jun 14 13:40 /var/log/alarmd.log
-rw-r--r--    1 root root      621 Jun 14 11:55 /var/log/arpd-trace.log
-rw-r--r--    1 root root  6595285 Jun 14 15:14 /var/log/arpd.log
-rw-r--r--    1 root root      645 Jun 14 11:55 /var/log/bios-manager-trace.log
-rw-r--r--    1 root root  3165769 Jun 14 13:40 /var/log/bios-manager.log
-rw-r--r--    1 root root     2152 Jun 14 11:55 /var/log/ccdbq.log
-rw-r--r--    1 root root   687637 Jun 14 13:40 /var/log/ccdinfra.log
-rw-r--r--    1 root root     1861 Jun 14 11:55 /var/log/ccdre-trace.log
-rw-r--r--    1 root root      611 Jun 14 11:55 /var/log/cfmd-trace.log
-rw-r--r--    1 root root  3256076 Jun 14 13:40 /var/log/cfmd.log
-rw-r--r--    1 root root      627 Jun 14 11:54 /var/log/charonctl-trace.log
-rw-r--r--    1 root root  3138411 Jun 14 13:40 /var/log/charonctl.log
-rw-r--r--    1 root root      180 Jun 14 11:54 /var/log/charonctl_trace.log
-rw-r--r--    1 root root    85557 Jun 14 11:47
/var/log/cli-mgd-interaction.log.1497465690
-rw-r--r--    1 root root    23603 Jun 14 11:47
/var/log/cli-mgd-interaction.log.1497466033
. . .
-rw-r--r--    1 root root    11520 Jun 15 14:19 /var/log/wtmp
-rw-r--r--   1 root root  12938555 Jun 15 14:24 /var/log/zookeeper--server-re0.log
-rw-r--r--   1 root root       926 Jun 14 11:53 /var/log/zookeeper--server-re0.out


/var/log/journal:
total 4
drwxr-xr-x 2 root root 4096 Jun 14 11:37 ecd9ed14512f11e7953f0050569fd61f
```

```
/var/log/junosvm:
total 0

/var/log/lttng-traces:
total 8
drwxr-x--- 3 root root 4096 Jun 14 11:54 re0
drwxr-x--- 3 root root 4096 Jun 14 11:54 re1

/var/log/lttng-traces-re1:
total 8
drwxr-x--- 3 root root 4096 Jun 14 11:39 re0
drwxr-x--- 3 root root 4096 Jun 14 11:39 re1

/var/log/traces:
total 26472
drwxr-xr-x 2 root root 4096 Jun 14 11:43 fpc0.ccdpfe-t1.0
drwxr-xr-x 2 root root 4096 Jun 14 11:59 fpc0.ccdpfe-t1.1
drwxr-xr-x 2 root root 4096 Jun 14 11:59 fpc0.ccdpfe-t1.10
drwxr-xr-x 2 root root 4096 Jun 14 11:59 fpc0.ccdpfe-t1.11
drwxr-xr-x 2 root root 4096 Jun 14 11:59 fpc0.ccdpfe-t1.12
drwxr-xr-x 2 root root 4096 Jun 14 11:59 fpc0.ccdpfe-t1.13
drwxr-xr-x 2 root root 4096 Jun 14 11:59 fpc0.ccdpfe-t1.14
. . .
drwxr-xr-x 2 root root 4096 Jun 14 18:42 re1.trace_client.2
drwxr-xr-x 2 root root 4096 Jun 15 01:31 re1.trace_client.3
drwxr-xr-x 2 root root 4096 Jun 15 08:21 re1.trace_client.4
drwxr-xr-x 2 root root 4096 Jun 14 11:39 re1.trace_conf.0
drwxr-xr-x 2 root root 4096 Jun 14 11:54 re1.trace_conf.1
drwxr-xr-x 2 root root 4096 Jun 14 11:39 re1.trace_server.0
drwxr-xr-x 2 root root 4096 Jun 14 11:54 re1.trace_server.1
drwxr-xr-x 2 root root 4096 Jun 14 20:59 re1.trace_server.2
drwxr-xr-x 2 root root 4096 Jun 15 06:06 re1.trace_server.3

/var/log/watchdog:
total 0
=== Removes any ISO files in /data partition ===
find: '/var/lib/ftp/in/*': No such file or directory
=== Current list of software versions installed ===
=== Software versions except current and rollback would be removed ===
List of installed version(s) :

[1] ->  junos-evo-install-qfx-x86-64-16.2I20170614010254_evo-builder - [2017-06-14
 11:36:21]

    '-' running version
    '>' next boot version
    '<' rollback boot version
```

request system storage cleanup force-deep (Junos OS Evolved)

user@host> **request system storage cleanup force-deep**

```
Please check the list of files to be deleted using the dry-run option.
 Continue anyway without checking? [yes,no] (no) yes

-------------------------------
node: re0
-------------------------------
........
```

```
========= Start cleanup now ==========
=== Start removing other logs, traces, core files  ===
Clearing core files
Clearing FPC logs
Clearing logical-systems logs
=== Clearing journal logs ===
Clearing log: /var/log/RE_journal.log
Clearing log: /var/log/RE_journal_boot.log
Clearing log: /var/log/alarm-mgmtd
Clearing log: /var/log/appDemo_stdout
Clearing log: /var/log/charonctl_trace.log
Clearing log: /var/log/configd-streamer.log
Clearing log: /var/log/core_mgr.log
Clearing log: /var/log/cscript.log
Clearing log: /var/log/eth_linkmon.log
Clearing log: /var/log/evo-cda-zx.log
Clearing log: /var/log/evoinit.log
Clearing log: /var/log/fibd-proxy.log
Clearing log: /var/log/i2ctrace.log
Clearing log: /var/log/i2ctrace_spmb0.log
Clearing log: /var/log/i2ctrace_spmb1.log
Clearing log: /var/log/icmpd.log
Clearing log: /var/log/ifinfo.log
Clearing log: /var/log/imgd_svr.log
Clearing log: /var/log/install
Clearing log: /var/log/interactive-commands
Clearing log: /var/log/jsd
Clearing log: /var/log/lastlog
Clearing log: /var/log/mcelog.log
Clearing log: /var/log/messages
Clearing log: /var/log/mgd-api
Clearing log: /var/log/mgmt-ethd-helper.log
Clearing log: /var/log/mib2d
Clearing log: /var/log/na-grpcd
Clearing log: /var/log/objmon_sync.json
Clearing log: /var/log/packetio-cout.log
Clearing log: /var/log/picd.log
Clearing log: /var/log/platform_mon.log
Clearing log: /var/log/policerd.log
Clearing log: /var/log/postinstall.log
Clearing log: /var/log/ptp_fpga.log
Clearing log: /var/log/reboot_node.log
Clearing log: /var/log/rollback.log
Clearing log: /var/log/security
Clearing log: /var/log/semctl.log
Clearing log: /var/log/set_mgmt_mac.log
Clearing log: /var/log/shutdown_complete.log
Clearing log: /var/log/sinet.log
Clearing log:
/var/log/smartd-attr-SFSA200GM3AA4TO_C_HC_636_JUN-000060139624B1000020.log
Clearing log:
/var/log/smartd-attr-SFSA200GM3AA4TO_C_HC_636_JUN-000060139624B1000022.log
Clearing log: /var/log/snmpd
Clearing log: /var/log/ss.log
Clearing log: /var/log/ssh-key-utils.log
Clearing log: /var/log/sshd_lua.log
Clearing log: /var/log/sysconfig.log
Clearing log: /var/log/sysman.conf
Clearing log: /var/log/system-events
Clearing log: /var/log/upgrade_master.log
```



```
Clearing log: /var/log/uswitch.log
Clearing log: /var/log/uswitch.log.prev
Clearing log: /var/log/validator_debug.log
Clearing log: /var/log/wtmp
Clearing log: /var/log/zookeeper--server-re.log
Clearing log: /var/log/zookeeper--server-re.out
Clearing log: /var/log/ztp.log
=== Clearing all traces ===
=== Clearing SI traces ===
=== Removing other logs, traces, core files completed ===
=== Started removing any ISO files in /data
=== Removing any ISO files in /data completed
=== Start Software versions cleanup ===
Removing older software versions except current and rollback
=== Software versions cleanup completed ===
========= Cleanup done ==========
Current space available in /soft: 12372572 K
Current space available in /data: 2638752 K
Cannot delete junos-evo-install-qfx-fixed-x86-64-18.3I20180906130134_mkamil - It
 is the rollback version
Cannot delete junos-evo-install-qfx-fixed-x86-64-18.3-20180906.3 - It is the
current version
Removing version junos-evo-install-qfx-x86-64-16.2I20180516093649...
Done.
```

request system storage cleanup director-group (QFabric Systems)

user@switch> **request system storage cleanup director-group**

```
List of files to delete:

         Size Date          Name
4.0K   2011-11-07 05:16:29  /tmp/2064.sfcauth
4.0K   2011-11-07 05:07:34  /tmp/30804.sfcauth
4.0K   2011-11-07 04:13:41  /tmp/26792.sfcauth
4.0K   2011-11-07 04:13:39  /tmp/26432.sfcauth
0      2011-11-07 07:45:40  /tmp/cluster_cleanup.log
1.3M   2011-11-07 07:39:11  /tmp/cn_monitor.20111107-052401.log
4.0K   2011-11-07 07:36:29  /tmp/clustat.28019.log
4.0K   2011-11-07 07:36:29  /tmp/clustat_x.28019.log
9.6M   2011-11-07 05:30:24  /tmp/sfc.2.log
4.0K   2011-11-07 05:28:11  /tmp/mgd-init.1320672491.log
248K   2011-11-07 05:19:24  /tmp/cn_monitor.20111107-045111.log
4.0K   2011-11-07 05:17:18  /tmp/clustat.3401.log
4.0K   2011-11-07 05:17:18  /tmp/clustat_x.3401.log
8.0K   2011-11-07 04:58:25  /tmp/mgd-init.1320670633.log
0      2011-11-07 04:54:01  /tmp/mysql_db_install_5.1.37.log
4.0K   2011-11-07 04:52:08  /tmp/cn_send.log
0      2011-11-07 04:52:00  /tmp/init_eth0.log
4.0K   2011-11-07 04:49:35  /tmp/install_interfaces.sh.log
4.0K   2011-11-07 04:48:15  /tmp/bootstrap.sh.log
160K   2011-11-07 04:47:43  /tmp/bootstrap_cleanup.log
38M    2011-11-07 04:42:42  /tmp/cn_monitor.20111104-110308.log
4.0K   2011-11-07 04:38:47  /tmp/clustat.30913.log
4.0K   2011-11-07 04:38:47  /tmp/clustat_x.30913.log
4.0K   2011-11-07 04:38:03  /tmp/dcf_upgrade.sh.remove.log
4.0K   2011-11-07 04:38:03  /tmp/peer_update.log
4.0K   2011-11-07 04:38:02  /tmp/dcf_upgrade.log
4.0K   2011-11-07 04:38:02  /tmp/perl_mark_upgrade.log
```



```
8.0K   2011-11-07 04:13:42  /tmp/install_dcf_rpm.log
4.0K   2011-11-07 04:13:06  /tmp/00_cleanup.sh.1320667986.log
0      2011-11-07 04:13:06  /tmp/ccif_patch_4410_4450.sh.1320667986.log
4.0K   2011-11-07 04:13:06  /tmp/dcf-tools.sh.1320667986.log
0      2011-11-07 04:13:06  /tmp/initial.sh.1320667986.log
0      2011-11-07 04:13:06  /tmp/inventory.sh.1320667986.log
4.0K   2011-11-07 04:13:06  /tmp/qf-db.sh.1320667986.log
4.0K   2011-11-07 04:13:06  /tmp/sfc.sh.1320667986.log
8.0K   2011-11-07 04:13:05  /tmp/jinstall-qfabric.log
8.0K   2011-11-04 11:10:24  /tmp/mgd-init.1320430192.log
4.0K   2011-11-04 11:07:03  /tmp/mysql_dcf_db_install.log
8.0K   2011-11-04 10:55:07  /tmp/ccif_patch_4410_4450.sh.1320429307.log
8.0K   2011-11-04 10:55:07  /tmp/initial.sh.1320429307.log
4.0K   2011-11-04 10:55:07  /tmp/inventory.sh.1320429307.log
8.0K   2011-11-04 10:55:07  /tmp/sfc.sh.1320429307.log
4.0K   2011-11-04 10:54:09  /tmp/ks-script-AxOtz5.log
4.0K   2011-11-07 04:13:06  /tmp//sfc.sh.1320667986.log
8.0K   2011-11-04 10:55:07  /tmp//sfc.sh.1320429307.log

Directory to delete:
45M    2011-11-08 10:57:43  /tmp/sfc-captures

List of files to delete:

         Size Date         Name
4.0K   2011-11-08 05:47:47  /tmp/5713.sfcauth
4.0K   2011-11-08 05:14:32  /tmp/14494.sfcauth
4.0K   2011-11-08 05:11:47  /tmp/9978.sfcauth
4.0K   2011-11-08 05:09:37  /tmp/6128.sfcauth
4.0K   2011-11-08 05:04:28  /tmp/29703.sfcauth
4.0K   2011-11-07 11:59:10  /tmp/7811.sfcauth
4.0K   2011-11-07 11:36:08  /tmp/32415.sfcauth
4.0K   2011-11-07 11:30:30  /tmp/22406.sfcauth
4.0K   2011-11-07 11:24:37  /tmp/12131.sfcauth
4.0K   2011-11-07 10:48:42  /tmp/12687.sfcauth
4.0K   2011-11-07 09:27:20  /tmp/31082.sfcauth
4.0K   2011-11-07 07:33:58  /tmp/14633.sfcauth
4.0K   2011-11-07 05:08:25  /tmp/15447.sfcauth
4.0K   2011-11-07 04:12:29  /tmp/26874.sfcauth
4.0K   2011-11-07 04:12:27  /tmp/26713.sfcauth
4.0K   2011-11-07 03:49:17  /tmp/17691.sfcauth
4.0K   2011-11-05 01:32:23  /tmp/5716.sfcauth
4.0K   2011-11-07 08:00:17  /tmp/sfcsnmpd.log
4.0K   2011-11-07 07:57:50  /tmp/cluster_cleanup.log
824K   2011-11-07 07:38:37  /tmp/cn_monitor.20111107-053643.log
4.0K   2011-11-07 07:36:30  /tmp/clustat.18399.log
4.0K   2011-11-07 07:36:30  /tmp/clustat_x.18399.log
4.0K   2011-11-07 07:35:47  /tmp/command_lock.log
4.0K   2011-11-07 05:39:54  /tmp/mgd-init.1320673194.log
92K    2011-11-07 05:19:25  /tmp/cn_monitor.20111107-050412.log
4.0K   2011-11-07 05:17:20  /tmp/clustat.30115.log
4.0K   2011-11-07 05:17:20  /tmp/clustat_x.30115.log
8.0K   2011-11-07 05:08:07  /tmp/mgd-init.1320671241.log
4.0K   2011-11-07 05:04:57  /tmp/cn_send.log
0      2011-11-07 05:04:52  /tmp/init_eth0.log
4.0K   2011-11-07 05:02:38  /tmp/install_interfaces.sh.log
4.0K   2011-11-07 05:01:19  /tmp/bootstrap.sh.log
160K   2011-11-07 05:00:47  /tmp/bootstrap_cleanup.log
28M    2011-11-07 04:42:27  /tmp/cn_monitor.20111104-112954.log
4.0K   2011-11-07 04:38:49  /tmp/clustat.6780.log
```



```
4.0K    2011-11-07 04:38:49  /tmp/clustat_x.6780.log
4.0K    2011-11-07 04:38:05  /tmp/issue_event.log
4.0K    2011-11-07 04:38:05  /tmp/peer_upgrade_reboot.log
12K     2011-11-07 04:38:05  /tmp/primary_update.log
4.0K    2011-11-07 04:38:04  /tmp/dcf_upgrade.sh.remove.log
4.0K    2011-11-07 04:38:04  /tmp/peer_rexec_upgrade.log
4.0K    2011-11-07 04:13:42  /tmp/peer_install_dcf_rpm.log
4.0K    2011-11-07 04:11:57  /tmp/dcf-tools.sh.1320667917.log
0       2011-11-07 04:11:57  /tmp/initial.sh.1320667917.log
0       2011-11-07 04:11:57  /tmp/inventory.sh.1320667917.log
4.0K    2011-11-07 04:11:57  /tmp/qf-db.sh.1320667917.log
4.0K    2011-11-07 04:11:57  /tmp/sfc.sh.1320667917.log
4.0K    2011-11-07 04:11:56  /tmp/00_cleanup.sh.1320667916.log
0       2011-11-07 04:11:56  /tmp/ccif_patch_4410_4450.sh.1320667916.log
8.0K    2011-11-07 04:11:56  /tmp/jinstall-qfabric.log
4.0K    2011-11-07 04:11:33  /tmp/dcf_upgrade.log
8.0K    2011-11-04 11:53:12  /tmp/mgd-init.1320432782.log
8.0K    2011-11-04 11:06:17  /tmp/ccif_patch_4410_4450.sh.1320429977.log
8.0K    2011-11-04 11:06:17  /tmp/initial.sh.1320429977.log
4.0K    2011-11-04 11:06:17  /tmp/inventory.sh.1320429977.log
8.0K    2011-11-04 11:06:17  /tmp/sfc.sh.1320429977.log
4.0K    2011-11-04 11:05:19  /tmp/ks-script-_tnWeb.log
4.0K    2011-11-07 04:11:57  /tmp//sfc.sh.1320667917.log
8.0K    2011-11-04 11:06:17  /tmp//sfc.sh.1320429977.log

Directory to delete:
49M     2011-11-08 10:45:20  /tmp/sfc-captures
```

request system storage cleanup infrastructure device-name (QFabric Systems)

user@switch> **request system storage cleanup infrastructure FC**

```
re0:
--------------------------------------------------------------------------

List of files to delete:

         Size Date         Name
   139B Nov  8 19:03 /var/log/default-log-messages.0.gz
  5602B Nov  8 19:03 /var/log/messages.0.gz
  28.4K Nov  8 10:15 /var/log/messages.1.gz
  35.2K Nov  7 13:45 /var/log/messages.2.gz
   207B Nov  7 16:02 /var/log/wtmp.0.gz
    27B Nov  7 12:14 /var/log/wtmp.1.gz
 184.4M Nov  7 12:16
/var/sw/pkg/jinstall-dc-re-11.3I20111104_1216_dc-builder-domestic-signed.tgz
 124.0K Nov  7 15:59 /var/tmp/gres-tp/env.dat
     0B Nov  7 12:57 /var/tmp/gres-tp/lock
   155B Nov  7 16:02 /var/tmp/krt_gencfg_filter.txt
     0B Nov  7 12:35 /var/tmp/last_ccif_update
  1217B Nov  7 12:15 /var/tmp/loader.conf.preinstall
 184.4M Nov  6 07:11 /var/tmp/mchassis-install.tgz
  10.8M Nov  7 12:16
/var/tmp/preinstall/bootstrap-install-11.3I20111104_1216_dc-builder.tar
  57.4K Nov  7 12:16 /var/tmp/preinstall/configs-11.3I20111104_1216_dc-builder.tgz

   259B Nov  7 12:16 /var/tmp/preinstall/install.conf
 734.3K Nov  4 13:46
/var/tmp/preinstall/jboot-dc-re-11.3I20111104_1216_dc-builder.tgz
 177.8M Nov  7 12:16
```



```
/var/tmp/preinstall/jbundle-dc-re-11.3I20111104_1216_dc-builder-domestic.tgz
   124B Nov  7 12:15 /var/tmp/preinstall/metatags
  1217B Nov  7 12:16 /var/tmp/preinstall_boot_loader.conf
     0B Nov  7 16:02 /var/tmp/rtsdb/if-rtsdb
```

request system storage cleanup interconnect-device device-name (QFabric Systems)

user@switch> **request system storage cleanup interconnect IC**

```
re1:
--------------------------------------------------------------------------

List of files to delete:

         Size Date         Name
    11B Nov  7 15:55 /var/jail/tmp/alarmd.ts
   128B Nov  8 19:06 /var/log/default-log-messages.0.gz
  9965B Nov  8 19:06 /var/log/messages.0.gz
  15.8K Nov  8 12:30 /var/log/messages.1.gz
  15.8K Nov  8 11:00 /var/log/messages.2.gz
  15.7K Nov  8 07:30 /var/log/messages.3.gz
  15.8K Nov  8 04:00 /var/log/messages.4.gz
  15.7K Nov  8 00:30 /var/log/messages.5.gz
  18.7K Nov  7 21:00 /var/log/messages.6.gz
  17.6K Nov  7 19:00 /var/log/messages.7.gz
  58.3K Nov  7 16:00 /var/log/messages.8.gz
  20.3K Nov  7 15:15 /var/log/messages.9.gz
    90B Nov  7 15:41 /var/log/wtmp.0.gz
    57B Nov  7 12:41 /var/log/wtmp.1.gz
 124.0K Nov  7 15:42 /var/tmp/gres-tp/env.dat
     0B Nov  7 12:40 /var/tmp/gres-tp/lock
     0B Nov  7 12:41 /var/tmp/if-rtsdb/env.lck
  12.0K Nov  7 15:41 /var/tmp/if-rtsdb/env.mem
 132.0K Nov  7 15:55 /var/tmp/if-rtsdb/shm_usr1.mem
2688.0K Nov  7 15:41 /var/tmp/if-rtsdb/shm_usr2.mem
2048.0K Nov  7 15:41 /var/tmp/if-rtsdb/trace.mem
   730B Nov  7 19:57 /var/tmp/juniper.conf+.gz
   155B Nov  7 15:53 /var/tmp/krt_gencfg_filter.txt
     0B Nov  7 15:41 /var/tmp/rtsdb/if-rtsdb

re0:
--------------------------------------------------------------------------

List of files to delete:

         Size Date         Name
    11B Nov  7 15:55 /var/jail/tmp/alarmd.ts
   121B Nov  8 19:06 /var/log/default-log-messages.0.gz
  16.7K Nov  8 19:06 /var/log/messages.0.gz
  22.2K Nov  8 17:45 /var/log/messages.1.gz
  K Nov  8 17:00 /var/log/messages.2.gz
  21.6K Nov  8 16:00 /var/log/messages.3.gz
  17.9K Nov  8 14:30 /var/log/messages.4.gz
  19.4K Nov  8 13:30 /var/log/messages.5.gz
  18.2K Nov  8 12:30 /var/log/messages.6.gz
  20.4K Nov  8 11:30 /var/log/messages.7.gz
  21.4K Nov  8 10:15 /var/log/messages.8.gz
  21.0K Nov  8 09:00 /var/log/messages.9.gz
  19.9K Nov  8 08:13 /var/log/snmp-traps.0.gz
   203B Nov  8 15:36 /var/log/wtmp.0.gz
```



```
   57B Nov  7 12:41 /var/log/wtmp.1.gz
 124.0K Nov  7 15:42 /var/tmp/gres-tp/env.dat
     0B Nov  7 12:40 /var/tmp/gres-tp/lock
     0B Nov  7 12:41 /var/tmp/if-rtsdb/env.lck
  12.0K Nov  7 15:41 /var/tmp/if-rtsdb/env.mem
 132.0K Nov  7 15:55 /var/tmp/if-rtsdb/shm_usr1.mem
2688.0K Nov  7 15:41 /var/tmp/if-rtsdb/shm_usr2.mem
2048.0K Nov  7 15:41 /var/tmp/if-rtsdb/trace.mem
   727B Nov  7 15:54 /var/tmp/juniper.conf+.gz
   155B Nov  7 15:55 /var/tmp/krt_gencfg_filter.txt
     0B Nov  7 15:41 /var/tmp/rtsdb/if-rtsdb
```

request system storage cleanup node-group group-name (QFabric Systems)

`user@switch>` **request system storage cleanup node-group NW-NG**

```
BBAK0372:
--------------------------------------------------------------------------

List of files to delete:

         Size Date         Name
   126B Nov  8 19:07 /var/log/default-log-messages.0.gz
   179B Nov  7 13:32 /var/log/install.0.gz
  22.9K Nov  8 19:07 /var/log/messages.0.gz
  26.5K Nov  8 17:30 /var/log/messages.1.gz
  20.5K Nov  8 13:15 /var/log/messages.2.gz
  33.2K Nov  7 17:45 /var/log/messages.3.gz
  35.5K Nov  7 15:45 /var/log/messages.4.gz
   339B Nov  8 17:10 /var/log/wtmp.0.gz
    58B Nov  7 12:40 /var/log/wtmp.1.gz
 124.0K Nov  8 17:08 /var/tmp/gres-tp/env.dat
     0B Nov  7 12:39 /var/tmp/gres-tp/lock
     0B Nov  7 12:59 /var/tmp/if-rtsdb/env.lck
  12.0K Nov  8 17:09 /var/tmp/if-rtsdb/env.mem
2688.0K Nov  8 17:09 /var/tmp/if-rtsdb/shm_usr1.mem
 132.0K Nov  8 17:09 /var/tmp/if-rtsdb/shm_usr2.mem
2048.0K Nov  8 17:09 /var/tmp/if-rtsdb/trace.mem
  1082B Nov  8 17:09 /var/tmp/juniper.conf+.gz
   155B Nov  7 17:39 /var/tmp/krt_gencfg_filter.txt
     0B Nov  8 17:09 /var/tmp/rtsdb/if-rtsdb

EE3093:
--------------------------------------------------------------------------

List of files to delete:

         Size Date         Name
    11B Nov  8 17:33 /var/jail/tmp/alarmd.ts
   119B Nov  8 19:08 /var/log/default-log-messages.0.gz
   180B Nov  7 17:41 /var/log/install.0.gz
   178B Nov  7 13:32 /var/log/install.1.gz
  2739B Nov  8 19:08 /var/log/messages.0.gz
  29.8K Nov  8 18:45 /var/log/messages.1.gz
  31.8K Nov  8 17:15 /var/log/messages.2.gz
  20.6K Nov  8 16:00 /var/log/messages.3.gz
  15.4K Nov  8 10:15 /var/log/messages.4.gz
  15.4K Nov  8 02:15 /var/log/messages.5.gz
  25.5K Nov  7 20:45 /var/log/messages.6.gz
  48.0K Nov  7 17:45 /var/log/messages.7.gz
```



```
 32.8K Nov  7 13:45 /var/log/messages.8.gz
  684B Nov  8 17:02 /var/log/wtmp.0.gz
   58B Nov  7 12:40 /var/log/wtmp.1.gz
124.0K Nov  7 17:34 /var/tmp/gres-tp/env.dat
    0B Nov  7 12:40 /var/tmp/gres-tp/lock
    0B Nov  7 12:59 /var/tmp/if-rtsdb/env.lck
 12.0K Nov  7 17:39 /var/tmp/if-rtsdb/env.mem
2688.0K Nov  7 17:39 /var/tmp/if-rtsdb/shm_usr1.mem
 132.0K Nov  7 17:40 /var/tmp/if-rtsdb/shm_usr2.mem
2048.0K Nov  7 17:39 /var/tmp/if-rtsdb/trace.mem
  155B Nov  7 17:40 /var/tmp/krt_gencfg_filter.txt
    0B Nov  7 17:39 /var/tmp/rtsdb/if-rtsdb
```

request system storage cleanup qfabric component device-name (QFabric Systems)

user@switch> **request system storage cleanup qfabric component Test**

```
Repository type: regular
Repository head: /pbstorage
Creating list of debug artifacts to be removed under: /pbstorage/rdumps/Test
Removing debug artifacts ... (press control C to abort)
Removing /pbstorage/rdumps/Test/cosd.core.0.0.05162011123308.gz ... done
Removing /pbstorage/rdumps/Test/cosd.core.1.0.05162011123614.gz ... done
Removing /pbstorage/rdumps/Test/cosd.core.2.0.05162011123920.gz ... done
Removing /pbstorage/rdumps/Test/livekcore.05132011163930.gz ... done
Removing /pbstorage/rdumps/Test/tnetd.core.0.1057.05162011124500.gz ... done
Removing /pbstorage/rdumps/Test/vmcore.05132011120528.gz ... done
Removing /pbstorage/rdumps/Test/vmcore.kz ... done
Creating list of debug artifacts to be removed under: /pbstorage/rlogs/Test
Removing debug artifacts ... (press control C to abort)
Removing /pbstorage/rlogs/Test/kdumpinfo.05132011120528 ... done
Removing /pbstorage/rlogs/Test/kernel.tarball.0.1039.05122011234415.tgz ... done
Removing /pbstorage/rlogs/Test/kernel.tarball.1.1039.05132011175544.tgz ... done
Removing /pbstorage/rlogs/Test/tnetd.tarball.0.1057.05162011175453.tgz ... done
```

request system storage cleanup qfabric component device-name repository core (QFabric Systems)

user@switch> **request system storage cleanup qfabric component Test repository core**

```
Repository scope: shared
Repository head: /pbdata/export
Repository name: core
Creating list of debug artifacts to be removed under: /pbdata/export/rdumps/Test
NOTE: core repository under /pbdata/export/rdumps/Test empty
```

request system storage cleanup qfabric component all (QFabric Systems)

user@switch> **request system storage cleanup qfabric component all**

```
Repository scope: shared
Repository head: /pbdata/export
Creating list of debug artifacts to be removed under: /pbdata/export/rdumps
NOTE: core repository under /pbdata/export/rdumps/all empty
Creating list of debug artifacts to be removed under: /pbdata/export/rlogs
List of debug artifacts to clean up ... (press control C to abort)
/pbdata/export/rlogs/73747cd8-0710-11e1-b6a4-00e081c5297e/install-11072011125819.log
/pbdata/export/rlogs/77116f18-0710-11e1-a2a0-00e081c5297e/install-11072011125819.log
/pbdata/export/rlogs/BBAK0372/install-11072011121538.log
/pbdata/export/rlogs/BBAK0394/install-11072011121532.log
```



```
/pbdata/export/rlogs/EE3093/install-11072011121536.log
/pbdata/export/rlogs/WS001/YN5999/install-11072011121644.log
/pbdata/export/rlogs/WS001/YW3803/install-11072011122429.log
/pbdata/export/rlogs/cd78871a-0710-11e1-878e-00e081c5297e/install-11072011125932.log
/pbdata/export/rlogs/d0afda1e-0710-11e1-a1d0-00e081c5297e/install-11072011125930.log
/pbdata/export/rlogs/d0afda1e-0710-11e1-a1d0-00e081c5297e/install-11072011133211.log
/pbdata/export/rlogs/d0afda1e-0710-11e1-a1d0-00e081c5297e/install-11072011155302.log
/pbdata/export/rlogs/d31ab7a6-0710-11e1-ad1b-00e081c5297e/install-11072011125931.log
/pbdata/export/rlogs/d4d0f254-0710-11e1-90c3-00e081c5297e/install-11072011125932.log
```


show chassis alarms

List of Syntax

Syntax

show chassis alarms

Syntax (TX Matrix Routers)

show chassis alarms
<lcc *number* | scc>

Syntax (TX Matrix Plus Routers)

show chassis alarms
<lcc *number* | sfc *number*>

Syntax (MX Series Routers)

show chassis alarms
<all-members>
<local>
<member *member-id*>

Syntax (MX104, MX2010, MX2020, and MX2008 Universal Routing Platforms)

show chassis alarms
<satellite [slot-id *slot-id*]>

Syntax (MX10003, MX204, and MX10008)

show chassis alarms

Syntax (QFX Series)

show chassis alarms
<interconnect-device *name*>
<node-device *name*>

Syntax (OCX Series)

show chassis alarms

Syntax (PTX Series Packet Transport Routers)

```
show chassis alarms
```

Syntax (ACX Series Universal Metro Routers)

```
show chassis alarms
```

Syntax (EX9251, EX9253 Switches)

```
show chassis alarms
```

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.
Command introduced in Junos OS Release 11.1 for the QFX Series.
Command introduced in Junos OS Release 12.1 for the PTX Series Packet Transport Routers.
Command introduced in Junos OS Release 12.2 for the ACX Series Universal Metro Routers.
Command introduced in Junos OS Release 12.3 for MX 2010 and MX2020 Universal Routing Platforms.
Command introduced in Junos OS Release 13.2 for MX104 Universal Routing Platforms.
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
satellite option introduced in Junos OS Release 14.2R3 for Junos Fusion.
Command introduced in Junos OS Release 17.2 for MX2008 Universal Routing Platforms.
Command introduced in Junos OS Release 17.2 for PTX10008 Routers.
Command introduced in Junos OS Release 17.3 for MX150 Router Appliance.
Command introduced in Junos OS Release 17.3 for MX10003 Universal Routing Platforms.
Command introduced in Junos OS Release 17.4 for MX204 Universal Routing Platforms.
Command introduced in Junos OS Release 18.1R1 for EX9251 Switches.
Command introduced in Junos OS Release 18.2 for EX9253 Switches.
Command introduced in Junos OS Release 18.2R1 for MX10008 Universal Routing Platforms.

Description

Display information about the conditions that have been configured to trigger alarms.

Options

none—Display information about the conditions that have been configured to trigger alarms.

all-members—(MX Series routers only) (Optional) Display information about alarm conditions for all the member routers of the Virtual Chassis configuration.

interconnect-device ***name***—(QFabric systems only) (Optional) Display information about alarm conditions for the Interconnect device.

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.

local—(MX Series routers only) (Optional) Display information about alarm conditions for the local Virtual Chassis member.

member *member-id*—(MX Series routers only) (Optional) Display information about alarm conditions for the specified member of the Virtual Chassis configuration. Replace *member-id* variable with a value of 0 or 1.

node-device *name*—(QFabric systems only) (Optional) Display information about alarm conditions for the Node device.

satellite [slot-id *slot-id*]—(Junos Fusion only)(Optional) Display information about alarm conditions for the specified satellite device in a Junos Fusion, or for all satellite devices in the Junos Fusion if no satellite devices are specified.

scc—(TX Matrix router only) (Optional) Show information about the TX Matrix router (switch-card chassis).

sfc *number*—(TX Matrix Plus router only) (Optional) Show information about the respective TX Matrix Plus router, which is the switch-fabric chassis. Replace *number* variable with **0**.

Additional Information

Chassis alarms are preset. You cannot modify them.

You cannot clear the alarms for chassis components. Instead, you must remedy the cause of the alarm. When a chassis alarm LED is lit, it indicates that you are running the router or switch in a manner that we do not recommend.

On routers, you can manually silence external devices connected to the alarm relay contacts by pressing the alarm cutoff button, located on the craft interface. Silencing the device does not remove the alarm messages from the display (if present on the router) or extinguish the alarm LEDs. In addition, new alarms that occur after you silence an external device reactivate the external device.

NOTE: MX10003 routers do not support craft interface.

In Junos OS release 11.1 and later, alarms for fans also show the slot number of the fans in the CLI output.

In Junos OS Release 11.2 and later, the command output on EX8200 switches shows the detailed location (**Plane/FPC/PFE**) for link errors in the chassis.

In Junos OS Release 10.2 and later, an alarm is shown on T Series routers for a standby SONET Clock Generator (SCG) that is offline or absent.

You may often see the following error messages, in which only the error code is shown and no other information is provided:

```
Apr 12 08:04:10 send: red alarm set, device FPC 6, reason FPC 6 Major Errors
 - Error code: 257
Apr 12 08:04:19 send: red alarm set, device FPC 1, reason FPC 1 Major Errors
 - Error code: 559
```

To understand what CM_ALARM error codes mean, you need to first identify the structure of the CM Alarm codes. A CM_ALARM code has the following structure:

Bits:	Error type:
1-31	Major (1)
0	Minor (0)

According to the table above, the LSB (bit 0) identifies the **Error Type** (major alarm, if the bit is set and minor alarm if the bit is unset). The rest of the bits (1 - 31) identify the actual error code.

Take an example of the following error code, which was logged on a T1600:

```
Apr 12 08:04:10 send: red alarm set, device FPC 1, reason FPC 1 Major Errors
 - Error code: 559
```

First, you have to convert 559 to binary; that is **1000101111**. The LSB in this case is **1**, which means that this is a major alarm. After removing the LSB, you are left with **100010111**, which is equal to 279 in decimal. This is the actual error code, its meaning can be found from the following list:

Chip Type: L Chip	Code
CMALARM_LCHIP_LOUT_DESRD_PARITY_ERR	1
CMALARM_LCHIP_LOUT_DESRD_UNINIT_ERR	2
CMALARM_LCHIP_LOUT_DESRD_ILLEGALLINK_ERR	3
CMALARM_LCHIP_LOUT_DESRD_ILLEGALSIZE_ERR	4
CMALARM_LCHIP_LOUT_HDRF_TOERR_ERR	5

CMALARM_LCHIP_LOUT_HDRF_PARITY_ERR	6
CMALARM_LCHIP_LOUT_HDRF_UCERR_ERR	7
CMALARM_LCHIP_LOUT_NLIF_CRCDROP_ERR	8
CMALARM_LCHIP_LOUT_NLIF_CRCERR_ERR	9
CMALARM_LCHIP_UCODE_TIMEOUT_ERR	10
CMALARM_LCHIP_LIN_SRCTL_ACCT_DROP_ERR	11
CMALARM_LCHIP_LIN_SRCTL_ACCT_ADDR_SIZE_ERR	12
CMALARM_LCHIP_SRAM_PARITY_ERR	13
CMALARM_LCHIP_UCODE_OVFLW_ERR	14
CMALARM_LCHIP_LOUT_HDRF_MTU_ERR	15

Chip Type: M Chip	Code
CMALARM_MCHIP_ECC_UNCORRECT_ERR	128

Chip Type: N Chip	Code
CMALARM_NCHIP_RDDMA_JBUS_TIMEOUT_ERR	256
CMALARM_NCHIP_RDDMA_FIFO_OVFLW_ERR	257
CMALARM_NCHIP_RDDMA_FIFO_UNFLW_ERR	258
CMALARM_NCHIP_RDDMA_SIZE_ERR	259
CMALARM_NCHIP_RDDMA_JBUS_CRC_ERR	260
CMALARM_NCHIP_WRDMA_PKTR_ERR	261
CMALARM_NCHIP_WRDMA_PKT_CRC_ERR	262
CMALARM_NCHIP_WRDMA_JBUS_TIMEOUT_ERR	263
CMALARM_NCHIP_WRDMA_FIFO_OVFLW_ERR	264
CMALARM_NCHIP_WRDMA_FIFO_UNFLW_ERR	265
CMALARM_NCHIP_WRDMA_PKT_LEN_ERR	266
CMALARM_NCHIP_WRDMA_JBUS_CRC_ERR	267

CMALARM_NCHIP_PKTR_DMA_AGE_ERR	268
CMALARM_NCHIP_PKTR_ICELLSIG_ERR	269
CMALARM_NCHIP_PKTR_FTTL_ERR	270
CMALARM_NCHIP_RODR_OFFSET_OVFLW_ERR	271
CMALARM_NCHIP_PKTR_TMO_CELL_ERR	272
CMALARM_NCHIP_PKTR_TMO_OUTRANGE_ERR	273
CMALARM_NCHIP_PKTR_MD_REQUEST_Q_OVFLW_ERR	274
CMALARM_NCHIP_PKTR_DMA_BUFFER_OVFLW_ERR	275
CMALARM_NCHIP_PKTR_GRT_OVFLW_ERR	276
CMALARM_NCHIP_FRQ_ERR	277
CMALARM_NCHIP_RODR_IN_Q_OVFLW_ERR	278
CMALARM_NCHIP_DBUF_CRC_ERR	279

Chip Type: R Chip	Code
CMALARM_RCHIP_SRAM_PARITY_ERR	512

Chip Type: R Chip	Code
CMALARM_ICHIP_WO_DESRD_ID_ERR	601
CMALARM_ICHIP_WO_DESRD_DATA_ERR	602
CMALARM_ICHIP_WO_DESRD_OFLOW_ERR	603
CMALARM_ICHIP_WO_HDRF_UCERR_ERR	604
CMALARM_ICHIP_WO_HDRF_MTUERR_ERR	605
CMALARM_ICHIP_WO_HDRF_PARITY_ERR	606
CMALARM_ICHIP_WO_HDRF_TOERR_ERR	607
CMALARM_ICHIP_WO_IP_CRC_ERR	608
CMALARM_ICHIP_WO_IP_INTER_ERR	609
CMALARM_ICHIP_WI_WAN_TIMEOUT_ERR	625

CMALARM_ICHIP_WI_FAB_TIMEOUT_ERR	626
CMALARM_ICHIP_RLDRAM_BIST_ERR	630
CMALARM_ICHIP_SDRAM_BIST_ERR	631
CMALARM_ICHIP_RLDRAM_PARITY_ERR	632
CMALARM_ICHIP_SDRAM_UNCORRECT_ERR	633
CMALARM_ICHIP_SDRAM_CORRECT_ERR	634
CMALARM_ICHIP_FUSE_DONE_ERR	635

According to the table above, the **279** error code corresponds to **CMALARM_NCHIP_DBUF_CRC_ERR**; this means that new CRC errors were seen on the NCHIP of this particular FPC, which is FPC as per the logs.

If you do not want to convert decimal to binary and vice versa, you may use the following shortcut:

For major alarms, the **Actual Error Code = (Error Code - 1)/2**, where **Error Code** is the code that you get in the log message. For example, if you get the following log:

```
    Apr 12 08:04:10 send: red alarm set, device FPC 6, reason FPC 6 Major
Errors - Error code: 257
```

Actual Error Code = (257-1)/2 = 128. Similarly, for minor alarms, Actual Error Code = (Error Code)/2

NOTE: Starting in Junos OS Release 18.2R1, on MX Series routers, the **show chassis alarms** output does not display error codes for PFE-related errors. You can use the following commands to view more details of the errors that caused the alarms:

- **show chassis errors active**
- **show chassis errors active detail**

Required Privilege Level view

Related Documentation

- *Configuring an RMON Alarm Entry and Its Attributes*
- *Chassis Conditions That Trigger Alarms*

List of Sample Output

Output Fields

Table 15 on page 210 lists the output fields for the **show chassis alarms** command. Output fields are listed in the approximate order in which they appear.

Table 15: show chassis alarms Output Fields

Field Name	Field Description
Alarm time	Date and time the alarm was first recorded.
Class	Severity class for this alarm: **Minor** or **Major**.
Description	Information about the alarm.

Sample Output

show chassis alarms (Alarms Active)

user@host> **show chassis alarms**

```
3 alarms are currently active
Alarm time               Class  Description
2000-02-07 10:12:22 UTC Major fxp0: ethernet link down
2000-02-07 10:11:54 UTC Minor YELLOW ALARM - PEM 1 Removed
2000-02-07 10:11:03 UTC Minor YELLOW ALARM - Lower Fan Tray Removed
```

show chassis alarms (No Alarms Active)

user@host> **show chassis alarms**

```
No alarms are currently active
```

show chassis alarms (Fan Tray)

user@host> **show chassis alarms**

```
4 alarms currently active
Alarm time               Class  Description
2010-11-11 20:27:38 UTC  Major  Side Fan Tray 7 Failure
2010-11-11 20:27:13 UTC  Minor  Side Fan Tray 7 Overspeed
2010-11-11 20:27:13 UTC  Major  Side Fan Tray 5 Failure
2010-11-11 20:27:13 UTC  Major  Side Fan Tray 0 Failure
```

show chassis alarms (MX150)

user@host > **show chassis alarms**

```
1 alarms currently active
Alarm time               Class  Description
2016-06-04 01:49:43 PDT  Major  Fan Tray 1 Fan 0 failed
```

show chassis alarms (MX104 Router)

user@host >**show chassis alarms**

```
1 alarms currently active
Alarm time               Class  Description
2013-06-05 14:43:31 IST  Minor  Backup RE Active
```

show chassis alarms (MX2010 Router)

`user@host>` **show chassis alarms**

```
7 alarms currently active
Alarm time               Class  Description
2012-08-07 00:46:06 PDT  Major  Fan Tray 2 Failure
2012-08-06 18:24:36 PDT  Minor  Redundant feed missing for PSM 6
2012-08-06 07:41:04 PDT  Minor  Redundant feed missing for PSM 8
2012-08-04 02:42:06 PDT  Minor  Redundant feed missing for PSM 5
2012-08-03 21:14:24 PDT  Minor  Loss of communication with Backup RE
2012-08-03 12:26:03 PDT  Minor  Redundant feed missing for PSM 4
2012-08-03 10:40:18 PDT  Minor  Redundant feed missing for PSM 7
```

show chassis alarms (MX2020 Router)

`user@host>` **show chassis alarms**

```
1 alarms currently active
Alarm time Class Description
2012-10-03 12:14:59 PDT Minor Plane 0 not online
```

show chassis alarms (MX10003 Router)

`user@host>` **show chassis alarms**

```

9 alarms currently active
Alarm time               Class  Description
2017-07-13 21:50:31 PDT  Major  FPC 1 Temperature Hot
2017-07-13 21:50:04 PDT  Minor  FPC 1 PIC 1 Invalid port profile configuration
2017-07-13 21:49:13 PDT  Minor  FPC 1 PIC 0 Invalid port profile configuration
2017-07-13 21:48:54 PDT  Major  FPC 0 Temperature Hot
2017-07-13 21:43:54 PDT  Minor  CB 1 Voltage Sensor ADS7830_0x4B Sensor Failed
2017-07-13 21:43:54 PDT  Minor  CB 0 Voltage Sensor ADS7830_0x4B Sensor Failed
2017-07-13 21:43:31 PDT  Minor  Loss of communication with Backup RE
```

Starting in Junos OS Release 19.2R1, the MX10003 routers do not raise an alarm if a Power Entry Module (PEM) slot is empty. However, when the number of operational PEMs goes below 2, the router raises a major alarm. This alarm is cleared when the required number of PEMs are made available.

show chassis alarms (MX204 Router)

`user@host>` **show chassis alarms**

```

1 alarms currently active
Alarm time               Class  Description
2017-11-05 22:13:03 PST  Major  PEM 0 Not Present
```

show chassis alarms (MX2008 Router)

user@host>**show chassis alarms**

```
No alarms currently active
```

show chassis alarms (MX960, MX480, and MX240 Routers showing Major CB Failure)

A major CB 0 failure alarm occurs in the event of a bad CB (unknown or mismatched CBs do not trigger this alarm in Junos Release OS 12.3R9 and later). Following GRES or recovery, if the hardware issue persists, the traffic moves to the good CB and continues. If the alarm was triggered by something transient like a power zone budget on GRES, bringing the CB back online can clear the alarm. Otherwise, replace the bad CB. Note that fabric link speed is not impacted by an offline SCB. The alarm migh be raised on CB0, CB1, and CB2.

user@host> **show chassis alarms**

```
6 alarms currently active
Alarm time               Class  Description
2014-10-31 16:49:41 EDT  Major  PEM 3 Not OK
2014-10-31 16:49:41 EDT  Major  PEM 2 Not OK
2014-10-31 16:49:31 EDT  Major  CB 0 Failure
2014-10-31 16:49:31 EDT  Minor  CB 0 Fabric Chip 0 Not Online
2014-10-31 16:49:31 EDT  Minor  CB 0 Fabric Chip 1 Not Online
2014-10-31 16:49:31 EDT  Minor  Backup RE Active
```

show chassis alarms (PTX10008 Router)

user@host>**show chassis alarms**

```
12 alarms currently active
Alarm time               Class  Description
2017-05-09 01:38:55 PDT  Minor  Loss of communication with Backup RE
2017-05-05 06:49:57 PDT  Major  FPC 5 LCPU Temp Sensor Access Failed
2017-05-05 06:49:57 PDT  Major  FPC 5 PE2 Temp Sensor Hot
2017-05-05 06:49:57 PDT  Major  FPC 5 PE1 Temp Sensor Hot
2017-05-05 06:49:57 PDT  Major  FPC 5 PE0 Temp Sensor Hot
2017-05-05 06:49:57 PDT  Major  FPC 5 Exhaust-C Temp Sensor Hot
2017-05-05 06:49:57 PDT  Major  FPC 5 Exhaust-B Temp Sensor Hot
2017-05-05 06:49:57 PDT  Major  FPC 5 Exhaust-A Temp Sensor Hot
2017-05-05 06:49:57 PDT  Major  FPC 5 Intake-B Temp Sensor Access Failed
2017-05-05 06:49:57 PDT  Major  FPC 5 Intake-A Temp Sensor Access Failed
2017-05-05 06:49:57 PDT  Major  Fan Tray 0 Fan 5 running at lower speed
2017-05-05 06:49:57 PDT  Major  Fan Tray 0 Fan 4 running at lower speed
```

show chassis alarms (T4000 Router)

user@host> **show chassis alarms**

```
9 alarms currently active
Alarm time               Class  Description
2007-06-02 01:41:10 UTC  Minor  RE 0 Not Supported
2007-06-02 01:41:10 UTC  Minor  CB 0 Not Supported
2007-06-02 01:41:10 UTC  Minor  Mixed Master and Backup RE types
2007-05-30 19:37:33 UTC  Major  SPMB 1 not online
2007-05-30 19:37:29 UTC  Minor  Front Bottom Fan Tray Absent
2007-05-30 19:37:13 UTC  Major  PEM 1 Input Failure
```



```
2007-05-30 19:37:13 UTC  Major  PEM 0 Not OK
2007-05-30 19:37:03 UTC  Major  PEM 0 Improper for Platform
2007-05-30 19:37:03 UTC  Minor  Backup RE Active
```

show chassis alarms (Unreachable Destinations Present on a T Series Router)

user@host> **show chassis alarms**

```
10 alarms currently active
Alarm time               Class  Description
2011-08-30 18:43:53 PDT  Major  FPC 7 has unreachable destinations
2011-08-30 18:43:53 PDT  Major  FPC 5 has unreachable destinations
2011-08-30 18:43:52 PDT  Major  FPC 3 has unreachable destinations
2011-08-30 18:43:52 PDT  Major  FPC 2 has unreachable destinations
2011-08-30 18:43:52 PDT  Minor  SIB 0 Not Online
2011-08-30 18:43:33 PDT  Minor  SIB 4 Not Online
2011-08-30 18:43:28 PDT  Minor  SIB 3 Not Online
2011-08-30 18:43:05 PDT  Minor  SIB 2 Not Online
2011-08-30 18:43:28 PDT  Minor  SIB 1 Not Online
2011-08-30 18:43:05 PDT  Major  PEM 1 Not Ok
```

show chassis alarms (FPC Offline Due to Unreachable Destinations on a T Series Router)

user@host> **show chassis alarms**

```
10 alarms currently active
Alarm time               Class  Description
2011-08-30 18:43:53 PDT  Major  FPC 7 offline due to unreachable destinations
2011-08-30 18:43:53 PDT  Major  FPC 5 offline due to unreachable destinations
2011-08-30 18:43:52 PDT  Major  FPC 3 offline due to unreachable destinations
2011-08-30 18:43:52 PDT  Major  FPC 2 offline due to unreachable destinations
2011-08-30 18:43:52 PDT  Minor  SIB 0 Not Online
2011-08-30 18:43:33 PDT  Minor  SIB 4 Not Online
2011-08-30 18:43:28 PDT  Minor  SIB 3 Not Online
2011-08-30 18:43:05 PDT  Minor  SIB 2 Not Online
2011-08-30 18:43:28 PDT  Minor  SIB 1 Not Online
2011-08-30 18:43:05 PDT  Major  PEM 1 Not Ok
```

show chassis alarms (SCG Absent on a T Series Router)

user@host> **show chassis alarms**

```
4 alarms currently active
Alarm time               Class  Description
2011-01-23 21:42:46 PST  Major  SCG 0 NO EXT CLK MEAS-BKUP SCG ABS
```

show chassis alarms (Alarms Active on a TX Matrix Router)

user@host> **show chassis alarms**

```
scc-re0:
--------------------------------------------------------------------------
8 alarms currently active
Alarm time               Class  Description
2004-08-05 18:43:53 PDT  Minor  LCC 0 Minor Errors
2004-08-05 18:43:53 PDT  Minor  SIB 3 Not Online
2004-08-05 18:43:52 PDT  Major  SIB 2 Absent
2004-08-05 18:43:52 PDT  Major  SIB 1 Absent
2004-08-05 18:43:52 PDT  Major  SIB 0 Absent
```

```
2004-08-05 18:43:33 PDT  Major  LCC 2 Major Errors
2004-08-05 18:43:28 PDT  Major  LCC 0 Major Errors
2004-08-05 18:43:05 PDT  Minor  LCC 2 Minor Errors
lcc0-re0:
--------------------------------------------------------------------------
5 alarms currently active
Alarm time               Class  Description
2004-08-05 18:43:53 PDT  Minor  SIB 3 Not Online
2004-08-05 18:43:49 PDT  Major  SIB 2 Absent
2004-08-05 18:43:49 PDT  Major  SIB 1 Absent
2004-08-05 18:43:49 PDT  Major  SIB 0 Absent
2004-08-05 18:43:28 PDT  Major  PEM 0 Not OK
lcc2-re0:
--------------------------------------------------------------------------
5 alarms currently active
Alarm time               Class  Description
2004-08-05 18:43:35 PDT  Minor  SIB 3 Not Online
2004-08-05 18:43:33 PDT  Major  SIB 2 Absent
2004-08-05 18:43:33 PDT  Major  SIB 1 Absent
2004-08-05 18:43:33 PDT  Major  SIB 0 Absent
2004-08-05 18:43:05 PDT  Minor  PEM 1 Absent
```

show chassis alarms (TX Matrix Plus router with 3D SIBs)

user@host> **show chassis alarms**

```
sfc0-re0:
--------------------------------------------------------------------------
Alarm time               Class  Description

2014-04-08 14:35:13 IST  Minor  FPM 0 SFC Config Size Changed
2014-04-08 14:32:58 IST  Major  Fan Tray Failure
2014-04-08 14:31:53 IST  Major  SIB F13 6 Fault
2014-04-08 14:31:43 IST  Major  SIB F13 11 Fault
2014-04-08 14:31:08 IST  Minor  Check SIB F13 12 CXP 14 Fbr Cbl
2014-04-08 14:31:08 IST  Minor  Check SIB F13 12 CXP 8 Fbr Cbl
2014-04-08 14:31:08 IST  Minor  Check SIB F13 12 CXP 3 Fbr Cbl
2014-04-08 14:31:08 IST  Major  SIB F13 12 CXP 15 fault
2014-04-08 14:31:08 IST  Minor  SIB F13 12 CXP 14 LOL
2014-04-08 14:31:08 IST  Minor  Check SIB F13 12 CXP 14
2014-04-08 14:31:08 IST  Major  SIB F13 12 CXP 10 fault
2014-04-08 14:31:08 IST  Minor  SIB F13 12 CXP 8 LOL
2014-04-08 14:31:08 IST  Minor  Check SIB F13 12 CXP 8
2014-04-08 14:31:08 IST  Major  SIB F13 12 CXP 7 fault
2014-04-08 14:31:08 IST  Major  SIB F13 12 CXP 4 fault
2014-04-08 14:31:08 IST  Minor  SIB F13 12 CXP 3 LOL
2014-04-08 14:31:08 IST  Minor  Check SIB F13 12 CXP 3
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 14 Fbr Cbl
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 12 Fbr Cbl
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 8 Fbr Cbl
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 6 Fbr Cbl
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 4 Fbr Cbl
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 2 Fbr Cbl
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 0 Fbr Cbl
2014-04-08 14:31:08 IST  Minor  SIB F13 6 CXP 14 LOL
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 14
2014-04-08 14:31:08 IST  Minor  SIB F13 6 CXP 12 LOL
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 12
2014-04-08 14:31:08 IST  Major  SIB F13 6 CXP 10 fault
2014-04-08 14:31:08 IST  Minor  SIB F13 6 CXP 8 LOL
```



```
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 8
2014-04-08 14:31:08 IST  Minor  SIB F13 6 CXP 6 LOL
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 6
2014-04-08 14:31:08 IST  Minor  SIB F13 6 CXP 4 LOL
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 4
2014-04-08 14:31:08 IST  Minor  SIB F13 6 CXP 2 LOL
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 2
2014-04-08 14:31:08 IST  Minor  SIB F13 6 CXP 0 LOL
2014-04-08 14:31:08 IST  Minor  Check SIB F13 6 CXP 0
2014-04-08 14:31:08 IST  Minor  SIB F13 12 CXP 14 XC HSL Link Error
2014-04-08 14:29:27 IST  Minor  LCC 0 Minor Errors
2014-04-08 14:28:37 IST  Major  LCC 0 Major Errors
2014-04-08 14:28:37 IST  Major  LCC 2 Major Errors
2014-04-08 14:28:37 IST  Minor  LCC 2 Minor Errors
2014-04-08 14:28:24 IST  Major  SIB F2S 4/6 Absent
2014-04-08 14:28:24 IST  Major  SIB F2S 4/4 Absent
2014-04-08 14:28:24 IST  Major  SIB F2S 4/2 Absent
2014-04-08 14:28:24 IST  Major  SIB F2S 4/0 Absent
2014-04-08 14:28:24 IST  Major  SIB F2S 3/6 Absent
2014-04-08 14:28:24 IST  Major  SIB F2S 3/4 Absent
2014-04-08 14:28:24 IST  Major  SIB F2S 3/2 Absent
2014-04-08 14:28:24 IST  Major  SIB F2S 3/0 Absent
2014-04-08 14:28:24 IST  Major  SIB F13 9 Absent
2014-04-08 14:28:24 IST  Major  SIB F13 8 Absent
2014-04-08 14:28:24 IST  Major  SIB F13 7 Absent
2014-04-08 14:28:24 IST  Major  SIB F13 4 Absent
2014-04-08 14:28:24 IST  Major  SIB F13 1 Absent
2014-04-08 14:28:22 IST  Major  PEM 0 Input Failure
2014-04-08 14:28:22 IST  Major  PEM 0 Not OK

lcc0-re0:
--------------------------------------------------------------------------
12 alarms currently active
Alarm time               Class  Description
2014-04-08 14:36:08 IST  Minor  CB 1  M/S Switch Changed
2014-04-08 14:36:08 IST  Minor  CB 1  CHASSIS ID Changed
2014-04-08 14:35:43 IST  Minor  CB 0  M/S Switch Changed
2014-04-08 14:35:43 IST  Minor  CB 0  CHASSIS ID Changed
2014-04-08 14:29:30 IST  Minor  SIB 4 Not Online
2014-04-08 14:29:30 IST  Minor  SIB 3 Not Online
2014-04-08 14:29:30 IST  Minor  SIB 2 Not Online
2014-04-08 14:29:24 IST  Major  Rear Fan Tray Failure
2014-04-08 14:29:24 IST  Major  Front Bottom Fan Tray Improper for Platform
2014-04-08 14:29:24 IST  Major  Front Top Fan Tray Improper for Platform
2014-04-08 14:28:37 IST  Major  SIB 4 Absent
2014-04-08 14:28:37 IST  Major  SIB 3 Absent

lcc2-re0:
--------------------------------------------------------------------------
12 alarms currently active
Alarm time               Class  Description
2014-04-08 14:36:02 IST  Minor  CB 1  M/S Switch Changed
2014-04-08 14:36:02 IST  Minor  CB 1  CHASSIS ID Changed
2014-04-08 14:35:42 IST  Minor  CB 0  M/S Switch Changed
2014-04-08 14:34:42 IST  Minor  CB 0  CHASSIS ID Changed
2014-04-08 14:29:29 IST  Minor  SIB 0 CXP 7 Unsupported Optics
2014-04-08 14:29:27 IST  Major  Front Bottom Fan Tray Improper for Platform
2014-04-08 14:29:27 IST  Major  Front Top Fan Tray Improper for Platform
2014-04-08 14:29:25 IST  Minor  SIB 4 Not Online
2014-04-08 14:29:25 IST  Minor  SIB 3 Not Online
```



```
2014-04-08 14:28:47 IST  Major  PEM 0 Not OK
2014-04-08 14:28:36 IST  Major  SIB 2 Absent
2014-04-08 14:28:36 IST  Minor  Host 0 Boot from alternate media

lcc6-re0:
--------------------------------------------------------------------------
2 alarms currently active
Alarm time               Class  Description
2013-11-06 04:03:56 PST  Minor  SIB 1 CXP 0 XC HSL Link Error
2013-11-06 03:49:32 PST  Major  PEM 1 Not OK
```

show chassis alarms (Alarms on a T4000 Router After the enhanced-mode Statement is Enabled)

To enable improved virtual private LAN service (VPLS) MAC address learning on T4000 routers, you must include the **enhanced-mode** statement at the **[edit chassis network-services]** hierarchy level and reboot the router. When router reboots, only the T4000 Type 5 FPCs are required to be present on the router. If there are any other FPCs (apart from T4000 Type 5 FPCs) on the T4000 router, such FPCs become offline, and FPC misconfiguration alarms are generated. The **show chassis alarm** command output displays FPC misconfiguration (**FPC *fpc-slot* misconfig**) as the reason for the generation of the alarms.

`user@host>` **show chassis alarms**

```
2 alarms currently active
  Alarm time               Class  Description
  2011-10-22 10:10:47 PDT  Major  FPC 1 misconfig
  2011-10-22 10:10:46 PDT  Major  FPC 0 misconfig
```

show chassis alarms (Backup Routing Engine)

`user@host>` **show chassis alarms**

```
2 alarms are currently active
Alarm time               Class  Description
2005-04-07 10:12:22 PDT  Minor  Host 1 Boot from alternate media
2005-04-07 10:11:54 PDT  Major  Host 1 compact-flash missing in Boot List
```

show chassis alarms (EX Series Switch)

`user@switch>` **show chassis alarms**

```
 4 alarms currently active
Alarm time               Class  Description
2014-03-12 15:36:09 UTC  Minor  Require a Fan Tray upgrade
2014-03-12 15:00:02 UTC  Major  PEM 0 Input Failure
2014-03-12 15:00:02 UTC  Major  PEM 0 Not OK
2014-03-12 14:59:51 UTC  Minor  Host 1 Boot from alternate media
```

show chassis alarms (Alarms Active on the QFX Series and OCX Series Switches)

`user@switch>` **show chassis alarms**

```
1 alarms currently active
Alarm time               Class  Description
2012-03-05 2:10:24 UTC  Major  FPC 0 PEM 0 Airflow not matching Chassis Airflow
```


show chassis alarms node-device (Alarms Active on the QFabric System)

user@switch> **show chassis alarms node-device Test**

```
node-device ED3694
3 alarms currently active
Alarm time               Class  Description
2011-08-24 16:04:15 UTC  Major  Test:fte-0/1/2: Link down
2011-08-24 16:04:14 UTC  Major  Test:fte-0/1/0: Link down
2011-08-24 14:21:14 UTC  Major  Test PEM 0 is not supported/powered
```

show chassis alarms (Alarms Active on the QFabric System)

user@switch> **show chassis alarms**

```
IC-1:
--------------------------------------------------------------------------
1 alarms currently active
Alarm time               Class  Description
2011-08-24 16:04:15 UTC  Minor  Backup RE Active

Test:
--------------------------------------------------------------------------
3 alarms currently active
Alarm time               Class  Description
2011-08-24 16:04:15 UTC  Major  Test:fte-0/1/2: Link down
2011-08-24 16:04:14 UTC  Major  Test:fte-0/1/0: Link down
2011-08-24 14:21:14 UTC  Major  Test PEM 0 is not supported/powered

SNG-0:
--------------------------------------------------------------------------

NW-NG-0:
--------------------------------------------------------------------------
1 alarms currently active
Alarm time               Class  Description
2011-08-24 15:49:27 UTC  Major  Test PEM 0 is not supported/powered
```

show chassis alarms (Alarms Active on an EX8200 Switch)

user@switch> **show chassis alarms**

```

6 alarms currently active
Alarm time               Class  Description
2010-12-02 19:15:22 UTC  Major  Fan Tray Failure
2010-12-02 19:15:22 UTC  Major  Fan Tray Failure
2010-12-02 19:15:14 UTC  Minor  Check CB 0 Fabric Chip 1 on Plane/FPC/PFE: 1/5/0,
 1/5/1, 1/5/2, 1/5/3, 1/7/0, 1/7/1, 1/7/2, 1/7/3, 2/5/0, 2/5/1, ...
2010-12-02 19:15:14 UTC  Minor  Check CB 0 Fabric Chip 0 on Plane/FPC/PFE: 1/5/0,
 1/5/1, 1/5/2, 1/5/3, 1/7/0, 1/7/1, 1/7/2, 1/7/3, 2/5/0, 2/5/1, ...
2010-12-02 19:14:18 UTC  Major  PSU 1 Output Failure
2010-12-02 19:14:18 UTC  Minor  Loss of communication with Backup RE
```

show chassis alarms (EX9251 Switch)

user@switch> **show chassis alarms**

```
 2 alarms currently active
Alarm time                Class  Description
2018-03-08 05:13:10 PST  Major  PEM 0 Not Powered
2018-03-08 05:13:10 PST  Major  Fan Tray 2 is not present
```

show chassis alarms (EX9253 Switch)

`user@switch>` **show chassis alarms**

```
6 alarms currently active
Alarm time                Class  Description
2018-03-07 01:09:01 PST  Major  Power Budget:Insufficient Power
2018-03-06 23:56:34 PST  Minor  Loss of communication with Backup RE
2018-02-15 00:48:10 PST  Minor  PEM 3 Not Present
2018-02-15 00:48:10 PST  Minor  PEM 2 Not Present
2018-02-15 00:48:07 PST  Major  PEM 4 Not Powered
2018-02-15 00:48:07 PST  Major  PEM 1 Not Powered
```

show chassis alarms (Alarms Active on a PTX5000 Packet Transport Router)

`user@host>` **show chassis alarms**

```

23 alarms currently active
Alarm time                Class  Description
2011-07-12 16:22:05 PDT  Minor  No Redundant Power for Rear Chassis
2011-07-12 16:22:05 PDT  Major  PDU 0 PSM 1 Not OK
2011-07-12 16:21:57 PDT  Minor  No Redundant Power for Fan 0-2
2011-07-12 16:21:57 PDT  Major  PDU 0 PSM 0 Not OK
2011-07-12 15:56:06 PDT  Major  PDU 1 PSM 2 Not OK
2011-07-12 15:56:06 PDT  Minor  No Redundant Power for FPC 0-7
2011-07-12 15:56:06 PDT  Major  PDU 0 PSM 3 Not OK
2011-07-12 15:28:20 PDT  Major  PDU 0 PSM 2 Not OK
2011-07-12 15:19:14 PDT  Minor  Backup RE Active
```

show chassis alarms (Mix of PDUs Alarm on a PTX5000 Packet Transport Router with FPC2-PTX-P1A)

All PDUs installed on a PTX5000 router must be of the same type. The **Mix of PDUs** or **Power Manager Non Operational** alarm is raised when different types of PDUs are installed on a PTX5000 router.

`user@host>` **show chassis alarms**

```
15 alarms currently active
Alarm time                Class  Description
2013-03-19 23:03:53 PDT  Minor  No Redundant Power
2013-03-19 23:03:48 PDT  Minor  Mix of PDUs
2013-03-19 23:03:47 PDT  Minor  PDU 1 PSM 3 Absent
2013-03-19 23:03:47 PDT  Minor  PDU 1 PSM 2 Absent
2013-03-19 23:03:47 PDT  Minor  PDU 1 PSM 1 Absent
2013-03-19 23:03:47 PDT  Minor  PDU 1 PSM 0 Absent
2013-03-19 23:03:46 PDT  Major  No CG Online
```

show chassis alarms (PDU Converter Failed Alarm on a PTX5000 Packet Transport Router with FPC2-PTX-P1A)

The **PDU Converter Failed** alarm is raised when one or more 36 V booster converter of a DC PDU fails. If two or more 36 V booster converter fails, fan trays fail and the router might get over heated. Therefore, when this alarm is raised, check the PDU and replace it, if required.

user@host> **show chassis alarms**

```
11 alarms currently active
Alarm time                Class  Description
2013-12-11 22:14:13 PST  Minor  No Redundant Power for System
2013-12-11 22:14:10 PST  Major  PDU 0 PSM 7 Not OK
2013-12-11 22:14:10 PST  Major  PDU 0 PSM 6 Not OK
2013-12-11 22:14:10 PST  Major  PDU 0 PSM 5 Not OK
2013-12-11 22:14:10 PST  Major  PDU 0 PSM 4 Not OK
2013-12-11 22:14:10 PST  Major  PDU 0 PSM 3 Not OK
2013-12-11 22:14:10 PST  Major  PDU 0 PSM 2 Not OK
2013-12-11 22:14:10 PST  Major  PDU 0 PSM 1 Not OK
2013-12-11 22:14:10 PST  Major  PDU 0 PSM 0 Not OK
2013-12-11 22:14:10 PST  Major  PDU 0 Not OK
2013-12-11 22:14:01 PST  Major  PDU 0 Converter Failed
```

show chassis alarms (No Power for System Alarm on a PTX5000 Packet Transport Router with FPC2-PTX-P1A)

user@host> **show chassis alarms**

```
8 alarms currently active
Alarm time                Class  Description
2013-11-19 01:58:41 PST  Major  No Power for System
2013-11-19 01:58:37 PST  Major  PDU 0 PSM 1 Not OK
2013-11-19 01:56:46 PST  Major  PDU 0 PSM 2 Not OK
2013-11-19 01:54:26 PST  Major  PDU 0 PSM 3 Not OK
2013-11-19 01:53:30 PST  Major  PDU 1 PSM 3 Not OK
2013-11-19 01:53:29 PST  Major  PDU 1 PSM 2 Not OK
2013-11-19 01:53:29 PST  Major  PDU 1 PSM 1 Not OK
2013-11-19 01:53:29 PST  Major  PDU 1 PSM 0 Not OK
```

show chassis alarms (Alarms Active on an ACX2000 Universal Metro Router)

user@host> **show chassis alarms**

```
7 alarms currently active
Alarm time                Class  Description
2012-05-22 11:19:09 UTC  Major  xe-0/3/1: Link down
2012-05-22 11:19:09 UTC  Major  xe-0/3/0: Link down
2012-05-22 11:19:09 UTC  Major  ge-0/1/7: Link down
2012-05-22 11:19:09 UTC  Major  ge-0/1/6: Link down
2012-05-22 11:19:09 UTC  Major  ge-0/1/3: Link down
2012-05-22 11:19:09 UTC  Major  ge-0/1/2: Link down
2012-05-22 11:19:09 UTC  Major  ge-0/1/1: Link down
```

show chassis alarms (Active Alarm to Indicate Status of the Bad SCB Clock on MX Series)

user@host> **show chassis alarms**

```
1 alarm currently active
Alarm time                Class  Description
2013-08-06 07:48:35 PDT  Major  CB 0 19.44 MHz clock failure
```

show chassis alarms (Alarms active on a PTX1000 Packet Transport Router)

user@host> **show chassis alarms**

```
2 alarms currently active
Alarm time               Class  Description
2004-08-10 00:55:49 UTC  Major  PEM 1 Not Present
2004-08-10 00:55:49 UTC  Major  PEM 0 Not Present
```

show chassis alarms (MX10003 Router)

If LCMD is down on the backup RE, then the following alarm is seen on the Master.

`user@host>` **show chassis alarms**

```
1 alarm currently active
Alarm time               Class  Description
2017-05-09 13:26:27 PDT  Major  VMHost RE 1 host application failed
```

If LCMD is down on the master, then following alarms are displayed.

`user@host>` **show chassis alarms**

```
3 alarms currently active
Alarm time               Class  Description
2017-05-10 14:12:21 PDT  Major  VMHost RE 0 host application failed
2017-05-10 14:12:16 PDT  Minor  LCM Peer Absent
2017-05-09 13:26:27 PDT  Major  VMHost RE 1 host application failed
```

If the LCMD process is crashing on the master, the system will switchover after one minute provided the backup RE LCMD connection is stable. The system will not switchover under the following conditions: if the backup RE LCMD connection is unstable or if the current master just gained mastership. When the master has just gained mastership, the switchover happens only after four minutes.

The LCM peer connection un-stable alarm is raised when the LCMD-CHASD IPC communication flaps three times within a small interval of two to three minutes. Once LCM peer connection un-stable alarm is raised, the connection status is monitored for two minutes.

`user@host>` **show chassis alarms**

```
7 alarms currently active
Alarm time               Class  Description
2017-05-29 10:12:17 PDT  Minor  LCM Peer Connection un-stable
2017-05-29 09:04:17 PDT  Minor  PEM 8 Not Powered
2017-05-29 09:04:17 PDT  Minor  PEM 9 Not Powered
2017-05-29 09:04:17 PDT  Minor  PEM 7 Not Powered
2017-05-29 09:04:17 PDT  Minor  PEM 3 Not Powered
2017-05-29 09:04:17 PDT  Minor  PEM 0 Not Powered
2017-05-29 09:04:08 PDT  Minor  Loss of communication with Backup RE
```

If there are no more connection flaps within this two minutes time interval, the LCM peer connection un-stable alarm is cleared.

```
6 alarms currently active
Alarm time               Class  Description
2017-05-29 09:04:17 PDT  Minor  PEM 8 Not Powered
2017-05-29 09:04:17 PDT  Minor  PEM 9 Not Powered
2017-05-29 09:04:17 PDT  Minor  PEM 7 Not Powered
2017-05-29 09:04:17 PDT  Minor  PEM 3 Not Powered
```



```
2017-05-29 09:04:17 PDT  Minor  PEM 0 Not Powered
2017-05-29 09:04:08 PDT  Minor  Loss of communication with Backup RE
```

A major alarm is raised even if there is on one PLL lock error, and this alarm can be cleared only through an FPC restart.

`user@host>` **show chassis alarms**

```
4 alarms currently active
Alarm time               Class  Description
2017-02-16 09:06:06 PDT  Major  FPC 0 Major Errors
2017-02-16 09:08:40 PDT  Major  FPC 1 Major Errors
2017-02-16 09:11:47 PST  Minor  Fan Tray 3 Pair 1 Outer Fan running at over speed
2017-02-16 09:11:47 PST  Minor  Fan Tray 3 Pair 1 Inner Fan running at over speed
```

show chassis alarms (Alarms active on a MX10008 Router)

`user@host>` **show chassis alarms**

```
13 alarms currently active
Alarm time               Class  Description
2018-07-17 05:48:08 PDT  Major  FPC 2 I2C Failure
2018-07-17 05:47:02 PDT  Minor  Mixed Master and Backup RE types
2018-07-17 05:47:01 PDT  Major  Fan Tray 0 Fan 5 Failed
2018-07-17 05:47:01 PDT  Major  Fan Tray 0 Fan 4 Failed
2018-07-17 05:47:01 PDT  Minor  PEM 5 Not Powered
2018-07-17 05:47:01 PDT  Minor  PEM 5 Feed 2 has no input source
2018-07-17 05:47:01 PDT  Minor  PEM 5 Feed 1 has no input source
2018-07-17 05:47:01 PDT  Minor  PEM 4 Not Powered
2018-07-17 05:47:01 PDT  Minor  PEM 4 Feed 2 has no input source
2018-07-17 05:47:01 PDT  Minor  PEM 4 Feed 1 has no input source
2018-07-17 05:47:01 PDT  Minor  PEM 3 Not Powered
2018-07-17 05:47:01 PDT  Minor  PEM 3 Feed 2 has no input source
2018-07-17 05:47:01 PDT  Minor  PEM 3 Feed 1 has no input source
```


show chassis environment

List of Syntax

Syntax

show chassis environment

Syntax (T320, T640, T1600, and T4000 Routers)

show chassis environment
<cb *cb-slot-number*>
<fpc *fpc-slot-number*>
<fpm>
<pem *pem-slot-number*>
<routing-engine *re-slot-number*>
<scg *scg-slot-number*>
<sib *sib-slot-number*>

Syntax (TX Matrix Routers)

show chassis environment
<lcc *number* | scc>

Syntax (TX Matrix Plus Routers)

show chassis environment
<cb *cb-slot-number*>
<cip *cip-slot-number*>
<fpc *fpc-slot-number*>
<fpm>
<lcc *number*>
<pem *pem-slot-number*>
<routing-engine *re-slot-number*>
<scg *scg-slot-number*>
< sfc *number*>
<sib *sib-slot-number*>

Syntax (MX Series Routers)

show chassis environment
<all-members>
<local>
<member *member-id*>

Syntax (MX104 Universal Routing Platforms)

show chassis environment
<cb>
<pem *pem-slot-number*>
<routing-engine *re-slot-number*>

Syntax (MX150 Router Appliance)

show chassis environment
<pem *pem-slot-number*>
<routing-engine *re-slot-number*>

Syntax (MX2010, MX2020, and MX2008 Universal Routing Platforms)

show chassis environment
<adc *adc-slot-number*>
<all-members>
<cb *cb-slot-number*>
<fan *fantray-slot-number*>
<fpc *fpc-slot-number*>
<fpm>
<local>
<member *member-id*>
<monitored>
<psm *psm-slot-number*>
<routing-engine *re-slot-number*>
<sfb *sfb-slot-number*>
<satellite [fpc-slot *slot-id* |device-alias *alias-name*]>

Syntax (MX10003 and MX204 Universal Routing Platforms)

show chassis environment
<cb *cb-slot-number*>
<fpc *fpc-slot-number*>
<pem *pem-slot-number*>
<routing-engine *re-slot-number*>

Syntax (EX8200 Switches)

show chassis environment
<all-members>
<cb *cb-slot-number*>
<fpc *fpc-slot-number*>
<local>
<member *member-id*>
<psu *psu-slot-number*>
<routing-engine *re-slot-number*>

Syntax (EX Series Switches except EX8200)

show chassis environment
<all-members>
<fpc *fpc-slot-number*>
<local>
<member *member-id*>
<power-supply-unit>
<routing-engine>
<satellite [fpc-slot *slot-id* |device-alias *alias-name*]>

Syntax (QFX Series)

show chassis environment
<cb *slot-number* <interconnect-device *name*>>
<fpc *slot-number* <interconnect-device *name*>>
<interconnect-device *name* <*slot-number*>
<node-device *name*>
<pem *slot-number* (interconnect-device *name slot-number*) | (node-device *name*)>
<routing-engine *name* <interconnect-device *name slot-number*>>

Syntax (OCX Series)

show chassis environment

Syntax (PTX Series Packet Transport Routers)

show chassis environment
<cb *cb-slot-number*>
<ccg *ccg-slot-number* >
<fpc *fpc-slot-number*>
<fpm>
<monitored>
<pdu *pdu-slot-number*>
<routing-engine *re-slot-number*>
<sib *sib-slot-number*>

Syntax (ACX Series Universal Metro Routers)

show chassis environment
<cb *cb-slot-number*>
<pem *pem-slot-number*>
<routing-engine *re-slot-number*>

Syntax (ACX5048 and ACX5096 Routers)

show chassis environment
<fpc *slot-number*>
<pem>
<routing-engine>

Syntax (ACX500 Routers)

show chassis environment
<cb *cb-slot-number*>
<routing-engine *re-slot-number*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

sfc option introduced for the TX Matrix Plus router in Junos OS Release 9.6.
Command introduced in Junos OS Release 11.1 for QFX Series.
Command introduced in Junos OS Release 12.1x48 for PTX Series Packet Transport Routers.
monitored option added in Junos OS Release 12.1x48 for PTX Series Packet Transport Routers.
Command introduced in Junos OS Release 12.1 for T4000 Core Routers.
Command introduced in Junos OS Release 12.2 for ACX Series Universal Metro Routers.
Command introduced in Junos OS Release 12.3 for MX 2020 and MX2010 Universal Routing Platforms.
pem option introduced in Junos OS Release 12.3 for ACX4000 Universal Metro Routers.
satellite option introduced in Junos OS Release 14.2R3.
all-members, **local**, and **member** *member-id* options introduced in Junos OS Release 15.1 for MX2010 and MX2020 routers.
Command introduced in Junos OS Release 15.1X54-D20 for ACX5048 and ACX5096 Routers.
Command introduced in Junos OS Release 17.2 for MX2008 Universal Routing Platforms.
Command introduced in Junos OS Release 17.3 for MX150 Router Appliance.
Command introduced in Junos OS Release 17.2 for PTX10008 Routers.
Command introduced in Junos OS Release 17.3 for MX10003 Universal Routing Platforms.
Command introduced in Junos OS Release 17.4 for MX204 Universal Routing Platforms.
Command introduced in Junos OS Release 18.1R1 for EX9251 Switches.
Command introduced in Junos OS Release 18.2 for EX9253 Switches.
Command introduced in Junos OS Release 18.2R1 for MX10008 Routers.

Description Display environmental information about the router or switch chassis, including the temperature and information about the fans, power supplies, and Routing Engine.

In addition, on ACX4000 routers, display temperature information about the different channels of a Modular Interface Card (MIC). The number of channels displayed depends on the type of MIC installed.

Starting with Junos OS Release 14.1, the **show chassis environment cb** ***cb-slot-number*** **| ccg** ***ccg-slot-number*** **| fpc** ***fpc-slot-number*** **| fpm | monitored | pdu** ***pdu-slot-number*** **| routing-engine** ***re-slot-number*** **| sib** ***sib-slot-number*** operational mode command output displays environmental information for the new DC power supply module (PSM) and power distribution unit (PDU) that are added to provide power to the high-density FPC (FPC2-PTX-P1A) and other components in a PTX5000 Packet Transport Router.

Options **none**—Display environmental information about the router or switch chassis. On a TX Matrix router, display environmental information about the TX Matrix router and its attached T640 routers. On a TX Matrix Plus router, display environmental information about the TX Matrix Plus router and its attached routers.

all-members—(MX Series routers and EX Series switches only) (Optional) Display chassis environmental information for all the members of the Virtual Chassis configuration.

adc ***adc-slot-number***—(MX2010, MX2020, and MX2008 routers only) (Optional) Display chassis environmental information for the adapter cards. For MX2020 routers, replace

adc-slot-number with a value from **0** through **19**. For MX2010 and MX2008 routers, replace ***adc-slot-number*** with a value from **0** through **9**.

cb *cb-slot-number*—(ACX Series Universal Metro Routers, EX Series switches, M120, M320, and M40e routers, MX Series routers, MX2020 routers, MX2010 routers, MX2008 routers, PTX Series Packet Transport Routers, QFX Series, and T Series routers, and TX Matrix Plus routers only) (Optional) Display chassis environmental information for the Control Board. On devices other than EX Series switches, replace ***cb-slot*** with **0** or **1**.

cip *cip-slot-number*—(TX Matrix Plus routers only) (Optional) Display chassis environmental information for the Connection Interface Panel (CIP). Replace the ***cip-slot-number*** variable with a value of **0** or **1**.

cb interconnect-device *name*—(QFabric systems only) (Optional) Display chassis environmental information for the Control Board on an Interconnect device.

ccg *ccg-slot-number*—(PTX Series only) (Optional) Display chassis environmental information for the Centralized Clock Generator. Replace ***cb-slot*** with a value of **0** or **1**.

fan *fantray-slot-number*—(MX2010, MX2020, and MX2008 routers only) (Optional) Display chassis environmental information for the fan trays. Replace ***fantray-slot-number*** with a value from **0** through **3**.

fpc *fpc-slot*—(EX Series switches, M120, M320, and M40e routers, MX Series routers, MX2010 routers, MX2020 routers, MX2008 routers, PTX Series Packet Transport Routers, QFX Series, QFX3500 switches, QFabric systems, T Series routers, and TX Matrix Plus routers) (Optional) Display chassis environmental information for a specified Flexible PIC Concentrator. For MX2010 and MX2008 routers, replace ***fpc-slot*** with a value from **0** through **9**. For MX2020 routers, replace ***fpc-slot*** with a value from **0** through **19**. For information about FPC numbering, see **show chassis environment fpc**. On a QFabric system, display chassis environmental information for a specified Flexible PIC Concentrator on an Interconnect device. On an EX Series switch, display chassis environmental information for a specified Flexible PIC Concentrator; see the hardware documentation for your switch for information on FPC numbering. On a TX Matrix Plus router with 3D SIBs replace *fpc-slot* with a value from **0** through **63**.

fpm—(M120, M320, and M40e routers, MX2010 routers, MX2020 routers, MX2008 routers, PTX Series, Packet Transport Routers, T Series routers, and TX Matrix Plus routers only) (Optional) Display chassis environmental information for the craft interface (FPM).

interconnect-device *name*—(QFabric systems only) (Optional) Display chassis environmental information for the Interconnect device.

lcc *number*—(TX Matrix routers and TX Matrix Plus routers 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.

local—(MX Series routers and EX Series switches only) (Optional) Display chassis environmental information for the local Virtual Chassis member.

member ***member-id***—(MX Series routers and EX Series switches only) (Optional) Display chassis environmental information for the specified member of the Virtual Chassis configuration. On MX Series routers, replace *member-id* with a value of **0** or **1**. For EX Series switches, see *member* for member ID values.

monitored—(MX2020 routers and PTX Series Packet Transport Routers only) (Optional) Display chassis environmental information for monitored temperatures only. Temperatures that are not included in temperature alarm computations are not displayed.

node-device ***name***—(QFabric systems only) (Optional) Display chassis environmental information for the Node device.

pdu ***pdu-slot-number***—(PTX Series only) (Optional) Display chassis environmental information for the specified power distribution unit.

pem—(QFX3500 switches and QFabric systems only) (Optional) Display chassis environmental information for the Power Entry Module on the specified Interconnect device or Node device.

pem ***pem-slot-number***—(ACX Series Universal Metro Routers, M120, M320, and M40e routers, MX Series routers, MX104 routers, QFX Series, and T Series routers only) (Optional) Display chassis environmental information for the Power Entry Module on the specified Power Entry Module. For information about the options, see show chassis environment pem.

psm ***psm-slot-number***—(MX2010, MX2020, and MX2008 routers only) (Optional) Display chassis environmental information for the power supply module. For MX2020 routers, replace ***psm-slot-number*** with a value from **0** through **17**. For MX2010 and MX2008 routers, replace ***psm-slot-number*** with a value from **0** through **8**.

psu ***psu-slot-number***—(EX Series switches only) (Optional) Display chassis environmental information for a specified power supply.

routing-engine—(QFX3500 switches and QFabric systems only) (Optional) Display chassis environmental information for the Routing Engine on the specified Interconnect device.

routing-engine *re-slot-number*—(Optional) Display chassis environmental information for the specified Routing Engine. For information about the options, see show chassis environment routing-engine.

satellite [fpc-slot *slot-id* | device-alias *alias-name*]—(Junos Fusion only)(Optional) Display chassis environmental information for the specified satellite device in a Junos Fusion, or for all satellite devices in the Junos Fusion if no satellite devices are specified.

scg—(T Series routers only) (Optional) Display chassis environmental information about the SONET Clock Generator.

scc—(TX Matrix routers only) (Optional) Display chassis environmental information about the TX Matrix router (switch-card chassis).

sfb *sfb-slot-number*—(MX2010, MX2020, and MX2008 routers only) (Optional) Display chassis environmental information for the switch fabric board. Replace ***sfb-slot-number*** with a value from **0** through **7**.

sfc *number*—(TX Matrix Plus routers only) (Optional) Display chassis environmental information about the respective TX Matrix Plus router (switch-fabric chassis). Replace ***number*** variable with **0**.

sib *sib-slot-number*—(M320 routers, PTX Series Packet Transport Routers, and T Series routers only) (Optional) Display chassis environmental information about the specified switch interface board. For information about the options, see *show chassis environment sib*.

Required Privilege Level

view

Related Documentation

- *show chassis environment adc*
- *show chassis environment cb*
- *show chassis environment ccg*
- *show chassis environment cip*
- show chassis environment fpc on page 307
- *show chassis environment fpm*
- *show chassis environment lcc*
- *show chassis environment mcs*
- *show chassis environment monitored*
- *show chassis environment pcg*

- *show chassis environment pdu*
- show chassis environment pem on page 367
- *show chassis environment psm*
- *show chassis environment psu*
- show chassis environment routing-engine on page 382
- *show chassis environment scg*
- *show chassis environment sfb*
- *show chassis environment sib*
- *show chassis environment sfc*

List of Sample Output

Output Fields Table 16 on page 231 lists the output fields for the **show chassis environment** command. Output fields are listed in the approximate order in which they appear.

Table 16: show chassis environment Output Fields

Field Name	Field Description

Class	Information about the category or class of chassis component:
	
	• **Power**: Power information:
	  ◦ (M5, M10, M20, and M40 routers and EX Series switches only) Power supply status: **OK**, **Testing**, (during initial power-on), **Failed**, or **Absent**.
	  ◦ (M7i, M10i, M40e, M120, M160, M320, and T Series routers and EX Series switches only) Power Entry Modules status: **OK**, **Testing**, (during initial power-on), **Check**, **Failed**, or **Absent**.
	  ◦ (PTX Series only) Power information is reported in PDU or PSM combinations. The status is: **OK**, **Testing**, (during initial power-on), **Check**, **Failed**, or **Absent**.
	• **Temp**: Temperature of air flowing through the chassis in degrees Celsius (C) and Fahrenheit (F).
	  ◦ On PTX Series Packet Transport Routers and MX2010, MX2020, and MX2008 Routers, multiple cooling zones are supported. FRU temperatures in each zone are coordinated with the fan speed of fan trays in those zones.
	  ◦ EX2200 switches have a side-to-rear cooling system. The **Local Intake** temperature is measured by the sensor on the right side of the chassis, and the **Remote Intake** temperature is measured by the sensor on the left side of the chassis.
	• **Pic**: On ACX4000 routers, multiple temperature channels on a MIC. The status is: **OK** and the **Measurement** is in degrees Celsius (C) and Fahrenheit (F).
	• **Fan**: Fan status: **OK**, **Testing** (during initial power-on), **Failed**, or **Absent**.
	  On PTX Series Packet Transport Routers and MX2010, MX2020, and MX2008 Routers, multiple fan trays are supported. Fan status is reported in Fan Tray or Fan combinations. **Measurement** indicates actual fan RPM (PTX and MX2010, MX2020, and MX2008 Routers only).
	• **Misc**: Information about other components of the chassis.
	  ◦ On some routers, this field indicates the status of one or more additional components.
	  ◦ On the M40e, M160, and M320 router, **Misc** includes **CIP** (Connector Interface Panel). **OK** indicates that the CIP is present. **Absent** indicates that the CIP is not present.
	  ◦ On T Series routers, **Misc** includes **CIP** and **SPMB** (Switch Processor Mezzanine Board). **OK** indicates that the **CIP** or **SPMB** is present. **Absent** indicates that the **CIP** or **SPMB** is not present.
	  ◦ On PTX Series Packet Transport Routers, **Misc** includes the **SPMB** (Switch Processor Mezzanine Board). The SPMB is located on the control boards. **OK** indicates that the control board is present. **Absent** indicates that the control board is not present.

Item	(MX2010, MX2020, and MX2008 Routers) Information about the chassis component: Routing Engines, Controls Boards (CBs), Switch Fabric Boards (SFBs), PICs, Flexible PIC Concentrators (FPCs), and Adapter Cards (ADCs). (MX104 Routers) Information about the chassis components: Routing Engines, Control Board (CB), Power Entry Module (PEM), and Compact Forwarding Engine Board (AFEB). (QFabric Systems) Information about the chassis component: Control Boards, Routing Engines, Flexible PIC Concentrators (FPCs), and Power Entry Modules (PEMs), Node Devices, and Interconnect Devices. (QFX Series) Information about the chassis component: Flexible PIC Concentrators (FPCs), and Power Entry Modules (PEMs).

Table 16: show chassis environment Output Fields (continued)

Field Name	Field Description
Status	(MX104, MX2010, MX2020, and MX2008 Routers) Status of the specified chassis component. For example, if the Class is Fan, the fan status can be: • **OK**: The fans are operational. • **Testing**: The fans are being tested during initial power-on. • **Failed**: The fans have failed or the fans are not spinning. • **Absent**: The fan tray is not installed. If the Class is Power, the power supply status can be: • **OK**: The power component is operational. • **Testing**: The power component is being tested during initial power-on. • **Check**: There is insufficient power---that is, fewer than the minimum required feeds are connected. • **Failed**: The inputs leads have failed. • **Absent**: The power component is not installed.
Measurement	(MX104, MX2010, MX2020, and MX2008 Routers) Dependant on the Class. For example, if the Class is Temp, indicates the temperature in degree Celsius and degrees Fahrenheit. If the Class is Fan, indicates actual fan RPM.

Sample Output

show chassis environment (M5 Router)

user@host> **show chassis environment**

```
Class Item                   Status     Measurement
Power Power Supply A         OK
      Power Supply B         Absent
Temp  FPC 0                  OK         30 degrees C / 86 degrees F
      FEB                    OK         33 degrees C / 91 degrees F
      PS Intake              OK         27 degrees C / 80 degrees F
      PS Exhaust             OK         27 degrees C / 80 degrees F
      Routing Engine         OK         34 degrees C / 93 degrees F
Fans  Left Fan 1             OK         Spinning at normal speed
      Left Fan 2             OK         Spinning at normal speed
      Left Fan 3             OK         Spinning at normal speed
      Left Fan 4             OK         Spinning at normal speed
Misc  Craft Interface        OK
```

show chassis environment (M7i Router)

user@host> **show chassis environment**

```
Class Item                   Status     Measurement
Power Power Supply 0         OK
      Power Supply 1         Absent
Temp  Intake                 OK         22 degrees C / 71 degrees F
      FPC 0                  OK         23 degrees C / 73 degrees F
      Power Supplies         OK         23 degrees C / 73 degrees F
      CFEB Intake            OK         24 degrees C / 75 degrees F
      CFEB Exhaust           OK         29 degrees C / 84 degrees F
```



```
      Routing Engine         OK         26 degrees C / 78 degrees F
Fans  Fan 1                  OK         Spinning at normal speed
      Fan 2                  OK         Spinning at normal speed
      Fan 3                  OK         Spinning at normal speed
      Fan 4                  OK         Spinning at normal speed
```

show chassis environment (M10 Router)

user@host> **show chassis environment**

```
Class Item                   Status     Measurement
Power Power Supply A         OK
      Power Supply B         Failed
Temp  FPC 0                  OK         36 degrees C / 96 degrees F
      FPC 1                  OK         35 degrees C / 95 degrees F
      FEB                    OK         34 degrees C / 93 degrees F
      PS Intake              OK         31 degrees C / 87 degrees F
      PS Exhaust             OK         34 degrees C / 93 degrees F
      Routing Engine         OK         35 degrees C / 95 degrees F
Fans  Left Fan 1             OK         Spinning at normal speed
      Left Fan 2             OK         Spinning at normal speed
      Left Fan 3             OK         Spinning at normal speed
      Left Fan 4             OK         Spinning at normal speed
Misc  Craft Interface        OK
```

show chassis environment (M10i Router)

user@host> **show chassis environment**

```
Class Item                   Status     Measurement
Power Power Supply 0         OK
      Power Supply 1         OK
      Power Supply 2         Absent
      Power Supply 3         Absent
Temp  Intake                 OK         26 degrees C / 78 degrees F
      FPC 0                  OK         27 degrees C / 80 degrees F
      FPC 1                  OK         28 degrees C / 82 degrees F
      Lower Power Supplies   OK         29 degrees C / 84 degrees F
      Upper Power Supplies   OK         28 degrees C / 82 degrees F
      CFEB Intake            OK         27 degrees C / 80 degrees F
      CFEB Exhaust           OK         36 degrees C / 96 degrees F
      Routing Engine 0       OK         31 degrees C / 87 degrees F
      Routing Engine 1       OK         27 degrees C / 80 degrees F
Fans  Fan Tray 0 Fan 1       OK         Spinning at normal speed
      Fan Tray 0 Fan 2       OK         Spinning at normal speed
      Fan Tray 0 Fan 3       OK         Spinning at normal speed
      Fan Tray 0 Fan 4       OK         Spinning at normal speed
      Fan Tray 0 Fan 5       OK         Spinning at normal speed
      Fan Tray 0 Fan 6       OK         Spinning at normal speed
      Fan Tray 0 Fan 7       OK         Spinning at normal speed
      Fan Tray 0 Fan 8       OK         Spinning at normal speed
      Fan Tray 1 Fan 1       Absent
      Fan Tray 1 Fan 2       Absent
      Fan Tray 1 Fan 3       Absent
      Fan Tray 1 Fan 4       Absent
      Fan Tray 1 Fan 5       Absent
      Fan Tray 1 Fan 6       Absent
```

```
      Fan Tray 1 Fan 7       Absent
      Fan Tray 1 Fan 8       Absent
```

show chassis environment (M20 Router)

user@host> **show chassis environment**

```
Class Item                   Status     Measurement
Power Power Supply A         OK
      Power Supply B         Absent
Temp  FPC 0                  OK         28 degrees C / 82 degrees F
      FPC 1                  OK         27 degrees C / 80 degrees F
      Power Supply A         OK         22 degrees C / 71 degrees F
      Power Supply B         Absent
      SSB 0                  OK         30 degrees C / 86 degrees F
      Backplane              OK         22 degrees C / 71 degrees F
      Routing Engine 0       OK         26 degrees C / 78 degrees F
      Routing Engine 1       Testing
Fans  Rear Fan               OK         Spinning at normal speed
      Front Upper Fan        OK         Spinning at normal speed
      Front Middle Fan       OK         Spinning at normal speed
      Front Bottom Fan       OK         Spinning at normal speed
Misc  Craft Interface        OK
```

show chassis environment (M40 Router)

user@host> **show chassis environment**

```
Class Item                   Status     Measurement
Power Power Supply A         OK
      Power Supply B         Absent
Temp  FPC 3                  OK         24 degrees C / 75 degrees F
      FPC 6                  OK         26 degrees C / 78 degrees F
      SCB                    OK         26 degrees C / 78 degrees F
      Backplane @ A1         OK         28 degrees C / 82 degrees F
      Backplane @ A2         OK         23 degrees C / 73 degrees F
      Routing Engine         OK         26 degrees C / 78 degrees F
Fans  Top Impeller           OK         Spinning at normal speed
      Bottom impeller        OK         Spinning at normal speed
      Rear Left Fan          OK         Spinning at normal speed
      Rear Center Fan        OK         Spinning at normal speed
      Rear Right Fan         OK         Spinning at normal speed
Misc  Craft Interface        OK
```

show chassis environment (M40e Router)

user@host> **show chassis environment**

```
Class Item                   Status     Measurement
Power PEM 0                  OK
      PEM 1                  Absent
Temp  PCG 0                  OK         44 degrees C / 111 degrees F
      PCG 1                  OK         47 degrees C / 116 degrees F
      Routing Engine 0       OK         40 degrees C / 104 degrees F
      Routing Engine 1       OK         37 degrees C / 98 degrees F
      MCS 0                  OK         45 degrees C / 113 degrees F
```



```
      MCS 1                  OK         42 degrees C / 107 degrees F
      SFM 0 SPP              OK         40 degrees C / 104 degrees F
      SFM 0 SPR              OK         44 degrees C / 111 degrees F
      SFM 1 SPP              OK         43 degrees C / 109 degrees F
      SFM 1 SPR              OK         45 degrees C / 113 degrees F
      FPC 0                  OK         38 degrees C / 100 degrees F
      FPC 1                  OK         40 degrees C / 104 degrees F
      FPC 2                  OK         38 degrees C / 100 degrees F
      FPC 4                  OK         34 degrees C / 93 degrees F
      FPC 5                  OK         43 degrees C / 109 degrees F
      FPC 6                  OK         41 degrees C / 105 degrees F
      FPC 7                  OK         43 degrees C / 109 degrees F
      FPM CMB                OK         28 degrees C / 82 degrees F
      FPM Display            OK         28 degrees C / 82 degrees F
Fans  Rear Bottom Blower     OK         Spinning at normal speed
      Rear Top Blower        OK         Spinning at normal speed
      Front Top Blower       OK         Spinning at normal speed
      Fan Tray Rear Left     OK         Spinning at normal speed
      Fan Tray Rear Right    OK         Spinning at normal speed
      Fan Tray Front Left    OK         Spinning at normal speed
      Fan Tray Front Right   OK         Spinning at normal speed
Misc  CIP                    OK
```

show chassis environment (M120 Router)

user@host> **show chassis environment**

```
Class Item                           Status     Measurement
Temp  PEM 0                          OK
      PEM 1                          OK
      Routing Engine 0               OK         43 degrees C / 109 degrees F
      Routing Engine 1               OK         44 degrees C / 111 degrees F
      CB 0 Intake                    OK         33 degrees C / 91 degrees F
      CB 0 Exhaust A                 OK         36 degrees C / 96 degrees F
      CB 0 Exhaust B                 OK         35 degrees C / 95 degrees F
      CB 1 Intake                    OK         34 degrees C / 93 degrees F
      CB 1 Exhaust A                 OK         38 degrees C / 100 degrees F
      CB 1 Exhaust B                 OK         35 degrees C / 95 degrees F
      FEB 3 Intake                   OK         35 degrees C / 95 degrees F
      FEB 3 Exhaust A                OK         37 degrees C / 98 degrees F
      FEB 3 Exhaust B                OK         39 degrees C / 102 degrees F
      FEB 4 Intake                   OK         33 degrees C / 91 degrees F
      FEB 4 Exhaust A                OK         39 degrees C / 102 degrees F
      FEB 4 Exhaust B                OK         36 degrees C / 96 degrees F
      FPC 2 Exhaust A                OK         32 degrees C / 89 degrees F
      FPC 2 Exhaust B                OK         31 degrees C / 87 degrees F
      FPC 3 Exhaust A                OK         32 degrees C / 89 degrees F
      FPC 3 Exhaust B                OK         33 degrees C / 91 degrees F
      FPC 4 Exhaust A                OK         32 degrees C / 89 degrees F
      FPC 4 Exhaust B                OK         30 degrees C / 86 degrees F
Fans  Front Top Tray Fan 1           OK         Spinning at normal speed
      Front Top Tray Fan 2           OK         Spinning at normal speed
      Front Top Tray Fan 3           OK         Spinning at normal speed
      Front Top Tray Fan 4           OK         Spinning at normal speed
      Front Top Tray Fan 5           OK         Spinning at normal speed
      Front Top Tray Fan 6           OK         Spinning at normal speed
      Front Top Tray Fan 7           OK         Spinning at normal speed
      Front Top Tray Fan 8           OK         Spinning at normal speed
      Front Bottom Tray Fan 1        OK         Spinning at normal speed
```

```
      Front Bottom Tray Fan 2        OK         Spinning at normal speed
      Front Bottom Tray Fan 3        OK         Spinning at normal speed
      Front Bottom Tray Fan 4        OK         Spinning at normal speed
      Front Bottom Tray Fan 5        OK         Spinning at normal speed
      Front Bottom Tray Fan 6        OK         Spinning at normal speed
      Front Bottom Tray Fan 7        OK         Spinning at normal speed
      Front Bottom Tray Fan 8        OK         Spinning at normal speed
      Rear Top Tray Fan 1            OK         Spinning at normal speed
      Rear Top Tray Fan 2            OK         Spinning at normal speed
      Rear Top Tray Fan 3            OK         Spinning at normal speed
      Rear Top Tray Fan 4            OK         Spinning at normal speed
      Rear Top Tray Fan 5            OK         Spinning at normal speed
      Rear Top Tray Fan 6            OK         Spinning at normal speed
      Rear Top Tray Fan 7            OK         Spinning at normal speed
      Rear Top Tray Fan 8            OK         Spinning at normal speed
      Rear Bottom Tray Fan 1         OK         Spinning at normal speed
      Rear Bottom Tray Fan 2         OK         Spinning at normal speed
      Rear Bottom Tray Fan 3         OK         Spinning at normal speed
      Rear Bottom Tray Fan 4         OK         Spinning at normal speed
      Rear Bottom Tray Fan 5         OK         Spinning at normal speed
      Rear Bottom Tray Fan 6         OK         Spinning at normal speed
      Rear Bottom Tray Fan 7         OK         Spinning at normal speed
      Rear Bottom Tray Fan 8         OK         Spinning at normal speed
```

show chassis environment (M160 Router)

user@host> **show chassis environment**

```
Class Item                      Status     Measurement
Power PEM 0                     OK           PEM 1                 Absent
Temp  PCG 0                     OK         45 degrees C / 113 degrees F
      PCG 1                     Absent
      Routing Engine 0          OK         35 degrees C / 95 degrees F
      Routing Engine 1          Absent
      MCS 0                     OK         50 degrees C / 122 degrees F
      SFM 0 SPP                 OK         47 degrees C / 116 degrees F
      SFM 0 SPR                 OK         49 degrees C / 120 degrees F
      SFM 1 SPP                 OK         50 degrees C / 122 degrees F
      SFM 1 SPR                 OK         50 degrees C / 122 degrees F
      SFM 2 SPP                 OK         51 degrees C / 123 degrees F
      SFM 2 SPR                 OK         52 degrees C / 125 degrees F
      SFM 3 SPP                 OK         52 degrees C / 125 degrees F
      SFM 3 SPR                 OK         48 degrees C / 118 degrees F
      FPC 0                     OK         45 degrees C / 113 degrees F
      FPC 6                     OK         43 degrees C / 109 degrees F
      FPM CMB                   OK         31 degrees C / 87 degrees F
      FPM Display               OK         33 degrees C / 91 degrees F
Fans  Rear Bottom Blower        OK         Spinning at normal speed
      Rear Top Blower           OK         Spinning at normal speed
      Front Top Blower          OK         Spinning at normal speed
      Fan Tray Rear Left        OK         Spinning at normal speed
      Fan Tray Rear Right       OK         Spinning at normal speed
      Fan Tray Front Left       OK         Spinning at normal speed
      Fan Tray Front Right      OK         Spinning at normal speed
Misc  CIP                       OK
```


show chassis environment (M320 Router)

user@host> **show chassis environment**

```
Class Item                  Status     Measurement
Temp  PEM 0                 Absent
      PEM 1                 Absent
      PEM 2                 OK
      PEM 3                 OK
      Routing Engine 0      OK         33 degrees C / 91 degrees F
      Routing Engine 1      OK         32 degrees C / 89 degrees F
      CB 0                  OK         36 degrees C / 96 degrees F
      CB 1                  OK         36 degrees C / 96 degrees F
      SIB 0                 OK         38 degrees C / 100 degrees F
      SIB 1                 OK         29 degrees C / 84 degrees F
      SIB 2                 OK         38 degrees C / 100 degrees F
      SIB 3                 OK         41 degrees C / 105 degrees F
      FPC 0 Intake          OK         28 degrees C / 82 degrees F
      FPC 0 Exhaust         OK         40 degrees C / 104 degrees F
      FPC 1 Intake          OK         29 degrees C / 84 degrees F
      FPC 1 Exhaust         OK         39 degrees C / 102 degrees F
      FPC 2 Intake          OK         28 degrees C / 82 degrees F
      FPC 2 Exhaust         OK         38 degrees C / 100 degrees F
      FPC 3 Intake          OK         28 degrees C / 82 degrees F
      FPC 3 Exhaust         OK         39 degrees C / 102 degrees F
      FPC 6 Intake          OK         27 degrees C / 80 degrees F
      FPC 6 Exhaust         OK         39 degrees C / 102 degrees F
      FPC 7 Intake          OK         27 degrees C / 80 degrees F
      FPC 7 Exhaust         OK         42 degrees C / 107 degrees F
      FPM GBUS              OK         30 degrees C / 86 degrees F
Fan   Top Left Front fan    OK         Spinning at normal speed
      Top Right Rear fan    OK         Spinning at normal speed
      Top Right Front fan   OK         Spinning at normal speed
      Top Left Rear fan     OK         Spinning at normal speed
      Bottom Left Front fan OK         Spinning at normal speed
      Bottom Right Rear fan OK         Spinning at normal speed
      Bottom Right Front fan OK        Spinning at normal speed
      Bottom Left Rear fan  OK         Spinning at normal speed
      Rear Fan 1 (TOP)      OK         Spinning at normal speed
      Rear Fan 2            OK         Spinning at normal speed
      Rear Fan 3            OK         Spinning at normal speed
      Rear Fan 4            OK         Spinning at normal speed
      Rear Fan 5            OK         Spinning at normal speed
      Rear Fan 6            OK         Spinning at normal speed
      Rear Fan 7 (Bottom)   OK         Spinning at normal speed
Misc  CIP                   OK
```

show chassis environment (MX150)

user@host> **show chassis environment**

```
Class Item                          Status     Measurement
Power FPC 0 Power Supply 0          OK
Temp  FPC 0 Sensor 1                OK         42 degrees C / 107 degrees F
      FPC 0 Sensor 2                OK         39 degrees C / 102 degrees F
      FPC 0 Coretemp                OK         75 degrees C / 167 degrees F
Fans  FPC 0 Fan Tray 0              OK         Spinning at normal speed
      FPC 0 Fan Tray 1              OK         Spinning at normal speed
```

show chassis environment (MX104 Router)

user@host> **show chassis environment**

```
Class Item                           Status     Measurement
Temp  PEM 0                          OK         34 degrees C / 93 degrees F
      PEM 1                          Absent
      ABB 0 Intake                   OK         33 degrees C / 91 degrees F
      ABB 0 Exhaust A                OK         42 degrees C / 107 degrees F
      ABB 0 Exhaust B                OK         43 degrees C / 109 degrees F
      ABB 1 Intake                   Absent
      ABB 1 Exhaust A                Absent
      ABB 1 Exhaust B                Absent
      Routing Engine 0               OK         34 degrees C / 93 degrees F
      Routing Engine 0 CPU           OK         46 degrees C / 114 degrees F
      Routing Engine 1               Absent
      Routing Engine 1 CPU           Absent
      AFEB 0 AFEB Processor          OK         33 degrees C / 91 degrees F
Fans  Fan 1                          OK         Spinning at normal speed
      Fan 2                          OK         Spinning at normal speed
      Fan 3                          OK         Spinning at normal speed
      Fan 4                          OK         Spinning at normal speed
      Fan 5                          OK         Spinning at normal speed
```

show chassis environment (MX240 Router)

user@host> **show chassis environment**

```
Class Item                           Status     Measurement
Temp  PEM 0                          OK         40 degrees C / 104 degrees F
      PEM 1                          OK         45 degrees C / 113 degrees F
      PEM 2                          Absent
      PEM 3                          Absent
      Routing Engine 0               OK         39 degrees C / 102 degrees F
      Routing Engine 1               OK         37 degrees C / 98 degrees F
      CB 0 Intake                    OK         36 degrees C / 96 degrees F
      CB 0 Exhaust A                 OK         34 degrees C / 93 degrees F
      CB 0 Exhaust B                 OK         38 degrees C / 100 degrees F
      CB 0 ACBC                      OK         37 degrees C / 98 degrees F
      CB 0 SF A                      OK         49 degrees C / 120 degrees F
      CB 0 SF B                      OK         41 degrees C / 105 degrees F
      CB 1 Intake                    OK         37 degrees C / 98 degrees F
      CB 1 Exhaust A                 OK         34 degrees C / 93 degrees F
      CB 1 Exhaust B                 OK         39 degrees C / 102 degrees F
      CB 1 ACBC                      OK         38 degrees C / 100 degrees F
      CB 1 SF A                      OK         47 degrees C / 116 degrees F
      CB 1 SF B                      OK         41 degrees C / 105 degrees F
      FPC 1 Intake                   OK         33 degrees C / 91 degrees F
      FPC 1 Exhaust A                OK         38 degrees C / 100 degrees F
      FPC 1 Exhaust B                OK         53 degrees C / 127 degrees F
      FPC 1 I3 0 TSensor             OK         50 degrees C / 122 degrees F
      FPC 1 I3 0 Chip                OK         53 degrees C / 127 degrees F
      FPC 1 I3 1 TSensor             OK         49 degrees C / 120 degrees F
      FPC 1 I3 1 Chip                OK         52 degrees C / 125 degrees F
      FPC 1 I3 2 TSensor             OK         47 degrees C / 116 degrees F
      FPC 1 I3 2 Chip                OK         49 degrees C / 120 degrees F
      FPC 1 I3 3 TSensor             OK         44 degrees C / 111 degrees F
      FPC 1 I3 3 Chip                OK         46 degrees C / 114 degrees F
      FPC 1 IA 0 TSensor             OK         45 degrees C / 113 degrees F
      FPC 1 IA 0 Chip                OK         44 degrees C / 111 degrees F
```

```
      FPC 1 IA 1 TSensor              OK         44 degrees C / 111 degrees F
      FPC 1 IA 1 Chip                 OK         48 degrees C / 118 degrees F
      FPC 2 Intake                    OK         32 degrees C / 89 degrees F
      FPC 2 Exhaust A                 OK         40 degrees C / 104 degrees F
      FPC 2 Exhaust B                 OK         52 degrees C / 125 degrees F
      FPC 2 I3 0 TSensor              OK         52 degrees C / 125 degrees F
      FPC 2 I3 0 Chip                 OK         56 degrees C / 132 degrees F
      FPC 2 I3 1 TSensor              OK         52 degrees C / 125 degrees F
      FPC 2 I3 1 Chip                 OK         55 degrees C / 131 degrees F
      FPC 2 I3 2 TSensor              OK         49 degrees C / 120 degrees F
      FPC 2 I3 2 Chip                 OK         52 degrees C / 125 degrees F
      FPC 2 I3 3 TSensor              OK         44 degrees C / 111 degrees F
      FPC 2 I3 3 Chip                 OK         48 degrees C / 118 degrees F
      FPC 2 IA 0 TSensor              OK         50 degrees C / 122 degrees F
      FPC 2 IA 0 Chip                 OK         48 degrees C / 118 degrees F
      FPC 2 IA 1 TSensor              OK         47 degrees C / 116 degrees F
      FPC 2 IA 1 Chip                 OK         53 degrees C / 127 degrees F
Fans  Front Fan                       OK         Spinning at normal speed
      Middle Fan                      OK         Spinning at normal speed
      Rear Fan                        OK         Spinning at normal speed
```

show chassis environment (MX240 Router with SCBE)

user@host> **show chassis environment**

```
Class Item                            Status     Measurement
Temp  PEM 0                           OK         40 degrees C / 104 degrees F
      PEM 1                           OK         45 degrees C / 113 degrees F
      PEM 2                           Absent
      PEM 3                           Absent
      Routing Engine 0                OK         39 degrees C / 102 degrees F
      Routing Engine 1                OK         37 degrees C / 98 degrees F
      CB 0 Intake                     OK         36 degrees C / 96 degrees F
      CB 0 Exhaust A                  OK         34 degrees C / 93 degrees F
      CB 0 Exhaust B                  OK         38 degrees C / 100 degrees F
      CB 0 ACBC                       OK         37 degrees C / 98 degrees F
      CB 0 XF A                       OK         49 degrees C / 120 degrees F
      CB 0 XF B                       OK         41 degrees C / 105 degrees F
      CB 1 Intake                     OK         37 degrees C / 98 degrees F
      CB 1 Exhaust A                  OK         34 degrees C / 93 degrees F
      CB 1 Exhaust B                  OK         39 degrees C / 102 degrees F
      CB 1 ACBC                       OK         38 degrees C / 100 degrees F
      CB 1 XF A                       OK         47 degrees C / 116 degrees F
      CB 1 XF B                       OK         41 degrees C / 105 degrees F
      FPC 1 Intake                    OK         33 degrees C / 91 degrees F
      FPC 1 Exhaust A                 OK         38 degrees C / 100 degrees F
      FPC 1 Exhaust B                 OK         53 degrees C / 127 degrees F
      FPC 1 I3 0 TSensor              OK         50 degrees C / 122 degrees F
      FPC 1 I3 0 Chip                 OK         53 degrees C / 127 degrees F
      FPC 1 I3 1 TSensor              OK         49 degrees C / 120 degrees F
      FPC 1 I3 1 Chip                 OK         52 degrees C / 125 degrees F
      FPC 1 I3 2 TSensor              OK         47 degrees C / 116 degrees F
      FPC 1 I3 2 Chip                 OK         49 degrees C / 120 degrees F
      FPC 1 I3 3 TSensor              OK         44 degrees C / 111 degrees F
      FPC 1 I3 3 Chip                 OK         46 degrees C / 114 degrees F
      FPC 1 IA 0 TSensor              OK         45 degrees C / 113 degrees F
      FPC 1 IA 0 Chip                 OK         44 degrees C / 111 degrees F
      FPC 1 IA 1 TSensor              OK         44 degrees C / 111 degrees F
      FPC 1 IA 1 Chip                 OK         48 degrees C / 118 degrees F
      FPC 2 Intake                    OK         32 degrees C / 89 degrees F
```

```
      FPC 2 Exhaust A               OK         40 degrees C / 104 degrees F
      FPC 2 Exhaust B               OK         52 degrees C / 125 degrees F
      FPC 2 I3 0 TSensor            OK         52 degrees C / 125 degrees F
      FPC 2 I3 0 Chip               OK         56 degrees C / 132 degrees F
      FPC 2 I3 1 TSensor            OK         52 degrees C / 125 degrees F
      FPC 2 I3 1 Chip               OK         55 degrees C / 131 degrees F
      FPC 2 I3 2 TSensor            OK         49 degrees C / 120 degrees F
      FPC 2 I3 2 Chip               OK         52 degrees C / 125 degrees F
      FPC 2 I3 3 TSensor            OK         44 degrees C / 111 degrees F
      FPC 2 I3 3 Chip               OK         48 degrees C / 118 degrees F
      FPC 2 IA 0 TSensor            OK         50 degrees C / 122 degrees F
      FPC 2 IA 0 Chip               OK         48 degrees C / 118 degrees F
      FPC 2 IA 1 TSensor            OK         47 degrees C / 116 degrees F
      FPC 2 IA 1 Chip               OK         53 degrees C / 127 degrees F
Fans  Front Fan                     OK         Spinning at normal speed
      Middle Fan                    OK         Spinning at normal speed
      Rear Fan                      OK         Spinning at normal speed
```

show chassis environment (MX480 Router)

`user@host>` **show chassis environment**

```
Class Item                          Status     Measurement
Temp  PEM 0                         OK         35 degrees C / 95 degrees F
      PEM 1                         OK         40 degrees C / 104 degrees F
      PEM 2                         Absent
      PEM 3                         Absent
      Routing Engine 0              OK         44 degrees C / 111 degrees F
      Routing Engine 1              OK         45 degrees C / 113 degrees F
      CB 0 Intake                   OK         36 degrees C / 96 degrees F
      CB 0 Exhaust A                OK         38 degrees C / 100 degrees F
      CB 0 Exhaust B                OK         39 degrees C / 102 degrees F
      CB 0 ACBC                     OK         37 degrees C / 98 degrees F
      CB 0 SF A                     OK         51 degrees C / 123 degrees F
      CB 0 SF B                     OK         44 degrees C / 111 degrees F
      CB 1 Intake                   OK         36 degrees C / 96 degrees F
      CB 1 Exhaust A                OK         39 degrees C / 102 degrees F
      CB 1 Exhaust B                OK         40 degrees C / 104 degrees F
      CB 1 ACBC                     OK         37 degrees C / 98 degrees F
      CB 1 SF A                     OK         50 degrees C / 122 degrees F
      CB 1 SF B                     OK         43 degrees C / 109 degrees F
      FPC 0 Intake                  OK         36 degrees C / 96 degrees F
      FPC 0 Exhaust A               OK         39 degrees C / 102 degrees F
      FPC 0 Exhaust B               OK         51 degrees C / 123 degrees F
      FPC 0 I3 0 TSensor            OK         49 degrees C / 120 degrees F
      FPC 0 I3 0 Chip               OK         56 degrees C / 132 degrees F
      FPC 0 I3 1 TSensor            OK         47 degrees C / 116 degrees F
      FPC 0 I3 1 Chip               OK         52 degrees C / 125 degrees F
      FPC 0 I3 2 TSensor            OK         46 degrees C / 114 degrees F
      FPC 0 I3 2 Chip               OK         48 degrees C / 118 degrees F
      FPC 0 I3 3 TSensor            OK         42 degrees C / 107 degrees F
      FPC 0 I3 3 Chip               OK         45 degrees C / 113 degrees F
      FPC 0 IA 0 TSensor            OK         45 degrees C / 113 degrees F
      FPC 0 IA 0 Chip               OK         45 degrees C / 113 degrees F
      FPC 0 IA 1 TSensor            OK         44 degrees C / 111 degrees F
      FPC 0 IA 1 Chip               OK         48 degrees C / 118 degrees F
      FPC 1 Intake                  OK         37 degrees C / 98 degrees F
      FPC 1 Exhaust A               OK         41 degrees C / 105 degrees F
      FPC 1 Exhaust B               OK         52 degrees C / 125 degrees F
      FPC 1 I3 0 TSensor            OK         51 degrees C / 123 degrees F
```



```
      FPC 1 I3 0 Chip              OK        57 degrees C / 134 degrees F
      FPC 1 I3 1 TSensor           OK        48 degrees C / 118 degrees F
      FPC 1 I3 1 Chip              OK        52 degrees C / 125 degrees F
      FPC 1 I3 2 TSensor           OK        46 degrees C / 114 degrees F
      FPC 1 I3 2 Chip              OK        50 degrees C / 122 degrees F
      FPC 1 I3 3 TSensor           OK        42 degrees C / 107 degrees F
      FPC 1 I3 3 Chip              OK        46 degrees C / 114 degrees F
      FPC 1 IA 0 TSensor           OK        49 degrees C / 120 degrees F
      FPC 1 IA 0 Chip              OK        48 degrees C / 118 degrees F
      FPC 1 IA 1 TSensor           OK        46 degrees C / 114 degrees F
      FPC 1 IA 1 Chip              OK        50 degrees C / 122 degrees F
Fans  Top Rear Fan                 OK        Spinning at normal speed
      Bottom Rear Fan              OK        Spinning at normal speed
      Top Middle Fan               OK        Spinning at normal speed
      Bottom Middle Fan            OK        Spinning at normal speed
      Top Front Fan                OK        Spinning at normal speed
      Bottom Front Fan             OK        Spinning at normal speed
```

show chassis environment (MX480 Router with SCBE)

user@host> **show chassis environment**

```
Class Item                         Status    Measurement
Temp  PEM 0                        OK        35 degrees C / 95 degrees F
      PEM 1                        OK        40 degrees C / 104 degrees F
      PEM 2                        Absent
      PEM 3                        Absent
      Routing Engine 0             OK        44 degrees C / 111 degrees F
      Routing Engine 1             OK        45 degrees C / 113 degrees F
      CB 0 Intake                  OK        36 degrees C / 96 degrees F
      CB 0 Exhaust A               OK        38 degrees C / 100 degrees F
      CB 0 Exhaust B               OK        39 degrees C / 102 degrees F
      CB 0 ACBC                    OK        37 degrees C / 98 degrees F
      CB 0 XF A                    OK        51 degrees C / 123 degrees F
      CB 0 XF B                    OK        44 degrees C / 111 degrees F
      CB 1 Intake                  OK        36 degrees C / 96 degrees F
      CB 1 Exhaust A               OK        39 degrees C / 102 degrees F
      CB 1 Exhaust B               OK        40 degrees C / 104 degrees F
      CB 1 ACBC                    OK        37 degrees C / 98 degrees F
      CB 1 XF A                    OK        50 degrees C / 122 degrees F
      CB 1 XF B                    OK        43 degrees C / 109 degrees F
      FPC 0 Intake                 OK        36 degrees C / 96 degrees F
      FPC 0 Exhaust A              OK        39 degrees C / 102 degrees F
      FPC 0 Exhaust B              OK        51 degrees C / 123 degrees F
      FPC 0 I3 0 TSensor           OK        49 degrees C / 120 degrees F
      FPC 0 I3 0 Chip              OK        56 degrees C / 132 degrees F
      FPC 0 I3 1 TSensor           OK        47 degrees C / 116 degrees F
      FPC 0 I3 1 Chip              OK        52 degrees C / 125 degrees F
      FPC 0 I3 2 TSensor           OK        46 degrees C / 114 degrees F
      FPC 0 I3 2 Chip              OK        48 degrees C / 118 degrees F
      FPC 0 I3 3 TSensor           OK        42 degrees C / 107 degrees F
      FPC 0 I3 3 Chip              OK        45 degrees C / 113 degrees F
      FPC 0 IA 0 TSensor           OK        45 degrees C / 113 degrees F
      FPC 0 IA 0 Chip              OK        45 degrees C / 113 degrees F
      FPC 0 IA 1 TSensor           OK        44 degrees C / 111 degrees F
      FPC 0 IA 1 Chip              OK        48 degrees C / 118 degrees F
      FPC 1 Intake                 OK        37 degrees C / 98 degrees F
      FPC 1 Exhaust A              OK        41 degrees C / 105 degrees F
      FPC 1 Exhaust B              OK        52 degrees C / 125 degrees F
      FPC 1 I3 0 TSensor           OK        51 degrees C / 123 degrees F
```

```
      FPC 1 I3 0 Chip                OK          57 degrees C / 134 degrees F
      FPC 1 I3 1 TSensor             OK          48 degrees C / 118 degrees F
      FPC 1 I3 1 Chip                OK          52 degrees C / 125 degrees F
      FPC 1 I3 2 TSensor             OK          46 degrees C / 114 degrees F
      FPC 1 I3 2 Chip                OK          50 degrees C / 122 degrees F
      FPC 1 I3 3 TSensor             OK          42 degrees C / 107 degrees F
      FPC 1 I3 3 Chip                OK          46 degrees C / 114 degrees F
      FPC 1 IA 0 TSensor             OK          49 degrees C / 120 degrees F
      FPC 1 IA 0 Chip                OK          48 degrees C / 118 degrees F
      FPC 1 IA 1 TSensor             OK          46 degrees C / 114 degrees F
      FPC 1 IA 1 Chip                OK          50 degrees C / 122 degrees F
Fans  Top Rear Fan                   OK          Spinning at normal speed
      Bottom Rear Fan                OK          Spinning at normal speed
      Top Middle Fan                 OK          Spinning at normal speed
      Bottom Middle Fan              OK          Spinning at normal speed
      Top Front Fan                  OK          Spinning at normal speed
      Bottom Front Fan               OK          Spinning at normal speed
```

show chassis environment (MX960 Router)

user@host> **show chassis environment**

```
Class Item                           Status      Measurement
Temp  PEM 0                          Absent
      PEM 1                          Absent
      PEM 2                          Check
      PEM 3                          OK          35 degrees C / 95 degrees F
      Routing Engine 0               OK          37 degrees C / 98 degrees F
      Routing Engine 1               Absent
      CB 0 Intake                    OK          24 degrees C / 75 degrees F
      CB 0 Exhaust A                 OK          30 degrees C / 86 degrees F
      CB 0 Exhaust B                 OK          27 degrees C / 80 degrees F
      CB 1 Intake                    Absent
      CB 1 Exhaust A                 Absent
      CB 1 Exhaust B                 Absent
      CB 1 ACBC                      Absent
      CB 1 SF A                      Absent
      CB 1 SF B                      Absent
      CB 2 Intake                    Absent
      CB 2 Exhaust A                 Absent
      CB 2 Exhaust B                 Absent
      CB 2 ACBC                      Absent
      CB 2 SF A                      Absent
      CB 2 SF B                      Absent
      FPC 4 Intake                   OK          24 degrees C / 75 degrees F
      FPC 4 Exhaust A                OK          36 degrees C / 96 degrees F
      FPC 4 Exhaust B                OK          38 degrees C / 100 degrees F
      FPC 7 Intake                   OK          24 degrees C / 75 degrees F
      FPC 7 Exhaust A                OK          36 degrees C / 96 degrees F
      FPC 7 Exhaust B                OK          42 degrees C / 107 degrees F
Fans  Top Fan Tray Temp              Failed
      Top Tray Fan 1                 OK          Spinning at normal speed
      Top Tray Fan 2                 OK          Spinning at normal speed
      Top Tray Fan 3                 OK          Spinning at normal speed
      Top Tray Fan 4                 OK          Spinning at normal speed
      Top Tray Fan 5                 OK          Spinning at normal speed
      Top Tray Fan 6                 OK          Spinning at normal speed
      Bottom Fan Tray Temp           Failed
      Bottom Tray Fan 1              OK          Spinning at normal speed
      Bottom Tray Fan 2              OK          Spinning at normal speed
```



```
      Bottom Tray Fan 3                 OK           Spinning at normal speed
      Bottom Tray Fan 4                 OK           Spinning at normal speed
      Bottom Tray Fan 5                 OK           Spinning at normal speed
      Bottom Tray Fan 6                 OK           Spinning at normal speed
```

show chassis environment (MX960 Router with SCBE)

`user@host>` **show chassis environment**

```
Class Item                              Status       Measurement
Temp  PEM 0                             Absent
      PEM 1                             OK           50 degrees C / 122 degrees F
      PEM 2                             OK           50 degrees C / 122 degrees F
      PEM 3                             OK           50 degrees C / 122 degrees F
      Routing Engine 0                  OK           42 degrees C / 107 degrees F
      Routing Engine 0 CPU              OK           51 degrees C / 123 degrees F
      Routing Engine 1                  OK           39 degrees C / 102 degrees F
      Routing Engine 1 CPU              OK           44 degrees C / 111 degrees F
      CB 0 Intake                       OK           35 degrees C / 95 degrees F
      CB 0 Exhaust A                    OK           36 degrees C / 96 degrees F
      CB 0 Exhaust B                    OK           43 degrees C / 109 degrees F
      CB 0 ACBC                         OK           38 degrees C / 100 degrees F
      CB 0 XF A                         OK           53 degrees C / 127 degrees F
      CB 0 XF B                         OK           47 degrees C / 116 degrees F
      CB 1 Intake                       OK           35 degrees C / 95 degrees F
      CB 1 Exhaust A                    OK           35 degrees C / 95 degrees F
      CB 1 Exhaust B                    OK           41 degrees C / 105 degrees F
      CB 1 ACBC                         OK           38 degrees C / 100 degrees F
      CB 1 XF A                         OK           52 degrees C / 125 degrees F
      CB 1 XF B                         OK           47 degrees C / 116 degrees F
      CB 2 Intake                       OK           32 degrees C / 89 degrees F
      CB 2 Exhaust A                    OK           30 degrees C / 86 degrees F
      CB 2 Exhaust B                    OK           35 degrees C / 95 degrees F
      CB 2 ACBC                         OK           33 degrees C / 91 degrees F
      CB 2 XF A                         OK           51 degrees C / 123 degrees F
      CB 2 XF B                         OK           50 degrees C / 122 degrees F
      FPC 0 Intake                      OK           35 degrees C / 95 degrees F
      FPC 0 Exhaust A                   OK           39 degrees C / 102 degrees F
      FPC 0 Exhaust B                   OK           50 degrees C / 122 degrees F
      FPC 0 I3 0 TSensor                OK           50 degrees C / 122 degrees F
      FPC 0 I3 0 Chip                   OK           56 degrees C / 132 degrees F
      FPC 0 I3 1 TSensor                OK           47 degrees C / 116 degrees F
      FPC 0 I3 1 Chip                   OK           50 degrees C / 122 degrees F
      FPC 0 I3 2 TSensor                OK           45 degrees C / 113 degrees F
      FPC 0 I3 2 Chip                   OK           48 degrees C / 118 degrees F
      FPC 0 I3 3 TSensor                OK           41 degrees C / 105 degrees F
      FPC 0 I3 3 Chip                   OK           44 degrees C / 111 degrees F
      FPC 0 IA 0 TSensor                OK           45 degrees C / 113 degrees F
      FPC 0 IA 0 Chip                   OK           45 degrees C / 113 degrees F
      FPC 0 IA 1 TSensor                OK           44 degrees C / 111 degrees F
      FPC 0 IA 1 Chip                   OK           48 degrees C / 118 degrees F
      FPC 1 Intake                      OK           36 degrees C / 96 degrees F
      FPC 1 Exhaust A                   OK           47 degrees C / 116 degrees F
      FPC 1 Exhaust B                   OK           43 degrees C / 109 degrees F
      FPC 1 LU 0 TCAM TSensor           OK           53 degrees C / 127 degrees F
      FPC 1 LU 0 TCAM Chip              OK           57 degrees C / 134 degrees F
      FPC 1 LU 0 TSensor                OK           53 degrees C / 127 degrees F
      FPC 1 LU 0 Chip                   OK           60 degrees C / 140 degrees F
      FPC 1 MQ 0 TSensor                OK           53 degrees C / 127 degrees F
      FPC 1 MQ 0 Chip                   OK           56 degrees C / 132 degrees F
```

```
FPC 1 LU 1 TCAM TSensor        OK         51 degrees C / 123 degrees F
FPC 1 LU 1 TCAM Chip           OK         52 degrees C / 125 degrees F
FPC 1 LU 1 TSensor             OK         51 degrees C / 123 degrees F
FPC 1 LU 1 Chip                OK         53 degrees C / 127 degrees F
FPC 1 MQ 1 TSensor             OK         51 degrees C / 123 degrees F
FPC 1 MQ 1 Chip                OK         58 degrees C / 136 degrees F
FPC 2 Intake                   OK         35 degrees C / 95 degrees F
FPC 2 Exhaust A                OK         39 degrees C / 102 degrees F
FPC 2 Exhaust B                OK         54 degrees C / 129 degrees F
FPC 2 I3 0 TSensor             OK         52 degrees C / 125 degrees F
FPC 2 I3 0 Chip                OK         59 degrees C / 138 degrees F
FPC 2 I3 1 TSensor             OK         48 degrees C / 118 degrees F
FPC 2 I3 1 Chip                OK         52 degrees C / 125 degrees F
FPC 2 I3 2 TSensor             OK         47 degrees C / 116 degrees F
FPC 2 I3 2 Chip                OK         49 degrees C / 120 degrees F
FPC 2 I3 3 TSensor             OK         41 degrees C / 105 degrees F
FPC 2 I3 3 Chip                OK         44 degrees C / 111 degrees F
FPC 2 IA 0 TSensor             OK         47 degrees C / 116 degrees F
FPC 2 IA 0 Chip                OK         46 degrees C / 114 degrees F
FPC 2 IA 1 TSensor             OK         45 degrees C / 113 degrees F
FPC 2 IA 1 Chip                OK         49 degrees C / 120 degrees F
FPC 3 Intake                   OK         34 degrees C / 93 degrees F
FPC 3 Exhaust A                OK         34 degrees C / 93 degrees F
FPC 3 Exhaust B                OK         47 degrees C / 116 degrees F
FPC 3 I3 0 TSensor             OK         48 degrees C / 118 degrees F
FPC 3 I3 0 Chip                OK         52 degrees C / 125 degrees F
FPC 3 I3 1 TSensor             OK         46 degrees C / 114 degrees F
FPC 3 I3 1 Chip                OK         48 degrees C / 118 degrees F
FPC 3 IA 0 TSensor             OK         41 degrees C / 105 degrees F
FPC 3 IA 0 Chip                OK         40 degrees C / 104 degrees F
FPC 5 Intake                   OK         42 degrees C / 107 degrees F
FPC 5 Exhaust A                OK         42 degrees C / 107 degrees F
FPC 5 Exhaust B                OK         53 degrees C / 127 degrees F
FPC 5 LU 0 TSensor             OK         53 degrees C / 127 degrees F
FPC 5 LU 0 Chip                OK         54 degrees C / 129 degrees F
FPC 5 LU 1 TSensor             OK         53 degrees C / 127 degrees F
FPC 5 LU 1 Chip                OK         61 degrees C / 141 degrees F
FPC 5 LU 2 TSensor             OK         53 degrees C / 127 degrees F
FPC 5 LU 2 Chip                OK         51 degrees C / 123 degrees F
FPC 5 LU 3 TSensor             OK         53 degrees C / 127 degrees F
FPC 5 LU 3 Chip                OK         53 degrees C / 127 degrees F
FPC 5 MQ 0 TSensor             OK         47 degrees C / 116 degrees F
FPC 5 MQ 0 Chip                OK         52 degrees C / 125 degrees F
FPC 5 MQ 1 TSensor             OK         47 degrees C / 116 degrees F
FPC 5 MQ 1 Chip                OK         52 degrees C / 125 degrees F
FPC 5 MQ 2 TSensor             OK         47 degrees C / 116 degrees F
FPC 5 MQ 2 Chip                OK         46 degrees C / 114 degrees F
FPC 5 MQ 3 TSensor             OK         47 degrees C / 116 degrees F
FPC 5 MQ 3 Chip                OK         45 degrees C / 113 degrees F
FPC 7 Intake                   OK         36 degrees C / 96 degrees F
FPC 7 Exhaust A                OK         35 degrees C / 95 degrees F
FPC 7 Exhaust B                OK         33 degrees C / 91 degrees F
FPC 7 QX 0 TSensor             OK         42 degrees C / 107 degrees F
FPC 7 QX 0 Chip                OK         47 degrees C / 116 degrees F
FPC 7 LU 0 TCAM TSensor        OK         42 degrees C / 107 degrees F
FPC 7 LU 0 TCAM Chip           OK         44 degrees C / 111 degrees F
FPC 7 LU 0 TSensor             OK         42 degrees C / 107 degrees F
FPC 7 LU 0 Chip                OK         46 degrees C / 114 degrees F
FPC 7 MQ 0 TSensor             OK         42 degrees C / 107 degrees F
FPC 7 MQ 0 Chip                OK         45 degrees C / 113 degrees F
```

```
      FPC 8 Intake                  OK         33 degrees C / 91 degrees F
      FPC 8 Exhaust A               OK         33 degrees C / 91 degrees F
      FPC 8 Exhaust B               OK         36 degrees C / 96 degrees F
      FPC 8 I3 0 TSensor            OK         38 degrees C / 100 degrees F
      FPC 8 I3 0 Chip               OK         43 degrees C / 109 degrees F
      FPC 8 BDS 0 TSensor           OK         37 degrees C / 98 degrees F
      FPC 8 BDS 0 Chip              OK         36 degrees C / 96 degrees F
      FPC 8 IA 0 TSensor            OK         37 degrees C / 98 degrees F
      FPC 8 IA 0 Chip               OK         37 degrees C / 98 degrees F
      FPC 10 Intake                 OK         38 degrees C / 100 degrees F
      FPC 10 Exhaust A              OK         36 degrees C / 96 degrees F
      FPC 10 Exhaust B              OK         41 degrees C / 105 degrees F
      FPC 10 I3 0 TSensor           OK         40 degrees C / 104 degrees F
      FPC 10 I3 0 Chip              OK         42 degrees C / 107 degrees F
      FPC 10 I3 1 TSensor           OK         40 degrees C / 104 degrees F
      FPC 10 I3 1 Chip              OK         44 degrees C / 111 degrees F
      FPC 10 I3 2 TSensor           OK         42 degrees C / 107 degrees F
      FPC 10 I3 2 Chip              OK         43 degrees C / 109 degrees F
      FPC 10 I3 3 TSensor           OK         39 degrees C / 102 degrees F
      FPC 10 I3 3 Chip              OK         44 degrees C / 111 degrees F
      FPC 10 IA 0 TSensor           OK         36 degrees C / 96 degrees F
      FPC 10 IA 0 Chip              OK         36 degrees C / 96 degrees F
      FPC 10 IA 1 TSensor           OK         43 degrees C / 109 degrees F
      FPC 10 IA 1 Chip              OK         42 degrees C / 107 degrees F
Fans  Top Fan Tray Temp             OK         37 degrees C / 98 degrees F
      Top Tray Fan 1                OK         Spinning at normal speed
      Top Tray Fan 2                OK         Spinning at normal speed
      Top Tray Fan 3                OK         Spinning at normal speed
      Top Tray Fan 4                OK         Spinning at normal speed
      Top Tray Fan 5                OK         Spinning at normal speed
      Top Tray Fan 6                OK         Spinning at normal speed
      Bottom Fan Tray Temp          OK         28 degrees C / 82 degrees F
      Bottom Tray Fan 1             OK         Spinning at normal speed
      Bottom Tray Fan 2             OK         Spinning at normal speed
      Bottom Tray Fan 3             OK         Spinning at normal speed
      Bottom Tray Fan 4             OK         Spinning at normal speed
      Bottom Tray Fan 5             OK         Spinning at normal speed
      Bottom Tray Fan 6             OK         Spinning at normal speed
```

show chassis environment (MX960 Router with MPC5EQ)

`user@host>` **show chassis environment**

```
Class Item                          Status     Measurement
Temp  PEM 0                         OK         50 degrees C / 122 degrees F
      PEM 1                         OK         45 degrees C / 113 degrees F
      PEM 2                         OK         45 degrees C / 113 degrees F
      PEM 3                         Absent
      Routing Engine 0              OK         31 degrees C / 87 degrees F
      Routing Engine 0 CPU          OK         30 degrees C / 86 degrees F
      Routing Engine 1              Present
      Routing Engine 1 CPU          Present
      CB 0 Intake                   OK         29 degrees C / 84 degrees F
      CB 0 Exhaust A                OK         29 degrees C / 84 degrees F
      CB 0 Exhaust B                OK         34 degrees C / 93 degrees F
      CB 0 ACBC                     OK         32 degrees C / 89 degrees F
      CB 0 XF A                     OK         49 degrees C / 120 degrees F
      CB 0 XF B                     OK         45 degrees C / 113 degrees F
      CB 1 Intake                   OK         26 degrees C / 78 degrees F
      CB 1 Exhaust A                OK         26 degrees C / 78 degrees F
```



```
     CB 1 Exhaust B                OK         27 degrees C / 80 degrees F
     CB 1 ACBC                     OK         26 degrees C / 78 degrees F
     CB 1 XF A                     OK         32 degrees C / 89 degrees F
     CB 1 XF B                     OK         32 degrees C / 89 degrees F
     CB 2 Intake                   OK         28 degrees C / 82 degrees F
     CB 2 Exhaust A                OK         27 degrees C / 80 degrees F
     CB 2 Exhaust B                OK         33 degrees C / 91 degrees F
     CB 2 ACBC                     OK         30 degrees C / 86 degrees F
     CB 2 XF A                     OK         48 degrees C / 118 degrees F
     CB 2 XF B                     OK         46 degrees C / 114 degrees F
     FPC 0 Intake                  OK         38 degrees C / 100 degrees F
     FPC 0 Exhaust A               OK         48 degrees C / 118 degrees F
     FPC 0 Exhaust B               OK         49 degrees C / 120 degrees F
     FPC 0 XL TSen                 OK         48 degrees C / 118 degrees F
     FPC 0 XL Chip                 OK         50 degrees C / 122 degrees F
     FPC 0 XL_XR0 TSen             OK         48 degrees C / 118 degrees F
     FPC 0 XL_XR0 Chip             OK         53 degrees C / 127 degrees F
     FPC 0 XL_XR1 TSen             OK         48 degrees C / 118 degrees F
     FPC 0 XL_XR1 Chip             OK         54 degrees C / 129 degrees F
     FPC 0 XQ TSen                 OK         48 degrees C / 118 degrees F
     FPC 0 XQ Chip                 OK         52 degrees C / 125 degrees F
     FPC 0 XQ_XR0 TSen             OK         48 degrees C / 118 degrees F
     FPC 0 XQ_XR0 Chip             OK         62 degrees C / 143 degrees F
     FPC 0 XQ_XR1 TSen             OK         48 degrees C / 118 degrees F
     FPC 0 XQ_XR1 Chip             OK         62 degrees C / 143 degrees F
     FPC 0 XM 0 TSen               OK         53 degrees C / 127 degrees F
     FPC 0 XM 0 Chip               OK         63 degrees C / 145 degrees F
     FPC 0 XM 1 TSen               OK         53 degrees C / 127 degrees F
     FPC 0 XM 1 Chip               OK         46 degrees C / 114 degrees F
     FPC 0 PLX PCIe Switch TSe     OK         53 degrees C / 127 degrees F
     FPC 0 PLX PCIe Switch Chi     OK         66 degrees C / 150 degrees F
     FPC 1 Intake                  OK         31 degrees C / 87 degrees F
     FPC 1 Exhaust A               OK         38 degrees C / 100 degrees F
     FPC 1 Exhaust B               OK         49 degrees C / 120 degrees F
     FPC 1 LU 0 TSen               OK         41 degrees C / 105 degrees F
     FPC 1 LU 0 Chip               OK         47 degrees C / 116 degrees F
     FPC 1 LU 1 TSen               OK         41 degrees C / 105 degrees F
FPC 1 LU 1 Chip               OK         42 degrees C / 107 degrees F
     FPC 1 LU 2 TSen               OK         41 degrees C / 105 degrees F
     FPC 1 LU 2 Chip               OK         46 degrees C / 114 degrees F
     FPC 1 LU 3 TSen               OK         41 degrees C / 105 degrees F
     FPC 1 LU 3 Chip               OK         51 degrees C / 123 degrees F
     FPC 1 XM 0 TSen               OK         41 degrees C / 105 degrees F
     FPC 1 XM 0 Chip               OK         49 degrees C / 120 degrees F
     FPC 1 XF 0 TSen               OK         41 degrees C / 105 degrees F
     FPC 1 XF 0 Chip               OK         63 degrees C / 145 degrees F
     FPC 1 PLX Switch TSen         OK         41 degrees C / 105 degrees F
     FPC 1 PLX Switch Chip         OK         43 degrees C / 109 degrees F
     FPC 3 Intake                  OK         31 degrees C / 87 degrees F
     FPC 3 Exhaust A               OK         37 degrees C / 98 degrees F
     FPC 3 Exhaust B               OK         43 degrees C / 109 degrees F
     FPC 3 LU 0 TSen               OK         42 degrees C / 107 degrees F
     FPC 3 LU 0 Chip               OK         43 degrees C / 109 degrees F
     FPC 3 LU 1 TSen               OK         42 degrees C / 107 degrees F
     FPC 3 LU 1 Chip               OK         46 degrees C / 114 degrees F
     FPC 3 LU 2 TSen               OK         42 degrees C / 107 degrees F
     FPC 3 LU 2 Chip               OK         40 degrees C / 104 degrees F
     FPC 3 LU 3 TSen               OK         42 degrees C / 107 degrees F
     FPC 3 LU 3 Chip               OK         41 degrees C / 105 degrees F
     FPC 3 MQ 0 TSen               OK         37 degrees C / 98 degrees F
```



```
     FPC 3 MQ 0 Chip              OK        37 degrees C / 98 degrees F
     FPC 3 MQ 1 TSen              OK        37 degrees C / 98 degrees F
     FPC 3 MQ 1 Chip              OK        40 degrees C / 104 degrees F
     FPC 3 MQ 2 TSen              OK        37 degrees C / 98 degrees F
     FPC 3 MQ 2 Chip              OK        36 degrees C / 96 degrees F
     FPC 3 MQ 3 TSen              OK        37 degrees C / 98 degrees F
     FPC 3 MQ 3 Chip              OK        38 degrees C / 100 degrees F
     FPC 4 Intake                 OK        34 degrees C / 93 degrees F
     FPC 4 Exhaust A              OK        45 degrees C / 113 degrees F
     FPC 4 Exhaust B              OK        47 degrees C / 116 degrees F
     FPC 4 XL TSen                OK        44 degrees C / 111 degrees F
     FPC 4 XL Chip                OK        47 degrees C / 116 degrees F
     FPC 4 XL_XR0 TSen            OK        44 degrees C / 111 degrees F
     FPC 4 XL_XR0 Chip            OK        48 degrees C / 118 degrees F
     FPC 4 XL_XR1 TSen            OK        44 degrees C / 111 degrees F
     FPC 4 XL_XR1 Chip            OK        47 degrees C / 116 degrees F
     FPC 4 XQ TSen                OK        44 degrees C / 111 degrees F
     FPC 4 XQ Chip                OK        47 degrees C / 116 degrees F
     FPC 4 XQ_XR0 TSen            OK        44 degrees C / 111 degrees F
     FPC 4 XQ_XR0 Chip            OK        57 degrees C / 134 degrees F
     FPC 4 XQ_XR1 TSen            OK        44 degrees C / 111 degrees F
     FPC 4 XQ_XR1 Chip            OK        58 degrees C / 136 degrees F
     FPC 4 XM 0 TSen              OK        51 degrees C / 123 degrees F
     FPC 4 XM 0 Chip              OK        61 degrees C / 141 degrees F
     FPC 4 XM 1 TSen              OK        51 degrees C / 123 degrees F
     FPC 4 XM 1 Chip              OK        47 degrees C / 116 degrees F
     FPC 4 PLX PCIe Switch TSe    OK        51 degrees C / 123 degrees F
     FPC 4 PLX PCIe Switch Chi    OK        60 degrees C / 140 degrees F
     FPC 5 Intake                 OK        34 degrees C / 93 degrees F
     FPC 5 Exhaust A              OK        45 degrees C / 113 degrees F
     FPC 5 Exhaust B              OK        47 degrees C / 116 degrees F
     FPC 5 XL TSen                OK        45 degrees C / 113 degrees F
     FPC 5 XL Chip                OK        47 degrees C / 116 degrees F
     FPC 5 XL_XR0 TSen            OK        45 degrees C / 113 degrees F
FPC 5 XL_XR0 Chip            OK        49 degrees C / 120 degrees F
     FPC 5 XL_XR1 TSen            OK        45 degrees C / 113 degrees F
     FPC 5 XL_XR1 Chip            OK        49 degrees C / 120 degrees F
     FPC 5 XQ TSen                OK        45 degrees C / 113 degrees F
     FPC 5 XQ Chip                OK        48 degrees C / 118 degrees F
     FPC 5 XQ_XR0 TSen            OK        45 degrees C / 113 degrees F
     FPC 5 XQ_XR0 Chip            OK        60 degrees C / 140 degrees F
     FPC 5 XQ_XR1 TSen            OK        45 degrees C / 113 degrees F
     FPC 5 XQ_XR1 Chip            OK        58 degrees C / 136 degrees F
     FPC 5 XM 0 TSen              OK        50 degrees C / 122 degrees F
     FPC 5 XM 0 Chip              OK        48 degrees C / 118 degrees F
     FPC 5 XM 1 TSen              OK        50 degrees C / 122 degrees F
     FPC 5 XM 1 Chip              OK        47 degrees C / 116 degrees F
     FPC 5 PLX PCIe Switch TSe    OK        50 degrees C / 122 degrees F
     FPC 5 PLX PCIe Switch Chi    OK        59 degrees C / 138 degrees F
     FPC 7 Intake                 OK        32 degrees C / 89 degrees F
     FPC 7 Exhaust A              OK        32 degrees C / 89 degrees F
     FPC 7 Exhaust B              OK        33 degrees C / 91 degrees F
     FPC 7 LU 0 TSen              OK        49 degrees C / 120 degrees F
     FPC 7 LU 0 Chip              OK        44 degrees C / 111 degrees F
     FPC 7 LU 1 TSen              OK        49 degrees C / 120 degrees F
     FPC 7 LU 1 Chip              OK        47 degrees C / 116 degrees F
     FPC 7 LU 2 TSen              OK        49 degrees C / 120 degrees F
     FPC 7 LU 2 Chip              OK        39 degrees C / 102 degrees F
     FPC 7 LU 3 TSen              OK        49 degrees C / 120 degrees F
     FPC 7 LU 3 Chip              OK        43 degrees C / 109 degrees F
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```
     FPC 7 XM 0 TSen               OK         49 degrees C / 120 degrees F
     FPC 7 XM 0 Chip               OK         57 degrees C / 134 degrees F
     FPC 7 XM 1 TSen               OK         49 degrees C / 120 degrees F
     FPC 7 XM 1 Chip               OK         48 degrees C / 118 degrees F
     FPC 7 PLX Switch TSen         OK         49 degrees C / 120 degrees F
     FPC 7 PLX Switch Chip         OK         45 degrees C / 113 degrees F
     FPC 8 Intake                  OK         36 degrees C / 96 degrees F
     FPC 8 Exhaust A               OK         51 degrees C / 123 degrees F
     FPC 8 Exhaust B               OK         46 degrees C / 114 degrees F
     FPC 8 XL TSen                 OK         46 degrees C / 114 degrees F
     FPC 8 XL Chip                 OK         47 degrees C / 116 degrees F
     FPC 8 XL_XR0 TSen             OK         46 degrees C / 114 degrees F
     FPC 8 XL_XR0 Chip             OK         53 degrees C / 127 degrees F
     FPC 8 XL_XR1 TSen             OK         46 degrees C / 114 degrees F
     FPC 8 XL_XR1 Chip             OK         52 degrees C / 125 degrees F
     FPC 8 XQ TSen                 OK         46 degrees C / 114 degrees F
     FPC 8 XQ Chip                 OK         46 degrees C / 114 degrees F
     FPC 8 XQ_XR0 TSen             OK         46 degrees C / 114 degrees F
     FPC 8 XQ_XR0 Chip             OK         59 degrees C / 138 degrees F
     FPC 8 XQ_XR1 TSen             OK         46 degrees C / 114 degrees F
     FPC 8 XQ_XR1 Chip             OK         57 degrees C / 134 degrees F
     FPC 8 XM 0 TSen               OK         52 degrees C / 125 degrees F
     FPC 8 XM 0 Chip               OK         61 degrees C / 141 degrees F
     FPC 8 XM 1 TSen               OK         52 degrees C / 125 degrees F
     FPC 8 XM 1 Chip               OK         47 degrees C / 116 degrees F
     FPC 8 PLX PCIe Switch TSe     OK         52 degrees C / 125 degrees F
     FPC 8 PLX PCIe Switch Chi     OK         63 degrees C / 145 degrees F
     FPC 9 Intake                  OK         31 degrees C / 87 degrees F
     FPC 9 Exhaust A               OK         34 degrees C / 93 degrees F
     FPC 9 Exhaust B               OK         35 degrees C / 95 degrees F
FPC 9 QX 0 TSen               OK         42 degrees C / 107 degrees F
     FPC 9 QX 0 Chip               OK         45 degrees C / 113 degrees F
     FPC 9 LU 0 TCAM TSen          OK         42 degrees C / 107 degrees F
     FPC 9 LU 0 TCAM Chip          OK         41 degrees C / 105 degrees F
     FPC 9 LU 0 TSen               OK         42 degrees C / 107 degrees F
     FPC 9 LU 0 Chip               OK         43 degrees C / 109 degrees F
     FPC 9 MQ 0 TSen               OK         42 degrees C / 107 degrees F
     FPC 9 MQ 0 Chip               OK         43 degrees C / 109 degrees F
     FPC 9 QX 1 TSen               OK         38 degrees C / 100 degrees F
     FPC 9 QX 1 Chip               OK         40 degrees C / 104 degrees F
     FPC 9 LU 1 TCAM TSen          OK         38 degrees C / 100 degrees F
     FPC 9 LU 1 TCAM Chip          OK         38 degrees C / 100 degrees F
     FPC 9 LU 1 TSen               OK         38 degrees C / 100 degrees F
     FPC 9 LU 1 Chip               OK         41 degrees C / 105 degrees F
     FPC 9 MQ 1 TSen               OK         38 degrees C / 100 degrees F
     FPC 9 MQ 1 Chip               OK         41 degrees C / 105 degrees F
     FPC 10 Intake                 OK         35 degrees C / 95 degrees F
     FPC 10 Exhaust A              OK         51 degrees C / 123 degrees F
     FPC 10 Exhaust B              OK         46 degrees C / 114 degrees F
     FPC 10 XL TSen                OK         42 degrees C / 107 degrees F
     FPC 10 XL Chip                OK         44 degrees C / 111 degrees F
     FPC 10 XL_XR0 TSen            OK         42 degrees C / 107 degrees F
     FPC 10 XL_XR0 Chip            OK         47 degrees C / 116 degrees F
     FPC 10 XL_XR1 TSen            OK         42 degrees C / 107 degrees F
     FPC 10 XL_XR1 Chip            OK         48 degrees C / 118 degrees F
     FPC 10 XQ TSen                OK         42 degrees C / 107 degrees F
     FPC 10 XQ Chip                OK         46 degrees C / 114 degrees F
     FPC 10 XQ_XR0 TSen            OK         42 degrees C / 107 degrees F
     FPC 10 XQ_XR0 Chip            OK         57 degrees C / 134 degrees F
     FPC 10 XQ_XR1 TSen            OK         42 degrees C / 107 degrees F
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```
      FPC 10 XQ_XR1 Chip              OK         53 degrees C / 127 degrees F
      FPC 10 XM 0 TSen                OK         51 degrees C / 123 degrees F
      FPC 10 XM 0 Chip                OK         61 degrees C / 141 degrees F
      FPC 10 XM 1 TSen                OK         51 degrees C / 123 degrees F
      FPC 10 XM 1 Chip                OK         49 degrees C / 120 degrees F
      FPC 10 PLX PCIe Switch TSe      OK         51 degrees C / 123 degrees F
      FPC 10 PLX PCIe Switch Chi      OK         61 degrees C / 141 degrees F
      FPC 11 Intake                   OK         33 degrees C / 91 degrees F
      FPC 11 Exhaust A                OK         33 degrees C / 91 degrees F
      FPC 11 Exhaust B                OK         34 degrees C / 93 degrees F
      FPC 11 LU 0 TSen                OK         50 degrees C / 122 degrees F
      FPC 11 LU 0 Chip                OK         48 degrees C / 118 degrees F
      FPC 11 LU 1 TSen                OK         50 degrees C / 122 degrees F
      FPC 11 LU 1 Chip                OK         50 degrees C / 122 degrees F
      FPC 11 LU 2 TSen                OK         50 degrees C / 122 degrees F
      FPC 11 LU 2 Chip                OK         41 degrees C / 105 degrees F
      FPC 11 LU 3 TSen                OK         50 degrees C / 122 degrees F
      FPC 11 LU 3 Chip                OK         48 degrees C / 118 degrees F
      FPC 11 XM 0 TSen                OK         50 degrees C / 122 degrees F
      FPC 11 XM 0 Chip                OK         57 degrees C / 134 degrees F
      FPC 11 XM 1 TSen                OK         50 degrees C / 122 degrees F
      FPC 11 XM 1 Chip                OK         52 degrees C / 125 degrees F
      FPC 11 PLX Switch TSen          OK         50 degrees C / 122 degrees F
      FPC 11 PLX Switch Chip          OK         45 degrees C / 113 degrees F
Fans  Top Fan Tray Temp               OK         42 degrees C / 107 degrees F
      Top Tray Fan 1                  OK         Spinning at high speed
 Top Tray Fan 2                  OK         Spinning at high speed
      Top Tray Fan 3                  OK         Spinning at high speed
      Top Tray Fan 4                  OK         Spinning at high speed
      Top Tray Fan 5                  OK         Spinning at high speed
      Top Tray Fan 6                  OK         Spinning at high speed
      Top Tray Fan 7                  OK         Spinning at high speed
      Top Tray Fan 8                  OK         Spinning at high speed
      Top Tray Fan 9                  OK         Spinning at high speed
      Top Tray Fan 10                 OK         Spinning at high speed
      Top Tray Fan 11                 OK         Spinning at high speed
      Top Tray Fan 12                 OK         Spinning at high speed
      Bottom Fan Tray Temp            OK         33 degrees C / 91 degrees F
      Bottom Tray Fan 1               OK         Spinning at high speed
      Bottom Tray Fan 2               OK         Spinning at high speed
      Bottom Tray Fan 3               OK         Spinning at high speed
      Bottom Tray Fan 4               OK         Spinning at high speed
      Bottom Tray Fan 5               OK         Spinning at high speed
      Bottom Tray Fan 6               OK         Spinning at high speed
      Bottom Tray Fan 7               OK         Spinning at high speed
      Bottom Tray Fan 8               OK         Spinning at high speed
      Bottom Tray Fan 9               OK         Spinning at high speed
      Bottom Tray Fan 10              OK         Spinning at high speed
      Bottom Tray Fan 11              OK         Spinning at high speed
      Bottom Tray Fan 12              OK         Spinning at high speed
```

show chassis environment (MX2020 Router)

`user@host>` **show chassis environment**

```
Class Item                            Status     Measurement
Temp  PSM 0                           Absent
      PSM 1                           Absent
      PSM 2                           OK         41 degrees C / 105 degrees F
      PSM 3                           OK         39 degrees C / 102 degrees F
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```
      PSM 4                          OK          39 degrees C / 102 degrees F
      PSM 5                          OK          38 degrees C / 100 degrees F
      PSM 6                          OK          38 degrees C / 100 degrees F
      PSM 7                          OK          38 degrees C / 100 degrees F
      PSM 8                          OK          37 degrees C / 98 degrees F
      PSM 9                          Absent
      PSM 10                         Absent
      PSM 11                         OK          47 degrees C / 116 degrees F
      PSM 12                         OK          45 degrees C / 113 degrees F
      PSM 13                         OK          44 degrees C / 111 degrees F
      PSM 14                         OK          44 degrees C / 111 degrees F
      PSM 15                         OK          43 degrees C / 109 degrees F
      PSM 16                         OK          42 degrees C / 107 degrees F
      PSM 17                         OK          41 degrees C / 105 degrees F
      PDM 0                          OK
      PDM 1                          Absent
      PDM 2                          Absent
      PDM 3                          OK
      CB 0 IntakeA-Zone0             OK          45 degrees C / 113 degrees F
      CB 0 IntakeB-Zone1             OK          34 degrees C / 93 degrees F
      CB 0 IntakeC-Zone0             OK          48 degrees C / 118 degrees F
      CB 0 ExhaustA-Zone0            OK          45 degrees C / 113 degrees F
      CB 0 ExhaustB-Zone1            OK          37 degrees C / 98 degrees F
      CB 0 TCBC-Zone0                OK          41 degrees C / 105 degrees F
      CB 1 IntakeA-Zone0             OK          46 degrees C / 114 degrees F
      CB 1 IntakeB-Zone1             OK          42 degrees C / 107 degrees F
      CB 1 IntakeC-Zone0             OK          49 degrees C / 120 degrees F
      CB 1 ExhaustA-Zone0            OK          46 degrees C / 114 degrees F
      CB 1 ExhaustB-Zone1            OK          41 degrees C / 105 degrees F
      CB 1 TCBC-Zone0                OK          46 degrees C / 114 degrees F
      SPMB 0 Intake                  OK          33 degrees C / 91 degrees F
      SPMB 1 Intake                  OK          42 degrees C / 107 degrees F
      Routing Engine 0               OK          35 degrees C / 95 degrees F
      Routing Engine 0 CPU           OK          34 degrees C / 93 degrees F
      Routing Engine 1               OK          44 degrees C / 111 degrees F
      Routing Engine 1 CPU           OK          42 degrees C / 107 degrees F
      SFB 0 Intake-Zone0             OK          55 degrees C / 131 degrees F
      SFB 0 Exhaust-Zone1            OK          48 degrees C / 118 degrees F
      SFB 0 IntakeA-Zone0            OK          50 degrees C / 122 degrees F
      SFB 0 IntakeB-Zone1            OK          40 degrees C / 104 degrees F
      SFB 0 Exhaust-Zone0            OK          52 degrees C / 125 degrees F
      SFB 0 SFB-XF2-Zone1            OK          61 degrees C / 141 degrees F
      SFB 0 SFB-XF1-Zone0            OK          69 degrees C / 156 degrees F
      SFB 0 SFB-XF0-Zone0            OK          68 degrees C / 154 degrees F
      SFB 1 Intake-Zone0             OK          56 degrees C / 132 degrees F
      SFB 1 Exhaust-Zone1            OK          47 degrees C / 116 degrees F
      SFB 1 IntakeA-Zone0            OK          51 degrees C / 123 degrees F
      SFB 1 IntakeB-Zone1            OK          40 degrees C / 104 degrees F
      SFB 1 Exhaust-Zone0            OK          51 degrees C / 123 degrees F
      SFB 1 SFB-XF2-Zone1            OK          62 degrees C / 143 degrees F
      SFB 1 SFB-XF1-Zone0            OK          67 degrees C / 152 degrees F
      SFB 1 SFB-XF0-Zone0            OK          69 degrees C / 156 degrees F
      SFB 2 Intake-Zone0             OK          56 degrees C / 132 degrees F
      SFB 2 Exhaust-Zone1            OK          47 degrees C / 116 degrees F
      SFB 2 IntakeA-Zone0            OK          51 degrees C / 123 degrees F
      SFB 2 IntakeB-Zone1            OK          40 degrees C / 104 degrees F
      SFB 2 Exhaust-Zone0            OK          53 degrees C / 127 degrees F
      SFB 2 SFB-XF2-Zone1            OK          65 degrees C / 149 degrees F
      SFB 2 SFB-XF1-Zone0            OK          69 degrees C / 156 degrees F
      SFB 2 SFB-XF0-Zone0            OK          70 degrees C / 158 degrees F
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```
SFB 3 Intake-Zone0            OK         57 degrees C / 134 degrees F
SFB 3 Exhaust-Zone1           OK         48 degrees C / 118 degrees F
SFB 3 IntakeA-Zone0           OK         52 degrees C / 125 degrees F
SFB 3 IntakeB-Zone1           OK         41 degrees C / 105 degrees F
SFB 3 Exhaust-Zone0           OK         53 degrees C / 127 degrees F
SFB 3 SFB-XF2-Zone1           OK         66 degrees C / 150 degrees F
SFB 3 SFB-XF1-Zone0           OK         69 degrees C / 156 degrees F
SFB 3 SFB-XF0-Zone0           OK         71 degrees C / 159 degrees F
SFB 4 Intake-Zone0            OK         58 degrees C / 136 degrees F
SFB 4 Exhaust-Zone1           OK         49 degrees C / 120 degrees F
SFB 4 IntakeA-Zone0           OK         54 degrees C / 129 degrees F
SFB 4 IntakeB-Zone1           OK         42 degrees C / 107 degrees F
SFB 4 Exhaust-Zone0           OK         53 degrees C / 127 degrees F
SFB 4 SFB-XF2-Zone1           OK         64 degrees C / 147 degrees F
SFB 4 SFB-XF1-Zone0           OK         68 degrees C / 154 degrees F
SFB 4 SFB-XF0-Zone0           OK         71 degrees C / 159 degrees F
SFB 5 Intake-Zone0            OK         58 degrees C / 136 degrees F
SFB 5 Exhaust-Zone1           OK         50 degrees C / 122 degrees F
SFB 5 IntakeA-Zone0           OK         53 degrees C / 127 degrees F
SFB 5 IntakeB-Zone1           OK         43 degrees C / 109 degrees F
SFB 5 Exhaust-Zone0           OK         54 degrees C / 129 degrees F
SFB 5 SFB-XF2-Zone1           OK         66 degrees C / 150 degrees F
SFB 5 SFB-XF1-Zone0           OK         69 degrees C / 156 degrees F
SFB 5 SFB-XF0-Zone0           OK         74 degrees C / 165 degrees F
SFB 6 Intake-Zone0            OK         58 degrees C / 136 degrees F
SFB 6 Exhaust-Zone1           OK         49 degrees C / 120 degrees F
SFB 6 IntakeA-Zone0           OK         53 degrees C / 127 degrees F
SFB 6 IntakeB-Zone1           OK         43 degrees C / 109 degrees F
SFB 6 Exhaust-Zone0           OK         53 degrees C / 127 degrees F
SFB 6 SFB-XF2-Zone1           OK         65 degrees C / 149 degrees F
SFB 6 SFB-XF1-Zone0           OK         68 degrees C / 154 degrees F
SFB 6 SFB-XF0-Zone0           OK         72 degrees C / 161 degrees F
SFB 7 Intake-Zone0            OK         57 degrees C / 134 degrees F
SFB 7 Exhaust-Zone1           OK         50 degrees C / 122 degrees F
SFB 7 IntakeA-Zone0           OK         53 degrees C / 127 degrees F
SFB 7 IntakeB-Zone1           OK         43 degrees C / 109 degrees F
SFB 7 Exhaust-Zone0           OK         54 degrees C / 129 degrees F
SFB 7 SFB-XF2-Zone1           OK         68 degrees C / 154 degrees F
SFB 7 SFB-XF1-Zone0           OK         69 degrees C / 156 degrees F
SFB 7 SFB-XF0-Zone0           OK         73 degrees C / 163 degrees F
FPC 0 Intake                  OK         41 degrees C / 105 degrees F
FPC 0 Exhaust A               OK         48 degrees C / 118 degrees F
FPC 0 Exhaust B               OK         62 degrees C / 143 degrees F
FPC 0 LU 0 TSen               OK         59 degrees C / 138 degrees F
FPC 0 LU 0 Chip               OK         62 degrees C / 143 degrees F
FPC 0 LU 1 TSen               OK         59 degrees C / 138 degrees F
FPC 0 LU 1 Chip               OK         64 degrees C / 147 degrees F
FPC 0 LU 2 TSen               OK         59 degrees C / 138 degrees F
FPC 0 LU 2 Chip               OK         53 degrees C / 127 degrees F
FPC 0 LU 3 TSen               OK         59 degrees C / 138 degrees F
FPC 0 LU 3 Chip               OK         53 degrees C / 127 degrees F
FPC 0 MQ 0 TSen               OK         47 degrees C / 116 degrees F
FPC 0 MQ 0 Chip               OK         49 degrees C / 120 degrees F
FPC 0 MQ 1 TSen               OK         47 degrees C / 116 degrees F
FPC 0 MQ 1 Chip               OK         51 degrees C / 123 degrees F
FPC 0 MQ 2 TSen               OK         47 degrees C / 116 degrees F
FPC 0 MQ 2 Chip               OK         44 degrees C / 111 degrees F
FPC 0 MQ 3 TSen               OK         47 degrees C / 116 degrees F
FPC 0 MQ 3 Chip               OK         45 degrees C / 113 degrees F
FPC 1 Intake                  OK         40 degrees C / 104 degrees F
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```
    FPC 1 Exhaust A                  OK          49 degrees C / 120 degrees F
    FPC 1 Exhaust B                  OK          58 degrees C / 136 degrees F
    FPC 1 LU 0 TSen                  OK          55 degrees C / 131 degrees F
    FPC 1 LU 0 Chip                  OK          56 degrees C / 132 degrees F
    FPC 1 LU 1 TSen                  OK          55 degrees C / 131 degrees F
    FPC 1 LU 1 Chip                  OK          58 degrees C / 136 degrees F
    FPC 1 LU 2 TSen                  OK          55 degrees C / 131 degrees F
    FPC 1 LU 2 Chip                  OK          49 degrees C / 120 degrees F
    FPC 1 LU 3 TSen                  OK          55 degrees C / 131 degrees F
    FPC 1 LU 3 Chip                  OK          51 degrees C / 123 degrees F
    FPC 1 MQ 0 TSen                  OK          47 degrees C / 116 degrees F
    FPC 1 MQ 0 Chip                  OK          48 degrees C / 118 degrees F
    FPC 1 MQ 1 TSen                  OK          47 degrees C / 116 degrees F
    FPC 1 MQ 1 Chip                  OK          50 degrees C / 122 degrees F
    FPC 1 MQ 2 TSen                  OK          47 degrees C / 116 degrees F
    FPC 1 MQ 2 Chip                  OK          44 degrees C / 111 degrees F
    FPC 1 MQ 3 TSen                  OK          47 degrees C / 116 degrees F
    FPC 1 MQ 3 Chip                  OK          44 degrees C / 111 degrees F
    FPC 2 Intake                     OK          39 degrees C / 102 degrees F
    FPC 2 Exhaust A                  OK          49 degrees C / 120 degrees F
    FPC 2 Exhaust B                  OK          61 degrees C / 141 degrees F
    FPC 2 LU 0 TSen                  OK          58 degrees C / 136 degrees F
    FPC 2 LU 0 Chip                  OK          60 degrees C / 140 degrees F
    FPC 2 LU 1 TSen                  OK          58 degrees C / 136 degrees F
    FPC 2 LU 1 Chip                  OK          65 degrees C / 149 degrees F
    FPC 2 LU 2 TSen                  OK          58 degrees C / 136 degrees F
    FPC 2 LU 2 Chip                  OK          51 degrees C / 123 degrees F
    FPC 2 LU 3 TSen                  OK          58 degrees C / 136 degrees F
    FPC 2 LU 3 Chip                  OK          53 degrees C / 127 degrees F
    FPC 2 MQ 0 TSen                  OK          47 degrees C / 116 degrees F
    FPC 2 MQ 0 Chip                  OK          50 degrees C / 122 degrees F
    FPC 2 MQ 1 TSen                  OK          47 degrees C / 116 degrees F
    FPC 2 MQ 1 Chip                  OK          52 degrees C / 125 degrees F
    FPC 2 MQ 2 TSen                  OK          47 degrees C / 116 degrees F
    FPC 2 MQ 2 Chip                  OK          45 degrees C / 113 degrees F
    FPC 2 MQ 3 TSen                  OK          47 degrees C / 116 degrees F
    FPC 2 MQ 3 Chip                  OK          46 degrees C / 114 degrees F
    FPC 3 Intake                     OK          40 degrees C / 104 degrees F
    FPC 3 Exhaust A                  OK          49 degrees C / 120 degrees F
    FPC 3 Exhaust B                  OK          61 degrees C / 141 degrees F
    FPC 3 LU 0 TSen                  OK          58 degrees C / 136 degrees F
    FPC 3 LU 0 Chip                  OK          61 degrees C / 141 degrees F
    FPC 3 LU 1 TSen                  OK          58 degrees C / 136 degrees F
    FPC 3 LU 1 Chip                  OK          62 degrees C / 143 degrees F
    FPC 3 LU 2 TSen                  OK          58 degrees C / 136 degrees F
    FPC 3 LU 2 Chip                  OK          51 degrees C / 123 degrees F
    FPC 3 LU 3 TSen                  OK          58 degrees C / 136 degrees F
    FPC 3 LU 3 Chip                  OK          53 degrees C / 127 degrees F
    FPC 3 MQ 0 TSen                  OK          48 degrees C / 118 degrees F
    FPC 3 MQ 0 Chip                  OK          50 degrees C / 122 degrees F
    FPC 3 MQ 1 TSen                  OK          48 degrees C / 118 degrees F
    FPC 3 MQ 1 Chip                  OK          54 degrees C / 129 degrees F
    FPC 3 MQ 2 TSen                  OK          48 degrees C / 118 degrees F
    FPC 3 MQ 2 Chip                  OK          45 degrees C / 113 degrees F
    FPC 3 MQ 3 TSen                  OK          48 degrees C / 118 degrees F
    FPC 3 MQ 3 Chip                  OK          48 degrees C / 118 degrees F
    FPC 4 Intake                     OK          40 degrees C / 104 degrees F
    FPC 4 Exhaust A                  OK          49 degrees C / 120 degrees F
    FPC 4 Exhaust B                  OK          62 degrees C / 143 degrees F
    FPC 4 LU 0 TSen                  OK          59 degrees C / 138 degrees F
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```
FPC 4 LU 0 Chip                  OK         62 degrees C / 143 degrees F
FPC 4 LU 1 TSen                  OK         59 degrees C / 138 degrees F
FPC 4 LU 1 Chip                  OK         65 degrees C / 149 degrees F
FPC 4 LU 2 TSen                  OK         59 degrees C / 138 degrees F
FPC 4 LU 2 Chip                  OK         51 degrees C / 123 degrees F
FPC 4 LU 3 TSen                  OK         59 degrees C / 138 degrees F
FPC 4 LU 3 Chip                  OK         53 degrees C / 127 degrees F
FPC 4 MQ 0 TSen                  OK         48 degrees C / 118 degrees F
FPC 4 MQ 0 Chip                  OK         52 degrees C / 125 degrees F
FPC 4 MQ 1 TSen                  OK         48 degrees C / 118 degrees F
FPC 4 MQ 1 Chip                  OK         53 degrees C / 127 degrees F
FPC 4 MQ 2 TSen                  OK         48 degrees C / 118 degrees F
FPC 4 MQ 2 Chip                  OK         46 degrees C / 114 degrees F
FPC 4 MQ 3 TSen                  OK         48 degrees C / 118 degrees F
FPC 4 MQ 3 Chip                  OK         47 degrees C / 116 degrees F
FPC 5 Intake                     OK         41 degrees C / 105 degrees F
FPC 5 Exhaust A                  OK         50 degrees C / 122 degrees F
FPC 5 Exhaust B                  OK         63 degrees C / 145 degrees F
FPC 5 LU 0 TSen                  OK         60 degrees C / 140 degrees F
FPC 5 LU 0 Chip                  OK         63 degrees C / 145 degrees F
FPC 5 LU 1 TSen                  OK         60 degrees C / 140 degrees F
FPC 5 LU 1 Chip                  OK         66 degrees C / 150 degrees F
FPC 5 LU 2 TSen                  OK         60 degrees C / 140 degrees F
FPC 5 LU 2 Chip                  OK         56 degrees C / 132 degrees F
FPC 5 LU 3 TSen                  OK         60 degrees C / 140 degrees F
FPC 5 LU 3 Chip                  OK         54 degrees C / 129 degrees F
FPC 5 MQ 0 TSen                  OK         49 degrees C / 120 degrees F
FPC 5 MQ 0 Chip                  OK         52 degrees C / 125 degrees F
FPC 5 MQ 1 TSen                  OK         49 degrees C / 120 degrees F
FPC 5 MQ 1 Chip                  OK         53 degrees C / 127 degrees F
FPC 5 MQ 2 TSen                  OK         49 degrees C / 120 degrees F
FPC 5 MQ 2 Chip                  OK         48 degrees C / 118 degrees F
FPC 5 MQ 3 TSen                  OK         49 degrees C / 120 degrees F
FPC 5 MQ 3 Chip                  OK         47 degrees C / 116 degrees F
FPC 6 Intake                     OK         42 degrees C / 107 degrees F
FPC 6 Exhaust A                  OK         51 degrees C / 123 degrees F
FPC 6 Exhaust B                  OK         63 degrees C / 145 degrees F
FPC 6 LU 0 TSen                  OK         61 degrees C / 141 degrees F
FPC 6 LU 0 Chip                  OK         64 degrees C / 147 degrees F
FPC 6 LU 1 TSen                  OK         61 degrees C / 141 degrees F
FPC 6 LU 1 Chip                  OK         66 degrees C / 150 degrees F
FPC 6 LU 2 TSen                  OK         61 degrees C / 141 degrees F
FPC 6 LU 2 Chip                  OK         56 degrees C / 132 degrees F
FPC 6 LU 3 TSen                  OK         61 degrees C / 141 degrees F
FPC 6 LU 3 Chip                  OK         56 degrees C / 132 degrees F
FPC 6 MQ 0 TSen                  OK         50 degrees C / 122 degrees F
FPC 6 MQ 0 Chip                  OK         56 degrees C / 132 degrees F
FPC 6 MQ 1 TSen                  OK         50 degrees C / 122 degrees F
FPC 6 MQ 1 Chip                  OK         59 degrees C / 138 degrees F
FPC 6 MQ 2 TSen                  OK         50 degrees C / 122 degrees F
FPC 6 MQ 2 Chip                  OK         49 degrees C / 120 degrees F
FPC 6 MQ 3 TSen                  OK         50 degrees C / 122 degrees F
FPC 6 MQ 3 Chip                  OK         49 degrees C / 120 degrees F
FPC 7 Intake                     OK         41 degrees C / 105 degrees F
FPC 7 Exhaust A                  OK         51 degrees C / 123 degrees F
FPC 7 Exhaust B                  OK         63 degrees C / 145 degrees F
FPC 7 LU 0 TSen                  OK         60 degrees C / 140 degrees F
FPC 7 LU 0 Chip                  OK         61 degrees C / 141 degrees F
FPC 7 LU 1 TSen                  OK         60 degrees C / 140 degrees F
FPC 7 LU 1 Chip                  OK         65 degrees C / 149 degrees F
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```
FPC 7 LU 2 TSen              OK         60 degrees C / 140 degrees F
FPC 7 LU 2 Chip              OK         54 degrees C / 129 degrees F
FPC 7 LU 3 TSen              OK         60 degrees C / 140 degrees F
FPC 7 LU 3 Chip              OK         53 degrees C / 127 degrees F
FPC 7 MQ 0 TSen              OK         50 degrees C / 122 degrees F
FPC 7 MQ 0 Chip              OK         53 degrees C / 127 degrees F
FPC 7 MQ 1 TSen              OK         50 degrees C / 122 degrees F
FPC 7 MQ 1 Chip              OK         54 degrees C / 129 degrees F
FPC 7 MQ 2 TSen              OK         50 degrees C / 122 degrees F
FPC 7 MQ 2 Chip              OK         47 degrees C / 116 degrees F
FPC 7 MQ 3 TSen              OK         50 degrees C / 122 degrees F
FPC 7 MQ 3 Chip              OK         47 degrees C / 116 degrees F
FPC 8 Intake                 OK         41 degrees C / 105 degrees F
FPC 8 Exhaust A              OK         50 degrees C / 122 degrees F
FPC 8 Exhaust B              OK         62 degrees C / 143 degrees F
FPC 8 LU 0 TSen              OK         59 degrees C / 138 degrees F
FPC 8 LU 0 Chip              OK         62 degrees C / 143 degrees F
FPC 8 LU 1 TSen              OK         59 degrees C / 138 degrees F
FPC 8 LU 1 Chip              OK         64 degrees C / 147 degrees F
FPC 8 LU 2 TSen              OK         59 degrees C / 138 degrees F
FPC 8 LU 2 Chip              OK         55 degrees C / 131 degrees F
FPC 8 LU 3 TSen              OK         59 degrees C / 138 degrees F
FPC 8 LU 3 Chip              OK         54 degrees C / 129 degrees F
FPC 8 MQ 0 TSen              OK         49 degrees C / 120 degrees F
FPC 8 MQ 0 Chip              OK         51 degrees C / 123 degrees F
FPC 8 MQ 1 TSen              OK         49 degrees C / 120 degrees F
FPC 8 MQ 1 Chip              OK         52 degrees C / 125 degrees F
FPC 8 MQ 2 TSen              OK         49 degrees C / 120 degrees F
FPC 8 MQ 2 Chip              OK         46 degrees C / 114 degrees F
FPC 8 MQ 3 TSen              OK         49 degrees C / 120 degrees F
FPC 8 MQ 3 Chip              OK         47 degrees C / 116 degrees F
FPC 9 Intake                 OK         42 degrees C / 107 degrees F
FPC 9 Exhaust A              OK         51 degrees C / 123 degrees F
FPC 9 Exhaust B              OK         63 degrees C / 145 degrees F
FPC 9 LU 0 TSen              OK         60 degrees C / 140 degrees F
FPC 9 LU 0 Chip              OK         65 degrees C / 149 degrees F
FPC 9 LU 1 TSen              OK         60 degrees C / 140 degrees F
FPC 9 LU 1 Chip              OK         67 degrees C / 152 degrees F
FPC 9 LU 2 TSen              OK         60 degrees C / 140 degrees F
FPC 9 LU 2 Chip              OK         54 degrees C / 129 degrees F
FPC 9 LU 3 TSen              OK         60 degrees C / 140 degrees F
FPC 9 LU 3 Chip              OK         54 degrees C / 129 degrees F
FPC 9 MQ 0 TSen              OK         51 degrees C / 123 degrees F
FPC 9 MQ 0 Chip              OK         55 degrees C / 131 degrees F
FPC 9 MQ 1 TSen              OK         51 degrees C / 123 degrees F
FPC 9 MQ 1 Chip              OK         59 degrees C / 138 degrees F
FPC 9 MQ 2 TSen              OK         51 degrees C / 123 degrees F
FPC 9 MQ 2 Chip              OK         49 degrees C / 120 degrees F
FPC 9 MQ 3 TSen              OK         51 degrees C / 123 degrees F
FPC 9 MQ 3 Chip              OK         49 degrees C / 120 degrees F
FPC 10 Intake                OK         44 degrees C / 111 degrees F
FPC 10 Exhaust A             OK         49 degrees C / 120 degrees F
FPC 10 Exhaust B             OK         55 degrees C / 131 degrees F
FPC 10 LU 0 TSen             OK         54 degrees C / 129 degrees F
FPC 10 LU 0 Chip             OK         55 degrees C / 131 degrees F
FPC 10 LU 1 TSen             OK         54 degrees C / 129 degrees F
FPC 10 LU 1 Chip             OK         59 degrees C / 138 degrees F
FPC 10 LU 2 TSen             OK         54 degrees C / 129 degrees F
FPC 10 LU 2 Chip             OK         52 degrees C / 125 degrees F
FPC 10 LU 3 TSen             OK         54 degrees C / 129 degrees F
```



```
FPC 10 LU 3 Chip              OK          51 degrees C / 123 degrees F
FPC 10 MQ 0 TSen              OK          48 degrees C / 118 degrees F
FPC 10 MQ 0 Chip              OK          49 degrees C / 120 degrees F
FPC 10 MQ 1 TSen              OK          48 degrees C / 118 degrees F
FPC 10 MQ 1 Chip              OK          52 degrees C / 125 degrees F
FPC 10 MQ 2 TSen              OK          48 degrees C / 118 degrees F
FPC 10 MQ 2 Chip              OK          47 degrees C / 116 degrees F
FPC 10 MQ 3 TSen              OK          48 degrees C / 118 degrees F
FPC 10 MQ 3 Chip              OK          47 degrees C / 116 degrees F
FPC 11 Intake                 OK          30 degrees C / 86 degrees F
FPC 11 Exhaust A              OK          35 degrees C / 95 degrees F
FPC 11 Exhaust B              OK          30 degrees C / 86 degrees F
FPC 11 LU 0 TSen              OK          57 degrees C / 134 degrees F
FPC 11 LU 0 Chip              OK          58 degrees C / 136 degrees F
FPC 11 LU 1 TSen              OK          57 degrees C / 134 degrees F
FPC 11 LU 1 Chip              OK          62 degrees C / 143 degrees F
FPC 11 LU 2 TSen              OK          57 degrees C / 134 degrees F
FPC 11 LU 2 Chip              OK          53 degrees C / 127 degrees F
FPC 11 LU 3 TSen              OK          57 degrees C / 134 degrees F
FPC 11 LU 3 Chip              OK          54 degrees C / 129 degrees F
FPC 11 MQ 0 TSen              OK          52 degrees C / 125 degrees F
FPC 11 MQ 0 Chip              OK          52 degrees C / 125 degrees F
FPC 11 MQ 1 TSen              OK          52 degrees C / 125 degrees F
FPC 11 MQ 1 Chip              OK          57 degrees C / 134 degrees F
FPC 11 MQ 2 TSen              OK          52 degrees C / 125 degrees F
FPC 11 MQ 2 Chip              OK          48 degrees C / 118 degrees F
FPC 11 MQ 3 TSen              OK          52 degrees C / 125 degrees F
FPC 11 MQ 3 Chip              OK          52 degrees C / 125 degrees F
FPC 12 Intake                 OK          40 degrees C / 104 degrees F
FPC 12 Exhaust A              OK          47 degrees C / 116 degrees F
FPC 12 Exhaust B              OK          52 degrees C / 125 degrees F
FPC 12 LU 0 TSen              OK          51 degrees C / 123 degrees F
FPC 12 LU 0 Chip              OK          52 degrees C / 125 degrees F
FPC 12 LU 1 TSen              OK          51 degrees C / 123 degrees F
FPC 12 LU 1 Chip              OK          55 degrees C / 131 degrees F
FPC 12 LU 2 TSen              OK          51 degrees C / 123 degrees F
FPC 12 LU 2 Chip              OK          47 degrees C / 116 degrees F
FPC 12 LU 3 TSen              OK          51 degrees C / 123 degrees F
FPC 12 LU 3 Chip              OK          50 degrees C / 122 degrees F
FPC 12 MQ 0 TSen              OK          46 degrees C / 114 degrees F
FPC 12 MQ 0 Chip              OK          46 degrees C / 114 degrees F
FPC 12 MQ 1 TSen              OK          46 degrees C / 114 degrees F
FPC 12 MQ 1 Chip              OK          50 degrees C / 122 degrees F
FPC 12 MQ 2 TSen              OK          46 degrees C / 114 degrees F
FPC 12 MQ 2 Chip              OK          44 degrees C / 111 degrees F
FPC 12 MQ 3 TSen              OK          46 degrees C / 114 degrees F
FPC 12 MQ 3 Chip              OK          46 degrees C / 114 degrees F
FPC 13 Intake                 OK          40 degrees C / 104 degrees F
FPC 13 Exhaust A              OK          48 degrees C / 118 degrees F
FPC 13 Exhaust B              OK          52 degrees C / 125 degrees F
FPC 13 LU 0 TSen              OK          51 degrees C / 123 degrees F
FPC 13 LU 0 Chip              OK          52 degrees C / 125 degrees F
FPC 13 LU 1 TSen              OK          51 degrees C / 123 degrees F
FPC 13 LU 1 Chip              OK          55 degrees C / 131 degrees F
FPC 13 LU 2 TSen              OK          51 degrees C / 123 degrees F
FPC 13 LU 2 Chip              OK          48 degrees C / 118 degrees F
FPC 13 LU 3 TSen              OK          51 degrees C / 123 degrees F
FPC 13 LU 3 Chip              OK          48 degrees C / 118 degrees F
FPC 13 MQ 0 TSen              OK          46 degrees C / 114 degrees F
FPC 13 MQ 0 Chip              OK          46 degrees C / 114 degrees F
```

```
      FPC 13 MQ 1 TSen              OK         46 degrees C / 114 degrees F
      FPC 13 MQ 1 Chip              OK         50 degrees C / 122 degrees F
      FPC 13 MQ 2 TSen              OK         46 degrees C / 114 degrees F
      FPC 13 MQ 2 Chip              OK         44 degrees C / 111 degrees F
      FPC 13 MQ 3 TSen              OK         46 degrees C / 114 degrees F
      FPC 13 MQ 3 Chip              OK         46 degrees C / 114 degrees F
      FPC 14 Intake                 OK         40 degrees C / 104 degrees F
      FPC 14 Exhaust A              OK         50 degrees C / 122 degrees F
      FPC 14 Exhaust B              OK         51 degrees C / 123 degrees F
      FPC 14 LU 0 TSen              OK         50 degrees C / 122 degrees F
      FPC 14 LU 0 Chip              OK         50 degrees C / 122 degrees F
      FPC 14 LU 1 TSen              OK         50 degrees C / 122 degrees F
      FPC 14 LU 1 Chip              OK         54 degrees C / 129 degrees F
      FPC 14 LU 2 TSen              OK         50 degrees C / 122 degrees F
      FPC 14 LU 2 Chip              OK         47 degrees C / 116 degrees F
      FPC 14 LU 3 TSen              OK         50 degrees C / 122 degrees F
      FPC 14 LU 3 Chip              OK         49 degrees C / 120 degrees F
      FPC 14 MQ 0 TSen              OK         47 degrees C / 116 degrees F
      FPC 14 MQ 0 Chip              OK         46 degrees C / 114 degrees F
      FPC 14 MQ 1 TSen              OK         47 degrees C / 116 degrees F
      FPC 14 MQ 1 Chip              OK         51 degrees C / 123 degrees F
      FPC 14 MQ 2 TSen              OK         47 degrees C / 116 degrees F
      FPC 14 MQ 2 Chip              OK         45 degrees C / 113 degrees F
      FPC 14 MQ 3 TSen              OK         47 degrees C / 116 degrees F
      FPC 14 MQ 3 Chip              OK         48 degrees C / 118 degrees F
      FPC 15 Intake                 OK         44 degrees C / 111 degrees F
      FPC 15 Exhaust A              OK         49 degrees C / 120 degrees F
      FPC 15 Exhaust B              OK         60 degrees C / 140 degrees F
      FPC 15 LU 0 TSen              OK         50 degrees C / 122 degrees F
      FPC 15 LU 0 Chip              OK         56 degrees C / 132 degrees F
      FPC 15 LU 1 TSen              OK         50 degrees C / 122 degrees F
      FPC 15 LU 1 Chip              OK         50 degrees C / 122 degrees F
      FPC 15 LU 2 TSen              OK         50 degrees C / 122 degrees F
      FPC 15 LU 2 Chip              OK         58 degrees C / 136 degrees F
      FPC 15 LU 3 TSen              OK         50 degrees C / 122 degrees F
      FPC 15 LU 3 Chip              OK         63 degrees C / 145 degrees F
      FPC 15 XM 0 TSen              OK         50 degrees C / 122 degrees F
      FPC 15 XM 0 Chip              OK         56 degrees C / 132 degrees F
      FPC 15 XF 0 TSen              OK         50 degrees C / 122 degrees F
      FPC 15 XF 0 Chip              OK         68 degrees C / 154 degrees F
      FPC 15 PLX Switch TSen        OK         50 degrees C / 122 degrees F
      FPC 15 PLX Switch Chip        OK         56 degrees C / 132 degrees F
      FPC 16 Intake                 OK         42 degrees C / 107 degrees F
      FPC 16 Exhaust A              OK         51 degrees C / 123 degrees F
      FPC 16 Exhaust B              OK         53 degrees C / 127 degrees F
      FPC 16 LU 0 TSen              OK         51 degrees C / 123 degrees F
      FPC 16 LU 0 Chip              OK         52 degrees C / 125 degrees F
      FPC 16 LU 1 TSen              OK         51 degrees C / 123 degrees F
      FPC 16 LU 1 Chip              OK         55 degrees C / 131 degrees F
      FPC 16 LU 2 TSen              OK         51 degrees C / 123 degrees F
      FPC 16 LU 2 Chip              OK         48 degrees C / 118 degrees F
      FPC 16 LU 3 TSen              OK         51 degrees C / 123 degrees F
      FPC 16 LU 3 Chip              OK         49 degrees C / 120 degrees F
      FPC 16 MQ 0 TSen              OK         49 degrees C / 120 degrees F
      FPC 16 MQ 0 Chip              OK         48 degrees C / 118 degrees F
      FPC 16 MQ 1 TSen              OK         49 degrees C / 120 degrees F
      FPC 16 MQ 1 Chip              OK         53 degrees C / 127 degrees F
      FPC 16 MQ 2 TSen              OK         49 degrees C / 120 degrees F
      FPC 16 MQ 2 Chip              OK         46 degrees C / 114 degrees F
      FPC 16 MQ 3 TSen              OK         49 degrees C / 120 degrees F
```



```
FPC 16 MQ 3 Chip              OK         49 degrees C / 120 degrees F
FPC 17 Intake                 OK         43 degrees C / 109 degrees F
FPC 17 Exhaust A              OK         51 degrees C / 123 degrees F
FPC 17 Exhaust B              OK         55 degrees C / 131 degrees F
FPC 17 LU 0 TSen              OK         54 degrees C / 129 degrees F
FPC 17 LU 0 Chip              OK         57 degrees C / 134 degrees F
FPC 17 LU 1 TSen              OK         54 degrees C / 129 degrees F
FPC 17 LU 1 Chip              OK         60 degrees C / 140 degrees F
FPC 17 LU 2 TSen              OK         54 degrees C / 129 degrees F
FPC 17 LU 2 Chip              OK         53 degrees C / 127 degrees F
FPC 17 LU 3 TSen              OK         54 degrees C / 129 degrees F
FPC 17 LU 3 Chip              OK         53 degrees C / 127 degrees F
FPC 17 MQ 0 TSen              OK         49 degrees C / 120 degrees F
FPC 17 MQ 0 Chip              OK         50 degrees C / 122 degrees F
FPC 17 MQ 1 TSen              OK         49 degrees C / 120 degrees F
FPC 17 MQ 1 Chip              OK         54 degrees C / 129 degrees F
FPC 17 MQ 2 TSen              OK         49 degrees C / 120 degrees F
FPC 17 MQ 2 Chip              OK         47 degrees C / 116 degrees F
FPC 17 MQ 3 TSen              OK         49 degrees C / 120 degrees F
FPC 17 MQ 3 Chip              OK         51 degrees C / 123 degrees F
FPC 18 Intake                 OK         44 degrees C / 111 degrees F
FPC 18 Exhaust A              OK         53 degrees C / 127 degrees F
FPC 18 Exhaust B              OK         57 degrees C / 134 degrees F
FPC 18 LU 0 TSen              OK         56 degrees C / 132 degrees F
FPC 18 LU 0 Chip              OK         57 degrees C / 134 degrees F
FPC 18 LU 1 TSen              OK         56 degrees C / 132 degrees F
FPC 18 LU 1 Chip              OK         62 degrees C / 143 degrees F
FPC 18 LU 2 TSen              OK         56 degrees C / 132 degrees F
FPC 18 LU 2 Chip              OK         53 degrees C / 127 degrees F
FPC 18 LU 3 TSen              OK         56 degrees C / 132 degrees F
FPC 18 LU 3 Chip              OK         55 degrees C / 131 degrees F
FPC 18 MQ 0 TSen              OK         51 degrees C / 123 degrees F
FPC 18 MQ 0 Chip              OK         54 degrees C / 129 degrees F
FPC 18 MQ 1 TSen              OK         51 degrees C / 123 degrees F
FPC 18 MQ 1 Chip              OK         58 degrees C / 136 degrees F
FPC 18 MQ 2 TSen              OK         51 degrees C / 123 degrees F
FPC 18 MQ 2 Chip              OK         50 degrees C / 122 degrees F
FPC 18 MQ 3 TSen              OK         51 degrees C / 123 degrees F
FPC 18 MQ 3 Chip              OK         53 degrees C / 127 degrees F
FPC 19 Intake                 OK         48 degrees C / 118 degrees F
FPC 19 Exhaust A              OK         56 degrees C / 132 degrees F
FPC 19 Exhaust B              OK         64 degrees C / 147 degrees F
FPC 19 LU 0 TSen              OK         63 degrees C / 145 degrees F
FPC 19 LU 0 Chip              OK         64 degrees C / 147 degrees F
FPC 19 LU 1 TSen              OK         63 degrees C / 145 degrees F
FPC 19 LU 1 Chip              OK         70 degrees C / 158 degrees F
FPC 19 LU 2 TSen              OK         63 degrees C / 145 degrees F
FPC 19 LU 2 Chip              OK         61 degrees C / 141 degrees F
FPC 19 LU 3 TSen              OK         63 degrees C / 145 degrees F
FPC 19 LU 3 Chip              OK         62 degrees C / 143 degrees F
FPC 19 MQ 0 TSen              OK         56 degrees C / 132 degrees F
FPC 19 MQ 0 Chip              OK         60 degrees C / 140 degrees F
FPC 19 MQ 1 TSen              OK         56 degrees C / 132 degrees F
FPC 19 MQ 1 Chip              OK         62 degrees C / 143 degrees F
FPC 19 MQ 2 TSen              OK         56 degrees C / 132 degrees F
FPC 19 MQ 2 Chip              OK         56 degrees C / 132 degrees F
FPC 19 MQ 3 TSen              OK         56 degrees C / 132 degrees F
FPC 19 MQ 3 Chip              OK         57 degrees C / 134 degrees F
ADC 0 Intake                  OK         40 degrees C / 104 degrees F
ADC 0 Exhaust                 OK         52 degrees C / 125 degrees F
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```
ADC 0 ADC-XF1                 OK          59 degrees C / 138 degrees F
ADC 0 ADC-XF0                 OK          66 degrees C / 150 degrees F
ADC 1 Intake                  OK          38 degrees C / 100 degrees F
ADC 1 Exhaust                 OK          50 degrees C / 122 degrees F
ADC 1 ADC-XF1                 OK          59 degrees C / 138 degrees F
ADC 1 ADC-XF0                 OK          63 degrees C / 145 degrees F
ADC 2 Intake                  OK          37 degrees C / 98 degrees F
ADC 2 Exhaust                 OK          52 degrees C / 125 degrees F
ADC 2 ADC-XF1                 OK          53 degrees C / 127 degrees F
ADC 2 ADC-XF0                 OK          61 degrees C / 141 degrees F
ADC 3 Intake                  OK          40 degrees C / 104 degrees F
ADC 3 Exhaust                 OK          51 degrees C / 123 degrees F
ADC 3 ADC-XF1                 OK          61 degrees C / 141 degrees F
ADC 3 ADC-XF0                 OK          64 degrees C / 147 degrees F
ADC 4 Intake                  OK          39 degrees C / 102 degrees F
ADC 4 Exhaust                 OK          51 degrees C / 123 degrees F
ADC 4 ADC-XF1                 OK          60 degrees C / 140 degrees F
ADC 4 ADC-XF0                 OK          63 degrees C / 145 degrees F
ADC 5 Intake                  OK          38 degrees C / 100 degrees F
ADC 5 Exhaust                 OK          54 degrees C / 129 degrees F
ADC 5 ADC-XF1                 OK          56 degrees C / 132 degrees F
ADC 5 ADC-XF0                 OK          67 degrees C / 152 degrees F
ADC 6 Intake                  OK          39 degrees C / 102 degrees F
ADC 6 Exhaust                 OK          52 degrees C / 125 degrees F
ADC 6 ADC-XF1                 OK          59 degrees C / 138 degrees F
ADC 6 ADC-XF0                 OK          66 degrees C / 150 degrees F
ADC 7 Intake                  OK          39 degrees C / 102 degrees F
ADC 7 Exhaust                 OK          54 degrees C / 129 degrees F
ADC 7 ADC-XF1                 OK          62 degrees C / 143 degrees F
ADC 7 ADC-XF0                 OK          70 degrees C / 158 degrees F
ADC 8 Intake                  OK          39 degrees C / 102 degrees F
ADC 8 Exhaust                 OK          52 degrees C / 125 degrees F
ADC 8 ADC-XF1                 OK          61 degrees C / 141 degrees F
ADC 8 ADC-XF0                 OK          65 degrees C / 149 degrees F
ADC 9 Intake                  OK          41 degrees C / 105 degrees F
ADC 9 Exhaust                 OK          51 degrees C / 123 degrees F
ADC 9 ADC-XF1                 OK          63 degrees C / 145 degrees F
ADC 9 ADC-XF0                 OK          63 degrees C / 145 degrees F
ADC 10 Intake                 OK          48 degrees C / 118 degrees F
ADC 10 Exhaust                OK          53 degrees C / 127 degrees F
ADC 10 ADC-XF1                OK          67 degrees C / 152 degrees F
ADC 10 ADC-XF0                OK          66 degrees C / 150 degrees F
ADC 12 Intake                 OK          49 degrees C / 120 degrees F
ADC 12 Exhaust                OK          54 degrees C / 129 degrees F
ADC 12 ADC-XF1                OK          67 degrees C / 152 degrees F
ADC 12 ADC-XF0                OK          67 degrees C / 152 degrees F
ADC 13 Intake                 OK          49 degrees C / 120 degrees F
ADC 13 Exhaust                OK          57 degrees C / 134 degrees F
ADC 13 ADC-XF1                OK          66 degrees C / 150 degrees F
ADC 13 ADC-XF0                OK          69 degrees C / 156 degrees F
ADC 14 Intake                 OK          51 degrees C / 123 degrees F
ADC 14 Exhaust                OK          59 degrees C / 138 degrees F
ADC 14 ADC-XF1                OK          69 degrees C / 156 degrees F
ADC 14 ADC-XF0                OK          74 degrees C / 165 degrees F
ADC 15 Intake                 OK          50 degrees C / 122 degrees F
ADC 15 Exhaust                OK          59 degrees C / 138 degrees F
ADC 15 ADC-XF1                OK          68 degrees C / 154 degrees F
ADC 15 ADC-XF0                OK          69 degrees C / 156 degrees F
ADC 16 Intake                 OK          52 degrees C / 125 degrees F
ADC 16 Exhaust                OK          58 degrees C / 136 degrees F
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```
        ADC 16 ADC-XF1                   OK         68 degrees C / 154 degrees F
        ADC 16 ADC-XF0                   OK         70 degrees C / 158 degrees F
        ADC 17 Intake                    OK         52 degrees C / 125 degrees F
        ADC 17 Exhaust                   OK         59 degrees C / 138 degrees F
        ADC 17 ADC-XF1                   OK         69 degrees C / 156 degrees F
        ADC 17 ADC-XF0                   OK         71 degrees C / 159 degrees F
        ADC 18 Intake                    OK         53 degrees C / 127 degrees F
        ADC 18 Exhaust                   OK         59 degrees C / 138 degrees F
        ADC 18 ADC-XF1                   OK         68 degrees C / 154 degrees F
        ADC 18 ADC-XF0                   OK         73 degrees C / 163 degrees F
        ADC 19 Intake                    OK         50 degrees C / 122 degrees F
        ADC 19 Exhaust                   OK         59 degrees C / 138 degrees F
        ADC 19 ADC-XF1                   OK         68 degrees C / 154 degrees F
        ADC 19 ADC-XF0                   OK         72 degrees C / 161 degrees F
Fans    Fan Tray 0 Fan 1                 OK         7440 RPM
        Fan Tray 0 Fan 2                 OK         7200 RPM
        Fan Tray 0 Fan 3                 OK         6960 RPM
        Fan Tray 0 Fan 4                 OK         7200 RPM
        Fan Tray 0 Fan 5                 OK         7080 RPM
        Fan Tray 0 Fan 6                 OK         6840 RPM
        Fan Tray 1 Fan 1                 OK         6840 RPM
        Fan Tray 1 Fan 2                 OK         6960 RPM
        Fan Tray 1 Fan 3                 OK         6960 RPM
        Fan Tray 1 Fan 4                 OK         7080 RPM
        Fan Tray 1 Fan 5                 OK         6960 RPM
        Fan Tray 1 Fan 6                 OK         6960 RPM
        Fan Tray 2 Fan 1                 OK         8640 RPM
        Fan Tray 2 Fan 2                 OK         8640 RPM
        Fan Tray 2 Fan 3                 OK         8760 RPM
        Fan Tray 2 Fan 4                 OK         8760 RPM
        Fan Tray 2 Fan 5                 OK         8640 RPM
        Fan Tray 2 Fan 6                 OK         8640 RPM
        Fan Tray 3 Fan 1                 OK         8520 RPM
        Fan Tray 3 Fan 2                 OK         8520 RPM
        Fan Tray 3 Fan 3                 OK         8640 RPM
        Fan Tray 3 Fan 4                 OK         8640 RPM
        Fan Tray 3 Fan 5                 OK         8520 RPM
        Fan Tray 3 Fan 6                 OK         8520 RPM
```

show chassis environment (MX2020 Router with MPC5EQ and MPC6E)

```
Class Item                           Status     Measurement
Temp    PSM 0                        OK         32 degrees C / 89 degrees F
        PSM 1                        OK         32 degrees C / 89 degrees F
        PSM 2                        OK         32 degrees C / 89 degrees F
        PSM 3                        OK         32 degrees C / 89 degrees F
        PSM 4                        OK         32 degrees C / 89 degrees F
        PSM 5                        OK         33 degrees C / 91 degrees F
        PSM 6                        OK         32 degrees C / 89 degrees F
        PSM 7                        OK         32 degrees C / 89 degrees F
        PSM 8                        OK         32 degrees C / 89 degrees F
        PSM 9                        Absent
        PSM 10                       Absent
        PSM 11                       Absent
        PSM 12                       OK         33 degrees C / 91 degrees F
        PSM 13                       OK         33 degrees C / 91 degrees F
        PSM 14                       OK         34 degrees C / 93 degrees F
        PSM 15                       OK         34 degrees C / 93 degrees F
        PSM 16                       OK         33 degrees C / 91 degrees F
```



```
    PSM 17                        OK        33 degrees C / 91 degrees F
    PDM 0                         OK
    PDM 1                         OK
    PDM 2                         OK
    PDM 3                         OK
    CB 0 IntakeA-Zone0            OK        34 degrees C / 93 degrees F
    CB 0 IntakeB-Zone1            OK        26 degrees C / 78 degrees F
    CB 0 IntakeC-Zone0            OK        38 degrees C / 100 degrees F
    CB 0 ExhaustA-Zone0           OK        34 degrees C / 93 degrees F
    CB 0 ExhaustB-Zone1           OK        27 degrees C / 80 degrees F
    CB 0 TCBC-Zone0               OK        32 degrees C / 89 degrees F
    CB 1 IntakeA-Zone0            OK        24 degrees C / 75 degrees F
    CB 1 IntakeB-Zone1            OK        22 degrees C / 71 degrees F
    CB 1 IntakeC-Zone0            OK        34 degrees C / 93 degrees F
    CB 1 ExhaustA-Zone0           OK        31 degrees C / 87 degrees F
    CB 1 ExhaustB-Zone1           OK        24 degrees C / 75 degrees F
    CB 1 TCBC-Zone0               OK        27 degrees C / 80 degrees F
    SPMB 0 Intake                 OK        25 degrees C / 77 degrees F
    SPMB 1 Intake                 OK        23 degrees C / 73 degrees F
    Routing Engine 0              OK        28 degrees C / 82 degrees F
    Routing Engine 0 CPU          OK        25 degrees C / 77 degrees F
    Routing Engine 1              OK        25 degrees C / 77 degrees F
    Routing Engine 1 CPU          OK        24 degrees C / 75 degrees F
    SFB 0 Intake-Zone0            OK        45 degrees C / 113 degrees F
    SFB 0 Exhaust-Zone1           OK        34 degrees C / 93 degrees F
    SFB 0 IntakeA-Zone0           OK        32 degrees C / 89 degrees F
    SFB 0 IntakeB-Zone1           OK        28 degrees C / 82 degrees F
    SFB 0 Exhaust-Zone0           OK        36 degrees C / 96 degrees F
    SFB 0 SFB-XF2-Zone1           OK        46 degrees C / 114 degrees F
    SFB 0 SFB-XF1-Zone0           OK        48 degrees C / 118 degrees F
    SFB 0 SFB-XF0-Zone0           OK        60 degrees C / 140 degrees F
    SFB 1 Intake-Zone0            OK        44 degrees C / 111 degrees F
    SFB 1 Exhaust-Zone1           OK        34 degrees C / 93 degrees F
    SFB 1 IntakeA-Zone0           OK        35 degrees C / 95 degrees F
    SFB 1 IntakeB-Zone1           OK        27 degrees C / 80 degrees F
    SFB 1 Exhaust-Zone0           OK        37 degrees C / 98 degrees F
    SFB 1 SFB-XF2-Zone1           OK        47 degrees C / 116 degrees F
    SFB 1 SFB-XF1-Zone0           OK        49 degrees C / 120 degrees F
SFB 1 SFB-XF0-Zone0           OK        56 degrees C / 132 degrees F
    SFB 2 Intake-Zone0            OK        41 degrees C / 105 degrees F
    SFB 2 Exhaust-Zone1           OK        34 degrees C / 93 degrees F
    SFB 2 IntakeA-Zone0           OK        35 degrees C / 95 degrees F
    SFB 2 IntakeB-Zone1           OK        28 degrees C / 82 degrees F
    SFB 2 Exhaust-Zone0           OK        37 degrees C / 98 degrees F
    SFB 2 SFB-XF2-Zone1           OK        47 degrees C / 116 degrees F
    SFB 2 SFB-XF1-Zone0           OK        55 degrees C / 131 degrees F
    SFB 2 SFB-XF0-Zone0           OK        55 degrees C / 131 degrees F
    SFB 3 Intake-Zone0            OK        43 degrees C / 109 degrees F
    SFB 3 Exhaust-Zone1           OK        33 degrees C / 91 degrees F
    SFB 3 IntakeA-Zone0           OK        35 degrees C / 95 degrees F
    SFB 3 IntakeB-Zone1           OK        27 degrees C / 80 degrees F
    SFB 3 Exhaust-Zone0           OK        36 degrees C / 96 degrees F
    SFB 3 SFB-XF2-Zone1           OK        46 degrees C / 114 degrees F
    SFB 3 SFB-XF1-Zone0           OK        46 degrees C / 114 degrees F
    SFB 3 SFB-XF0-Zone0           OK        57 degrees C / 134 degrees F
    SFB 4 Intake-Zone0            OK        36 degrees C / 96 degrees F
    SFB 4 Exhaust-Zone1           OK        32 degrees C / 89 degrees F
    SFB 4 IntakeA-Zone0           OK        31 degrees C / 87 degrees F
    SFB 4 IntakeB-Zone1           OK        26 degrees C / 78 degrees F
    SFB 4 Exhaust-Zone0           OK        32 degrees C / 89 degrees F
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```
     SFB 4 SFB-XF2-Zone1          OK        44 degrees C / 111 degrees F
     SFB 4 SFB-XF1-Zone0          OK        45 degrees C / 113 degrees F
     SFB 4 SFB-XF0-Zone0          OK        52 degrees C / 125 degrees F
     SFB 5 Intake-Zone0           OK        31 degrees C / 87 degrees F
     SFB 5 Exhaust-Zone1          OK        30 degrees C / 86 degrees F
     SFB 5 IntakeA-Zone0          OK        26 degrees C / 78 degrees F
     SFB 5 IntakeB-Zone1          OK        24 degrees C / 75 degrees F
     SFB 5 Exhaust-Zone0          OK        29 degrees C / 84 degrees F
     SFB 5 SFB-XF2-Zone1          OK        43 degrees C / 109 degrees F
     SFB 5 SFB-XF1-Zone0          OK        47 degrees C / 116 degrees F
     SFB 5 SFB-XF0-Zone0          OK        49 degrees C / 120 degrees F
     SFB 6 Intake-Zone0           OK        30 degrees C / 86 degrees F
     SFB 6 Exhaust-Zone1          OK        29 degrees C / 84 degrees F
     SFB 6 IntakeA-Zone0          OK        25 degrees C / 77 degrees F
     SFB 6 IntakeB-Zone1          OK        24 degrees C / 75 degrees F
     SFB 6 Exhaust-Zone0          OK        29 degrees C / 84 degrees F
     SFB 6 SFB-XF2-Zone1          OK        43 degrees C / 109 degrees F
     SFB 6 SFB-XF1-Zone0          OK        44 degrees C / 111 degrees F
     SFB 6 SFB-XF0-Zone0          OK        45 degrees C / 113 degrees F
     SFB 7 Intake-Zone0           OK        31 degrees C / 87 degrees F
     SFB 7 Exhaust-Zone1          OK        30 degrees C / 86 degrees F
     SFB 7 IntakeA-Zone0          OK        26 degrees C / 78 degrees F
     SFB 7 IntakeB-Zone1          OK        24 degrees C / 75 degrees F
     SFB 7 Exhaust-Zone0          OK        28 degrees C / 82 degrees F
     SFB 7 SFB-XF2-Zone1          OK        50 degrees C / 122 degrees F
     SFB 7 SFB-XF1-Zone0          OK        43 degrees C / 109 degrees F
     SFB 7 SFB-XF0-Zone0          OK        47 degrees C / 116 degrees F
     FPC 0 Intake                 OK        31 degrees C / 87 degrees F
     FPC 0 Exhaust A              OK        49 degrees C / 120 degrees F
     FPC 0 Exhaust B              OK        43 degrees C / 109 degrees F
     FPC 0 XL TSen                OK        42 degrees C / 107 degrees F
     FPC 0 XL Chip                OK        46 degrees C / 114 degrees F
     FPC 0 XL_XR0 TSen            OK        42 degrees C / 107 degrees F
     FPC 0 XL_XR0 Chip            OK        48 degrees C / 118 degrees F
FPC 0 XL_XR1 TSen            OK        42 degrees C / 107 degrees F
     FPC 0 XL_XR1 Chip            OK        48 degrees C / 118 degrees F
     FPC 0 XQ TSen                OK        42 degrees C / 107 degrees F
     FPC 0 XQ Chip                OK        44 degrees C / 111 degrees F
     FPC 0 XQ_XR0 TSen            OK        42 degrees C / 107 degrees F
     FPC 0 XQ_XR0 Chip            OK        57 degrees C / 134 degrees F
     FPC 0 XQ_XR1 TSen            OK        42 degrees C / 107 degrees F
     FPC 0 XQ_XR1 Chip            OK        55 degrees C / 131 degrees F
     FPC 0 XM 0 TSen              OK        48 degrees C / 118 degrees F
     FPC 0 XM 0 Chip              OK        62 degrees C / 143 degrees F
     FPC 0 XM 1 TSen              OK        48 degrees C / 118 degrees F
     FPC 0 XM 1 Chip              OK        44 degrees C / 111 degrees F
     FPC 0 PLX PCIe Switch TSe    OK        48 degrees C / 118 degrees F
     FPC 0 PLX PCIe Switch Chi    OK        57 degrees C / 134 degrees F
     FPC 1 Intake                 OK        29 degrees C / 84 degrees F
     FPC 1 Exhaust A              OK        36 degrees C / 96 degrees F
     FPC 1 Exhaust B              OK        44 degrees C / 111 degrees F
     FPC 1 LU 0 TSen              OK        38 degrees C / 100 degrees F
     FPC 1 LU 0 Chip              OK        45 degrees C / 113 degrees F
     FPC 1 LU 1 TSen              OK        38 degrees C / 100 degrees F
     FPC 1 LU 1 Chip              OK        38 degrees C / 100 degrees F
     FPC 1 LU 2 TSen              OK        38 degrees C / 100 degrees F
     FPC 1 LU 2 Chip              OK        42 degrees C / 107 degrees F
     FPC 1 LU 3 TSen              OK        38 degrees C / 100 degrees F
     FPC 1 LU 3 Chip              OK        47 degrees C / 116 degrees F
     FPC 1 XM 0 TSen              OK        38 degrees C / 100 degrees F
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     FPC 1 XM 0 Chip               OK          44 degrees C / 111 degrees F
     FPC 1 XF 0 TSen               OK          38 degrees C / 100 degrees F
     FPC 1 XF 0 Chip               OK          54 degrees C / 129 degrees F
     FPC 1 PLX Switch TSen         OK          38 degrees C / 100 degrees F
     FPC 1 PLX Switch Chip         OK          41 degrees C / 105 degrees F
     FPC 2 Intake                  OK          28 degrees C / 82 degrees F
     FPC 2 Exhaust A               OK          28 degrees C / 82 degrees F
     FPC 2 Exhaust B               OK          28 degrees C / 82 degrees F
     FPC 2 LU 0 TSen               OK          40 degrees C / 104 degrees F
     FPC 2 LU 0 Chip               OK          40 degrees C / 104 degrees F
     FPC 2 LU 1 TSen               OK          40 degrees C / 104 degrees F
     FPC 2 LU 1 Chip               OK          41 degrees C / 105 degrees F
     FPC 2 LU 2 TSen               OK          40 degrees C / 104 degrees F
     FPC 2 LU 2 Chip               OK          34 degrees C / 93 degrees F
     FPC 2 LU 3 TSen               OK          40 degrees C / 104 degrees F
     FPC 2 LU 3 Chip               OK          38 degrees C / 100 degrees F
     FPC 2 XM 0 TSen               OK          40 degrees C / 104 degrees F
     FPC 2 XM 0 Chip               OK          47 degrees C / 116 degrees F
     FPC 2 XM 1 TSen               OK          40 degrees C / 104 degrees F
     FPC 2 XM 1 Chip               OK          42 degrees C / 107 degrees F
     FPC 2 PLX Switch TSen         OK          40 degrees C / 104 degrees F
     FPC 2 PLX Switch Chip         OK          39 degrees C / 102 degrees F
     FPC 3 Intake                  OK          27 degrees C / 80 degrees F
     FPC 3 Exhaust A               OK          38 degrees C / 100 degrees F
     FPC 3 Exhaust B               OK          31 degrees C / 87 degrees F
     FPC 3 QX 0 TSen               OK          38 degrees C / 100 degrees F
     FPC 3 QX 0 Chip               OK          42 degrees C / 107 degrees F
     FPC 3 LU 0 TCAM TSen          OK          38 degrees C / 100 degrees F
     FPC 3 LU 0 TCAM Chip          OK          43 degrees C / 109 degrees F
     FPC 3 LU 0 TSen               OK          38 degrees C / 100 degrees F
FPC 3 LU 0 Chip               OK          42 degrees C / 107 degrees F
     FPC 3 MQ 0 TSen               OK          38 degrees C / 100 degrees F
     FPC 3 MQ 0 Chip               OK          39 degrees C / 102 degrees F
     FPC 3 QX 1 TSen               OK          32 degrees C / 89 degrees F
     FPC 3 QX 1 Chip               OK          36 degrees C / 96 degrees F
     FPC 3 LU 1 TCAM TSen          OK          32 degrees C / 89 degrees F
     FPC 3 LU 1 TCAM Chip          OK          35 degrees C / 95 degrees F
     FPC 3 LU 1 TSen               OK          32 degrees C / 89 degrees F
     FPC 3 LU 1 Chip               OK          37 degrees C / 98 degrees F
     FPC 3 MQ 1 TSen               OK          32 degrees C / 89 degrees F
     FPC 3 MQ 1 Chip               OK          36 degrees C / 96 degrees F
     FPC 4 Intake                  OK          29 degrees C / 84 degrees F
     FPC 4 Exhaust A               OK          36 degrees C / 96 degrees F
     FPC 4 Exhaust B               OK          40 degrees C / 104 degrees F
     FPC 4 XL TSen                 OK          39 degrees C / 102 degrees F
     FPC 4 XL Chip                 OK          42 degrees C / 107 degrees F
     FPC 4 XL_XR0 TSen             OK          39 degrees C / 102 degrees F
     FPC 4 XL_XR0 Chip             OK          45 degrees C / 113 degrees F
     FPC 4 XL_XR1 TSen             OK          39 degrees C / 102 degrees F
     FPC 4 XL_XR1 Chip             OK          46 degrees C / 114 degrees F
     FPC 4 XQ TSen                 OK          39 degrees C / 102 degrees F
     FPC 4 XQ Chip                 OK          42 degrees C / 107 degrees F
     FPC 4 XQ_XR0 TSen             OK          39 degrees C / 102 degrees F
     FPC 4 XQ_XR0 Chip             OK          54 degrees C / 129 degrees F
     FPC 4 XQ_XR1 TSen             OK          39 degrees C / 102 degrees F
     FPC 4 XQ_XR1 Chip             OK          53 degrees C / 127 degrees F
     FPC 4 XM 0 TSen               OK          45 degrees C / 113 degrees F
     FPC 4 XM 0 Chip               OK          59 degrees C / 138 degrees F
     FPC 4 XM 1 TSen               OK          45 degrees C / 113 degrees F
     FPC 4 XM 1 Chip               OK          41 degrees C / 105 degrees F
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      FPC 4 PLX PCIe Switch TSe    OK         45 degrees C / 113 degrees F
      FPC 4 PLX PCIe Switch Chi    OK         58 degrees C / 136 degrees F
      FPC 5 Intake                 OK         29 degrees C / 84 degrees F
      FPC 5 Exhaust A              OK         33 degrees C / 91 degrees F
      FPC 5 Exhaust B              OK         39 degrees C / 102 degrees F
      FPC 5 LU 0 TSen              OK         40 degrees C / 104 degrees F
      FPC 5 LU 0 Chip              OK         40 degrees C / 104 degrees F
      FPC 5 LU 1 TSen              OK         40 degrees C / 104 degrees F
      FPC 5 LU 1 Chip              OK         45 degrees C / 113 degrees F
      FPC 5 LU 2 TSen              OK         40 degrees C / 104 degrees F
      FPC 5 LU 2 Chip              OK         40 degrees C / 104 degrees F
      FPC 5 LU 3 TSen              OK         40 degrees C / 104 degrees F
      FPC 5 LU 3 Chip              OK         46 degrees C / 114 degrees F
      FPC 5 MQ 0 TSen              OK         32 degrees C / 89 degrees F
      FPC 5 MQ 0 Chip              OK         33 degrees C / 91 degrees F
      FPC 5 MQ 1 TSen              OK         32 degrees C / 89 degrees F
      FPC 5 MQ 1 Chip              OK         35 degrees C / 95 degrees F
      FPC 5 MQ 2 TSen              OK         32 degrees C / 89 degrees F
      FPC 5 MQ 2 Chip              OK         32 degrees C / 89 degrees F
      FPC 5 MQ 3 TSen              OK         32 degrees C / 89 degrees F
      FPC 5 MQ 3 Chip              OK         32 degrees C / 89 degrees F
      FPC 9 Intake                 OK         25 degrees C / 77 degrees F
      FPC 9 Exhaust A              OK         37 degrees C / 98 degrees F
      FPC 9 Exhaust B              OK         40 degrees C / 104 degrees F
      FPC 9 XL 0 TSen              OK         40 degrees C / 104 degrees F
...
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show chassis environment (MX2010 Router)

user@host> **show chassis environment**

```
Class Item                         Status     Measurement
Temp  PSM 0                        OK         7 degrees C / 44 degrees F
      PSM 1                        OK         7 degrees C / 44 degrees F
      PSM 2                        OK         7 degrees C / 44 degrees F
      PSM 3                        OK         6 degrees C / 42 degrees F
      PSM 4                        OK         6 degrees C / 42 degrees F
      PSM 5                        OK         6 degrees C / 42 degrees F
      PSM 6                        OK         6 degrees C / 42 degrees F
      PSM 7                        OK         7 degrees C / 44 degrees F
      PSM 8                        OK         7 degrees C / 44 degrees F
      PDM 0                        OK
      PDM 1                        Absent
      CB 0 IntakeA-Zone0           OK         14 degrees C / 57 degrees F
      CB 0 IntakeB-Zone1           OK         7 degrees C / 44 degrees F
      CB 0 IntakeC-Zone0           OK         22 degrees C / 71 degrees F
      CB 0 ExhaustA-Zone0          OK         14 degrees C / 57 degrees F
      CB 0 ExhaustB-Zone1          OK         9 degrees C / 48 degrees F
      CB 0 TCBC-Zone0              OK         11 degrees C / 51 degrees F
      CB 1 IntakeA-Zone0           OK         9 degrees C / 48 degrees F
      CB 1 IntakeB-Zone1           OK         5 degrees C / 41 degrees F
      CB 1 IntakeC-Zone0           OK         20 degrees C / 68 degrees F
      CB 1 ExhaustA-Zone0          OK         12 degrees C / 53 degrees F
      CB 1 ExhaustB-Zone1          OK         7 degrees C / 44 degrees F
      CB 1 TCBC-Zone0              OK         10 degrees C / 50 degrees F
      SPMB 0 Intake                OK         5 degrees C / 41 degrees F
      SPMB 1 Intake                OK         4 degrees C / 39 degrees F
      Routing Engine 0             OK         9 degrees C / 48 degrees F
      Routing Engine 0 CPU         OK         9 degrees C / 48 degrees F
      Routing Engine 1             OK         6 degrees C / 42 degrees F
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      Routing Engine 1 CPU          OK         6 degrees C / 42 degrees F
      SFB 0 Intake-Zone0            OK         26 degrees C / 78 degrees F
      SFB 0 Exhaust-Zone1           OK         17 degrees C / 62 degrees F
      SFB 0 IntakeA-Zone0           OK         16 degrees C / 60 degrees F
      SFB 0 IntakeB-Zone1           OK         11 degrees C / 51 degrees F
      SFB 0 Exhaust-Zone0           OK         18 degrees C / 64 degrees F
      SFB 0 SFB-XF2-Zone1           OK         25 degrees C / 77 degrees F
      SFB 0 SFB-XF1-Zone0           OK         23 degrees C / 73 degrees F
      SFB 0 SFB-XF0-Zone0           OK         33 degrees C / 91 degrees F
      SFB 1 Intake-Zone0            OK         27 degrees C / 80 degrees F
      SFB 1 Exhaust-Zone1           OK         15 degrees C / 59 degrees F
      SFB 1 IntakeA-Zone0           OK         20 degrees C / 68 degrees F
      SFB 1 IntakeB-Zone1           OK         10 degrees C / 50 degrees F
      SFB 1 Exhaust-Zone0           OK         19 degrees C / 66 degrees F
      SFB 1 SFB-XF2-Zone1           OK         26 degrees C / 78 degrees F
      SFB 1 SFB-XF1-Zone0           OK         27 degrees C / 80 degrees F
      SFB 1 SFB-XF0-Zone0           OK         32 degrees C / 89 degrees F
      SFB 2 Intake-Zone0            OK         21 degrees C / 69 degrees F
      SFB 2 Exhaust-Zone1           OK         13 degrees C / 55 degrees F
      SFB 2 IntakeA-Zone0           OK         18 degrees C / 64 degrees F
      SFB 2 IntakeB-Zone1           OK         9 degrees C / 48 degrees F
      SFB 2 Exhaust-Zone0           OK         16 degrees C / 60 degrees F
      SFB 2 SFB-XF2-Zone1           OK         24 degrees C / 75 degrees F
      SFB 2 SFB-XF1-Zone0           OK         21 degrees C / 69 degrees F
      SFB 2 SFB-XF0-Zone0           OK         26 degrees C / 78 degrees F
      SFB 4 Intake-Zone0            OK         28 degrees C / 82 degrees F
      SFB 4 Exhaust-Zone1           OK         16 degrees C / 60 degrees F
SFB 4 IntakeA-Zone0           OK         18 degrees C / 64 degrees F
      SFB 4 IntakeB-Zone1           OK         11 degrees C / 51 degrees F
      SFB 4 Exhaust-Zone0           OK         19 degrees C / 66 degrees F
      SFB 4 SFB-XF2-Zone1           OK         27 degrees C / 80 degrees F
      SFB 4 SFB-XF1-Zone0           OK         27 degrees C / 80 degrees F
      SFB 4 SFB-XF0-Zone0           OK         32 degrees C / 89 degrees F
      SFB 5 Intake-Zone0            OK         22 degrees C / 71 degrees F
      SFB 5 Exhaust-Zone1           OK         14 degrees C / 57 degrees F
      SFB 5 IntakeA-Zone0           OK         18 degrees C / 64 degrees F
      SFB 5 IntakeB-Zone1           OK         10 degrees C / 50 degrees F
      SFB 5 Exhaust-Zone0           OK         17 degrees C / 62 degrees F
      SFB 5 SFB-XF2-Zone1           OK         22 degrees C / 71 degrees F
      SFB 5 SFB-XF1-Zone0           OK         29 degrees C / 84 degrees F
      SFB 5 SFB-XF0-Zone0           OK         27 degrees C / 80 degrees F
      SFB 6 Intake-Zone0            OK         27 degrees C / 80 degrees F
      SFB 6 Exhaust-Zone1           OK         13 degrees C / 55 degrees F
      SFB 6 IntakeA-Zone0           OK         19 degrees C / 66 degrees F
      SFB 6 IntakeB-Zone1           OK         10 degrees C / 50 degrees F
      SFB 6 Exhaust-Zone0           OK         20 degrees C / 68 degrees F
      SFB 6 SFB-XF2-Zone1           OK         24 degrees C / 75 degrees F
      SFB 6 SFB-XF1-Zone0           OK         32 degrees C / 89 degrees F
      SFB 6 SFB-XF0-Zone0           OK         33 degrees C / 91 degrees F
      SFB 7 Intake-Zone0            OK         25 degrees C / 77 degrees F
      SFB 7 Exhaust-Zone1           OK         13 degrees C / 55 degrees F
      SFB 7 IntakeA-Zone0           OK         14 degrees C / 57 degrees F
      SFB 7 IntakeB-Zone1           OK         8 degrees C / 46 degrees F
      SFB 7 Exhaust-Zone0           OK         17 degrees C / 62 degrees F
      SFB 7 SFB-XF2-Zone1           OK         21 degrees C / 69 degrees F
      SFB 7 SFB-XF1-Zone0           OK         21 degrees C / 69 degrees F
      SFB 7 SFB-XF0-Zone0           OK         33 degrees C / 91 degrees F
      FPC 0 Intake                  OK         13 degrees C / 55 degrees F
      FPC 0 Exhaust A               OK         13 degrees C / 55 degrees F
      FPC 0 Exhaust B               OK         14 degrees C / 57 degrees F
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      FPC 0 LU 0 TSen                OK         28 degrees C / 82 degrees F
      FPC 0 LU 0 Chip                OK         25 degrees C / 77 degrees F
      FPC 0 LU 1 TSen                OK         28 degrees C / 82 degrees F
      FPC 0 LU 1 Chip                OK         27 degrees C / 80 degrees F
      FPC 0 LU 2 TSen                OK         28 degrees C / 82 degrees F
      FPC 0 LU 2 Chip                OK         19 degrees C / 66 degrees F
      FPC 0 LU 3 TSen                OK         28 degrees C / 82 degrees F
      FPC 0 LU 3 Chip                OK         23 degrees C / 73 degrees F
      FPC 0 XM 0 TSen                OK         28 degrees C / 82 degrees F
      FPC 0 XM 0 Chip                OK         33 degrees C / 91 degrees F
      FPC 0 XM 1 TSen                OK         28 degrees C / 82 degrees F
      FPC 0 XM 1 Chip                OK         26 degrees C / 78 degrees F
      FPC 0 PLX Switch TSen          OK         28 degrees C / 82 degrees F
      FPC 0 PLX Switch Chip          OK         26 degrees C / 78 degrees F
      FPC 1 Intake                   OK         10 degrees C / 50 degrees F
      FPC 1 Exhaust A                OK         24 degrees C / 75 degrees F
      FPC 1 Exhaust B                OK         28 degrees C / 82 degrees F
      FPC 1 LU 0 TSen                OK         22 degrees C / 71 degrees F
      FPC 1 LU 0 Chip                OK         31 degrees C / 87 degrees F
      FPC 1 LU 1 TSen                OK         22 degrees C / 71 degrees F
      FPC 1 LU 1 Chip                OK         21 degrees C / 69 degrees F
      FPC 1 LU 2 TSen                OK         22 degrees C / 71 degrees F
      FPC 1 LU 2 Chip                OK         25 degrees C / 77 degrees F
      FPC 1 LU 3 TSen                OK         22 degrees C / 71 degrees F
      FPC 1 LU 3 Chip                OK         33 degrees C / 91 degrees F
      FPC 1 XM 0 TSen                OK         22 degrees C / 71 degrees F
      FPC 1 XM 0 Chip                OK         30 degrees C / 86 degrees F
      FPC 1 XF 0 TSen                OK         22 degrees C / 71 degrees F
      FPC 1 XF 0 Chip                OK         37 degrees C / 98 degrees F
      FPC 1 PLX Switch TSen          OK         22 degrees C / 71 degrees F
FPC 1 PLX Switch Chip          OK         22 degrees C / 71 degrees F
      FPC 2 Intake                   OK         9 degrees C / 48 degrees F
      FPC 2 Exhaust A                OK         10 degrees C / 50 degrees F
      FPC 2 Exhaust B                OK         10 degrees C / 50 degrees F
      FPC 2 LU 0 TSen                OK         26 degrees C / 78 degrees F
      FPC 2 LU 0 Chip                OK         25 degrees C / 77 degrees F
      FPC 2 LU 1 TSen                OK         26 degrees C / 78 degrees F
      FPC 2 LU 1 Chip                OK         26 degrees C / 78 degrees F
      FPC 2 LU 2 TSen                OK         26 degrees C / 78 degrees F
      FPC 2 LU 2 Chip                OK         17 degrees C / 62 degrees F
      FPC 2 LU 3 TSen                OK         26 degrees C / 78 degrees F
      FPC 2 LU 3 Chip                OK         22 degrees C / 71 degrees F
      FPC 2 XM 0 TSen                OK         26 degrees C / 78 degrees F
      FPC 2 XM 0 Chip                OK         34 degrees C / 93 degrees F
      FPC 2 XM 1 TSen                OK         26 degrees C / 78 degrees F
      FPC 2 XM 1 Chip                OK         26 degrees C / 78 degrees F
      FPC 2 PLX Switch TSen          OK         26 degrees C / 78 degrees F
      FPC 2 PLX Switch Chip          OK         20 degrees C / 68 degrees F
      FPC 3 Intake                   OK         12 degrees C / 53 degrees F
      FPC 3 Exhaust A                OK         16 degrees C / 60 degrees F
      FPC 3 Exhaust B                OK         26 degrees C / 78 degrees F
      FPC 3 LU 0 TSen                OK         23 degrees C / 73 degrees F
      FPC 3 LU 0 Chip                OK         26 degrees C / 78 degrees F
      FPC 3 LU 1 TSen                OK         23 degrees C / 73 degrees F
      FPC 3 LU 1 Chip                OK         27 degrees C / 80 degrees F
      FPC 3 LU 2 TSen                OK         23 degrees C / 73 degrees F
      FPC 3 LU 2 Chip                OK         22 degrees C / 71 degrees F
      FPC 3 LU 3 TSen                OK         23 degrees C / 73 degrees F
      FPC 3 LU 3 Chip                OK         21 degrees C / 69 degrees F
      FPC 3 MQ 0 TSen                OK         15 degrees C / 59 degrees F
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     FPC 3 MQ 0 Chip                OK        18 degrees C / 64 degrees F
     FPC 3 MQ 1 TSen                OK        15 degrees C / 59 degrees F
     FPC 3 MQ 1 Chip                OK        20 degrees C / 68 degrees F
     FPC 3 MQ 2 TSen                OK        15 degrees C / 59 degrees F
     FPC 3 MQ 2 Chip                OK        17 degrees C / 62 degrees F
     FPC 3 MQ 3 TSen                OK        15 degrees C / 59 degrees F
     FPC 3 MQ 3 Chip                OK        16 degrees C / 60 degrees F
     FPC 4 Intake                   OK        11 degrees C / 51 degrees F
     FPC 4 Exhaust A                OK        22 degrees C / 71 degrees F
     FPC 4 Exhaust B                OK        28 degrees C / 82 degrees F
     FPC 4 LU 0 TSen                OK        22 degrees C / 71 degrees F
     FPC 4 LU 0 Chip                OK        33 degrees C / 91 degrees F
     FPC 4 LU 1 TSen                OK        22 degrees C / 71 degrees F
     FPC 4 LU 1 Chip                OK        21 degrees C / 69 degrees F
     FPC 4 LU 2 TSen                OK        22 degrees C / 71 degrees F
     FPC 4 LU 2 Chip                OK        26 degrees C / 78 degrees F
     FPC 4 LU 3 TSen                OK        22 degrees C / 71 degrees F
     FPC 4 LU 3 Chip                OK        33 degrees C / 91 degrees F
     FPC 4 XM 0 TSen                OK        22 degrees C / 71 degrees F
     FPC 4 XM 0 Chip                OK        30 degrees C / 86 degrees F
     FPC 4 XF 0 TSen                OK        22 degrees C / 71 degrees F
     FPC 4 XF 0 Chip                OK        37 degrees C / 98 degrees F
     FPC 4 PLX Switch TSen          OK        22 degrees C / 71 degrees F
     FPC 4 PLX Switch Chip          OK        23 degrees C / 73 degrees F
     FPC 5 Intake                   OK        12 degrees C / 53 degrees F
     FPC 5 Exhaust A                OK        12 degrees C / 53 degrees F
FPC 5 Exhaust B                OK        12 degrees C / 53 degrees F
     FPC 5 LU 0 TSen                OK        27 degrees C / 80 degrees F
     FPC 5 LU 0 Chip                OK        28 degrees C / 82 degrees F
     FPC 5 LU 1 TSen                OK        27 degrees C / 80 degrees F
     FPC 5 LU 1 Chip                OK        27 degrees C / 80 degrees F
     FPC 5 LU 2 TSen                OK        27 degrees C / 80 degrees F
     FPC 5 LU 2 Chip                OK        19 degrees C / 66 degrees F
     FPC 5 LU 3 TSen                OK        27 degrees C / 80 degrees F
     FPC 5 LU 3 Chip                OK        22 degrees C / 71 degrees F
     FPC 5 XM 0 TSen                OK        27 degrees C / 80 degrees F
     FPC 5 XM 0 Chip                OK        36 degrees C / 96 degrees F
     FPC 5 XM 1 TSen                OK        27 degrees C / 80 degrees F
     FPC 5 XM 1 Chip                OK        26 degrees C / 78 degrees F
     FPC 5 PLX Switch TSen          OK        27 degrees C / 80 degrees F
     FPC 5 PLX Switch Chip          OK        24 degrees C / 75 degrees F
     FPC 6 Intake                   OK        12 degrees C / 53 degrees F
     FPC 6 Exhaust A                OK        17 degrees C / 62 degrees F
     FPC 6 Exhaust B                OK        28 degrees C / 82 degrees F
     FPC 6 LU 0 TSen                OK        24 degrees C / 75 degrees F
     FPC 6 LU 0 Chip                OK        29 degrees C / 84 degrees F
     FPC 6 LU 1 TSen                OK        24 degrees C / 75 degrees F
     FPC 6 LU 1 Chip                OK        30 degrees C / 86 degrees F
     FPC 6 LU 2 TSen                OK        24 degrees C / 75 degrees F
     FPC 6 LU 2 Chip                OK        24 degrees C / 75 degrees F
     FPC 6 LU 3 TSen                OK        24 degrees C / 75 degrees F
     FPC 6 LU 3 Chip                OK        22 degrees C / 71 degrees F
     FPC 6 MQ 0 TSen                OK        16 degrees C / 60 degrees F
     FPC 6 MQ 0 Chip                OK        19 degrees C / 66 degrees F
     FPC 6 MQ 1 TSen                OK        16 degrees C / 60 degrees F
     FPC 6 MQ 1 Chip                OK        20 degrees C / 68 degrees F
     FPC 6 MQ 2 TSen                OK        16 degrees C / 60 degrees F
     FPC 6 MQ 2 Chip                OK        17 degrees C / 62 degrees F
     FPC 6 MQ 3 TSen                OK        16 degrees C / 60 degrees F
     FPC 6 MQ 3 Chip                OK        16 degrees C / 60 degrees F
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     FPC 7 Intake                 OK         10 degrees C / 50 degrees F
     FPC 7 Exhaust A              OK         10 degrees C / 50 degrees F
     FPC 7 Exhaust B              OK         11 degrees C / 51 degrees F
     FPC 7 LU 0 TSen              OK         26 degrees C / 78 degrees F
     FPC 7 LU 0 Chip              OK         26 degrees C / 78 degrees F
     FPC 7 LU 1 TSen              OK         26 degrees C / 78 degrees F
     FPC 7 LU 1 Chip              OK         29 degrees C / 84 degrees F
     FPC 7 LU 2 TSen              OK         26 degrees C / 78 degrees F
     FPC 7 LU 2 Chip              OK         19 degrees C / 66 degrees F
     FPC 7 LU 3 TSen              OK         26 degrees C / 78 degrees F
     FPC 7 LU 3 Chip              OK         24 degrees C / 75 degrees F
     FPC 7 XM 0 TSen              OK         26 degrees C / 78 degrees F
     FPC 7 XM 0 Chip              OK         34 degrees C / 93 degrees F
     FPC 7 XM 1 TSen              OK         26 degrees C / 78 degrees F
     FPC 7 XM 1 Chip              OK         32 degrees C / 89 degrees F
     FPC 7 PLX Switch TSen        OK         26 degrees C / 78 degrees F
     FPC 7 PLX Switch Chip        OK         22 degrees C / 71 degrees F
     FPC 8 Intake                 OK         10 degrees C / 50 degrees F
     FPC 8 Exhaust A              OK         22 degrees C / 71 degrees F
     FPC 8 Exhaust B              OK         28 degrees C / 82 degrees F
     FPC 8 LU 0 TSen              OK         20 degrees C / 68 degrees F
     FPC 8 LU 0 Chip              OK         33 degrees C / 91 degrees F
FPC 8 LU 1 TSen              OK         20 degrees C / 68 degrees F
     FPC 8 LU 1 Chip              OK         23 degrees C / 73 degrees F
     FPC 8 LU 2 TSen              OK         20 degrees C / 68 degrees F
     FPC 8 LU 2 Chip              OK         26 degrees C / 78 degrees F
     FPC 8 LU 3 TSen              OK         20 degrees C / 68 degrees F
     FPC 8 LU 3 Chip              OK         33 degrees C / 91 degrees F
     FPC 8 XM 0 TSen              OK         20 degrees C / 68 degrees F
     FPC 8 XM 0 Chip              OK         29 degrees C / 84 degrees F
     FPC 8 XF 0 TSen              OK         20 degrees C / 68 degrees F
     FPC 8 XF 0 Chip              OK         38 degrees C / 100 degrees F
     FPC 8 PLX Switch TSen        OK         20 degrees C / 68 degrees F
     FPC 8 PLX Switch Chip        OK         24 degrees C / 75 degrees F
     FPC 9 Intake                 OK         11 degrees C / 51 degrees F
     FPC 9 Exhaust A              OK         11 degrees C / 51 degrees F
     FPC 9 Exhaust B              OK         11 degrees C / 51 degrees F
     FPC 9 LU 0 TSen              OK         25 degrees C / 77 degrees F
     FPC 9 LU 0 Chip              OK         24 degrees C / 75 degrees F
     FPC 9 LU 1 TSen              OK         25 degrees C / 77 degrees F
     FPC 9 LU 1 Chip              OK         26 degrees C / 78 degrees F
     FPC 9 LU 2 TSen              OK         25 degrees C / 77 degrees F
     FPC 9 LU 2 Chip              OK         16 degrees C / 60 degrees F
     FPC 9 LU 3 TSen              OK         25 degrees C / 77 degrees F
     FPC 9 LU 3 Chip              OK         21 degrees C / 69 degrees F
     FPC 9 XM 0 TSen              OK         25 degrees C / 77 degrees F
     FPC 9 XM 0 Chip              OK         32 degrees C / 89 degrees F
     FPC 9 XM 1 TSen              OK         25 degrees C / 77 degrees F
     FPC 9 XM 1 Chip              OK         25 degrees C / 77 degrees F
     FPC 9 PLX Switch TSen        OK         25 degrees C / 77 degrees F
     FPC 9 PLX Switch Chip        OK         21 degrees C / 69 degrees F
     ADC 0 Intake                 OK         12 degrees C / 53 degrees F
     ADC 0 Exhaust                OK         20 degrees C / 68 degrees F
     ADC 0 ADC-XF1                OK         26 degrees C / 78 degrees F
     ADC 0 ADC-XF0                OK         32 degrees C / 89 degrees F
     ADC 1 Intake                 OK         11 degrees C / 51 degrees F
     ADC 1 Exhaust                OK         21 degrees C / 69 degrees F
     ADC 1 ADC-XF1                OK         24 degrees C / 75 degrees F
     ADC 1 ADC-XF0                OK         31 degrees C / 87 degrees F
     ADC 2 Intake                 OK         14 degrees C / 57 degrees F
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         ADC 2 Exhaust                  OK         21 degrees C / 69 degrees F
         ADC 2 ADC-XF1                  OK         28 degrees C / 82 degrees F
         ADC 2 ADC-XF0                  OK         34 degrees C / 93 degrees F
         ADC 3 Intake                   OK         13 degrees C / 55 degrees F
         ADC 3 Exhaust                  OK         19 degrees C / 66 degrees F
         ADC 3 ADC-XF1                  OK         24 degrees C / 75 degrees F
         ADC 3 ADC-XF0                  OK         31 degrees C / 87 degrees F
         ADC 4 Intake                   OK         9 degrees C / 48 degrees F
         ADC 4 Exhaust                  OK         22 degrees C / 71 degrees F
         ADC 4 ADC-XF1                  OK         28 degrees C / 82 degrees F
         ADC 4 ADC-XF0                  OK         35 degrees C / 95 degrees F
         ADC 5 Intake                   OK         12 degrees C / 53 degrees F
         ADC 5 Exhaust                  OK         22 degrees C / 71 degrees F
         ADC 5 ADC-XF1                  OK         28 degrees C / 82 degrees F
         ADC 5 ADC-XF0                  OK         34 degrees C / 93 degrees F
         ADC 6 Intake                   OK         11 degrees C / 51 degrees F
         ADC 6 Exhaust                  OK         21 degrees C / 69 degrees F
         ADC 6 ADC-XF1                  OK         26 degrees C / 78 degrees F
 ADC 6 ADC-XF0                  OK         35 degrees C / 95 degrees F
         ADC 7 Intake                   OK         14 degrees C / 57 degrees F
         ADC 7 Exhaust                  OK         22 degrees C / 71 degrees F
         ADC 7 ADC-XF1                  OK         26 degrees C / 78 degrees F
         ADC 7 ADC-XF0                  OK         34 degrees C / 93 degrees F
         ADC 8 Intake                   OK         14 degrees C / 57 degrees F
         ADC 8 Exhaust                  OK         21 degrees C / 69 degrees F
         ADC 8 ADC-XF1                  OK         24 degrees C / 75 degrees F
         ADC 8 ADC-XF0                  OK         31 degrees C / 87 degrees F
         ADC 9 Intake                   OK         10 degrees C / 50 degrees F
         ADC 9 Exhaust                  OK         22 degrees C / 71 degrees F
         ADC 9 ADC-XF1                  OK         28 degrees C / 82 degrees F
         ADC 9 ADC-XF0                  OK         36 degrees C / 96 degrees F
Fans     Fan Tray 0 Fan 1               OK         3480 RPM
         Fan Tray 0 Fan 2               OK         3480 RPM
         Fan Tray 0 Fan 3               OK         3480 RPM
         Fan Tray 0 Fan 4               OK         3360 RPM
         Fan Tray 0 Fan 5               OK         3360 RPM
         Fan Tray 0 Fan 6               OK         3480 RPM
         Fan Tray 1 Fan 1               OK         3360 RPM
         Fan Tray 1 Fan 2               OK         3360 RPM
         Fan Tray 1 Fan 3               OK         3360 RPM
         Fan Tray 1 Fan 4               OK         3480 RPM
         Fan Tray 1 Fan 5               OK         3480 RPM
         Fan Tray 1 Fan 6               OK         3480 RPM
         Fan Tray 2 Fan 1               OK         3360 RPM
         Fan Tray 2 Fan 2               OK         3360 RPM
         Fan Tray 2 Fan 3               OK         3480 RPM
         Fan Tray 2 Fan 4               OK         3480 RPM
         Fan Tray 2 Fan 5               OK         3360 RPM
         Fan Tray 2 Fan 6               OK         3480 RPM
         Fan Tray 3 Fan 1               OK         3360 RPM
         Fan Tray 3 Fan 2               OK         3360 RPM
         Fan Tray 3 Fan 3               OK         3480 RPM
         Fan Tray 3 Fan 4               OK         3480 RPM
         Fan Tray 3 Fan 5               OK         3480 RPM
         Fan Tray 3 Fan 6               OK         3360 RPM
```

show chassis environment (MX2008 Router)

`user@host>` **show chassis environment**

```
Class Item                          Status     Measurement
Temp  PSM 0                         Absent
      PSM 1                         OK         29 degrees C / 84 degrees F
      PSM 2                         OK         30 degrees C / 86 degrees F
      PSM 3                         OK         29 degrees C / 84 degrees F
      PSM 4                         OK         29 degrees C / 84 degrees F
      PSM 5                         OK         30 degrees C / 86 degrees F
      PSM 6                         OK         29 degrees C / 84 degrees F
      PSM 7                         OK         31 degrees C / 87 degrees F
      PSM 8                         Absent
      PDM 0                         OK
      PDM 1                         OK
      CB 0 Inlet1                   OK         37 degrees C / 98 degrees F
      CB 0 Inlet2                   OK         45 degrees C / 113 degrees F
      CB 0 Inlet3                   OK         44 degrees C / 111 degrees F
      CB 0 Inlet4                   OK         41 degrees C / 105 degrees F
      CB 0 Exhaust1                 OK         30 degrees C / 86 degrees F
      CB 0 Exhaust2                 OK         40 degrees C / 104 degrees F
      CB 0 Exhaust3                 OK         48 degrees C / 118 degrees F
      CB 0 Exhaust4                 OK         46 degrees C / 114 degrees F
      CB 1 Inlet1                   OK         30 degrees C / 86 degrees F
      CB 1 Inlet2                   OK         31 degrees C / 87 degrees F
      CB 1 Inlet3                   OK         29 degrees C / 84 degrees F
      CB 1 Inlet4                   OK         32 degrees C / 89 degrees F
      CB 1 Exhaust1                 OK         30 degrees C / 86 degrees F
      CB 1 Exhaust2                 OK         33 degrees C / 91 degrees F
      CB 1 Exhaust3                 OK         34 degrees C / 93 degrees F
      CB 1 Exhaust4                 OK         34 degrees C / 93 degrees F
      Routing Engine 0              OK
      Routing Engine 0 CPU          OK         75 degrees C / 167 degrees F
      Routing Engine 1              OK
      Routing Engine 1 CPU          OK         46 degrees C / 114 degrees F
      SFB 0 Inlet2                  OK         44 degrees C / 111 degrees F
      SFB 0 Exhaust1                OK         39 degrees C / 102 degrees F
      SFB 0 Inlet1                  OK         41 degrees C / 105 degrees F
      SFB 0 Exhaust2                OK         45 degrees C / 113 degrees F
      SFB 0 SFB2-PF-local           OK         45 degrees C / 113 degrees F
      SFB 0 SFB2-PF-die             OK         51 degrees C / 123 degrees F
      SFB 1 Inlet2                  OK         30 degrees C / 86 degrees F
      SFB 1 Exhaust1                OK         27 degrees C / 80 degrees F
      SFB 1 Inlet1                  OK         28 degrees C / 82 degrees F
      SFB 1 Exhaust2                OK         31 degrees C / 87 degrees F
      SFB 1 SFB2-PF-local           OK         30 degrees C / 86 degrees F
      SFB 1 SFB2-PF-die             OK         37 degrees C / 98 degrees F
      SFB 2 Inlet2                  OK         28 degrees C / 82 degrees F
      SFB 2 Exhaust1                OK         26 degrees C / 78 degrees F
      SFB 2 Inlet1                  OK         27 degrees C / 80 degrees F
      SFB 2 Exhaust2                OK         28 degrees C / 82 degrees F
      SFB 2 SFB2-PF-local           OK         27 degrees C / 80 degrees F
      SFB 2 SFB2-PF-die             OK         33 degrees C / 91 degrees F
      SFB 3 Inlet2                  OK         28 degrees C / 82 degrees F
      SFB 3 Exhaust1                OK         26 degrees C / 78 degrees F
      SFB 3 Inlet1                  OK         26 degrees C / 78 degrees F
      SFB 3 Exhaust2                OK         28 degrees C / 82 degrees F
      SFB 3 SFB2-PF-local           OK         27 degrees C / 80 degrees F
      SFB 3 SFB2-PF-die             OK         33 degrees C / 91 degrees F
      SFB 4 Inlet2                  OK         28 degrees C / 82 degrees F
      SFB 4 Exhaust1                OK         26 degrees C / 78 degrees F
      SFB 4 Inlet1                  OK         26 degrees C / 78 degrees F
      SFB 4 Exhaust2                OK         28 degrees C / 82 degrees F
```



```
    SFB 4 SFB2-PF-local           OK          27 degrees C / 80 degrees F
    SFB 4 SFB2-PF-die             OK          32 degrees C / 89 degrees F
    SFB 5 Inlet2                  OK          29 degrees C / 84 degrees F
    SFB 5 Exhaust1                OK          27 degrees C / 80 degrees F
    SFB 5 Inlet1                  OK          28 degrees C / 82 degrees F
    SFB 5 Exhaust2                OK          29 degrees C / 84 degrees F
    SFB 5 SFB2-PF-local           OK          28 degrees C / 82 degrees F
    SFB 5 SFB2-PF-die             OK          34 degrees C / 93 degrees F
    SFB 6 Inlet2                  OK          33 degrees C / 91 degrees F
    SFB 6 Exhaust1                OK          32 degrees C / 89 degrees F
    SFB 6 Inlet1                  OK          32 degrees C / 89 degrees F
    SFB 6 Exhaust2                OK          34 degrees C / 93 degrees F
    SFB 6 SFB2-PF-local           OK          33 degrees C / 91 degrees F
    SFB 6 SFB2-PF-die             OK          40 degrees C / 104 degrees F
    SFB 7 Inlet2                  OK          29 degrees C / 84 degrees F
    SFB 7 Exhaust1                OK          28 degrees C / 82 degrees F
    SFB 7 Inlet1                  OK          29 degrees C / 84 degrees F
    SFB 7 Exhaust2                OK          29 degrees C / 84 degrees F
    SFB 7 SFB2-PF-local           OK          28 degrees C / 82 degrees F
    SFB 7 SFB2-PF-die             OK          33 degrees C / 91 degrees F
    FPC 0 Intake                  OK          29 degrees C / 84 degrees F
    FPC 0 Exhaust A               OK          42 degrees C / 107 degrees F
    FPC 0 Exhaust B               OK          42 degrees C / 107 degrees F
    FPC 0 XL 0 TSen               OK          38 degrees C / 100 degrees F
    FPC 0 XL 0 Chip               OK          53 degrees C / 127 degrees F
    FPC 0 XL 0 XR2 0 TSen         OK          38 degrees C / 100 degrees F
    FPC 0 XL 0 XR2 0 Chip         OK          59 degrees C / 138 degrees F
    FPC 0 XL 0 XR2 1 TSen         OK          38 degrees C / 100 degrees F
    FPC 0 XL 0 XR2 1 Chip         OK          59 degrees C / 138 degrees F
    FPC 0 XL 1 TSen               OK          30 degrees C / 86 degrees F
    FPC 0 XL 1 Chip               OK          42 degrees C / 107 degrees F
    FPC 0 XL 1 XR2 0 TSen         OK          30 degrees C / 86 degrees F
    FPC 0 XL 1 XR2 0 Chip         OK          49 degrees C / 120 degrees F
    FPC 0 XL 1 XR2 1 TSen         OK          30 degrees C / 86 degrees F
    FPC 0 XL 1 XR2 1 Chip         OK          50 degrees C / 122 degrees F
    FPC 0 XM 0 TSen               OK          42 degrees C / 107 degrees F
    FPC 0 XM 0 Chip               OK          49 degrees C / 120 degrees F
    FPC 0 XM 1 TSen               OK          42 degrees C / 107 degrees F
    FPC 0 XM 1 Chip               OK          42 degrees C / 107 degrees F
    FPC 0 XM 2 TSen               OK          42 degrees C / 107 degrees F
    FPC 0 XM 2 Chip               OK          42 degrees C / 107 degrees F
    FPC 0 XM 3 TSen               OK          42 degrees C / 107 degrees F
    FPC 0 XM 3 Chip               OK          40 degrees C / 104 degrees F
    FPC 0 PCIe Switch TSen        OK          42 degrees C / 107 degrees F
    FPC 0 PCIe Switch Chip        OK          22 degrees C / 71 degrees F
    FPC 1 Intake                  OK          29 degrees C / 84 degrees F
    FPC 1 Exhaust A               OK          52 degrees C / 125 degrees F
    FPC 1 Exhaust B               OK          44 degrees C / 111 degrees F
    FPC 1 EA0 TSen                OK          54 degrees C / 129 degrees F
    FPC 1 EA0 Chip                OK          47 degrees C / 116 degrees F
    FPC 1 EA0_XR0 TSen            OK          54 degrees C / 129 degrees F
    FPC 1 EA0_XR0 Chip            OK          56 degrees C / 132 degrees F
    FPC 1 EA0_XR1 TSen            OK          54 degrees C / 129 degrees F
    FPC 1 EA0_XR1 Chip            OK          53 degrees C / 127 degrees F
    FPC 1 EA1 TSen                OK          54 degrees C / 129 degrees F
    FPC 1 EA1 Chip                OK          49 degrees C / 120 degrees F
    FPC 1 EA1_XR0 TSen            OK          54 degrees C / 129 degrees F
    FPC 1 EA1_XR0 Chip            OK          57 degrees C / 134 degrees F
    FPC 1 EA1_XR1 TSen            OK          54 degrees C / 129 degrees F
    FPC 1 EA1_XR1 Chip            OK          58 degrees C / 136 degrees F
```



```
    FPC 1 PEX TSen               OK         54 degrees C / 129 degrees F
    FPC 1 PEX Chip               OK         39 degrees C / 102 degrees F
    FPC 1 EA2 TSen               OK         43 degrees C / 109 degrees F
    FPC 1 EA2 Chip               OK         39 degrees C / 102 degrees F
    FPC 1 EA2_XR0 TSen           OK         43 degrees C / 109 degrees F
    FPC 1 EA2_XR0 Chip           OK         45 degrees C / 113 degrees F
    FPC 1 EA2_XR1 TSen           OK         43 degrees C / 109 degrees F
    FPC 1 EA2_XR1 Chip           OK         42 degrees C / 107 degrees F
    FPC 1 EA3 TSen               OK         43 degrees C / 109 degrees F
    FPC 1 EA3 Chip               OK         40 degrees C / 104 degrees F
    FPC 1 EA3_XR0 TSen           OK         43 degrees C / 109 degrees F
    FPC 1 EA3_XR0 Chip           OK         50 degrees C / 122 degrees F
    FPC 1 EA3_XR1 TSen           OK         43 degrees C / 109 degrees F
    FPC 1 EA3_XR1 Chip           OK         46 degrees C / 114 degrees F
    FPC 1 EA0_HMC0 Logic die     OK         60 degrees C / 140 degrees F
    FPC 1 EA0_HMC0 DRAM botm     OK         57 degrees C / 134 degrees F
    FPC 1 EA0_HMC1 Logic die     OK         61 degrees C / 141 degrees F
    FPC 1 EA0_HMC1 DRAM botm     OK         58 degrees C / 136 degrees F
    FPC 1 EA0_HMC2 Logic die     OK         57 degrees C / 134 degrees F
    FPC 1 EA0_HMC2 DRAM botm     OK         54 degrees C / 129 degrees F
    FPC 1 EA1_HMC0 Logic die     OK         65 degrees C / 149 degrees F
    FPC 1 EA1_HMC0 DRAM botm     OK         62 degrees C / 143 degrees F
    FPC 1 EA1_HMC1 Logic die     OK         64 degrees C / 147 degrees F
    FPC 1 EA1_HMC1 DRAM botm     OK         61 degrees C / 141 degrees F
    FPC 1 EA1_HMC2 Logic die     OK         61 degrees C / 141 degrees F
    FPC 1 EA1_HMC2 DRAM botm     OK         58 degrees C / 136 degrees F
    FPC 1 EA2_HMC0 Logic die     OK         50 degrees C / 122 degrees F
    FPC 1 EA2_HMC0 DRAM botm     OK         47 degrees C / 116 degrees F
    FPC 1 EA2_HMC1 Logic die     OK         54 degrees C / 129 degrees F
    FPC 1 EA2_HMC1 DRAM botm     OK         51 degrees C / 123 degrees F
    FPC 1 EA2_HMC2 Logic die     OK         51 degrees C / 123 degrees F
    FPC 1 EA2_HMC2 DRAM botm     OK         48 degrees C / 118 degrees F
    FPC 1 EA3_HMC0 Logic die     OK         51 degrees C / 123 degrees F
    FPC 1 EA3_HMC0 DRAM botm     OK         48 degrees C / 118 degrees F
    FPC 1 EA3_HMC1 Logic die     OK         51 degrees C / 123 degrees F
    FPC 1 EA3_HMC1 DRAM botm     OK         48 degrees C / 118 degrees F
    FPC 1 EA3_HMC2 Logic die     OK         51 degrees C / 123 degrees F
    FPC 1 EA3_HMC2 DRAM botm     OK         48 degrees C / 118 degrees F
    FPC 7 Intake                 OK         30 degrees C / 86 degrees F
    FPC 7 Exhaust A              OK         45 degrees C / 113 degrees F
    FPC 7 Exhaust B              OK         38 degrees C / 100 degrees F
    FPC 7 QX 0 TSen              OK         48 degrees C / 118 degrees F
    FPC 7 QX 0 Chip              OK         51 degrees C / 123 degrees F
    FPC 7 LU 0 TCAM TSen         OK         48 degrees C / 118 degrees F
    FPC 7 LU 0 TCAM Chip         OK         51 degrees C / 123 degrees F
    FPC 7 LU 0 TSen              OK         48 degrees C / 118 degrees F
    FPC 7 LU 0 Chip              OK         50 degrees C / 122 degrees F
    FPC 7 MQ 0 TSen              OK         48 degrees C / 118 degrees F
    FPC 7 MQ 0 Chip              OK         54 degrees C / 129 degrees F
    FPC 7 QX 1 TSen              OK         41 degrees C / 105 degrees F
    FPC 7 QX 1 Chip              OK         42 degrees C / 107 degrees F
    FPC 7 LU 1 TCAM TSen         OK         41 degrees C / 105 degrees F
    FPC 7 LU 1 TCAM Chip         OK         43 degrees C / 109 degrees F
    FPC 7 LU 1 TSen              OK         41 degrees C / 105 degrees F
    FPC 7 LU 1 Chip              OK         46 degrees C / 114 degrees F
    FPC 7 MQ 1 TSen              OK         41 degrees C / 105 degrees F
    FPC 7 MQ 1 Chip              OK         47 degrees C / 116 degrees F
    ADC 7 Intake                 OK         32 degrees C / 89 degrees F
    ADC 7 Exhaust                OK         39 degrees C / 102 degrees F
    ADC 7 ADC-XF1                OK         46 degrees C / 114 degrees F
```

```
      ADC 7 ADC-XF0                OK          54 degrees C / 129 degrees F
Fans  Fan Tray 0 Fan 1             OK          6240 RPM
      Fan Tray 0 Fan 2             OK          6120 RPM
      Fan Tray 0 Fan 3             OK          6120 RPM
      Fan Tray 0 Fan 4             OK          5760 RPM
      Fan Tray 0 Fan 5             OK          5880 RPM
      Fan Tray 0 Fan 6             OK          6000 RPM
      Fan Tray 1 Fan 1             OK          5880 RPM
      Fan Tray 1 Fan 2             OK          5880 RPM
      Fan Tray 1 Fan 3             OK          6000 RPM
      Fan Tray 1 Fan 4             OK          6000 RPM
      Fan Tray 1 Fan 5             OK          6000 RPM
      Fan Tray 1 Fan 6             OK          6000 RPM
```

show chassis environment (T320 Router)

user@host> **show chassis environment**

```
Class Item                     Status     Measurement
Power PEM 0                    OK
      PEM 1                    Absent
Temp  SCG 0                    OK         28 degrees C / 82 degrees F
      SCG 1                    OK         28 degrees C / 82 degrees F
      Routing Engine 0         OK         31 degrees C / 87 degrees F
      Routing Engine 1         OK         30 degrees C / 86 degrees F
      CB 0                     OK         32 degrees C / 89 degrees F
      CB 1                     OK         32 degrees C / 89 degrees F
      SIB 0                    OK         33 degrees C / 91 degrees F
      SIB 1                    OK         33 degrees C / 91 degrees F
      SIB 2                    OK         34 degrees C / 93 degrees F
      FPC 0 Top                OK         38 degrees C / 100 degrees F
      FPC 0 Bottom             OK         32 degrees C / 89 degrees F
      FPC 1 Top                OK         38 degrees C / 100 degrees F
      FPC 1 Bottom             OK         33 degrees C / 91 degrees F
      FPC 2 Top                OK         36 degrees C / 96 degrees F
      FPC 2 Bottom             OK         31 degrees C / 87 degrees F
      FPM GBUS                 OK         26 degrees C / 78 degrees F
      FPM Display              OK         29 degrees C / 84 degrees F
Fans  Top Left Front fan       OK         Spinning at normal speed
      Top Left Middle fan      OK         Spinning at normal speed
      Top Left Rear fan        OK         Spinning at normal speed
      Top Right Front fan      OK         Spinning at normal speed
      Top Right Middle fan     OK         Spinning at normal speed
      Top Right Rear fan       OK         Spinning at normal speed
      Bottom Left Front fan    OK         Spinning at normal speed
      Bottom Left Middle fan   OK         Spinning at normal speed
      Bottom Left Rear fan     OK         Spinning at normal speed
      Bottom Right Front fan   OK         Spinning at normal speed
      Bottom Right Middle fan OK          Spinning at normal speed
      Bottom Right Rear fan    OK         Spinning at normal speed
      Rear Tray Top fan        OK         Spinning at normal speed
      Rear Tray Second fan     OK         Spinning at normal speed
      Rear Tray Middle fan     OK         Spinning at normal speed
      Rear Tray Fourth fan     OK         Spinning at normal speed
      Rear Tray Bottom fan     OK         Spinning at normal speed
Misc  CIP                      OK
      SPMB 0                   OK
      SPMB 1                   OK
```


show chassis environment (MX10003 Router)

user@host> **show chassis environment**

```
Class Item                           Status      Measurement
Temp  CB 0 Exhaust Temp Sensor 0x49  OK          36 degrees C / 96 degrees F
      CB 0 Inlet Temp Sensor 0x49    OK          29 degrees C / 84 degrees F
      CB 1 Exhaust Temp Sensor 0x49  OK          36 degrees C / 96 degrees F
      CB 1 Inlet Temp Sensor 0x49    OK          31 degrees C / 87 degrees F
      FPC 0 Intake Temp Sensor       OK          29 degrees C / 84 degrees F
      FPC 0 Exhaust-A Temp Sensor    OK          55 degrees C / 131 degrees F
      FPC 0 Exhaust-B Temp Sensor    OK          44 degrees C / 111 degrees F
      FPC 0 EA0 Chip                 OK          58 degrees C / 136 degrees F
      FPC 0 EA0-XR0 Chip             OK          61 degrees C / 141 degrees F
      FPC 0 EA0-XR1 Chip             OK          62 degrees C / 143 degrees F
      FPC 0 EA1 Chip                 OK          67 degrees C / 152 degrees F
      FPC 0 EA1-XR0 Chip             OK          71 degrees C / 159 degrees F
      FPC 0 EA1-XR1 Chip             OK          72 degrees C / 161 degrees F
      FPC 0 PEX Chip                 OK          75 degrees C / 167 degrees F
      FPC 0 EA2 Chip                 OK          49 degrees C / 120 degrees F
      FPC 0 EA2-XR0 Chip             OK          55 degrees C / 131 degrees F
      FPC 0 EA2-XR1 Chip             OK          56 degrees C / 132 degrees F
      FPC 0 PF Chip                  OK          68 degrees C / 154 degrees F
      FPC 0 EA0_HMC0 Logic die       OK          72 degrees C / 161 degrees F
      FPC 0 EA0_HMC0 DRAM botm       OK          69 degrees C / 156 degrees F
      FPC 0 EA0_HMC1 Logic die       OK          72 degrees C / 161 degrees F
      FPC 0 EA0_HMC1 DRAM botm       OK          69 degrees C / 156 degrees F
      FPC 0 EA0_HMC2 Logic die       OK          75 degrees C / 167 degrees F
      FPC 0 EA0_HMC2 DRAM botm       OK          72 degrees C / 161 degrees F
      FPC 0 EA1_HMC0 Logic die       OK          81 degrees C / 177 degrees F
      FPC 0 EA1_HMC0 DRAM botm       OK          78 degrees C / 172 degrees F
      FPC 0 EA1_HMC1 Logic die       OK          79 degrees C / 174 degrees F
      FPC 0 EA1_HMC1 DRAM botm       OK          76 degrees C / 168 degrees F
      FPC 0 EA1_HMC2 Logic die       OK          82 degrees C / 179 degrees F
      FPC 0 EA1_HMC2 DRAM botm       OK          79 degrees C / 174 degrees F
      FPC 0 EA2_HMC0 Logic die       OK          61 degrees C / 141 degrees F
      FPC 0 EA2_HMC0 DRAM botm       OK          58 degrees C / 136 degrees F
      FPC 0 EA2_HMC1 Logic die       OK          62 degrees C / 143 degrees F
      FPC 0 EA2_HMC1 DRAM botm       OK          59 degrees C / 138 degrees F
      FPC 0 EA2_HMC2 Logic die       OK          64 degrees C / 147 degrees F
      FPC 0 EA2_HMC2 DRAM botm       OK          61 degrees C / 141 degrees F
      FPC 1 Intake Temp Sensor       OK          28 degrees C / 82 degrees F
      FPC 1 Exhaust-A Temp Sensor    OK          58 degrees C / 136 degrees F
      FPC 1 Exhaust-B Temp Sensor    OK          46 degrees C / 114 degrees F
      FPC 1 EA0 Chip                 OK          64 degrees C / 147 degrees F
      FPC 1 EA0-XR0 Chip             OK          67 degrees C / 152 degrees F
      FPC 1 EA0-XR1 Chip             OK          68 degrees C / 154 degrees F
      FPC 1 EA1 Chip                 OK          70 degrees C / 158 degrees F
      FPC 1 EA1-XR0 Chip             OK          74 degrees C / 165 degrees F
      FPC 1 EA1-XR1 Chip             OK          74 degrees C / 165 degrees F
      FPC 1 PEX Chip                 OK          88 degrees C / 190 degrees F
      FPC 1 EA2 Chip                 OK          50 degrees C / 122 degrees F
      FPC 1 EA2-XR0 Chip             OK          54 degrees C / 129 degrees F
      FPC 1 EA2-XR1 Chip             OK          56 degrees C / 132 degrees F
      FPC 1 PF Chip                  OK          71 degrees C / 159 degrees F
      FPC 1 EA0_HMC0 Logic die       OK          74 degrees C / 165 degrees F
      FPC 1 EA0_HMC0 DRAM botm       OK          71 degrees C / 159 degrees F
      FPC 1 EA0_HMC1 Logic die       OK          78 degrees C / 172 degrees F
      FPC 1 EA0_HMC1 DRAM botm       OK          75 degrees C / 167 degrees F
```



```
      FPC 1 EA0_HMC2 Logic die       OK         78 degrees C / 172 degrees F
      FPC 1 EA0_HMC2 DRAM botm       OK         75 degrees C / 167 degrees F
      FPC 1 EA1_HMC0 Logic die       OK         84 degrees C / 183 degrees F
      FPC 1 EA1_HMC0 DRAM botm       OK         81 degrees C / 177 degrees F
      FPC 1 EA1_HMC1 Logic die       OK         81 degrees C / 177 degrees F
      FPC 1 EA1_HMC1 DRAM botm       OK         78 degrees C / 172 degrees F
      FPC 1 EA1_HMC2 Logic die       OK         85 degrees C / 185 degrees F
      FPC 1 EA1_HMC2 DRAM botm       OK         82 degrees C / 179 degrees F
      FPC 1 EA2_HMC0 Logic die       OK         63 degrees C / 145 degrees F
      FPC 1 EA2_HMC0 DRAM botm       OK         60 degrees C / 140 degrees F
      FPC 1 EA2_HMC1 Logic die       OK         60 degrees C / 140 degrees F
      FPC 1 EA2_HMC1 DRAM botm       OK         57 degrees C / 134 degrees F
      FPC 1 EA2_HMC2 Logic die       OK         66 degrees C / 150 degrees F
      FPC 1 EA2_HMC2 DRAM botm       OK         63 degrees C / 145 degrees F
Power PEM 0                          OK
      PEM 1                          OK
      PEM 2                          OK
      PEM 3                          OK
      PEM 4                          Absent
      PEM 5                          Absent
Fans  Fan Tray 0 Fan 0               OK         Spinning at normal speed
      Fan Tray 0 Fan 1               OK         Spinning at normal speed
      Fan Tray 0 Fan 2               OK         Spinning at normal speed
      Fan Tray 0 Fan 3               OK         Spinning at normal speed
      Fan Tray 1 Fan 0               OK         Spinning at normal speed
      Fan Tray 1 Fan 1               OK         Spinning at normal speed
      Fan Tray 1 Fan 2               OK         Spinning at normal speed
      Fan Tray 1 Fan 3               OK         Spinning at normal speed
      Fan Tray 2 Fan 0               OK         Spinning at normal speed
      Fan Tray 2 Fan 1               OK         Spinning at normal speed
      Fan Tray 2 Fan 2               OK         Spinning at normal speed
      Fan Tray 2 Fan 3               OK         Spinning at normal speed
      Fan Tray 3 Fan 0               OK         Spinning at normal speed
      Fan Tray 3 Fan 1               OK         Spinning at normal speed
      Fan Tray 3 Fan 2               OK         Spinning at normal speed
      Fan Tray 3 Fan 3               OK         Spinning at normal speed
```

show chassis environment (MX10008 Router)

user@host> **show chassis environment**

```
Class Item                           Status     Measurement
      Routing Engine 0 CPU           OK         41 degrees C / 105 degrees F
      Routing Engine 1 CPU           OK         40 degrees C / 104 degrees F
Temp  CB 0 Intake A Temp Sensor      OK         24 degrees C / 75 degrees F
      CB 0 Intake B Temp Sensor      OK         24 degrees C / 75 degrees F
      CB 0 Exhaust A Temp Sensor     OK         28 degrees C / 82 degrees F
      CB 0 Exhaust B Temp Sensor     OK         30 degrees C / 86 degrees F
      CB 0 Middle Temp Sensor        OK         28 degrees C / 82 degrees F
      CB 1 Intake A Temp Sensor      OK         24 degrees C / 75 degrees F
      CB 1 Intake B Temp Sensor      OK         23 degrees C / 73 degrees F
      CB 1 Exhaust A Temp Sensor     OK         27 degrees C / 80 degrees F
      CB 1 Exhaust B Temp Sensor     OK         29 degrees C / 84 degrees F
      CB 1 Middle Temp Sensor        OK         28 degrees C / 82 degrees F
      FPC 0 Intake-A Temp Sensor     OK         32 degrees C / 89 degrees F
      FPC 0 Exhaust-A Temp Sensor    OK         44 degrees C / 111 degrees F
      FPC 0 Exhaust-B Temp Sensor    OK         49 degrees C / 120 degrees F
      FPC 0 EA0 Temp Sensor          OK         66 degrees C / 150 degrees F
      FPC 0 EA0_XR0 Temp Sensor      OK         69 degrees C / 156 degrees F
      FPC 0 EA0_XR1 Temp Sensor      OK         73 degrees C / 163 degrees F
```



```
FPC 0 EA1 Temp Sensor         OK        60 degrees C / 140 degrees F
FPC 0 EA1_XR0 Temp Sensor     OK        64 degrees C / 147 degrees F
FPC 0 EA1_XR1 Temp Sensor     OK        63 degrees C / 145 degrees F
FPC 0 EA2 Temp Sensor         OK        68 degrees C / 154 degrees F
FPC 0 EA2_XR0 Temp Sensor     OK        73 degrees C / 163 degrees F
FPC 0 EA2_XR1 Temp Sensor     OK        72 degrees C / 161 degrees F
FPC 0 EA3 Temp Sensor         OK        63 degrees C / 145 degrees F
FPC 0 EA3_XR0 Temp Sensor     OK        66 degrees C / 150 degrees F
FPC 0 EA3_XR1 Temp Sensor     OK        65 degrees C / 149 degrees F
FPC 0 EA4 Temp Sensor         OK        68 degrees C / 154 degrees F
FPC 0 EA4_XR0 Temp Sensor     OK        71 degrees C / 159 degrees F
FPC 0 EA4_XR1 Temp Sensor     OK        70 degrees C / 158 degrees F
FPC 0 EA5 Temp Sensor         OK        56 degrees C / 132 degrees F
FPC 0 EA5_XR0 Temp Sensor     OK        61 degrees C / 141 degrees F
FPC 0 EA5_XR1 Temp Sensor     OK        63 degrees C / 145 degrees F
FPC 0 EA0_HMC0 Logic die      OK        75 degrees C / 167 degrees F
FPC 0 EA0_HMC0 DRAM botm      OK        72 degrees C / 161 degrees F
FPC 0 EA0_HMC1 Logic die      OK        75 degrees C / 167 degrees F
FPC 0 EA0_HMC1 DRAM botm      OK        72 degrees C / 161 degrees F
FPC 0 EA0_HMC2 Logic die      OK        77 degrees C / 170 degrees F
FPC 0 EA0_HMC2 DRAM botm      OK        74 degrees C / 165 degrees F
FPC 0 EA1_HMC0 Logic die      OK        72 degrees C / 161 degrees F
FPC 0 EA1_HMC0 DRAM botm      OK        69 degrees C / 156 degrees F
FPC 0 EA1_HMC1 Logic die      OK        73 degrees C / 163 degrees F
FPC 0 EA1_HMC1 DRAM botm      OK        70 degrees C / 158 degrees F
FPC 0 EA1_HMC2 Logic die      OK        72 degrees C / 161 degrees F
FPC 0 EA1_HMC2 DRAM botm      OK        69 degrees C / 156 degrees F
FPC 0 EA2_HMC0 Logic die      OK        80 degrees C / 176 degrees F
FPC 0 EA2_HMC0 DRAM botm      OK        77 degrees C / 170 degrees F
FPC 0 EA2_HMC1 Logic die      OK        80 degrees C / 176 degrees F
FPC 0 EA2_HMC1 DRAM botm      OK        77 degrees C / 170 degrees F
FPC 0 EA2_HMC2 Logic die      OK        79 degrees C / 174 degrees F
FPC 0 EA2_HMC2 DRAM botm      OK        76 degrees C / 168 degrees F
FPC 0 EA3_HMC0 Logic die      OK        77 degrees C / 170 degrees F
FPC 0 EA3_HMC0 DRAM botm      OK        74 degrees C / 165 degrees F
FPC 0 EA3_HMC1 Logic die      OK        78 degrees C / 172 degrees F
FPC 0 EA3_HMC1 DRAM botm      OK        75 degrees C / 167 degrees F
FPC 0 EA3_HMC2 Logic die      OK        77 degrees C / 170 degrees F
FPC 0 EA3_HMC2 DRAM botm      OK        74 degrees C / 165 degrees F
FPC 0 EA4_HMC0 Logic die      OK        80 degrees C / 176 degrees F
FPC 0 EA4_HMC0 DRAM botm      OK        77 degrees C / 170 degrees F
FPC 0 EA4_HMC1 Logic die      OK        81 degrees C / 177 degrees F
FPC 0 EA4_HMC1 DRAM botm      OK        78 degrees C / 172 degrees F
FPC 0 EA4_HMC2 Logic die      OK        80 degrees C / 176 degrees F
FPC 0 EA4_HMC2 DRAM botm      OK        77 degrees C / 170 degrees F
FPC 0 EA5_HMC0 Logic die      OK        68 degrees C / 154 degrees F
FPC 0 EA5_HMC0 DRAM botm      OK        65 degrees C / 149 degrees F
FPC 0 EA5_HMC1 Logic die      OK        68 degrees C / 154 degrees F
FPC 0 EA5_HMC1 DRAM botm      OK        65 degrees C / 149 degrees F
FPC 0 EA5_HMC2 Logic die      OK        67 degrees C / 152 degrees F
FPC 0 EA5_HMC2 DRAM botm      OK        64 degrees C / 147 degrees F
FPC 2 Intake-A Temp Sensor    OK        32 degrees C / 89 degrees F
FPC 2 Exhaust-A Temp Sensor   OK        52 degrees C / 125 degrees F
FPC 2 Exhaust-B Temp Sensor   OK        50 degrees C / 122 degrees F
FPC 2 EA0 Temp Sensor         OK        71 degrees C / 159 degrees F
FPC 2 EA0_XR0 Temp Sensor     OK        75 degrees C / 167 degrees F
FPC 2 EA0_XR1 Temp Sensor     OK        78 degrees C / 172 degrees F
FPC 2 EA1 Temp Sensor         OK        64 degrees C / 147 degrees F
FPC 2 EA1_XR0 Temp Sensor     OK        67 degrees C / 152 degrees F
FPC 2 EA1_XR1 Temp Sensor     OK        65 degrees C / 149 degrees F
```

```
FPC 2 EA2 Temp Sensor          OK         75 degrees C / 167 degrees F
FPC 2 EA2_XR0 Temp Sensor      OK         80 degrees C / 176 degrees F
FPC 2 EA2_XR1 Temp Sensor      OK         80 degrees C / 176 degrees F
FPC 2 EA3 Temp Sensor          OK         66 degrees C / 150 degrees F
FPC 2 EA3_XR0 Temp Sensor      OK         69 degrees C / 156 degrees F
FPC 2 EA3_XR1 Temp Sensor      OK         69 degrees C / 156 degrees F
FPC 2 EA4 Temp Sensor          OK         75 degrees C / 167 degrees F
FPC 2 EA4_XR0 Temp Sensor      OK         76 degrees C / 168 degrees F
FPC 2 EA4_XR1 Temp Sensor      OK         75 degrees C / 167 degrees F
FPC 2 EA5 Temp Sensor          OK         60 degrees C / 140 degrees F
FPC 2 EA5_XR0 Temp Sensor      OK         64 degrees C / 147 degrees F
FPC 2 EA5_XR1 Temp Sensor      OK         64 degrees C / 147 degrees F
FPC 2 EA0_HMC0 Logic die       OK         84 degrees C / 183 degrees F
FPC 2 EA0_HMC0 DRAM botm       OK         81 degrees C / 177 degrees F
FPC 2 EA0_HMC1 Logic die       OK         85 degrees C / 185 degrees F
FPC 2 EA0_HMC1 DRAM botm       OK         82 degrees C / 179 degrees F
FPC 2 EA0_HMC2 Logic die       OK         83 degrees C / 181 degrees F
FPC 2 EA0_HMC2 DRAM botm       OK         80 degrees C / 176 degrees F
FPC 2 EA1_HMC0 Logic die       OK         76 degrees C / 168 degrees F
FPC 2 EA1_HMC0 DRAM botm       OK         73 degrees C / 163 degrees F
FPC 2 EA1_HMC1 Logic die       OK         76 degrees C / 168 degrees F
FPC 2 EA1_HMC1 DRAM botm       OK         73 degrees C / 163 degrees F
FPC 2 EA1_HMC2 Logic die       OK         76 degrees C / 168 degrees F
FPC 2 EA1_HMC2 DRAM botm       OK         73 degrees C / 163 degrees F
FPC 2 EA2_HMC0 Logic die       OK         86 degrees C / 186 degrees F
FPC 2 EA2_HMC0 DRAM botm       OK         83 degrees C / 181 degrees F
FPC 2 EA2_HMC1 Logic die       OK         87 degrees C / 188 degrees F
FPC 2 EA2_HMC1 DRAM botm       OK         84 degrees C / 183 degrees F
FPC 2 EA2_HMC2 Logic die       OK         87 degrees C / 188 degrees F
FPC 2 EA2_HMC2 DRAM botm       OK         84 degrees C / 183 degrees F
FPC 2 EA3_HMC0 Logic die       OK         80 degrees C / 176 degrees F
FPC 2 EA3_HMC0 DRAM botm       OK         77 degrees C / 170 degrees F
FPC 2 EA3_HMC1 Logic die       OK         80 degrees C / 176 degrees F
FPC 2 EA3_HMC1 DRAM botm       OK         77 degrees C / 170 degrees F
FPC 2 EA3_HMC2 Logic die       OK         80 degrees C / 176 degrees F
FPC 2 EA3_HMC2 DRAM botm       OK         77 degrees C / 170 degrees F
FPC 2 EA4_HMC0 Logic die       OK         88 degrees C / 190 degrees F
FPC 2 EA4_HMC0 DRAM botm       OK         85 degrees C / 185 degrees F
FPC 2 EA4_HMC1 Logic die       OK         89 degrees C / 192 degrees F
FPC 2 EA4_HMC1 DRAM botm       OK         86 degrees C / 186 degrees F
FPC 2 EA4_HMC2 Logic die       OK         80 degrees C / 176 degrees F
FPC 2 EA4_HMC2 DRAM botm       OK         77 degrees C / 170 degrees F
FPC 2 EA5_HMC0 Logic die       OK         72 degrees C / 161 degrees F
FPC 2 EA5_HMC0 DRAM botm       OK         69 degrees C / 156 degrees F
FPC 2 EA5_HMC1 Logic die       OK         69 degrees C / 156 degrees F
FPC 2 EA5_HMC1 DRAM botm       OK         66 degrees C / 150 degrees F
FPC 2 EA5_HMC2 Logic die       OK         72 degrees C / 161 degrees F
FPC 2 EA5_HMC2 DRAM botm       OK         69 degrees C / 156 degrees F
FPC 3 Intake-A Temp Sensor     OK         30 degrees C / 86 degrees F
FPC 3 Exhaust-A Temp Sensor    OK         48 degrees C / 118 degrees F
FPC 3 Exhaust-B Temp Sensor    OK         44 degrees C / 111 degrees F
FPC 3 EA0 Temp Sensor          OK         60 degrees C / 140 degrees F
FPC 3 EA0_XR0 Temp Sensor      OK         65 degrees C / 149 degrees F
FPC 3 EA0_XR1 Temp Sensor      OK         67 degrees C / 152 degrees F
FPC 3 EA1 Temp Sensor          OK         54 degrees C / 129 degrees F
FPC 3 EA1_XR0 Temp Sensor      OK         59 degrees C / 138 degrees F
FPC 3 EA1_XR1 Temp Sensor      OK         58 degrees C / 136 degrees F
FPC 3 EA2 Temp Sensor          OK         62 degrees C / 143 degrees F
FPC 3 EA2_XR0 Temp Sensor      OK         66 degrees C / 150 degrees F
FPC 3 EA2_XR1 Temp Sensor      OK         66 degrees C / 150 degrees F
```

```
      FPC 3 EA3 Temp Sensor         OK         54 degrees C / 129 degrees F
      FPC 3 EA3_XR0 Temp Sensor     OK         57 degrees C / 134 degrees F
      FPC 3 EA3_XR1 Temp Sensor     OK         56 degrees C / 132 degrees F
      FPC 3 EA4 Temp Sensor         OK         68 degrees C / 154 degrees F
      FPC 3 EA4_XR0 Temp Sensor     OK         71 degrees C / 159 degrees F
      FPC 3 EA4_XR1 Temp Sensor     OK         70 degrees C / 158 degrees F
      FPC 3 EA5 Temp Sensor         OK         55 degrees C / 131 degrees F
      FPC 3 EA5_XR0 Temp Sensor     OK         58 degrees C / 136 degrees F
      FPC 3 EA5_XR1 Temp Sensor     OK         58 degrees C / 136 degrees F
      FPC 3 EA0_HMC0 Logic die      OK         69 degrees C / 156 degrees F
      FPC 3 EA0_HMC0 DRAM botm      OK         66 degrees C / 150 degrees F
      FPC 3 EA0_HMC1 Logic die      OK         70 degrees C / 158 degrees F
      FPC 3 EA0_HMC1 DRAM botm      OK         67 degrees C / 152 degrees F
      FPC 3 EA0_HMC2 Logic die      OK         69 degrees C / 156 degrees F
      FPC 3 EA0_HMC2 DRAM botm      OK         66 degrees C / 150 degrees F
      FPC 3 EA1_HMC0 Logic die      OK         67 degrees C / 152 degrees F
      FPC 3 EA1_HMC0 DRAM botm      OK         64 degrees C / 147 degrees F
      FPC 3 EA1_HMC1 Logic die      OK         64 degrees C / 147 degrees F
      FPC 3 EA1_HMC1 DRAM botm      OK         61 degrees C / 141 degrees F
      FPC 3 EA1_HMC2 Logic die      OK         64 degrees C / 147 degrees F
      FPC 3 EA1_HMC2 DRAM botm      OK         61 degrees C / 141 degrees F
      FPC 3 EA2_HMC0 Logic die      OK         74 degrees C / 165 degrees F
      FPC 3 EA2_HMC0 DRAM botm      OK         71 degrees C / 159 degrees F
      FPC 3 EA2_HMC1 Logic die      OK         76 degrees C / 168 degrees F
      FPC 3 EA2_HMC1 DRAM botm      OK         73 degrees C / 163 degrees F
      FPC 3 EA2_HMC2 Logic die      OK         74 degrees C / 165 degrees F
      FPC 3 EA2_HMC2 DRAM botm      OK         71 degrees C / 159 degrees F
      FPC 3 EA3_HMC0 Logic die      OK         69 degrees C / 156 degrees F
      FPC 3 EA3_HMC0 DRAM botm      OK         66 degrees C / 150 degrees F
      FPC 3 EA3_HMC1 Logic die      OK         68 degrees C / 154 degrees F
      FPC 3 EA3_HMC1 DRAM botm      OK         65 degrees C / 149 degrees F
      FPC 3 EA3_HMC2 Logic die      OK         68 degrees C / 154 degrees F
      FPC 3 EA3_HMC2 DRAM botm      OK         65 degrees C / 149 degrees F
      FPC 3 EA4_HMC0 Logic die      OK         81 degrees C / 177 degrees F
      FPC 3 EA4_HMC0 DRAM botm      OK         78 degrees C / 172 degrees F
      FPC 3 EA4_HMC1 Logic die      OK         80 degrees C / 176 degrees F
      FPC 3 EA4_HMC1 DRAM botm      OK         77 degrees C / 170 degrees F
      FPC 3 EA4_HMC2 Logic die      OK         81 degrees C / 177 degrees F
      FPC 3 EA4_HMC2 DRAM botm      OK         78 degrees C / 172 degrees F
      FPC 3 EA5_HMC0 Logic die      OK         68 degrees C / 154 degrees F
      FPC 3 EA5_HMC0 DRAM botm      OK         65 degrees C / 149 degrees F
      FPC 3 EA5_HMC1 Logic die      OK         70 degrees C / 158 degrees F
      FPC 3 EA5_HMC1 DRAM botm      OK         67 degrees C / 152 degrees F
      FPC 3 EA5_HMC2 Logic die      OK         69 degrees C / 156 degrees F
      FPC 3 EA5_HMC2 DRAM botm      OK         66 degrees C / 150 degrees F
Power PEM 0                         OK         29 degrees C / 84 degrees F
      PEM 1                         OK         27 degrees C / 80 degrees F
      PEM 2                         OK         30 degrees C / 86 degrees F
      PEM 3                         Check
      PEM 4                         Check
      PEM 5                         Check
Fans  Fan Tray 0 Fan 0              OK         Spinning at normal speed
      Fan Tray 0 Fan 1              OK         Spinning at normal speed
      Fan Tray 0 Fan 2              OK         Spinning at normal speed
      Fan Tray 0 Fan 3              OK         Spinning at normal speed
      Fan Tray 0 Fan 4              Failed
      Fan Tray 0 Fan 5              Failed
      Fan Tray 0 Fan 6              OK         Spinning at normal speed
      Fan Tray 0 Fan 7              OK         Spinning at normal speed
      Fan Tray 0 Fan 8              OK         Spinning at normal speed
```

```
          Fan Tray 0 Fan 9               OK         Spinning at normal speed
          Fan Tray 0 Fan 10              OK         Spinning at normal speed
          Fan Tray 1 Fan 0               OK         Spinning at normal speed
          Fan Tray 1 Fan 1               OK         Spinning at normal speed
          Fan Tray 1 Fan 2               OK         Spinning at normal speed
          Fan Tray 1 Fan 3               OK         Spinning at normal speed
          Fan Tray 1 Fan 4               OK         Spinning at normal speed
          Fan Tray 1 Fan 5               OK         Spinning at normal speed
          Fan Tray 1 Fan 6               OK         Spinning at normal speed
          Fan Tray 1 Fan 7               OK         Spinning at normal speed
          Fan Tray 1 Fan 8               OK         Spinning at normal speed
          Fan Tray 1 Fan 9               OK         Spinning at normal speed
          Fan Tray 1 Fan 10              OK         Spinning at normal speed
          SFB 0 Intake-A                 OK         32 degrees C / 89 degrees F
          SFB 0 Intake-B                 OK         21 degrees C / 69 degrees F
          SFB 0 Exhaust-A                OK         27 degrees C / 80 degrees F
          SFB 0 Exhaust-B                OK         32 degrees C / 89 degrees F
          SFB 0 PF0                      OK         39 degrees C / 102 degrees F
          SFB 0 PF1                      OK         29 degrees C / 84 degrees F
          SFB 1 Intake-A                 OK         43 degrees C / 109 degrees F
          SFB 1 Intake-B                 OK         20 degrees C / 68 degrees F
          SFB 1 Exhaust-A                OK         25 degrees C / 77 degrees F
          SFB 1 Exhaust-B                OK         44 degrees C / 111 degrees F
          SFB 1 PF0                      OK         50 degrees C / 122 degrees F
          SFB 1 PF1                      OK         29 degrees C / 84 degrees F
          SFB 2 Intake-A                 OK         39 degrees C / 102 degrees F
          SFB 2 Intake-B                 OK         20 degrees C / 68 degrees F
          SFB 2 Exhaust-A                OK         25 degrees C / 77 degrees F
          SFB 2 Exhaust-B                OK         38 degrees C / 100 degrees F
          SFB 2 PF0                      OK         45 degrees C / 113 degrees F
          SFB 2 PF1                      OK         30 degrees C / 86 degrees F
          SFB 3 Intake-A                 OK         36 degrees C / 96 degrees F
          SFB 3 Intake-B                 OK         20 degrees C / 68 degrees F
          SFB 3 Exhaust-A                OK         25 degrees C / 77 degrees F
          SFB 3 Exhaust-B                OK         35 degrees C / 95 degrees F
          SFB 3 PF0                      OK         42 degrees C / 107 degrees F
          SFB 3 PF1                      OK         29 degrees C / 84 degrees F
          SFB 4 Intake-A                 OK         30 degrees C / 86 degrees F
          SFB 4 Intake-B                 OK         20 degrees C / 68 degrees F
          SFB 4 Exhaust-A                OK         25 degrees C / 77 degrees F
          SFB 4 Exhaust-B                OK         31 degrees C / 87 degrees F
          SFB 4 PF0                      OK         41 degrees C / 105 degrees F
          SFB 4 PF1                      OK         29 degrees C / 84 degrees F
          SFB 5 Intake-A                 OK         30 degrees C / 86 degrees F
          SFB 5 Intake-B                 OK         21 degrees C / 69 degrees F
          SFB 5 Exhaust-A                OK         25 degrees C / 77 degrees F
          SFB 5 Exhaust-B                OK         30 degrees C / 86 degrees F
          SFB 5 PF0                      OK         35 degrees C / 95 degrees F
          SFB 5 PF1                      OK         34 degrees C / 93 degrees F
```

show chassis environment (MX204 Router)

user@host> **show chassis environment**

```
Class Item                           Status     Measurement
Temp  CB 0 Top Right Inlet Sensor    OK         35 degrees C / 95 degrees F
      CB 0 Top Left Inlet Sensor     OK         37 degrees C / 98 degrees F
      CB 0 Top Right Exhaust Sensor  OK         43 degrees C / 109 degrees F
      CB 0 Top Left Exhaust Sensor   OK         50 degrees C / 122 degrees F
```



```
      CB 0 CPU Core-0 Temp          OK         47 degrees C / 116 degrees F
      CB 0 CPU Core-1 Temp          OK         48 degrees C / 118 degrees F
      CB 0 CPU Core-2 Temp          OK         47 degrees C / 116 degrees F
      CB 0 CPU Core-3 Temp          OK         47 degrees C / 116 degrees F
      CB 0 CPU Core-4 Temp          OK         47 degrees C / 116 degrees F
      CB 0 CPU Core-5 Temp          OK         47 degrees C / 116 degrees F
      CB 0 CPU Core-6 Temp          OK         47 degrees C / 116 degrees F
      CB 0 CPU Core-7 Temp          OK         47 degrees C / 116 degrees F
      FPC 0 EA0_HMC0 Logic die      OK         77 degrees C / 170 degrees F
      FPC 0 EA0_HMC0 DRAM botm      OK         74 degrees C / 165 degrees F
      FPC 0 EA0_HMC1 Logic die      OK         81 degrees C / 177 degrees F
      FPC 0 EA0_HMC1 DRAM botm      OK         78 degrees C / 172 degrees F
      FPC 0 EA0 Chip                OK         94 degrees C / 201 degrees F
      FPC 0 EA0-XR0 Chip            OK         64 degrees C / 147 degrees F
      FPC 0 EA0-XR1 Chip            OK         65 degrees C / 149 degrees F
Power PEM 0                         Absent
      PEM 1                         OK         48 degrees C / 118 degrees F
Fans  Fan Tray 0 Fan 0              OK         Spinning at normal speed
      Fan Tray 0 Fan 1              OK         Spinning at normal speed
      Fan Tray 1 Fan 0              OK         Spinning at normal speed
      Fan Tray 1 Fan 1              OK         Spinning at normal speed
      Fan Tray 2 Fan 0              OK         Spinning at normal speed
      Fan Tray 2 Fan 1              OK         Spinning at normal speed
```

show chassis environment (T640 Router)

user@host> **show chassis environment**

```
Class Item                   Status     Measurement
Temp  PEM 0                  Absent
      PEM 1                  OK         22 degrees C / 71 degrees F
      SCG 0                  OK         30 degrees C / 86 degrees F
      SCG 1                  OK         30 degrees C / 86 degrees F
      Routing Engine 0       Present
      Routing Engine 1       OK         27 degrees C / 80 degrees F
      CB 0                   Present
      CB 1                   OK         33 degrees C / 91 degrees F
      SIB 0                  Absent
      SIB 1                  Absent
      SIB 2                  Absent
      SIB 3                  Absent
      SIB 4                  Absent
      FPC 4 Top              Testing
      FPC 4 Bottom           Testing
      FPC 5 Top              Testing
      FPC 5 Bottom           Testing
      FPC 6 Top              Testing
      FPC 6 Bottom           Testing
      FPM GBUS               OK         23 degrees C / 73 degrees F
      FPM Display            Absent
Fans  Top Left Front fan     OK         Spinning at normal speed
      Top Left Middle fan    OK         Spinning at normal speed
      Top Left Rear fan      OK         Spinning at normal speed
      Top Right Front fan    OK         Spinning at normal speed
      Top Right Middle fan   OK         Spinning at normal speed
      Top Right Rear fan     OK         Spinning at normal speed
      Bottom Left Front fan  OK         Spinning at normal speed
      Bottom Left Middle fan OK         Spinning at normal speed
      Bottom Left Rear fan   OK         Spinning at normal speed
      Bottom Right Front fan OK         Spinning at normal speed
```

```
      Bottom Right Middle fan OK        Spinning at normal speed
      Bottom Right Rear fan   OK        Spinning at normal speed
      Fourth Blower from top OK         Spinning at normal speed
      Bottom Blower           OK        Spinning at normal speed
      Middle Blower           OK        Spinning at normal speed
      Top Blower              OK        Spinning at normal speed
      Second Blower from top OK         Spinning at normal speed
Misc  CIP                     OK
      SPMB 0                  OK
      SPMB 1                  OK
```

show chassis environment (T4000 Router)

`user@host>` **show chassis environment**

```
Class Item                           Status     Measurement
Temp  PEM 0                          OK         33 degrees C / 91 degrees F
      PEM 1                          Absent
      SCG 0                          OK         33 degrees C / 91 degrees F
      SCG 1                          OK         33 degrees C / 91 degrees F
      Routing Engine 0               OK         33 degrees C / 91 degrees F
      Routing Engine 0 CPU           OK         50 degrees C / 122 degrees F
      Routing Engine 1               OK         32 degrees C / 89 degrees F
      Routing Engine 1 CPU           OK         46 degrees C / 114 degrees F
      CB 0                           OK         32 degrees C / 89 degrees F
      CB 1                           OK         33 degrees C / 91 degrees F
      SIB 0                          OK         42 degrees C / 107 degrees F
      SIB 1                          OK         42 degrees C / 107 degrees F
      SIB 2                          OK         42 degrees C / 107 degrees F
      SIB 3                          OK         43 degrees C / 109 degrees F
      SIB 4                          OK         45 degrees C / 113 degrees F
      FPC 0 Fan Intake               OK         34 degrees C / 93 degrees F
      FPC 0 Fan Exhaust              OK         48 degrees C / 118 degrees F
      FPC 0 PMB                      OK         47 degrees C / 116 degrees F
      FPC 0 LMB0                     OK         50 degrees C / 122 degrees F
      FPC 0 LMB1                     OK         41 degrees C / 105 degrees F
      FPC 0 LMB2                     OK         35 degrees C / 95 degrees F
      FPC 0 PFE1 LU2                 OK         46 degrees C / 114 degrees F
      FPC 0 PFE1 LU0                 OK         41 degrees C / 105 degrees F
      FPC 0 PFE0 LU0                 OK         57 degrees C / 134 degrees F
      FPC 0 XF1                      OK         46 degrees C / 114 degrees F
      FPC 0 XF0                      OK         52 degrees C / 125 degrees F
      FPC 0 XM1                      OK         41 degrees C / 105 degrees F
      FPC 0 XM0                      OK         50 degrees C / 122 degrees F
      FPC 0 PFE0 LU1                 OK         56 degrees C / 132 degrees F
      FPC 0 PFE0 LU2                 OK         45 degrees C / 113 degrees F
      FPC 0 PFE1 LU1                 OK         37 degrees C / 98 degrees F
      FPC 3 Fan Intake               OK         36 degrees C / 96 degrees F
      FPC 3 Fan Exhaust              OK         51 degrees C / 123 degrees F
      FPC 3 PMB                      OK         43 degrees C / 109 degrees F
      FPC 3 LMB0                     OK         57 degrees C / 134 degrees F
      FPC 3 LMB1                     OK         54 degrees C / 129 degrees F
      FPC 3 LMB2                     OK         38 degrees C / 100 degrees F
      FPC 3 PFE1 LU2                 OK         63 degrees C / 145 degrees F
      FPC 3 PFE1 LU0                 OK         45 degrees C / 113 degrees F
      FPC 3 PFE0 LU0                 OK         69 degrees C / 156 degrees F
      FPC 3 XF1                      OK         62 degrees C / 143 degrees F
      FPC 3 XF0                      OK         63 degrees C / 145 degrees F
      FPC 3 XM1                      OK         43 degrees C / 109 degrees F
```



```
      FPC 3 XM0                      OK         67 degrees C / 152 degrees F
      FPC 3 PFE0 LU1                 OK         63 degrees C / 145 degrees F
      FPC 3 PFE0 LU2                 OK         66 degrees C / 150 degrees F
      FPC 3 PFE1 LU1                 OK         41 degrees C / 105 degrees F
      FPC 5 Top                      OK         39 degrees C / 102 degrees F
      FPC 5 Bottom                   OK         38 degrees C / 100 degrees F
      FPC 6 Fan Intake               OK         33 degrees C / 91 degrees F
      FPC 6 Fan Exhaust              OK         49 degrees C / 120 degrees F
      FPC 6 PMB                      OK         40 degrees C / 104 degrees F
      FPC 6 LMB0                     OK         60 degrees C / 140 degrees F
      FPC 6 LMB1                     OK         58 degrees C / 136 degrees F
      FPC 6 LMB2                     OK         40 degrees C / 104 degrees F
      FPC 6 PFE1 LU2                 OK         69 degrees C / 156 degrees F
      FPC 6 PFE1 LU0                 OK         45 degrees C / 113 degrees F
      FPC 6 PFE0 LU0                 OK         71 degrees C / 159 degrees F
      FPC 6 XF1                      OK         58 degrees C / 136 degrees F
      FPC 6 XF0                      OK         65 degrees C / 149 degrees F
      FPC 6 XM1                      OK         39 degrees C / 102 degrees F
      FPC 6 XM0                      OK         66 degrees C / 150 degrees F
      FPC 6 PFE0 LU1                 OK         69 degrees C / 156 degrees F
      FPC 6 PFE0 LU2                 OK         69 degrees C / 156 degrees F
      FPC 6 PFE1 LU1                 OK         42 degrees C / 107 degrees F
      FPM GBUS                       OK         24 degrees C / 75 degrees F
      FPM Display                    OK         27 degrees C / 80 degrees F
Fans  Top Left Front fan             OK         Spinning at high speed
      Top Left Middle fan            OK         Spinning at high speed
      Top Left Rear fan              OK         Spinning at high speed
      Top Right Front fan            OK         Spinning at high speed
      Top Right Middle fan           OK         Spinning at high speed
      Top Right Rear fan             OK         Spinning at high speed
      Bottom Left Front fan          OK         Spinning at high speed
      Bottom Left Middle fan         OK         Spinning at high speed
      Bottom Left Rear fan           OK         Spinning at high speed
      Bottom Right Front fan         OK         Spinning at high speed
      Bottom Right Middle fan        OK         Spinning at high speed
      Bottom Right Rear fan          OK         Spinning at high speed
      Rear Tray Top fan              OK         Spinning at high speed
      Rear Tray Second fan           OK         Spinning at high speed
      Rear Tray Third fan            OK         Spinning at high speed
      Rear Tray Fourth fan           OK         Spinning at high speed
      Rear Tray Fifth fan            OK         Spinning at high speed
      Rear Tray Sixth fan            OK         Spinning at high speed
      Rear Tray Seventh fan          OK         Spinning at high speed
      Rear Tray Bottom fan           OK         Spinning at high speed
Misc  CIP                            OK
      SPMB 0                         OK
      SPMB 1                         OK
```

show chassis environment (TX Matrix Router)

user@host> **show chassis environment**

```

---------------------------------------------------------------------------
Class Item                 Status     Measurement
Temp  PEM 0                Absent
      PEM 1                OK         29 degrees C / 84 degrees F
      Routing Engine 0     OK         34 degrees C / 93 degrees F
      Routing Engine 1     OK         34 degrees C / 93 degrees F
      CB 0                 OK         32 degrees C / 89 degrees F
```



```
      CB 1                 OK         32 degrees C / 89 degrees F
      SIB 0                OK         44 degrees C / 111 degrees F
      SIB 0 (B)            OK         44 degrees C / 111 degrees F
      FPM GBUS             OK         27 degrees C / 80 degrees F
      FPM Display          OK         32 degrees C / 89 degrees F
Fans  Top Left Front fan   OK         Spinning at normal speed
      Top Left Middle fan  OK         Spinning at normal speed
      Top Left Rear fan    OK         Spinning at normal speed
      Top Right Front fan  OK         Spinning at normal speed
      Top Right Middle fan OK         Spinning at normal speed
      Top Right Rear fan   OK         Spinning at normal speed
      Bottom Left Front fan  OK       Spinning at normal speed
      Bottom Left Middle fan OK       Spinning at normal speed
      Bottom Left Rear fan   OK       Spinning at normal speed
      Bottom Right Front fan OK       Spinning at normal speed
      Bottom Right Middle fan OK      Spinning at normal speed
      Bottom Right Rear fan  OK       Spinning at normal speed
      Rear Tray Top fan    OK         Spinning at normal speed
      Rear Tray Second fan OK         Spinning at normal speed
      Rear Tray Third fan  OK         Spinning at normal speed
      Rear Tray Fourth fan OK         Spinning at normal speed
      Rear Tray Fifth fan  OK         Spinning at normal speed
      Rear Tray Sixth fan  OK         Spinning at normal speed
      Rear Tray Seventh fan  OK       Spinning at normal speed
      Rear Tray Bottom fan OK         Spinning at normal speed
Misc  CIP 0                OK
      CIP 1                OK
      SPMB 0               OK
      SPMB 1               OK

lcc0-re0:
--------------------------------------------------------------------------
Class Item                 Status     Measurement
Temp  PEM 0                OK         29 degrees C / 84 degrees F
      PEM 1                Absent
      SCG 0                OK         35 degrees C / 95 degrees F
      SCG 1                Absent
      Routing Engine 0     OK         39 degrees C / 102 degrees F
      Routing Engine 1     OK         36 degrees C / 96 degrees F
      CB 0                 OK         32 degrees C / 89 degrees F
      CB 1                 OK         32 degrees C / 89 degrees F
      SIB 0                OK         40 degrees C / 104 degrees F
      SIB 0 (B)            OK         51 degrees C / 123 degrees F
      FPC 0 Top            OK         45 degrees C / 113 degrees F
      FPC 0 Bottom         OK         31 degrees C / 87 degrees F
      FPC 1 Top            OK         34 degrees C / 93 degrees F
      FPC 1 Bottom         OK         31 degrees C / 87 degrees F
      FPM GBUS             OK         30 degrees C / 86 degrees F
      FPM Display          OK         34 degrees C / 93 degrees F
Fans  Top Left Front fan   OK         Spinning at normal speed
      Top Left Middle fan  OK         Spinning at normal speed
      Top Left Rear fan    OK         Spinning at normal speed
      Top Right Front fan  OK         Spinning at normal speed
      Top Right Middle fan OK         Spinning at normal speed
      Top Right Rear fan   OK         Spinning at normal speed
      Bottom Left Front fan  OK       Spinning at normal speed
      Bottom Left Middle fan OK       Spinning at normal speed
      Bottom Left Rear fan   OK       Spinning at normal speed
      Bottom Right Front fan OK       Spinning at normal speed
      Bottom Right Middle fan OK      Spinning at normal speed
```



```
      Bottom Right Rear fan  OK         Spinning at normal speed
      Rear Tray Top fan      OK         Spinning at normal speed
      Rear Tray Second fan   OK         Spinning at normal speed
      Rear Tray Third fan    OK         Spinning at normal speed
      Rear Tray Fourth fan   OK         Spinning at normal speed
      Rear Tray Fifth fan    OK         Spinning at normal speed
      Rear Tray Sixth fan    OK         Spinning at normal speed
      Rear Tray Seventh fan  OK         Spinning at normal speed
      Rear Tray Bottom fan   OK         Spinning at normal speed
Misc  CIP                    OK
      SPMB 0                 OK
      SPMB 1                 OK

lcc2-re0:
--------------------------------------------------------------------------
Class Item                   Status     Measurement
Temp  PEM 0                  OK         29 degrees C / 84 degrees F
      PEM 1                  Absent
      SCG 0                  OK         32 degrees C / 89 degrees F
      SCG 1                  Absent
      Routing Engine 0       OK         31 degrees C / 87 degrees F
      Routing Engine 1       OK         32 degrees C / 89 degrees F
      CB 0                   OK         30 degrees C / 86 degrees F
      SIB 0                  OK         38 degrees C / 100 degrees F
      SIB 0 (B)              OK         49 degrees C / 120 degrees F
      FPC 0 Top              OK         45 degrees C / 113 degrees F
      FPC 0 Bottom           OK         33 degrees C / 91 degrees F
      FPC 1 Top              OK         37 degrees C / 98 degrees F
      FPC 1 Bottom           OK         33 degrees C / 91 degrees F
      FPM GBUS               OK         30 degrees C / 86 degrees F
      FPM Display            OK         34 degrees C / 93 degrees F
Fans  Top Left Front fan     OK         Spinning at normal speed
      Top Left Middle fan    OK         Spinning at normal speed
...
```

show chassis environment (T1600 Router)

`user@host>` **show chassis environment**

```
Class Item                           Status     Measurement
Temp  PEM 0                          OK         27 degrees C / 80 degrees F
      PEM 1                          Absent
      SCG 0                          OK         31 degrees C / 87 degrees F
      SCG 1                          OK         35 degrees C / 95 degrees F
      Routing Engine 0               OK         30 degrees C / 86 degrees F
      Routing Engine 1               OK         30 degrees C / 86 degrees F
      CB 0                           OK         31 degrees C / 87 degrees F
      CB 1                           OK         31 degrees C / 87 degrees F
      SIB 0                          OK         41 degrees C / 105 degrees F
      SIB 0 (B)                      OK         34 degrees C / 93 degrees F
      SIB 1                          OK         0 degrees C / 32 degrees F
      SIB 1 (B)                      OK         0 degrees C / 32 degrees F
      SIB 2                          OK         0 degrees C / 32 degrees F
      SIB 2 (B)                      OK         0 degrees C / 32 degrees F
      SIB 3                          OK         0 degrees C / 32 degrees F
      SIB 3 (B)                      OK         0 degrees C / 32 degrees F
      SIB 4                          OK         0 degrees C / 32 degrees F
      SIB 4 (B)                      OK         0 degrees C / 32 degrees F
      FPC 0 Top                      OK         49 degrees C / 120 degrees F
      FPC 0 Bottom                   OK         50 degrees C / 122 degrees F
```



```
      FPC 1 Top                      OK         48 degrees C / 118 degrees F
      FPC 1 Bottom                   OK         49 degrees C / 120 degrees F
      FPM GBUS                       OK         27 degrees C / 80 degrees F
      FPM Display                    OK         30 degrees C / 86 degrees F
Fans  Top Left Front fan             OK         Spinning at normal speed
      Top Left Middle fan            OK         Spinning at normal speed
      Top Left Rear fan              OK         Spinning at normal speed
      Top Right Front fan            OK         Spinning at normal speed
      Top Right Middle fan           OK         Spinning at normal speed
      Top Right Rear fan             OK         Spinning at normal speed
      Bottom Left Front fan          OK         Spinning at normal speed
      Bottom Left Middle fan         OK         Spinning at normal speed
      Bottom Left Rear fan           OK         Spinning at normal speed
      Bottom Right Front fan         OK         Spinning at normal speed
      Bottom Right Middle fan        OK         Spinning at normal speed
      Bottom Right Rear fan          OK         Spinning at normal speed
      Rear Tray Top fan              OK         Spinning at normal speed
      Rear Tray Second fan           OK         Spinning at normal speed
      Rear Tray Third fan            OK         Spinning at normal speed
      Rear Tray Fourth fan           OK         Spinning at normal speed
      Rear Tray Fifth fan            OK         Spinning at normal speed
      Rear Tray Sixth fan            OK         Spinning at normal speed
      Rear Tray Seventh fan          OK         Spinning at normal speed
      Rear Tray Bottom fan           OK         Spinning at normal speed
Misc  CIP                            OK
      SPMB 0                         OK
      SPMB 1                         OK
```

show chassis environment (TX Matrix Plus Router)

user@host> **show chassis environment**

```

--------------------------------------------------------------------------
Class Item                           Status     Measurement
Temp  PEM 0                          OK         28 degrees C / 82 degrees F
      PEM 1                          Absent
      Routing Engine 0               OK         27 degrees C / 80 degrees F
      Routing Engine 1               OK         29 degrees C / 84 degrees F
      CB 0 Intake                    OK         26 degrees C / 78 degrees F
      CB 0 Exhaust A                 OK         25 degrees C / 77 degrees F
      CB 0 Exhaust B                 OK         25 degrees C / 77 degrees F
      CB 1 Intake                    OK         26 degrees C / 78 degrees F
      CB 1 Exhaust A                 OK         26 degrees C / 78 degrees F
      CB 1 Exhaust B                 OK         26 degrees C / 78 degrees F
      SIB F13 0                      OK         47 degrees C / 116 degrees F
      SIB F13 0 (B)                  OK         48 degrees C / 118 degrees F
      SIB F13 1                      OK         38 degrees C / 100 degrees F
      SIB F13 1 (B)                  OK         37 degrees C / 98 degrees F
      SIB F2S 0/0                    OK         27 degrees C / 80 degrees F
      SIB F2S 0/2                    OK         28 degrees C / 82 degrees F
      SIB F2S 0/4                    OK         27 degrees C / 80 degrees F
      SIB F2S 0/6                    OK         28 degrees C / 82 degrees F
      SIB F2S 1/0                    OK         26 degrees C / 78 degrees F
      SIB F2S 1/2                    OK         26 degrees C / 78 degrees F
      SIB F2S 1/4                    OK         26 degrees C / 78 degrees F
      SIB F2S 1/6                    OK         26 degrees C / 78 degrees F
      SIB F2S 2/0                    OK         25 degrees C / 77 degrees F
      SIB F2S 2/2                    OK         25 degrees C / 77 degrees F
      SIB F2S 2/4                    OK         23 degrees C / 73 degrees F
```



```
      CIP 0 Intake                    OK         23 degrees C / 73 degrees F
      CIP 0 Exhaust A                 OK         24 degrees C / 75 degrees F
      CIP 0 Exhaust B                 OK         24 degrees C / 75 degrees F
      CIP 1 Intake                    OK         24 degrees C / 75 degrees F
      CIP 1 Exhaust A                 OK         25 degrees C / 77 degrees F
      CIP 1 Exhaust B                 OK         25 degrees C / 77 degrees F
Fans  Fan Tray 0 Fan 1                OK         Spinning at normal speed
      Fan Tray 0 Fan 2                OK         Spinning at normal speed
      Fan Tray 0 Fan 3                OK         Spinning at normal speed
      Fan Tray 0 Fan 4                OK         Spinning at normal speed
      Fan Tray 0 Fan 5                OK         Spinning at normal speed
      Fan Tray 0 Fan 6                OK         Spinning at normal speed
      Fan Tray 1 Fan 1                OK         Spinning at normal speed
      Fan Tray 1 Fan 2                OK         Spinning at normal speed
      Fan Tray 1 Fan 3                OK         Spinning at normal speed
      Fan Tray 1 Fan 4                OK         Spinning at normal speed
      Fan Tray 1 Fan 5                OK         Spinning at normal speed
      Fan Tray 1 Fan 6                OK         Spinning at normal speed
      Fan Tray 2 Fan 1                OK         Spinning at normal speed
      Fan Tray 2 Fan 2                OK         Spinning at normal speed
      Fan Tray 2 Fan 3                OK         Spinning at normal speed
      Fan Tray 2 Fan 4                OK         Spinning at normal speed
      Fan Tray 2 Fan 5                OK         Spinning at normal speed
      Fan Tray 2 Fan 6                OK         Spinning at normal speed
      Fan Tray 2 Fan 7                OK         Spinning at normal speed
      Fan Tray 2 Fan 8                OK         Spinning at normal speed
      Fan Tray 2 Fan 9                OK         Spinning at normal speed
      Fan Tray 3 Fan 1                OK         Spinning at normal speed
      Fan Tray 3 Fan 2                OK         Spinning at normal speed
      Fan Tray 3 Fan 3                OK         Spinning at normal speed
      Fan Tray 3 Fan 4                OK         Spinning at normal speed
      Fan Tray 3 Fan 5                OK         Spinning at normal speed
      Fan Tray 3 Fan 6                OK         Spinning at normal speed
      Fan Tray 3 Fan 7                OK         Spinning at normal speed
      Fan Tray 3 Fan 8                OK         Spinning at normal speed
      Fan Tray 3 Fan 9                OK         Spinning at normal speed
      Fan Tray 4 Fan 1                OK         Spinning at normal speed
      Fan Tray 4 Fan 2                OK         Spinning at normal speed
      Fan Tray 4 Fan 3                OK         Spinning at normal speed
      Fan Tray 4 Fan 4                OK         Spinning at normal speed
      Fan Tray 4 Fan 5                OK         Spinning at normal speed
      Fan Tray 4 Fan 6                OK         Spinning at normal speed
      Fan Tray 4 Fan 7                OK         Spinning at normal speed
      Fan Tray 4 Fan 8                OK         Spinning at normal speed
      Fan Tray 4 Fan 9                OK         Spinning at normal speed
      Fan Tray 5 Fan 1                OK         Spinning at normal speed
      Fan Tray 5 Fan 2                OK         Spinning at normal speed
      Fan Tray 5 Fan 3                OK         Spinning at normal speed
      Fan Tray 5 Fan 4                OK         Spinning at normal speed
      Fan Tray 5 Fan 5                OK         Spinning at normal speed
      Fan Tray 5 Fan 6                OK         Spinning at normal speed
      Fan Tray 5 Fan 7                OK         Spinning at normal speed
      Fan Tray 5 Fan 8                OK         Spinning at normal speed
      Fan Tray 5 Fan 9                OK         Spinning at normal speed
Misc  SPMB 0                          OK
      SPMB 1                          OK

lcc0-re0:
--------------------------------------------------------------------------
Class Item                            Status     Measurement
```

```
Temp  PEM 0                          OK       27 degrees C / 80 degrees F
      PEM 1                          Absent
      SCG 0                          OK       31 degrees C / 87 degrees F
      SCG 1                          OK       35 degrees C / 95 degrees F
      Routing Engine 0               OK       30 degrees C / 86 degrees F
      Routing Engine 1               OK       30 degrees C / 86 degrees F
      CB 0                           OK       31 degrees C / 87 degrees F
      CB 1                           OK       31 degrees C / 87 degrees F
      SIB 0                          OK       41 degrees C / 105 degrees F
      SIB 0 (B)                      OK       34 degrees C / 93 degrees F
      SIB 1                          OK       0 degrees C / 32 degrees F
      SIB 1 (B)                      OK       0 degrees C / 32 degrees F
      SIB 2                          OK       0 degrees C / 32 degrees F
      SIB 2 (B)                      OK       0 degrees C / 32 degrees F
      SIB 3                          OK       0 degrees C / 32 degrees F
      SIB 3 (B)                      OK       0 degrees C / 32 degrees F
      SIB 4                          OK       0 degrees C / 32 degrees F
      SIB 4 (B)                      OK       0 degrees C / 32 degrees F
      FPC 0 Top                      OK       49 degrees C / 120 degrees F
      FPC 0 Bottom                   OK       50 degrees C / 122 degrees F
      FPC 1 Top                      OK       48 degrees C / 118 degrees F
      FPC 1 Bottom                   OK       49 degrees C / 120 degrees F
      FPM GBUS                       OK       27 degrees C / 80 degrees F
      FPM Display                    OK       30 degrees C / 86 degrees F
Fans  Top Left Front fan             OK       Spinning at normal speed
      Top Left Middle fan            OK       Spinning at normal speed
      Top Left Rear fan              OK       Spinning at normal speed
      Top Right Front fan            OK       Spinning at normal speed
      Top Right Middle fan           OK       Spinning at normal speed
      Top Right Rear fan             OK       Spinning at normal speed
      Bottom Left Front fan          OK       Spinning at normal speed
      Bottom Left Middle fan         OK       Spinning at normal speed
      Bottom Left Rear fan           OK       Spinning at normal speed
      Bottom Right Front fan         OK       Spinning at normal speed
      Bottom Right Middle fan        OK       Spinning at normal speed
      Bottom Right Rear fan          OK       Spinning at normal speed
      Rear Tray Top fan              OK       Spinning at normal speed
      Rear Tray Second fan           OK       Spinning at normal speed
      Rear Tray Third fan            OK       Spinning at normal speed
      Rear Tray Fourth fan           OK       Spinning at normal speed
      Rear Tray Fifth fan            OK       Spinning at normal speed
      Rear Tray Sixth fan            OK       Spinning at normal speed
      Rear Tray Seventh fan          OK       Spinning at normal speed
      Rear Tray Bottom fan           OK       Spinning at normal speed
Misc  CIP                            OK
      SPMB 0                         OK
      SPMB 1                         OK
```

show chassis environment (TX Matrix Plus router with 3D SIBs)

`user@host>` **show chassis environment**

```

---------------------------------------------------------------------------
Class Item                           Status   Measurement
Temp  PEM 0                          Check    30 degrees C / 86 degrees F
      PEM 1                          OK       33 degrees C / 91 degrees F
      Routing Engine 0               OK       28 degrees C / 82 degrees F
      Routing Engine 0 CPU           OK       42 degrees C / 107 degrees F
      Routing Engine 1               OK       29 degrees C / 84 degrees F
```

```
      Routing Engine 1 CPU          OK          44 degrees C / 111 degrees F
      CB 0 Intake                   OK          30 degrees C / 86 degrees F
      CB 0 Exhaust A                OK          28 degrees C / 82 degrees F
      CB 0 Exhaust B                OK          30 degrees C / 86 degrees F
      CB 1 Intake                   OK          31 degrees C / 87 degrees F
      CB 1 Exhaust A                OK          27 degrees C / 80 degrees F
      CB 1 Exhaust B                OK          31 degrees C / 87 degrees F
      SIB F13 0 Board               OK          44 degrees C / 111 degrees F
      SIB F13 0 XF Junction         OK          62 degrees C / 143 degrees F
      SIB F13 3 Board               OK          45 degrees C / 113 degrees F
      SIB F13 3 XF Junction         OK          60 degrees C / 140 degrees F
      SIB F13 6 Board               OK          47 degrees C / 116 degrees F
      SIB F13 6 XF Junction         OK          62 degrees C / 143 degrees F
      SIB F2S 0/0 Board             OK          32 degrees C / 89 degrees F
      SIB F2S 0/0 XF Junction       OK          42 degrees C / 107 degrees F
      SIB F2S 0/2 Board             OK          31 degrees C / 87 degrees F
      SIB F2S 0/2 XF Junction       OK          41 degrees C / 105 degrees F
      SIB F2S 0/4 Board             OK          31 degrees C / 87 degrees F
      SIB F2S 0/4 XF Junction       OK          42 degrees C / 107 degrees F
      SIB F2S 0/6 Board             OK          31 degrees C / 87 degrees F
      SIB F2S 0/6 XF Junction       OK          41 degrees C / 105 degrees F
      SIB F2S 1/0 Board             OK          31 degrees C / 87 degrees F
      SIB F2S 1/0 XF Junction       OK          41 degrees C / 105 degrees F
      SIB F2S 1/2 Board             OK          29 degrees C / 84 degrees F
      SIB F2S 1/2 XF Junction       OK          39 degrees C / 102 degrees F
      SIB F2S 1/4 Board             OK          29 degrees C / 84 degrees F
      SIB F2S 1/4 XF Junction       OK          35 degrees C / 95 degrees F
      SIB F2S 1/6 Board             OK          30 degrees C / 86 degrees F
      SIB F2S 1/6 XF Junction       OK          41 degrees C / 105 degrees F
      SIB F2S 2/0 Board             OK          30 degrees C / 86 degrees F
      SIB F2S 2/0 XF Junction       OK          42 degrees C / 107 degrees F
      SIB F2S 2/2 Board             OK          28 degrees C / 82 degrees F
      SIB F2S 2/2 XF Junction       OK          39 degrees C / 102 degrees F
      SIB F2S 2/4 Board             OK          29 degrees C / 84 degrees F
      SIB F2S 2/4 XF Junction       OK          42 degrees C / 107 degrees F
      SIB F2S 2/6 Board             OK          29 degrees C / 84 degrees F
      SIB F2S 2/6 XF Junction       OK          41 degrees C / 105 degrees F
      CIP 0 Intake                  OK          25 degrees C / 77 degrees F
      CIP 0 Exhaust A               OK          26 degrees C / 78 degrees F
      CIP 0 Exhaust B               OK          26 degrees C / 78 degrees F
      CIP 1 Intake                  OK          26 degrees C / 78 degrees F
      CIP 1 Exhaust A               OK          27 degrees C / 80 degrees F
      CIP 1 Exhaust B               OK          27 degrees C / 80 degrees F
Fans  Fan Tray 0 Fan 1              OK          Spinning at normal speed
      Fan Tray 0 Fan 2              OK          Spinning at normal speed
      Fan Tray 0 Fan 3              OK          Spinning at normal speed
      Fan Tray 0 Fan 4              OK          Spinning at normal speed
      Fan Tray 0 Fan 5              OK          Spinning at normal speed
      Fan Tray 0 Fan 6              OK          Spinning at normal speed
      Fan Tray 1 Fan 1              OK          Spinning at normal speed
      Fan Tray 1 Fan 2              OK          Spinning at normal speed
      Fan Tray 1 Fan 3              OK          Spinning at normal speed
      Fan Tray 1 Fan 4              OK          Spinning at normal speed
      Fan Tray 1 Fan 5              OK          Spinning at normal speed
      Fan Tray 1 Fan 6              OK          Spinning at normal speed
      Fan Tray 2 Fan 1              OK          Spinning at normal speed
      Fan Tray 2 Fan 2              OK          Spinning at normal speed
      Fan Tray 2 Fan 3              OK          Spinning at normal speed
      Fan Tray 2 Fan 4              OK          Spinning at normal speed
      Fan Tray 2 Fan 5              OK          Spinning at normal speed
```



```
      Fan Tray 2 Fan 6               OK         Spinning at normal speed
      Fan Tray 2 Fan 7               OK         Spinning at normal speed
      Fan Tray 2 Fan 8               OK         Spinning at normal speed
      Fan Tray 2 Fan 9               OK         Spinning at normal speed
      Fan Tray 3 Fan 1               OK         Spinning at normal speed
      Fan Tray 3 Fan 2               OK         Spinning at normal speed
      Fan Tray 3 Fan 3               OK         Spinning at normal speed
      Fan Tray 3 Fan 4               OK         Spinning at normal speed
      Fan Tray 3 Fan 5               OK         Spinning at normal speed
      Fan Tray 3 Fan 6               OK         Spinning at normal speed
      Fan Tray 3 Fan 7               OK         Spinning at normal speed
      Fan Tray 3 Fan 8               OK         Spinning at normal speed
      Fan Tray 3 Fan 9               OK         Spinning at normal speed
      Fan Tray 4 Fan 1               OK         Spinning at normal speed
      Fan Tray 4 Fan 2               OK         Spinning at normal speed
      Fan Tray 4 Fan 3               OK         Spinning at normal speed
      Fan Tray 4 Fan 4               OK         Spinning at normal speed
      Fan Tray 4 Fan 5               OK         Spinning at normal speed
      Fan Tray 4 Fan 6               OK         Spinning at normal speed
      Fan Tray 4 Fan 7               OK         Spinning at normal speed
      Fan Tray 4 Fan 8               OK         Spinning at normal speed
      Fan Tray 4 Fan 9               OK         Spinning at normal speed
      Fan Tray 5 Fan 1               OK         Spinning at normal speed
      Fan Tray 5 Fan 2               OK         Spinning at normal speed
      Fan Tray 5 Fan 3               OK         Spinning at normal speed
      Fan Tray 5 Fan 4               OK         Spinning at normal speed
      Fan Tray 5 Fan 5               OK         Spinning at normal speed
      Fan Tray 5 Fan 6               OK         Spinning at normal speed
      Fan Tray 5 Fan 7               OK         Spinning at normal speed
      Fan Tray 5 Fan 8               OK         Spinning at normal speed
      Fan Tray 5 Fan 9               Check
Misc  SPMB 0                         OK
      SPMB 1                         OK

lcc0-re0:
--------------------------------------------------------------------------
Class Item                           Status     Measurement
Temp  PEM 0                          OK         29 degrees C / 84 degrees F
      PEM 1                          Check      29 degrees C / 84 degrees F
      SCG 0                          OK         32 degrees C / 89 degrees F
      SCG 1                          OK         33 degrees C / 91 degrees F
      Routing Engine 0               OK         32 degrees C / 89 degrees F
      Routing Engine 0 CPU           OK         51 degrees C / 123 degrees F
      Routing Engine 1               OK         32 degrees C / 89 degrees F
      Routing Engine 1 CPU           OK         49 degrees C / 120 degrees F
      CB 0                           OK         34 degrees C / 93 degrees F
      CB 1                           OK         34 degrees C / 93 degrees F
      SIB 0                          OK         39 degrees C / 102 degrees F
      SIB 0 (B)                      Absent
      SIB 1                          OK         39 degrees C / 102 degrees F
      SIB 1 (B)                      Absent
      SIB 2                          OK         39 degrees C / 102 degrees F
      SIB 2 (B)                      Absent
      FPC 4 Top                      OK         43 degrees C / 109 degrees F
      FPC 4 Bottom                   OK         43 degrees C / 109 degrees F
      FPC 7 Fan Intake               OK         35 degrees C / 95 degrees F
      FPC 7 Fan Exhaust              OK         50 degrees C / 122 degrees F
      FPC 7 PMB                      OK         50 degrees C / 122 degrees F
      FPC 7 LMB0                     OK         55 degrees C / 131 degrees F
      FPC 7 LMB1                     OK         49 degrees C / 120 degrees F
```



```
      FPC 7 LMB2                     OK          39 degrees C / 102 degrees F
      FPC 7 PFE1 LU2                 OK          55 degrees C / 131 degrees F
      FPC 7 PFE1 LU0                 OK          45 degrees C / 113 degrees F
      FPC 7 PFE0 LU0                 OK          62 degrees C / 143 degrees F
      FPC 7 XF1                      OK          52 degrees C / 125 degrees F
      FPC 7 XF0                      OK          61 degrees C / 141 degrees F
      FPC 7 XM1                      OK          39 degrees C / 102 degrees F
      FPC 7 XM0                      OK          56 degrees C / 132 degrees F
      FPC 7 PFE0 LU1                 OK          60 degrees C / 140 degrees F
      FPC 7 PFE0 LU2                 OK          55 degrees C / 131 degrees F
      FPC 7 PFE1 LU1                 OK          41 degrees C / 105 degrees F
      FPM GBUS                       OK          24 degrees C / 75 degrees F
      FPM Display                    OK          28 degrees C / 82 degrees F
Fans  Top Left Front fan             OK          Spinning at normal speed
      Top Left Middle fan            OK          Spinning at normal speed
      Top Left Rear fan              OK          Spinning at normal speed
      Top Right Front fan            OK          Spinning at normal speed
      Top Right Middle fan           OK          Spinning at normal speed
      Top Right Rear fan             OK          Spinning at normal speed
      Bottom Left Front fan          OK          Spinning at normal speed
      Bottom Left Middle fan         OK          Spinning at normal speed
      Bottom Left Rear fan           OK          Spinning at normal speed
      Bottom Right Front fan         OK          Spinning at normal speed
      Bottom Right Middle fan        OK          Spinning at normal speed
      Bottom Right Rear fan          OK          Spinning at normal speed
      Rear Tray fan 1 (Top)          OK          Spinning at normal speed
      Rear Tray fan 2                OK          Spinning at normal speed
      Rear Tray fan 3                OK          Spinning at normal speed
      Rear Tray fan 4                OK          Spinning at normal speed
      Rear Tray fan 5                OK          Spinning at normal speed
      Rear Tray fan 6                OK          Spinning at normal speed
      Rear Tray fan 7                OK          Spinning at normal speed
      Rear Tray fan 8                OK          Spinning at normal speed
      Rear Tray fan 9                OK          Spinning at normal speed
      Rear Tray fan 10               OK          Spinning at normal speed
      Rear Tray fan 11               OK          Spinning at normal speed
      Rear Tray fan 12               OK          Spinning at normal speed
      Rear Tray fan 13               OK          Spinning at normal speed
      Rear Tray fan 14               OK          Spinning at normal speed
      Rear Tray fan 15               OK          Spinning at normal speed
      Rear Tray fan 16 (Bottom)      OK          Spinning at normal speed
Misc  CIP                            OK
      SPMB 0                         OK
      SPMB 1                         OK
```

show chassis environment (EX4200 Standalone Switch)

user@switch> **show chassis environment**

```
Class Item                           Status      Measurement
Power FPC 0 Power Supply 0           OK
      FPC 0 Power Supply 1           Absent
Temp  FPC 0 CPU                      OK          41 degrees C / 105 degrees F
      FPC 0 EX-PFE1                  OK          42 degrees C / 107 degrees F
      FPC 0 EX-PFE2                  OK          46 degrees C / 114 degrees F
      FPC 0 GEPHY Front Left         OK          25 degrees C / 77 degrees F
      FPC 0 GEPHY Front Right        OK          27 degrees C / 80 degrees F
      FPC 0 Uplink Conn              OK          29 degrees C / 84 degrees F
Fans  FPC 0 Fan 1                    OK          Spinning at normal speed
```

```
      FPC 0 Fan 2                     OK          Spinning at normal speed
      FPC 0 Fan 3                     OK          Spinning at normal speed
```

show chassis environment (EX8216 Switch)

user@switch> **show chassis environment**

```
Class Item                            Status      Measurement
Power PSU 0                           OK
      PSU 1                           OK
      PSU 2                           OK
      PSU 3                           Check
      PSU 4                           Absent
      PSU 5                           Absent
Temp  CB 0 Intake                     OK          23 degrees C / 73 degrees F
      CB 0 Exhaust                    OK          26 degrees C / 78 degrees F
      CB 1 Intake                     OK          22 degrees C / 71 degrees F
      CB 1 Exhaust                    OK          25 degrees C / 77 degrees F
      FPC 4 Intake                    OK          49 degrees C / 120 degrees F
      FPC 4 Exhaust                   OK          59 degrees C / 138 degrees F
      SIB 5 Intake                    OK          25 degrees C / 77 degrees F
      SIB 5 Exhaust                   OK          35 degrees C / 95 degrees F
      SIB 6 Intake                    OK          25 degrees C / 77 degrees F
      SIB 6 Exhaust                   OK          38 degrees C / 100 degrees F
Fans  Top Fan 1                       OK          Spinning at normal speed
      Top Fan 2                       OK          Spinning at normal speed
      Top Fan 3                       OK          Spinning at normal speed
      Top Fan 4                       OK          Spinning at normal speed
      Top Fan 5                       OK          Spinning at normal speed
      Top Fan 6                       OK          Spinning at normal speed
      Top Fan 7                       OK          Spinning at normal speed
      Top Fan 8                       OK          Spinning at normal speed
      Top Fan 9                       OK          Spinning at normal speed
      Bottom Fan 1                    OK          Spinning at normal speed
      Bottom Fan 2                    OK          Spinning at normal speed
      Bottom Fan 3                    OK          Spinning at normal speed
      Bottom Fan 4                    OK          Spinning at normal speed
      Bottom Fan 5                    OK          Spinning at normal speed
      Bottom Fan 6                    OK          Spinning at normal speed
      Bottom Fan 7                    OK          Spinning at normal speed
      Bottom Fan 8                    OK          Spinning at normal speed
      Bottom Fan 9                    OK          Spinning at normal speed
```

show chassis environment (EX9200 Switch)

user@switch> **show chassis environment**

```
Class Item                            Status      Measurement
Temp  PEM 0                           Check
      PEM 1                           OK          40 degrees C / 104 degrees F
      PEM 2                           OK          40 degrees C / 104 degrees F
      PEM 3                           Absent
      Routing Engine 0                OK          35 degrees C / 95 degrees F
      Routing Engine 0 CPU            OK          33 degrees C / 91 degrees F
      Routing Engine 1                OK          38 degrees C / 100 degrees F
      Routing Engine 1 CPU            OK          33 degrees C / 91 degrees F
      CB 0 Intake                     OK          35 degrees C / 95 degrees F
      CB 0 Exhaust A                  OK          33 degrees C / 91 degrees F
      CB 0 Exhaust B                  OK          40 degrees C / 104 degrees F
```



```
      CB 0 ACBC                      OK        39 degrees C / 102 degrees F
      CB 0 XF A                      OK        49 degrees C / 120 degrees F
      CB 0 XF B                      OK        46 degrees C / 114 degrees F
      CB 1 Intake                    OK        37 degrees C / 98 degrees F
      CB 1 Exhaust A                 OK        32 degrees C / 89 degrees F
      CB 1 Exhaust B                 OK        39 degrees C / 102 degrees F
      CB 1 ACBC                      OK        41 degrees C / 105 degrees F
      CB 1 XF A                      OK        49 degrees C / 120 degrees F
      CB 1 XF B                      OK        49 degrees C / 120 degrees F
      FPC 2 Intake                   OK        37 degrees C / 98 degrees F
      FPC 2 Exhaust A                OK        40 degrees C / 104 degrees F
      FPC 2 Exhaust B                OK        34 degrees C / 93 degrees F
      FPC 2 LU 0 TCAM TSen           OK        44 degrees C / 111 degrees F
      FPC 2 LU 0 TCAM Chip           OK        48 degrees C / 118 degrees F
      FPC 2 LU 0 TSen                OK        44 degrees C / 111 degrees F
      FPC 2 LU 0 Chip                OK        60 degrees C / 140 degrees F
      FPC 2 MQ 0 TSen                OK        44 degrees C / 111 degrees F
      FPC 2 MQ 0 Chip                OK        51 degrees C / 123 degrees F
      FPC 3 Intake                   OK        39 degrees C / 102 degrees F
      FPC 3 Exhaust A                OK        51 degrees C / 123 degrees F

[...Output truncated...]

     Fans  Top Rear Fan              OK        Spinning at intermediate-speed
     Bottom Rear Fan                 OK        Spinning at intermediate-speed
     Top Middle Fan                  OK        Spinning at intermediate-speed
     Bottom Middle Fan               OK        Spinning at intermediate-speed
     Top Front Fan                   OK        Spinning at intermediate-speed
     Bottom Front Fan                OK        Spinning at intermediate-speed
```

show chassis environment (EX9251 Switch)

`user@switch>` **show chassis environment**

```
Class Item                           Status    Measurement
Temp  CB 0 Top Right Inlet Sensor    OK        29 degrees C / 84 degrees F
      CB 0 Top Left Inlet Sensor     OK        29 degrees C / 84 degrees F
      CB 0 Top Right Exhaust Sensor  OK        40 degrees C / 104 degrees F
      CB 0 Top Left Exhaust Sensor   OK        59 degrees C / 138 degrees F
      CB 0 CPU Core-0 Temp           OK        45 degrees C / 113 degrees F
      CB 0 CPU Core-1 Temp           OK        44 degrees C / 111 degrees F
      CB 0 CPU Core-2 Temp           OK        44 degrees C / 111 degrees F
      CB 0 CPU Core-3 Temp           OK        44 degrees C / 111 degrees F
      CB 0 CPU Core-4 Temp           OK        45 degrees C / 113 degrees F
      CB 0 CPU Core-5 Temp           OK        44 degrees C / 111 degrees F
      CB 0 CPU Core-6 Temp           OK        44 degrees C / 111 degrees F
      CB 0 CPU Core-7 Temp           OK        43 degrees C / 109 degrees F
Power PEM 0                          Check
      PEM 1                          OK        36 degrees C / 96 degrees F
Fans  Fan Tray 0 Fan 0               OK        Spinning at normal speed
      Fan Tray 0 Fan 1               OK        Spinning at normal speed
      Fan Tray 1 Fan 0               OK        Spinning at normal speed
      Fan Tray 1 Fan 1               OK        Spinning at normal speed
      Fan Tray 2 Fan 0               Absent
      Fan Tray 2 Fan 1               Absent
```

show chassis environment (EX9253 Switch)

`user@switch>` **show chassis environment**

```
Class Item                          Status     Measurement
Temp  CB 0 Exhaust Temp Sensor      OK         37 degrees C / 98 degrees F
      CB 0 Inlet Temp Sensor        OK         31 degrees C / 87 degrees F
      CB 0 CPU DIE Temp Sensor      OK         42 degrees C / 107 degrees F
      CB 1 Exhaust Temp Sensor      OK         31 degrees C / 87 degrees F
      CB 1 Inlet Temp Sensor        OK         28 degrees C / 82 degrees F
      CB 1 CPU DIE Temp Sensor      OK         42 degrees C / 107 degrees F
      FPC 0 Intake Temp Sensor      OK         31 degrees C / 87 degrees F
      FPC 0 Exhaust-A Temp Sensor   OK         58 degrees C / 136 degrees F
      FPC 0 Exhaust-B Temp Sensor   OK         47 degrees C / 116 degrees F
      FPC 1 Intake Temp Sensor      OK         29 degrees C / 84 degrees F
      FPC 1 Exhaust-A Temp Sensor   OK         59 degrees C / 138 degrees F
      FPC 1 Exhaust-B Temp Sensor   OK         48 degrees C / 118 degrees F
Power PEM 0                         OK         54 degrees C / 129 degrees F
      PEM 1                         Check
      PEM 2                         Absent
      PEM 3                         Absent
      PEM 4                         Check
      PEM 5                         OK         61 degrees C / 141 degrees F
Fans  Fan Tray 0 Fan 0              OK         Spinning at normal speed
      Fan Tray 0 Fan 1              OK         Spinning at normal speed
      Fan Tray 0 Fan 2              OK         Spinning at normal speed
      Fan Tray 0 Fan 3              OK         Spinning at normal speed
      Fan Tray 1 Fan 0              OK         Spinning at normal speed
      Fan Tray 1 Fan 1              OK         Spinning at normal speed
      Fan Tray 1 Fan 2              OK         Spinning at normal speed
      Fan Tray 1 Fan 3              OK         Spinning at normal speed
      Fan Tray 2 Fan 0              OK         Spinning at normal speed
      Fan Tray 2 Fan 1              OK         Spinning at normal speed
      Fan Tray 2 Fan 2              OK         Spinning at normal speed
      Fan Tray 2 Fan 3              OK         Spinning at normal speed
      Fan Tray 3 Fan 0              OK         Spinning at normal speed
      Fan Tray 3 Fan 1              OK         Spinning at normal speed
      Fan Tray 3 Fan 2              OK         Spinning at normal speed
      Fan Tray 3 Fan 3              OK         Spinning at normal speed
```

show chassis environment (QFX Series and OCX Series)

user@switch> **show chassis environment**

```
Class Item                          Status     Measurement
Temp  CB 0 Top Right Inlet Sensor   OK         29 degrees C / 84 degrees F
      CB 0 Top Left Inlet Sensor    OK         29 degrees C / 84 degrees F
      CB 0 Top Right Exhaust Sensor OK         40 degrees C / 104 degrees F
      CB 0 Top Left Exhaust Sensor  OK         59 degrees C / 138 degrees F
      CB 0 CPU Core-0 Temp          OK         45 degrees C / 113 degrees F
      CB 0 CPU Core-1 Temp          OK         44 degrees C / 111 degrees F
      CB 0 CPU Core-2 Temp          OK         44 degrees C / 111 degrees F
      CB 0 CPU Core-3 Temp          OK         44 degrees C / 111 degrees F
      CB 0 CPU Core-4 Temp          OK         45 degrees C / 113 degrees F
      CB 0 CPU Core-5 Temp          OK         44 degrees C / 111 degrees F
      CB 0 CPU Core-6 Temp          OK         44 degrees C / 111 degrees F
      CB 0 CPU Core-7 Temp          OK         43 degrees C / 109 degrees F
Power PEM 0                         Check
      PEM 1                         OK         36 degrees C / 96 degrees F
Fans  Fan Tray 0 Fan 0              OK         Spinning at normal speed
      Fan Tray 0 Fan 1              OK         Spinning at normal speed
      Fan Tray 1 Fan 0              OK         Spinning at normal speed
      Fan Tray 1 Fan 1              OK         Spinning at normal speed
```



```
     Fan Tray 2 Fan 0                Absent
     Fan Tray 2 Fan 1                Absent
```

show chassis environment interconnect-device (QFabric System)

`user@switch>` **show chassis environment interconnect-device IC-A0004**

```
Class Item                           Status     Measurement
      CB 0
      CB 0 L Intake                  OK         30 degrees C / 86 degrees F
      CB 0 R Intake                  OK         31 degrees C / 87 degrees F
      CB 0 L Exhaust                 OK         32 degrees C / 89 degrees F
      CB 0 R Exhaust                 OK         33 degrees C / 91 degrees F
      Routing Engine 0 CPU temp      OK         51 degrees C / 123 degrees F
      CB 1
      CB 1 L Intake                  OK         27 degrees C / 80 degrees F
      CB 1 R Intake                  OK         29 degrees C / 84 degrees F
      CB 1 L Exhaust                 OK         31 degrees C / 87 degrees F
      CB 1 R Exhaust                 OK         32 degrees C / 89 degrees F
      Routing Engine 1 CPU temp      OK         40 degrees C / 104 degrees F
      FC 0 FPC 0
      FPC 0 L Intake                 OK         25 degrees C / 77 degrees F
      FPC 0 R Intake                 OK         28 degrees C / 82 degrees F
      FPC 0 L Exhaust                OK         28 degrees C / 82 degrees F
      FPC 0 R Exhaust                OK         29 degrees C / 84 degrees F
      FC 7 FPC 7
      FPC 7 L Intake                 OK         25 degrees C / 77 degrees F
      FPC 7 R Intake                 OK         26 degrees C / 78 degrees F
      FPC 7 L Exhaust                OK         28 degrees C / 82 degrees F
      FPC 7 R Exhaust                OK         29 degrees C / 84 degrees F
      RC 0 FPC 8
      FPC 8 L Intake                 OK         25 degrees C / 77 degrees F
      FPC 8 R Intake                 OK         26 degrees C / 78 degrees F
      FPC 8 L Exhaust                OK         32 degrees C / 89 degrees F
      FPC 8 R Exhaust                OK         30 degrees C / 86 degrees F
      RC 7 FPC 15
      FPC 15 L Intake                OK         24 degrees C / 75 degrees F
      FPC 15 R Intake                OK         25 degrees C / 77 degrees F
      FPC 15 L Exhaust               OK         33 degrees C / 91 degrees F
      FPC 15 R Exhaust               OK         31 degrees C / 87 degrees F
Fans  TFT 0 Fan 0                    OK         Spinning at normal speed
Fans  TFT 0 Fan 1                    OK         Spinning at normal speed
Fans  TFT 0 Fan 2                    OK         Spinning at normal speed
Fans  TFT 0 Fan 3                    OK         Spinning at normal speed
Fans  TFT 0 Fan 4                    OK         Spinning at normal speed
Fans  TFT 0 Fan 5                    OK         Spinning at normal speed
Fans  BFT 1 Fan 0                    OK         Spinning at normal speed
Fans  BFT 1 Fan 1                    OK         Spinning at normal speed
Fans  BFT 1 Fan 2                    OK         Spinning at normal speed
Fans  BFT 1 Fan 3                    Check
Fans  BFT 1 Fan 4                    OK         Spinning at normal speed
Fans  BFT 1 Fan 5                    OK         Spinning at normal speed
Fans  SFT 0 Fan 0 Rotor 0            OK         Spinning at normal speed
Fans  SFT 0 Fan 0 Rotor 1            OK         Spinning at normal speed
Fans  SFT 0 Fan 1 Rotor 0            OK         Spinning at normal speed
Fans  SFT 0 Fan 1 Rotor 1            OK         Spinning at normal speed
Fans  SFT 0 Fan 2 Rotor 0            OK         Spinning at normal speed
Fans  SFT 0 Fan 2 Rotor 1            OK         Spinning at normal speed
Fans  SFT 0 Fan 3 Rotor 0            OK         Spinning at normal speed
Fans  SFT 0 Fan 3 Rotor 1            OK         Spinning at normal speed
```

```
Fans  SFT 1 Fan 0 Rotor 0            OK         Spinning at normal speed
Fans  SFT 1 Fan 0 Rotor 1            OK         Spinning at normal speed
Fans  SFT 1 Fan 1 Rotor 0            OK         Spinning at normal speed
Fans  SFT 1 Fan 1 Rotor 1            OK         Spinning at normal speed
Fans  SFT 1 Fan 2 Rotor 0            OK         Spinning at normal speed
Fans  SFT 1 Fan 2 Rotor 1            OK         Spinning at normal speed
Fans  SFT 1 Fan 3 Rotor 0            OK         Spinning at normal speed
Fans  SFT 1 Fan 3 Rotor 1            OK         Spinning at normal speed
Fans  SFT 2 Fan 0 Rotor 0            OK         Spinning at normal speed
Fans  SFT 2 Fan 0 Rotor 1            OK         Spinning at normal speed
Fans  SFT 2 Fan 1 Rotor 0            OK         Spinning at normal speed
Fans  SFT 2 Fan 1 Rotor 1            OK         Spinning at normal speed
Fans  SFT 2 Fan 2 Rotor 0            OK         Spinning at normal speed
Fans  SFT 2 Fan 2 Rotor 1            OK         Spinning at normal speed
Fans  SFT 2 Fan 3 Rotor 0            OK         Spinning at normal speed
Fans  SFT 2 Fan 3 Rotor 1            OK         Spinning at normal speed
Fans  SFT 3 Fan 0 Rotor 0            OK         Spinning at normal speed
Fans  SFT 3 Fan 0 Rotor 1            OK         Spinning at normal speed
Fans  SFT 3 Fan 1 Rotor 0            OK         Spinning at normal speed
Fans  SFT 3 Fan 1 Rotor 1            OK         Spinning at normal speed
Fans  SFT 3 Fan 2 Rotor 0            OK         Spinning at normal speed
Fans  SFT 3 Fan 2 Rotor 1            OK         Spinning at normal speed
Fans  SFT 3 Fan 3 Rotor 0            OK         Spinning at normal speed
Fans  SFT 3 Fan 3 Rotor 1            OK         Spinning at normal speed
Fans  SFT 4 Fan 0 Rotor 0            OK         Spinning at normal speed
Fans  SFT 4 Fan 0 Rotor 1            OK         Spinning at normal speed
Fans  SFT 4 Fan 1 Rotor 0            OK         Spinning at normal speed
Fans  SFT 4 Fan 1 Rotor 1            OK         Spinning at normal speed
Fans  SFT 4 Fan 2 Rotor 0            OK         Spinning at normal speed
Fans  SFT 4 Fan 2 Rotor 1            OK         Spinning at normal speed
Fans  SFT 4 Fan 3 Rotor 0            OK         Spinning at normal speed
Fans  SFT 4 Fan 3 Rotor 1            OK         Spinning at normal speed
Fans  SFT 5 Fan 0 Rotor 0            OK         Spinning at normal speed
Fans  SFT 5 Fan 0 Rotor 1            OK         Spinning at normal speed
Fans  SFT 5 Fan 1 Rotor 0            OK         Spinning at normal speed
Fans  SFT 5 Fan 1 Rotor 1            OK         Spinning at normal speed
Fans  SFT 5 Fan 2 Rotor 0            OK         Spinning at normal speed
Fans  SFT 5 Fan 2 Rotor 1            OK         Spinning at normal speed
Fans  SFT 5 Fan 3 Rotor 0            OK         Spinning at normal speed
Fans  SFT 5 Fan 3 Rotor 1            OK         Spinning at normal speed
Fans  SFT 6 Fan 0 Rotor 0            OK         Spinning at normal speed
Fans  SFT 6 Fan 0 Rotor 1            OK         Spinning at normal speed
Fans  SFT 6 Fan 1 Rotor 0            OK         Spinning at normal speed
Fans  SFT 6 Fan 1 Rotor 1            OK         Spinning at normal speed
Fans  SFT 6 Fan 2 Rotor 0            OK         Spinning at normal speed
Fans  SFT 6 Fan 2 Rotor 1            OK         Spinning at normal speed
Fans  SFT 6 Fan 3 Rotor 0            OK         Spinning at normal speed
Fans  SFT 6 Fan 3 Rotor 1            OK         Spinning at normal speed
Fans  SFT 7 Fan 0 Rotor 0            OK         Spinning at normal speed
Fans  SFT 7 Fan 0 Rotor 1            OK         Spinning at normal speed
Fans  SFT 7 Fan 1 Rotor 0            OK         Spinning at normal speed
Fans  SFT 7 Fan 1 Rotor 1            OK         Spinning at normal speed
Fans  SFT 7 Fan 2 Rotor 0            OK         Spinning at normal speed
Fans  SFT 7 Fan 2 Rotor 1            OK         Spinning at normal speed
Fans  SFT 7 Fan 3 Rotor 0            OK         Spinning at normal speed
Fans  SFT 7 Fan 3 Rotor 1            OK         Spinning at normal speed
Power PEM 0                          OK         30 degrees C / 86 degrees F
Power PEM 1                          OK         30 degrees C / 86 degrees F
Power PEM 2                          OK         30 degrees C / 86 degrees F
Power PEM 3                          Absent
```

```
Power PEM 4                          Absent
Power PEM 5                          Absent
```

show chassis environment node-device (QFabric System)

user@switch> **show chassis environment node-device node1**

```
Class Item                           Status     Measurement
Power node1 Power Supply 0            Absent
      node1 Power Supply 1            Absent
Fans  node1 Fan Tray 0                Testing
      node1 Fan Tray 1                Testing
      node1 Fan Tray 2                Testing
```

show chassis environment pem node-device (QFabric System)

user@switch> **show chassis environment pem node-device node1**

```
FPC 0 PEM 0 status:
  State                      Check
  Airflow                    Front to Back
  Temperature                OK
  AC Input:                  OK
  DC Output           Voltage(V) Current(A)  Power(W)  Load(%)
                          12         10          120      18
FPC 0 PEM 1 status:
  State                      Online
  Airflow                    Back to Front
  Temperature                OK
  AC Input:                  OK
  DC Output           Voltage(V) Current(A)  Power(W)  Load(%)
                          11         10         110      17
```

show chassis environment (PTX5000 Packet Transport Router)

user@host> **show chassis environment**

```
Class Item                           Status     Measurement
Temp  PDU 0                          OK
      PDU 0 PSM 0                    OK         36 degrees C / 96 degrees F
      PDU 0 PSM 1                    OK         38 degrees C / 100 degrees F
      PDU 0 PSM 2                    OK         38 degrees C / 100 degrees F
      PDU 0 PSM 3                    OK         37 degrees C / 98 degrees F
      PDU 1                          Absent
      CCG 0                          OK         44 degrees C / 111 degrees F
      CCG 1                          OK         44 degrees C / 111 degrees F
      Routing Engine 0               OK         62 degrees C / 143 degrees F
      Routing Engine 0 CPU           OK         75 degrees C / 167 degrees F
      Routing Engine 1               OK         51 degrees C / 123 degrees F
      Routing Engine 1 CPU           OK         64 degrees C / 147 degrees F
      CB 0 Intake                    OK         38 degrees C / 100 degrees F
      CB 0 Exhaust A                 OK         46 degrees C / 114 degrees F
      CB 0 Exhaust B                 OK         42 degrees C / 107 degrees F
      CB 1 Intake                    OK         35 degrees C / 95 degrees F
      CB 1 Exhaust A                 OK         39 degrees C / 102 degrees F
      CB 1 Exhaust B                 OK         36 degrees C / 96 degrees F
      SIB 0 Exhaust                  OK         47 degrees C / 116 degrees F
      SIB 0 Junction                 OK         45 degrees C / 113 degrees F
      SIB 1 Exhaust                  OK         44 degrees C / 111 degrees F
```

```
    SIB 1 Junction                OK         43 degrees C / 109 degrees F
    SIB 2 Exhaust                 OK         47 degrees C / 116 degrees F
    SIB 2 Junction                OK         42 degrees C / 107 degrees F
    SIB 3 Exhaust                 OK         43 degrees C / 109 degrees F
    SIB 3 Junction                OK         43 degrees C / 109 degrees F
    SIB 4 Exhaust                 OK         47 degrees C / 116 degrees F
    SIB 4 Junction                OK         42 degrees C / 107 degrees F
    SIB 5 Exhaust                 OK         42 degrees C / 107 degrees F
    SIB 5 Junction                OK         40 degrees C / 104 degrees F
    SIB 6 Exhaust                 OK         46 degrees C / 114 degrees F
    SIB 6 Junction                OK         42 degrees C / 107 degrees F
    SIB 7 Exhaust                 OK         43 degrees C / 109 degrees F
    SIB 7 Junction                OK         39 degrees C / 102 degrees F
    SIB 8 Exhaust                 OK         44 degrees C / 111 degrees F
    SIB 8 Junction                OK         41 degrees C / 105 degrees F
    FPC 0 PMB                     OK         35 degrees C / 95 degrees F
    FPC 0 Intake                  OK         33 degrees C / 91 degrees F
    FPC 0 Exhaust A               OK         51 degrees C / 123 degrees F
    FPC 0 Exhaust B               OK         43 degrees C / 109 degrees F
    FPC 0 TL0                     OK         48 degrees C / 118 degrees F
    FPC 0 TQ0                     OK         53 degrees C / 127 degrees F
    FPC 0 TL1                     OK         56 degrees C / 132 degrees F
    FPC 0 TQ1                     OK         58 degrees C / 136 degrees F
    FPC 0 TL2                     OK         55 degrees C / 131 degrees F
    FPC 0 TQ2                     OK         56 degrees C / 132 degrees F
    FPC 0 TL3                     OK         59 degrees C / 138 degrees F
    FPC 0 TQ3                     OK         59 degrees C / 138 degrees F
    FPC 2 PMB                     OK         35 degrees C / 95 degrees F
    FPC 2 Intake                  OK         34 degrees C / 93 degrees F
    FPC 2 Exhaust A               OK         51 degrees C / 123 degrees F
    FPC 2 Exhaust B               OK         52 degrees C / 125 degrees F
    FPC 2 TL0                     OK         53 degrees C / 127 degrees F
    FPC 2 TQ0                     OK         53 degrees C / 127 degrees F
    FPC 2 TL1                     OK         57 degrees C / 134 degrees F
    FPC 2 TQ1                     OK         58 degrees C / 136 degrees F
    FPC 2 TL2                     OK         54 degrees C / 129 degrees F
    FPC 2 TQ2                     OK         59 degrees C / 138 degrees F
    FPC 2 TL3                     OK         60 degrees C / 140 degrees F
    FPC 2 TQ3                     OK         64 degrees C / 147 degrees F
    PIC 2/0 Ambient               OK         49 degrees C / 120 degrees F
    FPC 3 PMB                     OK         34 degrees C / 93 degrees F
    FPC 3 Intake                  OK         35 degrees C / 95 degrees F
    FPC 3 Exhaust A               OK         54 degrees C / 129 degrees F
    FPC 3 Exhaust B               OK         49 degrees C / 120 degrees F
    FPC 3 TL0                     OK         49 degrees C / 120 degrees F
    FPC 3 TQ0                     OK         55 degrees C / 131 degrees F
    FPC 3 TL1                     OK         56 degrees C / 132 degrees F
    FPC 3 TQ1                     OK         58 degrees C / 136 degrees F
    FPC 3 TL2                     OK         56 degrees C / 132 degrees F
    FPC 3 TQ2                     OK         59 degrees C / 138 degrees F
    FPC 3 TL3                     OK         62 degrees C / 143 degrees F
    FPC 3 TQ3                     OK         63 degrees C / 145 degrees F
    PIC 3/1                       Absent
    FPC 5 PMB                     OK         35 degrees C / 95 degrees F
    FPC 5 Intake                  OK         34 degrees C / 93 degrees F
    FPC 5 Exhaust A               OK         51 degrees C / 123 degrees F
    FPC 5 Exhaust B               OK         53 degrees C / 127 degrees F
    FPC 5 TL0                     OK         54 degrees C / 129 degrees F
    FPC 5 TQ0                     OK         52 degrees C / 125 degrees F
    FPC 5 TL1                     OK         61 degrees C / 141 degrees F
```



```
      FPC 5 TQ1                      OK         60 degrees C / 140 degrees F
      FPC 5 TL2                      OK         55 degrees C / 131 degrees F
      FPC 5 TQ2                      OK         55 degrees C / 131 degrees F
      FPC 5 TL3                      OK         59 degrees C / 138 degrees F
      FPC 5 TQ3                      OK         58 degrees C / 136 degrees F
      PIC 5/0 Ambient                OK         51 degrees C / 123 degrees F
      PIC 5/1 Ambient                OK         34 degrees C / 93 degrees F
      PIC 5/1 cfp-5/1/0              OK         34 degrees C / 93 degrees F
      PIC 5/1 cfp-5/1/1              OK         36 degrees C / 96 degrees F
      FPC 6 PMB                      OK         36 degrees C / 96 degrees F
      FPC 6 Intake                   OK         33 degrees C / 91 degrees F
      FPC 6 Exhaust A                OK         51 degrees C / 123 degrees F
      FPC 6 Exhaust B                OK         39 degrees C / 102 degrees F
      FPC 6 TL0                      OK         44 degrees C / 111 degrees F
      FPC 6 TQ0                      OK         54 degrees C / 129 degrees F
      FPC 6 TL1                      OK         59 degrees C / 138 degrees F
      FPC 6 TQ1                      OK         58 degrees C / 136 degrees F
      FPC 6 TL2                      OK         60 degrees C / 140 degrees F
      FPC 6 TQ2                      OK         57 degrees C / 134 degrees F
      FPC 6 TL3                      OK         65 degrees C / 149 degrees F
      FPC 6 TQ3                      OK         60 degrees C / 140 degrees F
      FPC 7 PMB                      OK         35 degrees C / 95 degrees F
      FPC 7 Intake                   OK         33 degrees C / 91 degrees F
      FPC 7 Exhaust A                OK         53 degrees C / 127 degrees F
      FPC 7 Exhaust B                OK         40 degrees C / 104 degrees F
      FPC 7 TL0                      OK         46 degrees C / 114 degrees F
      FPC 7 TQ0                      OK         58 degrees C / 136 degrees F
      FPC 7 TL1                      OK         53 degrees C / 127 degrees F
      FPC 7 TQ1                      OK         59 degrees C / 138 degrees F
      FPC 7 TL2                      OK         56 degrees C / 132 degrees F
      FPC 7 TQ2                      OK         61 degrees C / 141 degrees F
      FPC 7 TL3                      OK         63 degrees C / 145 degrees F
      FPC 7 TQ3                      OK         63 degrees C / 145 degrees F
      FPM I2CS                       OK         37 degrees C / 98 degrees F
Fans  Fan Tray 0 Fan 1               OK         3042 RPM
      Fan Tray 0 Fan 2               OK         3042 RPM
      Fan Tray 0 Fan 3               OK         3000 RPM
      Fan Tray 0 Fan 4               OK         3042 RPM
      Fan Tray 0 Fan 5               OK         3000 RPM
      Fan Tray 0 Fan 6               OK         3042 RPM
      Fan Tray 0 Fan 7               OK         3085 RPM
      Fan Tray 0 Fan 8               OK         3042 RPM
      Fan Tray 0 Fan 9               OK         3042 RPM
      Fan Tray 0 Fan 10              OK         3085 RPM
      Fan Tray 0 Fan 11              OK         3085 RPM
      Fan Tray 0 Fan 12              OK         3128 RPM
      Fan Tray 0 Fan 13              OK         3128 RPM
      Fan Tray 0 Fan 14              OK         3042 RPM
      Fan Tray 1 Fan 1               OK         2299 RPM
      Fan Tray 1 Fan 2               OK         2399 RPM
      Fan Tray 1 Fan 3               OK         2299 RPM
      Fan Tray 1 Fan 4               OK         2266 RPM
      Fan Tray 1 Fan 5               OK         2266 RPM
      Fan Tray 1 Fan 6               OK         2366 RPM
      Fan Tray 2 Fan 1               OK         2199 RPM
      Fan Tray 2 Fan 2               OK         2133 RPM
      Fan Tray 2 Fan 3               OK         2366 RPM
      Fan Tray 2 Fan 4               OK         2233 RPM
      Fan Tray 2 Fan 5               OK         2399 RPM
      Fan Tray 2 Fan 6               OK         2233 RPM
```

```
Misc  SPMB 0 Intake                     OK         50 degrees C / 122 degrees F
      SPMB 1 Intake                     OK         40 degrees C / 104 degrees F
```

show chassis environment (PTX5000 Packet Transport Router with FPC2-PTX-P1A)

user@host> **show chassis environment**

```
Class Item                              Status     Measurement
Temp  PDU 0                             OK
      PDU 0 PSM 0                       OK         41 degrees C / 105 degrees F
      PDU 0 PSM 1                       Absent
      PDU 0 PSM 2                       OK         43 degrees C / 109 degrees F
      PDU 0 PSM 3                       Absent
      PDU 0 PSM 4                       OK         44 degrees C / 111 degrees F
      PDU 0 PSM 5                       Absent
      PDU 0 PSM 6                       OK         45 degrees C / 113 degrees F
      PDU 0 PSM 7                       Absent
      PDU 1                             OK
      PDU 1 PSM 0                       Absent
      PDU 1 PSM 1                       OK         45 degrees C / 113 degrees F
      PDU 1 PSM 2                       Absent
      PDU 1 PSM 3                       OK         43 degrees C / 109 degrees F
      PDU 1 PSM 4                       Absent
      PDU 1 PSM 5                       OK         46 degrees C / 114 degrees F
      PDU 1 PSM 6                       Absent
      PDU 1 PSM 7                       OK         46 degrees C / 114 degrees F
      CCG 0                             OK         27 degrees C / 80 degrees F
      CCG 1                             OK         29 degrees C / 84 degrees F
...
```

show chassis environment (PTX1000 Packet Transport Router)

user@host> **show chassis environment**

```
Class Item                              Status     Measurement
Power FPC 0 Power Supply 0              Absent
      FPC 0 Power Supply 1              Absent
      FPC 0 Power Supply 2              OK
      FPC 0 Power Supply 3              OK
Temp  FPC 0 Intake Temp Sensor          OK         25 degrees C / 77 degrees F
      FPC 0 Exhaust Temp Sensor         OK         35 degrees C / 95 degrees F
      FPC 0 Mezz Temp Sensor 0          OK         25 degrees C / 77 degrees F
      FPC 0 Mezz Temp Sensor 1          OK         34 degrees C / 93 degrees F
      FPC 0 PE2 Temp Sensor             OK         34 degrees C / 93 degrees F
      FPC 0 PE1 Temp Sensor             OK         32 degrees C / 89 degrees F
      FPC 0 PF0 Temp Sensor             OK         40 degrees C / 104 degrees F
      FPC 0 PE0 Temp Sensor             OK         33 degrees C / 91 degrees F
      FPC 0 PE5 Temp Sensor             OK         34 degrees C / 93 degrees F
      FPC 0 PE4 Temp Sensor             OK         34 degrees C / 93 degrees F
      FPC 0 PF1 Temp Sensor             OK         41 degrees C / 105 degrees F
      FPC 0 PE3 Temp Sensor             OK         36 degrees C / 96 degrees F
      FPC 0 CPU Die Temp Sensor         OK         40 degrees C / 104 degrees F
      FPC 0 OCXO Temp Sensor            OK         37 degrees C / 98 degrees F
Fans  FPC 0 Fan Tray 0                  OK         Spinning at normal speed
      FPC 0 Fan Tray 1                  OK         Spinning at normal speed
      FPC 0 Fan Tray 2                  OK         Spinning at normal speed
```


show chassis environment (PTX10008 Router)

`user@host>` **show chassis environment**

```
Class Item                          Status     Measurement
      Routing Engine 0 CPU          OK         40 degrees C / 104 degrees F
      Routing Engine 1 CPU          OK         40 degrees C / 104 degrees F
Temp  CB 0 Intake Temp Sensor       OK         29 degrees C / 84 degrees F
      CB 0 Exhaust Temp Sensor      OK         33 degrees C / 91 degrees F
      CB 1 Intake Temp Sensor       OK         28 degrees C / 82 degrees F
      CB 1 Exhaust Temp Sensor      OK         32 degrees C / 89 degrees F
      FPC 0 Intake-A Temp Sensor    OK         38 degrees C / 100 degrees F
      FPC 0 Intake-B Temp Sensor    OK         34 degrees C / 93 degrees F
      FPC 0 Exhaust-A Temp Sensor   OK         36 degrees C / 96 degrees F
      FPC 0 Exhaust-B Temp Sensor   OK         37 degrees C / 98 degrees F
      FPC 0 Exhaust-C Temp Sensor   OK         40 degrees C / 104 degrees F
      FPC 0 PE0 Temp Sensor         OK         40 degrees C / 104 degrees F
      FPC 0 PE1 Temp Sensor         OK         42 degrees C / 107 degrees F
      FPC 0 PE2 Temp Sensor         OK         44 degrees C / 111 degrees F
      FPC 0 LCPU Temp Sensor        OK         41 degrees C / 105 degrees F
      FPC 1 Intake-A Temp Sensor    OK         37 degrees C / 98 degrees F
      FPC 1 Intake-B Temp Sensor    OK         33 degrees C / 91 degrees F
      FPC 1 Exhaust-A Temp Sensor   OK         37 degrees C / 98 degrees F
      FPC 1 Exhaust-B Temp Sensor   OK         38 degrees C / 100 degrees F
      FPC 1 Exhaust-C Temp Sensor   OK         40 degrees C / 104 degrees F
      FPC 1 PE0 Temp Sensor         OK         41 degrees C / 105 degrees F
      FPC 1 PE1 Temp Sensor         OK         41 degrees C / 105 degrees F
      FPC 1 PE2 Temp Sensor         OK         45 degrees C / 113 degrees F
      FPC 1 LCPU Temp Sensor        OK         40 degrees C / 104 degrees F
      FPC 2 Intake-A Temp Sensor    OK         44 degrees C / 111 degrees F
      FPC 2 Intake-B Temp Sensor    OK         30 degrees C / 86 degrees F
      FPC 2 Exhaust-A Temp Sensor   OK         52 degrees C / 125 degrees F
      FPC 2 Exhaust-B Temp Sensor   OK         54 degrees C / 129 degrees F
      FPC 2 Exhaust-C Temp Sensor   OK         52 degrees C / 125 degrees F
      FPC 2 PE0 Temp Sensor         OK         49 degrees C / 120 degrees F
      FPC 2 PE1 Temp Sensor         OK         59 degrees C / 138 degrees F
      FPC 2 PE2 Temp Sensor         OK         49 degrees C / 120 degrees F
      FPC 2 PE3 Temp Sensor         OK         60 degrees C / 140 degrees F
      FPC 2 PE4 Temp Sensor         OK         49 degrees C / 120 degrees F
      FPC 2 PE5 Temp Sensor         OK         63 degrees C / 145 degrees F
      FPC 2 LCPU Temp Sensor        OK         47 degrees C / 116 degrees F
      FPC 3 Intake-A Temp Sensor    OK         42 degrees C / 107 degrees F
      FPC 3 Intake-B Temp Sensor    OK         30 degrees C / 86 degrees F
      FPC 3 Exhaust-A Temp Sensor   OK         46 degrees C / 114 degrees F
      FPC 3 Exhaust-B Temp Sensor   OK         48 degrees C / 118 degrees F
      FPC 3 Exhaust-C Temp Sensor   OK         47 degrees C / 116 degrees F
      FPC 3 PE0 Temp Sensor         OK         47 degrees C / 116 degrees F
      FPC 3 PE1 Temp Sensor         OK         53 degrees C / 127 degrees F
      FPC 3 PE2 Temp Sensor         OK         46 degrees C / 114 degrees F
      FPC 3 PE3 Temp Sensor         OK         53 degrees C / 127 degrees F
      FPC 3 PE4 Temp Sensor         OK         48 degrees C / 118 degrees F
      FPC 3 PE5 Temp Sensor         OK         57 degrees C / 134 degrees F
      FPC 3 LCPU Temp Sensor        OK         47 degrees C / 116 degrees F
      FPC 5 Intake-A Temp Sensor    Failed
      FPC 5 Intake-B Temp Sensor    Failed
      FPC 5 Exhaust-A Temp Sensor   OK         40 degrees C / 104 degrees F
      FPC 5 Exhaust-B Temp Sensor   OK         40 degrees C / 104 degrees F
      FPC 5 Exhaust-C Temp Sensor   OK         41 degrees C / 105 degrees F
      FPC 5 PE0 Temp Sensor         OK         46 degrees C / 114 degrees F
      FPC 5 PE1 Temp Sensor         OK         48 degrees C / 118 degrees F
      FPC 5 PE2 Temp Sensor         OK         51 degrees C / 123 degrees F
```



```
      FPC 5 LCPU Temp Sensor         Failed
      FPC 6 Intake-A Temp Sensor     OK         40 degrees C / 104 degrees F
      FPC 6 Intake-B Temp Sensor     OK         36 degrees C / 96 degrees F
      FPC 6 Exhaust-A Temp Sensor    OK         39 degrees C / 102 degrees F
      FPC 6 Exhaust-B Temp Sensor    OK         39 degrees C / 102 degrees F
      FPC 6 Exhaust-C Temp Sensor    OK         39 degrees C / 102 degrees F
      FPC 6 PE0 Temp Sensor          OK         44 degrees C / 111 degrees F
      FPC 6 PE1 Temp Sensor          OK         45 degrees C / 113 degrees F
      FPC 6 PE2 Temp Sensor          OK         50 degrees C / 122 degrees F
      FPC 6 LCPU Temp Sensor         OK         40 degrees C / 104 degrees F
      SIB 0 Intake-A Temp Sensor     OK         37 degrees C / 98 degrees F
      SIB 0 Intake-B Temp Sensor     OK         30 degrees C / 86 degrees F
      SIB 0 Exhaust-A Temp Sensor    OK         33 degrees C / 91 degrees F
      SIB 0 Exhaust-B Temp Sensor    OK         38 degrees C / 100 degrees F
      SIB 0 PF0 Temp Sensor          OK         46 degrees C / 114 degrees F
      SIB 0 PF1 Temp Sensor          OK         39 degrees C / 102 degrees F
      SIB 1 Intake-A Temp Sensor     OK         43 degrees C / 109 degrees F
      SIB 1 Intake-B Temp Sensor     OK         34 degrees C / 93 degrees F
      SIB 1 Exhaust-A Temp Sensor    OK         36 degrees C / 96 degrees F
      SIB 1 Exhaust-B Temp Sensor    OK         44 degrees C / 111 degrees F
      SIB 1 PF0 Temp Sensor          OK         54 degrees C / 129 degrees F
      SIB 1 PF1 Temp Sensor          OK         41 degrees C / 105 degrees F
      SIB 2 Intake-A Temp Sensor     OK         46 degrees C / 114 degrees F
      SIB 2 Intake-B Temp Sensor     OK         35 degrees C / 95 degrees F
      SIB 2 Exhaust-A Temp Sensor    OK         37 degrees C / 98 degrees F
      SIB 2 Exhaust-B Temp Sensor    OK         47 degrees C / 116 degrees F
      SIB 2 PF0 Temp Sensor          OK         55 degrees C / 131 degrees F
      SIB 2 PF1 Temp Sensor          OK         42 degrees C / 107 degrees F
      SIB 3 Intake-A Temp Sensor     OK         45 degrees C / 113 degrees F
      SIB 3 Intake-B Temp Sensor     OK         35 degrees C / 95 degrees F
      SIB 3 Exhaust-A Temp Sensor    OK         36 degrees C / 96 degrees F
      SIB 3 Exhaust-B Temp Sensor    OK         45 degrees C / 113 degrees F
      SIB 3 PF0 Temp Sensor          OK         54 degrees C / 129 degrees F
      SIB 3 PF1 Temp Sensor          OK         42 degrees C / 107 degrees F
      SIB 4 Intake-A Temp Sensor     OK         46 degrees C / 114 degrees F
      SIB 4 Intake-B Temp Sensor     OK         34 degrees C / 93 degrees F
      SIB 4 Exhaust-A Temp Sensor    OK         36 degrees C / 96 degrees F
      SIB 4 Exhaust-B Temp Sensor    OK         46 degrees C / 114 degrees F
      SIB 4 PF0 Temp Sensor          OK         54 degrees C / 129 degrees F
      SIB 4 PF1 Temp Sensor          OK         41 degrees C / 105 degrees F
      SIB 5 Intake-A Temp Sensor     OK         38 degrees C / 100 degrees F
      SIB 5 Intake-B Temp Sensor     OK         31 degrees C / 87 degrees F
      SIB 5 Exhaust-A Temp Sensor    OK         34 degrees C / 93 degrees F
      SIB 5 Exhaust-B Temp Sensor    OK         39 degrees C / 102 degrees F
      SIB 5 PF0 Temp Sensor          OK         44 degrees C / 111 degrees F
      SIB 5 PF1 Temp Sensor          OK         42 degrees C / 107 degrees F
Power Power Supply 0                 OK
      Power Supply 1                 OK
      Power Supply 2                 OK
      Power Supply 3                 OK
      Power Supply 4                 Check
      Power Supply 5                 OK
Fans  Fan Tray 0 Fan 0               OK         Spinning at normal speed
      Fan Tray 0 Fan 1               OK         Spinning at normal speed
      Fan Tray 0 Fan 2               OK         Spinning at normal speed
      Fan Tray 0 Fan 3               OK         Spinning at normal speed
      Fan Tray 0 Fan 4               Failed
      Fan Tray 0 Fan 5               Failed
      Fan Tray 0 Fan 6               OK         Spinning at normal speed
      Fan Tray 0 Fan 7               OK         Spinning at normal speed
```



```
     Fan Tray 0 Fan 8              OK         Spinning at normal speed
     Fan Tray 0 Fan 9              OK         Spinning at normal speed
     Fan Tray 0 Fan 10             OK         Spinning at normal speed
     Fan Tray 1 Fan 0              OK         Spinning at normal speed
     Fan Tray 1 Fan 1              OK         Spinning at normal speed
     Fan Tray 1 Fan 2              OK         Spinning at normal speed
     Fan Tray 1 Fan 3              OK         Spinning at normal speed
     Fan Tray 1 Fan 4              OK         Spinning at normal speed
     Fan Tray 1 Fan 5              OK         Spinning at normal speed
     Fan Tray 1 Fan 6              OK         Spinning at normal speed
     Fan Tray 1 Fan 7              OK         Spinning at normal speed
     Fan Tray 1 Fan 8              OK         Spinning at normal speed
     Fan Tray 1 Fan 9              OK         Spinning at normal speed
     Fan Tray 1 Fan 10             OK         Spinning at normal speed
```

show chassis environment (PTX10016 Router)

user@host> **show chassis environment**

```
Class Item                         Status     Measurement
      Routing Engine 0 CPU         OK         34 degrees C / 93 degrees F
      Routing Engine 1 CPU         OK         34 degrees C / 93 degrees F
Temp  CB 0 Intake Temp Sensor      OK         20 degrees C / 68 degrees F
      CB 0 Exhaust Temp Sensor     OK         24 degrees C / 75 degrees F
      CB 1 Intake Temp Sensor      OK         20 degrees C / 68 degrees F
      CB 1 Exhaust Temp Sensor     OK         23 degrees C / 73 degrees F
      FPC 1 Intake-A Temp Sensor   OK         37 degrees C / 98 degrees F
      FPC 1 Intake-B Temp Sensor   OK         32 degrees C / 89 degrees F
      FPC 1 Exhaust-A Temp Sensor  OK         37 degrees C / 98 degrees F
      FPC 1 Exhaust-B Temp Sensor  OK         36 degrees C / 96 degrees F
      FPC 1 Exhaust-C Temp Sensor  OK         36 degrees C / 96 degrees F
      FPC 1 PE0 Temp Sensor        OK         45 degrees C / 113 degrees F
      FPC 1 PE1 Temp Sensor        OK         46 degrees C / 114 degrees F
      FPC 1 PE2 Temp Sensor        OK         54 degrees C / 129 degrees F
      FPC 1 LCPU Temp Sensor       OK         35 degrees C / 95 degrees F
      FPC 3 Intake-A Temp Sensor   OK         35 degrees C / 95 degrees F
      FPC 3 Intake-B Temp Sensor   OK         31 degrees C / 87 degrees F
      FPC 3 Exhaust-A Temp Sensor  OK         36 degrees C / 96 degrees F
      FPC 3 Exhaust-B Temp Sensor  OK         35 degrees C / 95 degrees F
      FPC 3 Exhaust-C Temp Sensor  OK         33 degrees C / 91 degrees F
      FPC 3 PE0 Temp Sensor        OK         43 degrees C / 109 degrees F
      FPC 3 PE1 Temp Sensor        OK         45 degrees C / 113 degrees F
      FPC 3 PE2 Temp Sensor        OK         49 degrees C / 120 degrees F
      FPC 3 LCPU Temp Sensor       OK         35 degrees C / 95 degrees F
      FPC 6 Intake-A Temp Sensor   OK         34 degrees C / 93 degrees F
      FPC 6 Intake-B Temp Sensor   OK         31 degrees C / 87 degrees F
      FPC 6 Exhaust-A Temp Sensor  OK         35 degrees C / 95 degrees F
      FPC 6 Exhaust-B Temp Sensor  OK         35 degrees C / 95 degrees F
      FPC 6 Exhaust-C Temp Sensor  OK         35 degrees C / 95 degrees F
      FPC 6 PE0 Temp Sensor        OK         43 degrees C / 109 degrees F
      FPC 6 PE1 Temp Sensor        OK         43 degrees C / 109 degrees F
      FPC 6 PE2 Temp Sensor        OK         47 degrees C / 116 degrees F
      FPC 6 LCPU Temp Sensor       OK         35 degrees C / 95 degrees F
      FPC 8 Intake-A Temp Sensor   OK         34 degrees C / 93 degrees F
      FPC 8 Intake-B Temp Sensor   OK         31 degrees C / 87 degrees F
      FPC 8 Exhaust-A Temp Sensor  OK         37 degrees C / 98 degrees F
      FPC 8 Exhaust-B Temp Sensor  OK         37 degrees C / 98 degrees F
      FPC 8 Exhaust-C Temp Sensor  OK         38 degrees C / 100 degrees F
      FPC 8 PE0 Temp Sensor        OK         42 degrees C / 107 degrees F
      FPC 8 PE1 Temp Sensor        OK         44 degrees C / 111 degrees F
```

```
      FPC 8 PE2 Temp Sensor         OK         47 degrees C / 116 degrees F
      FPC 8 LCPU Temp Sensor        OK         33 degrees C / 91 degrees F
      FPC 9 Intake-A Temp Sensor    OK         44 degrees C / 111 degrees F
      FPC 9 Intake-B Temp Sensor    OK         28 degrees C / 82 degrees F
      FPC 9 Exhaust-A Temp Sensor   OK         51 degrees C / 123 degrees F
      FPC 9 Exhaust-B Temp Sensor   OK         52 degrees C / 125 degrees F
      FPC 9 Exhaust-C Temp Sensor   OK         48 degrees C / 118 degrees F
      FPC 9 PE0 Temp Sensor         OK         52 degrees C / 125 degrees F
      FPC 9 PE1 Temp Sensor         OK         66 degrees C / 150 degrees F
      FPC 9 PE2 Temp Sensor         OK         50 degrees C / 122 degrees F
      FPC 9 PE3 Temp Sensor         OK         65 degrees C / 149 degrees F
      FPC 9 PE4 Temp Sensor         OK         51 degrees C / 123 degrees F
      FPC 9 PE5 Temp Sensor         OK         68 degrees C / 154 degrees F
      FPC 9 LCPU Temp Sensor        OK         46 degrees C / 114 degrees F
Power Power Supply 0                OK         22 degrees C / 71 degrees F
      Power Supply 1                OK         23 degrees C / 73 degrees F
      Power Supply 2                OK         23 degrees C / 73 degrees F
      Power Supply 3                OK         21 degrees C / 69 degrees F
      Power Supply 4                OK         22 degrees C / 71 degrees F
      Power Supply 5                OK         25 degrees C / 77 degrees F
      Power Supply 6                OK         21 degrees C / 69 degrees F
      Power Supply 7                Absent
      Power Supply 8                Absent
      Power Supply 9                Absent
Fans  Fan Tray 0 Fan 0              OK         Spinning at normal speed
      Fan Tray 0 Fan 1              OK         Spinning at normal speed
      Fan Tray 0 Fan 2              OK         Spinning at normal speed
      Fan Tray 0 Fan 3              OK         Spinning at normal speed
      Fan Tray 0 Fan 4              OK         Spinning at normal speed
      Fan Tray 0 Fan 5              OK         Spinning at normal speed
      Fan Tray 0 Fan 6              OK         Spinning at normal speed
      Fan Tray 0 Fan 7              OK         Spinning at normal speed
      Fan Tray 0 Fan 8              OK         Spinning at normal speed
      Fan Tray 0 Fan 9              OK         Spinning at normal speed
      Fan Tray 0 Fan 10             OK         Spinning at normal speed
      Fan Tray 0 Fan 11             OK         Spinning at normal speed
      Fan Tray 0 Fan 12             OK         Spinning at normal speed
      Fan Tray 0 Fan 13             OK         Spinning at normal speed
      Fan Tray 0 Fan 14             OK         Spinning at normal speed
      Fan Tray 0 Fan 15             OK         Spinning at normal speed
      Fan Tray 0 Fan 16             OK         Spinning at normal speed
      Fan Tray 0 Fan 17             OK         Spinning at normal speed
      Fan Tray 0 Fan 18             OK         Spinning at normal speed
      Fan Tray 0 Fan 19             OK         Spinning at normal speed
      Fan Tray 0 Fan 20             OK         Spinning at normal speed
      Fan Tray 1 Fan 0              OK         Spinning at normal speed
      Fan Tray 1 Fan 1              OK         Spinning at normal speed
      Fan Tray 1 Fan 2              OK         Spinning at normal speed
      Fan Tray 1 Fan 3              OK         Spinning at normal speed
      Fan Tray 1 Fan 4              OK         Spinning at normal speed
      Fan Tray 1 Fan 5              OK         Spinning at normal speed
      Fan Tray 1 Fan 6              OK         Spinning at normal speed
      Fan Tray 1 Fan 7              OK         Spinning at normal speed
      Fan Tray 1 Fan 8              OK         Spinning at normal speed
      Fan Tray 1 Fan 9              OK         Spinning at normal speed
      Fan Tray 1 Fan 10             OK         Spinning at normal speed
      Fan Tray 1 Fan 11             OK         Spinning at normal speed
      Fan Tray 1 Fan 12             OK         Spinning at normal speed
      Fan Tray 1 Fan 13             OK         Spinning at normal speed
      Fan Tray 1 Fan 14             OK         Spinning at normal speed
```



```
    Fan Tray 1 Fan 15              OK         Spinning at normal speed
    Fan Tray 1 Fan 16              OK         Spinning at normal speed
    Fan Tray 1 Fan 17              OK         Spinning at normal speed
    Fan Tray 1 Fan 18              OK         Spinning at normal speed
    Fan Tray 1 Fan 19              OK         Spinning at normal speed
    Fan Tray 1 Fan 20              OK         Spinning at normal speed
    SIB 0 Intake-A Temp Sensor     OK         20 degrees C / 68 degrees F
    SIB 0 Intake-B Temp Sensor     OK         20 degrees C / 68 degrees F
    SIB 0 Intake-C Temp Sensor     OK         16 degrees C / 60 degrees F
    SIB 0 Exhaust-A Temp Sensor    OK         28 degrees C / 82 degrees F
    SIB 0 Exhaust-B Temp Sensor    OK         28 degrees C / 82 degrees F
    SIB 0 Exhaust-C Temp Sensor    OK         23 degrees C / 73 degrees F
    SIB 0 PF0 Temp Sensor          OK         30 degrees C / 86 degrees F
    SIB 0 PF1 Temp Sensor          OK         30 degrees C / 86 degrees F
    SIB 0 PF2 Temp Sensor          OK         31 degrees C / 87 degrees F
    SIB 0 PF3 Temp Sensor          OK         32 degrees C / 89 degrees F
    SIB 0 PF4 Temp Sensor          OK         27 degrees C / 80 degrees F
    SIB 0 PF5 Temp Sensor          OK         26 degrees C / 78 degrees F
    SIB 1 Intake-A Temp Sensor     OK         22 degrees C / 71 degrees F
    SIB 1 Intake-B Temp Sensor     OK         22 degrees C / 71 degrees F
    SIB 1 Intake-C Temp Sensor     OK         16 degrees C / 60 degrees F
    SIB 1 Exhaust-A Temp Sensor    OK         29 degrees C / 84 degrees F
    SIB 1 Exhaust-B Temp Sensor    OK         31 degrees C / 87 degrees F
    SIB 1 Exhaust-C Temp Sensor    OK         23 degrees C / 73 degrees F
    SIB 1 PF0 Temp Sensor          OK         32 degrees C / 89 degrees F
    SIB 1 PF1 Temp Sensor          OK         31 degrees C / 87 degrees F
    SIB 1 PF2 Temp Sensor          OK         33 degrees C / 91 degrees F
    SIB 1 PF3 Temp Sensor          OK         38 degrees C / 100 degrees F
    SIB 1 PF4 Temp Sensor          OK         28 degrees C / 82 degrees F
    SIB 1 PF5 Temp Sensor          OK         26 degrees C / 78 degrees F
    SIB 2 Intake-A Temp Sensor     OK         24 degrees C / 75 degrees F
    SIB 2 Intake-B Temp Sensor     OK         21 degrees C / 69 degrees F
    SIB 2 Intake-C Temp Sensor     OK         16 degrees C / 60 degrees F
    SIB 2 Exhaust-A Temp Sensor    OK         28 degrees C / 82 degrees F
    SIB 2 Exhaust-B Temp Sensor    OK         32 degrees C / 89 degrees F
    SIB 2 Exhaust-C Temp Sensor    OK         23 degrees C / 73 degrees F
    SIB 2 PF0 Temp Sensor          OK         31 degrees C / 87 degrees F
    SIB 2 PF1 Temp Sensor          OK         30 degrees C / 86 degrees F
    SIB 2 PF2 Temp Sensor          OK         33 degrees C / 91 degrees F
    SIB 2 PF3 Temp Sensor          OK         41 degrees C / 105 degrees F
    SIB 2 PF4 Temp Sensor          OK         27 degrees C / 80 degrees F
    SIB 2 PF5 Temp Sensor          OK         26 degrees C / 78 degrees F
    SIB 3 Intake-A Temp Sensor     OK         22 degrees C / 71 degrees F
    SIB 3 Intake-B Temp Sensor     OK         23 degrees C / 73 degrees F
    SIB 3 Intake-C Temp Sensor     OK         16 degrees C / 60 degrees F
    SIB 3 Exhaust-A Temp Sensor    OK         29 degrees C / 84 degrees F
    SIB 3 Exhaust-B Temp Sensor    OK         31 degrees C / 87 degrees F
    SIB 3 Exhaust-C Temp Sensor    OK         24 degrees C / 75 degrees F
    SIB 3 PF0 Temp Sensor          OK         32 degrees C / 89 degrees F
    SIB 3 PF1 Temp Sensor          OK         30 degrees C / 86 degrees F
    SIB 3 PF2 Temp Sensor          OK         31 degrees C / 87 degrees F
    SIB 3 PF3 Temp Sensor          OK         39 degrees C / 102 degrees F
    SIB 3 PF4 Temp Sensor          OK         27 degrees C / 80 degrees F
    SIB 3 PF5 Temp Sensor          OK         26 degrees C / 78 degrees F
    SIB 4 Intake-A Temp Sensor     OK         22 degrees C / 71 degrees F
    SIB 4 Intake-B Temp Sensor     OK         25 degrees C / 77 degrees F
    SIB 4 Intake-C Temp Sensor     OK         16 degrees C / 60 degrees F
    SIB 4 Exhaust-A Temp Sensor    OK         29 degrees C / 84 degrees F
    SIB 4 Exhaust-B Temp Sensor    OK         32 degrees C / 89 degrees F
    SIB 4 Exhaust-C Temp Sensor    OK         23 degrees C / 73 degrees F
```

```
      SIB 4 PF0 Temp Sensor          OK         32 degrees C / 89 degrees F
      SIB 4 PF1 Temp Sensor          OK         31 degrees C / 87 degrees F
      SIB 4 PF2 Temp Sensor          OK         32 degrees C / 89 degrees F
      SIB 4 PF3 Temp Sensor          OK         40 degrees C / 104 degrees F
      SIB 4 PF4 Temp Sensor          OK         26 degrees C / 78 degrees F
      SIB 4 PF5 Temp Sensor          OK         25 degrees C / 77 degrees F
      SIB 5 Intake-A Temp Sensor     OK         21 degrees C / 69 degrees F
      SIB 5 Intake-B Temp Sensor     OK         20 degrees C / 68 degrees F
      SIB 5 Intake-C Temp Sensor     OK         16 degrees C / 60 degrees F
      SIB 5 Exhaust-A Temp Sensor    OK         27 degrees C / 80 degrees F
      SIB 5 Exhaust-B Temp Sensor    OK         27 degrees C / 80 degrees F
      SIB 5 Exhaust-C Temp Sensor    OK         23 degrees C / 73 degrees F
      SIB 5 PF0 Temp Sensor          OK         30 degrees C / 86 degrees F
      SIB 5 PF1 Temp Sensor          OK         29 degrees C / 84 degrees F
      SIB 5 PF2 Temp Sensor          OK         30 degrees C / 86 degrees F
      SIB 5 PF3 Temp Sensor          OK         32 degrees C / 89 degrees F
      SIB 5 PF4 Temp Sensor          OK         28 degrees C / 82 degrees F
      SIB 5 PF5 Temp Sensor          OK         27 degrees C / 80 degrees F
```

show chassis environment (ACX2000 Universal Metro Router)

`user@host>` **show chassis environment**

```
Class Item                           Status     Measurement
      PCB Left                       OK         44 degrees C / 111 degrees F
      SFP+ Xcvr                      OK         50 degrees C / 122 degrees F
      FEB                            OK         70 degrees C / 158 degrees F
      PCB Up                         OK         63 degrees C / 145 degrees F
      PCB Mid                        OK         66 degrees C / 150 degrees F
      Telecom Mod                    OK         65 degrees C / 149 degrees F
      Routing Engine                 OK         54 degrees C / 129 degrees F
      Heater off
```

show chassis environment (ACX4000 Universal Metro Router)

On the ACX4000 router, the MIC output of the **show chassis environment** command varies depending on the number of temperature channels present in the installed MIC.

`user@host>` **show chassis environment**

```
Class Item                           Status     Measurement
Temp  PEM 0                          OK         33 degrees C / 91 degrees F
      PEM 1                          Absent
      PCB Bottom                     OK         30 degrees C / 86 degrees F
      PCB Middle                     OK         34 degrees C / 93 degrees F
      BCM56445                       OK         33 degrees C / 91 degrees F
      SFP+ Xcvr                      OK         32 degrees C / 89 degrees F
      Fan tray inlet                 OK         39 degrees C / 102 degrees F
      Exhaust                        OK         30 degrees C / 86 degrees F
      Routing Engine                 OK         32 degrees C / 89 degrees F
      Heater off
Pic   PIC 0/0 Channel 0              OK         28 degrees C / 82 degrees F
      PIC 0/0 Channel 1              OK         29 degrees C / 84 degrees F
      PIC 0/0 Channel 2              OK         0 degrees C / 32 degrees F
      PIC 0/0 Channel 3              OK         0 degrees C / 32 degrees F
      PIC 0/0 Channel 4              OK         0 degrees C / 32 degrees F
      PIC 0/0 Channel 5              OK         0 degrees C / 32 degrees F
      PIC 0/0 Channel 6              OK         0 degrees C / 32 degrees F
```



```
      PIC 0/0 Channel 7              OK         0 degrees C / 32 degrees F
      PIC 0/0 Channel 8              OK         0 degrees C / 32 degrees F
      PIC 0/0 Channel 9              OK         0 degrees C / 32 degrees F
      PIC 1/0 Channel 0              OK         33 degrees C / 91 degrees F
      PIC 1/0 Channel 1              OK         31 degrees C / 87 degrees F
      PIC 1/0 Channel 2              OK         30 degrees C / 86 degrees F
      PIC 1/0 Channel 3              OK         0 degrees C / 32 degrees F
      PIC 1/0 Channel 4              OK         0 degrees C / 32 degrees F
      PIC 1/0 Channel 5              OK         0 degrees C / 32 degrees F
      PIC 1/0 Channel 6              OK         0 degrees C / 32 degrees F
      PIC 1/0 Channel 7              OK         0 degrees C / 32 degrees F
      PIC 1/0 Channel 8              OK         0 degrees C / 32 degrees F
      PIC 1/1 Channel 0              OK         31 degrees C / 87 degrees F
      PIC 1/1 Channel 1              OK         29 degrees C / 84 degrees F
      PIC 1/1 Channel 2              OK         28 degrees C / 82 degrees F
      PIC 1/1 Channel 3              OK         0 degrees C / 32 degrees F
      PIC 1/1 Channel 4              OK         0 degrees C / 32 degrees F
      PIC 1/1 Channel 5              OK         0 degrees C / 32 degrees F
      PIC 1/1 Channel 6              OK         0 degrees C / 32 degrees F
      PIC 1/1 Channel 7              OK         0 degrees C / 32 degrees F
      PIC 1/1 Channel 8              OK         0 degrees C / 32 degrees F
Fans  Fan 1                          OK         Spinning at normal speed
      Fan 2                          OK         Spinning at normal speed
```

show chassis environment (ACX5048 Router)

`user@host>` **show chassis environment**

```

Class Item                           Status     Measurement
Power FPC 0 Power Supply 0           Absent
      FPC 0 Power Supply 1           OK
Temp  FPC 0 Sensor TopMiddle E       OK         23 degrees C / 73 degrees F
      FPC 0 Sensor TopRight C        OK         18 degrees C / 64 degrees F
      FPC 0 Sensor TopLeft C         OK         21 degrees C / 69 degrees F
      FPC 0 Sensor TopRight E        OK         20 degrees C / 68 degrees F
      FPC 0 Sensor CPURight C        OK         23 degrees C / 73 degrees F
      FPC 0 Sensor CPULeft E         OK         22 degrees C / 71 degrees F
      FPC 0 Sensor CPU Die Temp      OK         39 degrees C / 102 degrees F
Fans  FPC 0 Fan Tray 0               OK         Spinning at normal speed
      FPC 0 Fan Tray 1               OK         Spinning at normal speed
      FPC 0 Fan Tray 2               OK         Spinning at normal speed
      FPC 0 Fan Tray 3               OK         Spinning at normal speed
      FPC 0 Fan Tray 4               OK         Spinning at normal speed
```

show chassis environment (ACX5096 Router)

`user@host>` **show chassis environment**

```

Class Item                           Status     Measurement
Power FPC 0 Power Supply 0           OK
      FPC 0 Power Supply 1           OK
Temp  FPC 0 Sensor TopMiddle E       OK         32 degrees C / 89 degrees F
      FPC 0 Sensor TopRight I        OK         29 degrees C / 84 degrees F
      FPC 0 Sensor TopLeft I         OK         23 degrees C / 73 degrees F
      FPC 0 Sensor TopRight E        OK         28 degrees C / 82 degrees F
      FPC 0 Sensor CPURight I        OK         30 degrees C / 86 degrees F
      FPC 0 Sensor CPULeft I         OK         29 degrees C / 84 degrees F
```



```
      FPC 0 Sensor Die Temp          OK         46 degrees C / 114 degrees F
      FPC 0 Mezz Temp                OK         23 degrees C / 73 degrees F
Fans  FPC 0 Fan Tray 0               OK         Spinning at normal speed
      FPC 0 Fan Tray 1               OK         Spinning at normal speed
      FPC 0 Fan Tray 2               OK         Spinning at normal speed
```

show chassis environment (ACX500 Router)

`user@host>` **show chassis environment**

```

Class Item                           Status     Measurement
      Power Mod                      OK         47 degrees C / 116 degrees F
      BCM54610                       OK         46 degrees C / 114 degrees F
      DPLL31404                      OK         45 degrees C / 113 degrees F
      CPLD                           OK         42 degrees C / 107 degrees F
      1588-FPGA                      OK         43 degrees C / 109 degrees F
      NPU                            OK         62 degrees C / 143 degrees F
      MAC sensor 1                   OK         40 degrees C / 104 degrees F
      MAC sensor 2                   OK         38 degrees C / 100 degrees F
      SFP PHY                        OK         38 degrees C / 100 degrees F
      Combo/RJ45 PHY                 OK         37 degrees C / 98 degrees F
      SFP sensor 1                   OK         35 degrees C / 95 degrees F
      SFP sensor 2                   OK         33 degrees C / 91 degrees F
      SFP sensor 3                   OK         32 degrees C / 89 degrees F
      Routing Engine                 OK         54 degrees C / 129 degrees F
      Heater off
```


show chassis environment fpc

List of Syntax

Syntax on page 307
Syntax (TX Matrix and TX Matrix Plus Routers) on page 307
Syntax (MX Series Routers) on page 307
Syntax (MX2010, MX10003, MX204, MX2008, and MX10008 Universal Routing Platforms) on page 307
Syntax (MX2020 Universal Routing Platforms) on page 307
Syntax (QFX Series) on page 307
Syntax (OCX Series) on page 307
Syntax (PTX3000 Series) on page 308
Syntax (PTX10008 Series) on page 308
Syntax (Junos OS Evolved) on page 308

Syntax

```
show chassis environment fpc
<slot>
```

Syntax (TX Matrix and TX Matrix Plus Routers)

```
show chassis environment fpc
<lcc number>
<slot>
```

Syntax (MX Series Routers)

```
show chassis environment fpc
<slot>
<all-members>
<local>
<member member-id>
```

Syntax (MX2010, MX10003, MX204, MX2008, and MX10008 Universal Routing Platforms)

```
show chassis environment fpc
<slot>
```

Syntax (MX2020 Universal Routing Platforms)

```
show chassis environment fpc
<slot>
<satellite [fpc-slot slot-id |device-alias alias-name]
```

Syntax (QFX Series)

```
show chassis environment fpc
<fpc-slot>
interconnect-device name
```

Syntax (OCX Series)

```
show chassis environment fpc
<fpc-slot>
```


Syntax (PTX3000 Series)

```
show chassis environment fpc
<fpc-slot>
```

Syntax (PTX10008 Series)

```
show chassis environment fpc
<fpc-slot>
```

Syntax (Junos OS Evolved)

```
show chassis environment fpc
<fpc-slot>
```

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 11.1 for QFX Series.
Command introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers.
Command introduced in Junos OS Release 12.1 for T4000 Core Routers.
Command introduced in Junos OS Release 12.3 for MX 2010 and MX2020 Universal Routing Platforms.
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
satellite option introduced in Junos OS Release 14.2R3.
Command introduced in Junos OS Release 17.2 for MX2008 Universal Routing Platforms.
Command introduced in Junos OS Release 17.2 for PTX10008 Routers.
Command introduced in Junos OS Release 17.3 for MX10003 Universal Routing Platforms.
Command introduced in Junos OS Release 17.4 for MX204 Universal Routing Platforms.
Command introduced in Junos OS Release 18.1R1 for EX9251 switches.
Command introduced in Junos OS Release 18.2 for EX9253 Switches.
Command introduced in Junos OS Release 18.2R1 for MX10008 Universal Routing Platforms.

Description

(M40e, M120, M160, M320, MX Series, T Series routers, EX Series, QFX Series, and PTX Series routers only) Display environmental information about Flexible PIC Concentrators (FPCs).

Options

none—Display environmental information about all FPCs. On a TX Matrix router, display environmental information about all FPCs on the TX Matrix router and its attached T640 routers. On a TX Matrix Plus router, display environmental information about all FPCs on the TX Matrix Plus router and its attached routers.

all-members—(MX Series routers only) (Optional) Display environmental information for the FPCs in all the members of the Virtual Chassis configuration.

interconnect-device *name*—(QFabric systems only) (Optional) Display chassis environmental information for the Interconnect device.

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.

local—(MX Series routers only) (Optional) Display environmental information for the FPCs in the local Virtual Chassis member.

member *member-id*—(MX Series routers only) (Optional) Display environmental information for the FPCs in the specified member of the Virtual Chassis configuration. Replace ***member-id*** with a value of 0 or 1.

satellite [fpc-slot *slot-id* | device-alias *alias-name*]—(Junos Fusion only)(Optional) Display environmental information for the FPCs in the specified satellite device in a Junos Fusion, or for all satellite devices in the Junos Fusion if no satellite devices are specified.

slot **or** ***fpc-slot***—(Optional) Display environmental information about an individual FPC:

- (TX Matrix and TX Matrix Plus routers only) On a TX Matrix router, if you specify the number of the T640 router by using only the **lcc *number*** option (the recommended method), replace ***slot*** with a value from **0** through **7**. Similarly, on a TX Matrix Plus router, if you specify the number of the router by using only the **lcc *number*** option (the recommended method), replace ***slot*** with a value from **0** through **7**. Otherwise, replace ***slot*** with a value from **0** through **31**. For example, the following commands have the same result:

  ```
  user@host> show chassis environment fpc 1 lcc 1
  user@host> show chassis environment fpc 9
  ```

- M120 router—Replace ***slot*** with a value from **0** through **5.**
- MX240 router—Replace ***slot*** with a value from **0** through **2**.
- MX480 router—Replace ***slot*** with a value from **0** through **5**.
- MX960 router—Replace ***slot*** with a value from **0** through **11**.
- MX2010 router—Replace ***slot*** with a value from **0** through **9**.
- MX2020 router—Replace ***slot*** with a value from **0** through **19**.
- MX2008 router—Replace ***slot*** with a value from **0** through **9**.
- Other routers—Replace ***slot*** with a value from **0** through **7**.

- EX Series switches:
  - EX3200 switches and EX4200 standalone switches—Replace ***slot*** with 0.
  - EX4200 switches in a Virtual Chassis configuration—Replace ***slot*** with a value from 0 through 9 (switch's member ID).
  - EX6210 switches–Replace ***slot*** with a value from 0 through 3 (line card only), 4 or 5 (line card or Switch Fabric and Rotuing Engine (SRE) module), or 6 through 9 (line card only).
  - EX8208 switches—Replace ***slot*** with a value from 0 through 7 (line card).
  - EX8216 switches—Replace ***slot*** with a value from 0 through 15 (line card).
- QFX3500 switches —Replace ***fpc-slot*** with 0 through 15.
- PTX5000 Packet Transport Router—Replace ***fpc-slot*** with 0 through 7.
- PTX3000 Packet Transport Router—Replace ***fpc-slot*** with 0 through 15.

Required Privilege Level

view

Related Documentation

- *request chassis fpc*
- *show chassis fpc*
- *show chassis fpc-feb-connectivity*
- *Resynchronizing FPC Sequence Numbers with Active FPCs when an FPC Comes Online*
- *MX960 Flexible PIC Concentrator Description*

List of Sample Output

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show chassis environment fpc lcc (TX Matrix Router) on page 348
show chassis environment fpc lcc (TX Matrix Plus Router) on page 348
show chassis environment fpc (QFX Series and OCX Series) on page 349
show chassis environment fpc interconnect-device (QFabric Systems) on page 349
show chassis environment fpc 5(PTX3000 Packet Transport Router) on page 350
show chassis environment fpc 0 (PTX5000 Packet Transport Router) on page 350
show chassis environment fpc 07 (PTX5000 Packet Transport Router with FPC2-PTX-P1A) on page 351
show chassis environment fpc (PTX10008 router) on page 352
show chassis environment fpc (PTX10016 router) on page 356
show chassis environment FPC 1 (MX Routers with Media Services Blade [MSB]) on page 359
show chassis environment FPC (Junos OS Evolved) on page 359

Output Fields

Table 17 on page 311 lists the output fields for the **show chassis environment fpc** command. Output fields are listed in the approximate order in which they appear.

Table 17: show chassis environment fpc Output Fields

Field Name	Field Description
State	Status of the FPC: • **Unknown**—FPC is not detected by the router. • **Empty**—No FPC is present. • **Present**—FPC is detected by the chassis daemon but is either not supported by the current version of the Junos OS, or the FPC is coming up but not yet online. • **Ready**—FPC is in intermediate or transition state. • **Announce online**—Intermediate state during which the FPC is coming up but not yet online, and the chassis manager acknowledges the chassisd FPC online initiative. • **Online**—FPC is online and running. • **Offline**—FPC is powered down. • **Diagnostics**—FPC is set to operate in diagnostics mode.
Temperature	(M40e and M160 routers and QFX Series only) Temperature of the air flowing past the FPC.
PMB Temperature	(PTX Series only) Temperature of the air flowing past the PMB (bottom of the FPC). The PTX5000 Packet Transport Router with FPC2-PTX-P1A include multiple temperatures for PMB (**TEMP0** and **TEMP1**).
PMB CPU Temperature	(PTX5000 Packet Transport Router with FPC2-PTX-P1A only) Temperature of the air flowing past the PMB CPU.
Temperature Intake	(M320 routers, MX2010 routers, MX2020 routers, MX2008 routers, and PTX Series only) Temperature of the air flowing into the chassis.
Temperature Top	(T Series routers only) Temperature of the air flowing past the top of the FPC.

Table 17: show chassis environment fpc Output Fields (continued)

Field Name	Field Description
Temperature Exhaust	(M120 and M320 routers, MX2010 routers, MX2020 routers, MX2008 routers, and PTX Series only) Temperature of the air flowing out of the chassis. The PTX Series Packet Transport Routers, and the MX2010, MX2020, and MX2008 routers include exhaust temperatures for multiple zones (**Exhaust A** and **Exhaust B**).
Temperature Bottom	(T Series routers only) Temperature of the air flowing past the bottom of the FPC.
TL *n* Temperature	(PTX Series only) Temperature of the air flowing past the specified TL area of the packet forwarding engine (PFE) on the FPC.
TQ *n* Temperature	(PTX Series only) Temperature of the air flowing past the specified TQ area of the packet forwarding engine (PFE) on the FPC.
Temperature MMBO	(T640 router only) Temperature of the air flowing past the type 3 FPC.
Temperature MMB1	(M320 and T Series routers only) Temperature of the air flowing past the type 1, type 2, and type 3 FPC.
Power	Information about the voltage supplied to the FPC. The left column displays the required power, in volts. The right column displays the measured power, in millivolts.
CMB Revision or **BUS revision**	Revision level of the chassis management bus device (M Series router) or bus (T Series routers).

Sample Output

show chassis environment fpc (M120 Router)

user@host> **show chassis environment fpc**

```
FPC 2 status:
  State                       Online
  Temperature Exhaust A       32 degrees C / 89 degrees F
  Temperature Exhaust B       31 degrees C / 87 degrees F
  Power A-Board
    1.2 V                      1202 mV
    1.5 V                      1508 mV
    1.8 V                      1798 mV
    2.5 V                      2507 mV
    3.3 V                      3351 mV
    5.0 V                      4995 mV
    3.3 V bias                 3296 mV
    1.2 V Rocket IO            1205 mV
    1.5 V Rocket IO            1501 mV
  I2C Slave Revision          12
FPC 3 status:
  State                       Online
  Temperature Exhaust A       31 degrees C / 87 degrees F
  Temperature Exhaust B       33 degrees C / 91 degrees F
  Power A-Board
    1.2 V                      1211 mV
```



```
    1.5 V                       1501 mV
    1.8 V                       1798 mV
    2.5 V                       2471 mV
    3.3 V                       3293 mV
    5.0 V                       4930 mV
    3.3 V bias                  3296 mV
    1.2 V Rocket IO             1205 mV
    1.5 V Rocket IO             1501 mV
  Power B-Board
    1.2 V                       1214 mV
    1.5 V                       1501 mV
    2.5 V                       2471 mV
    3.3 V                       3300 mV
    5.0 V                       4943 mV
    3.3 V bias                  3296 mV
    1.2 V Rocket IO             1205 mV
    1.5 V Rocket IO             1501 mV
  I2C Slave Revision           12
FPC 4 status:
  State                        Online
  Temperature Exhaust A        32 degrees C / 89 degrees F
  Temperature Exhaust B        30 degrees C / 86 degrees F
  Power A-Board
    1.2 V                       1195 mV
    1.5 V                       1504 mV
    1.8 V                       1801 mV
    2.5 V                       2504 mV
    3.3 V                       3293 mV
    5.0 V                       4917 mV
    3.3 V bias                  3296 mV
    1.2 V Rocket IO             1202 mV
    1.5 V Rocket IO             1492 mV
  I2C Slave Revision           12
```

show chassis environment fpc (M160 Router)

user@host> **show chassis environment fpc**

```
FPC 0 status:
  State                         Online
  Temperature                 42 degrees C / 107 degrees F
  Power:
    1.5 V                  1500 mV
    2.5 V                  2509 mV
    3.3 V                  3308 mV
    5.0 V                  4991 mV
    5.0 V bias             4952 mV
    8.0 V bias             8307 mV
  CMB Revision                12
FPC 1 status:
  State                         Online
  Temperature                 45 degrees C / 113 degrees F
  Power:
    1.5 V                  1498 mV
    2.5 V                  2501 mV
    3.3 V                  3319 mV
    5.0 V                  5020 mV
    5.0 V bias             5025 mV
    8.0 V bias             8307 mV
  CMB Revision                12
```

show chassis environment fpc (M320 Router)

user@host> **show chassis environment fpc**

```
FPC 0 status:
  State                           Online
  Temperature Intake           27 degrees C / 80 degrees F
  Temperature Exhaust          38 degrees C / 100 degrees F
  Temperature MMB1             31 degrees C / 87 degrees F
  Power:
    1.5 V                    1487 mV
    1.5 V *                  1494 mV
    1.8 V                    1821 mV
    2.5 V                    2533 mV
    3.3 V                    3323 mV
    5.0 V                    5028 mV
    3.3 V bias               3296 mV
    5.0 V bias               4984 mV
  CMB Revision                 16
FPC 1 status:
  State                           Online
  Temperature Intake           27 degrees C / 80 degrees F
  Temperature Exhaust          37 degrees C / 98 degrees F
  Temperature MMB1             32 degrees C / 89 degrees F
  Power:
    1.5 V                    1504 mV
    1.5 V *                  1499 mV
    1.8 V                    1820 mV
    2.5 V                    2529 mV
    3.3 V                    3328 mV
    5.0 V                    5013 mV
    3.3 V bias               3294 mV
    5.0 V bias               4984 mV
  CMB Revision                 16
FPC 2 status:
  State                           Online
  Temperature Intake           28 degrees C / 82 degrees F
  Temperature Exhaust          38 degrees C / 100 degrees F
  Temperature MMB1             32 degrees C / 89 degrees F
  Power:
    1.5 V                    1498 mV
    1.5 V *                  1487 mV
    1.8 V                    1816 mV
    2.5 V                    2531 mV
    3.3 V                    3324 mV
    5.0 V                    5025 mV
    3.3 V bias               3277 mV
    5.0 V bias               5013 mV
  CMB Revision                 17
FPC 3 status:
...
```

show chassis environment fpc (MX2020 Router)

user@host> **show chassis environment fpc**

```
FPC 0 status:
  State                      Online
  Temperature Intake         41 degrees C / 105 degrees F
  Temperature Exhaust A      48 degrees C / 118 degrees F
```



```
  Temperature Exhaust B      60 degrees C / 140 degrees F
  Temperature LU 0 TSen      56 degrees C / 132 degrees F
  Temperature LU 0 Chip      59 degrees C / 138 degrees F
  Temperature LU 1 TSen      56 degrees C / 132 degrees F
  Temperature LU 1 Chip      61 degrees C / 141 degrees F
  Temperature LU 2 TSen      56 degrees C / 132 degrees F
  Temperature LU 2 Chip      52 degrees C / 125 degrees F
  Temperature LU 3 TSen      56 degrees C / 132 degrees F
  Temperature LU 3 Chip      52 degrees C / 125 degrees F
  Temperature MQ 0 TSen      49 degrees C / 120 degrees F
  Temperature MQ 0 Chip      49 degrees C / 120 degrees F
  Temperature MQ 1 TSen      49 degrees C / 120 degrees F
  Temperature MQ 1 Chip      52 degrees C / 125 degrees F
  Temperature MQ 2 TSen      49 degrees C / 120 degrees F
  Temperature MQ 2 Chip      45 degrees C / 113 degrees F
  Temperature MQ 3 TSen      49 degrees C / 120 degrees F
  Temperature MQ 3 Chip      46 degrees C / 114 degrees F
  Power
    AS-BIAS3V3-zl2105         3299 mV
    AS-VDD1V8-zl2006          1807 mV
    AS-VDD2V5-zl2006          2512 mV
    AS-AVDD1V0-zl2004          997 mV
    AS-PCIE_1V0-zl2004         996 mV
    AS-VDD3V3-zl2004          3294 mV
    AS-VDD_1V5A-zl2004        1501 mV
    AS-VDD_1V5B-zl2004        1498 mV
    AS-LU0_1V0-zl2004          998 mV
    AS-LU1_1V0-zl2004         1002 mV
    AS-MQ0_1V0-zl2004          999 mV
    AS-MQ1_1V0-zl2004          994 mV
    AS-LU2_1V0-zl2004         1000 mV
    AS-LU3_1V0-zl2004          998 mV
    AS-MQ2_1V0-zl2004         1002 mV
    AS-MQ3_1V0-zl2004          999 mV
    AS-PMB_1V1-zl2006         1096 mV
  I2C Slave Revision         68
FPC 1 status:
  State                      Online
  Temperature Intake         39 degrees C / 102 degrees F
  Temperature Exhaust A      48 degrees C / 118 degrees F
  Temperature Exhaust B      55 degrees C / 131 degrees F
  Temperature LU 0 TSen      52 degrees C / 125 degrees F
  Temperature LU 0 Chip      54 degrees C / 129 degrees F
  Temperature LU 1 TSen      52 degrees C / 125 degrees F
  Temperature LU 1 Chip      56 degrees C / 132 degrees F
  Temperature LU 2 TSen      52 degrees C / 125 degrees F
  Temperature LU 2 Chip      49 degrees C / 120 degrees F
  Temperature LU 3 TSen      52 degrees C / 125 degrees F
  Temperature LU 3 Chip      50 degrees C / 122 degrees F
  Temperature MQ 0 TSen      48 degrees C / 118 degrees F
  Temperature MQ 0 Chip      48 degrees C / 118 degrees F
  Temperature MQ 1 TSen      48 degrees C / 118 degrees F
  Temperature MQ 1 Chip      51 degrees C / 123 degrees F
  Temperature MQ 2 TSen      48 degrees C / 118 degrees F
  Temperature MQ 2 Chip      45 degrees C / 113 degrees F
  Temperature MQ 3 TSen      48 degrees C / 118 degrees F
  Temperature MQ 3 Chip      45 degrees C / 113 degrees F
  Power
    AS-BIAS3V3-zl2105         3291 mV
    AS-VDD1V8-zl2006          1786 mV
```

```
    AS-VDD2V5-zl2006          2496 mV
    AS-AVDD1V0-zl2004         1000 mV
    AS-PCIE_1V0-zl2004        1000 mV
    AS-VDD3V3-zl2004          3294 mV
    AS-VDD_1V5A-zl2004        1500 mV
    AS-VDD_1V5B-zl2004        1498 mV
    AS-LU0_1V0-zl2004         1003 mV
    AS-LU1_1V0-zl2004         1000 mV
    AS-MQ0_1V0-zl2004         1000 mV
    AS-MQ1_1V0-zl2004          995 mV
    AS-LU2_1V0-zl2004         1002 mV
    AS-LU3_1V0-zl2004          997 mV
    AS-MQ2_1V0-zl2004         1000 mV
    AS-MQ3_1V0-zl2004          998 mV
    AS-PMB_1V1-zl2006         1096 mV
  I2C Slave Revision         68
FPC 2 status:
  State                      Online
  Temperature Intake         39 degrees C / 102 degrees F
  Temperature Exhaust A      48 degrees C / 118 degrees F
  Temperature Exhaust B      58 degrees C / 136 degrees F
  Temperature LU 0 TSen      55 degrees C / 131 degrees F
  Temperature LU 0 Chip      57 degrees C / 134 degrees F
  Temperature LU 1 TSen      55 degrees C / 131 degrees F
  Temperature LU 1 Chip      63 degrees C / 145 degrees F
  Temperature LU 2 TSen      55 degrees C / 131 degrees F
  Temperature LU 2 Chip      51 degrees C / 123 degrees F
  Temperature LU 3 TSen      55 degrees C / 131 degrees F
  Temperature LU 3 Chip      52 degrees C / 125 degrees F
  Temperature MQ 0 TSen      48 degrees C / 118 degrees F
  Temperature MQ 0 Chip      50 degrees C / 122 degrees F
  Temperature MQ 1 TSen      48 degrees C / 118 degrees F
  Temperature MQ 1 Chip      52 degrees C / 125 degrees F
  Temperature MQ 2 TSen      48 degrees C / 118 degrees F
  Temperature MQ 2 Chip      47 degrees C / 116 degrees F
  Temperature MQ 3 TSen      48 degrees C / 118 degrees F
  Temperature MQ 3 Chip      47 degrees C / 116 degrees F
  Power
    AS-BIAS3V3-zl2105         3299 mV
    AS-VDD1V8-zl2006          1805 mV
    AS-VDD2V5-zl2006          2510 mV
    AS-AVDD1V0-zl2004          999 mV
    AS-PCIE_1V0-zl2004         998 mV
    AS-VDD3V3-zl2004          3296 mV
    AS-VDD_1V5A-zl2004        1492 mV
    AS-VDD_1V5B-zl2004        1497 mV
    AS-LU0_1V0-zl2004          997 mV
    AS-LU1_1V0-zl2004         1000 mV
    AS-MQ0_1V0-zl2004          998 mV
    AS-MQ1_1V0-zl2004         1001 mV
    AS-LU2_1V0-zl2004          996 mV
    AS-LU3_1V0-zl2004          995 mV
    AS-MQ2_1V0-zl2004          998 mV
    AS-MQ3_1V0-zl2004          997 mV
    AS-PMB_1V1-zl2006         1100 mV
  I2C Slave Revision         68
FPC 3 status:
  State                      Online
  Temperature Intake         41 degrees C / 105 degrees F
  Temperature Exhaust A      48 degrees C / 118 degrees F
```



```
  Temperature Exhaust B      58 degrees C / 136 degrees F
  Temperature LU 0 TSen      56 degrees C / 132 degrees F
  Temperature LU 0 Chip      59 degrees C / 138 degrees F
  Temperature LU 1 TSen      56 degrees C / 132 degrees F
  Temperature LU 1 Chip      61 degrees C / 141 degrees F
  Temperature LU 2 TSen      56 degrees C / 132 degrees F
  Temperature LU 2 Chip      51 degrees C / 123 degrees F
  Temperature LU 3 TSen      56 degrees C / 132 degrees F
  Temperature LU 3 Chip      53 degrees C / 127 degrees F
  Temperature MQ 0 TSen      50 degrees C / 122 degrees F
  Temperature MQ 0 Chip      51 degrees C / 123 degrees F
  Temperature MQ 1 TSen      50 degrees C / 122 degrees F
  Temperature MQ 1 Chip      55 degrees C / 131 degrees F
  Temperature MQ 2 TSen      50 degrees C / 122 degrees F
  Temperature MQ 2 Chip      47 degrees C / 116 degrees F
  Temperature MQ 3 TSen      50 degrees C / 122 degrees F
  Temperature MQ 3 Chip      50 degrees C / 122 degrees F
  Power
    AS-BIAS3V3-zl2105         3305 mV
    AS-VDD1V8-zl2006          1810 mV
    AS-VDD2V5-zl2006          2508 mV
    AS-AVDD1V0-zl2004          999 mV
    AS-PCIE_1V0-zl2004        1001 mV
    AS-VDD3V3-zl2004          3294 mV
    AS-VDD_1V5A-zl2004        1500 mV
    AS-VDD_1V5B-zl2004        1498 mV
    AS-LU0_1V0-zl2004          998 mV
    AS-LU1_1V0-zl2004          998 mV
    AS-MQ0_1V0-zl2004          999 mV
    AS-MQ1_1V0-zl2004          998 mV
    AS-LU2_1V0-zl2004         1000 mV
    AS-LU3_1V0-zl2004         1001 mV
    AS-MQ2_1V0-zl2004          996 mV
    AS-MQ3_1V0-zl2004          998 mV
    AS-PMB_1V1-zl2006         1098 mV
  I2C Slave Revision         68
FPC 4 status:
...
```

show chassis environment fpc (MX2010 Router)

`user@host>` **show chassis environment fpc**

```
FPC 0 status:
  State                      Online
  Temperature Intake         36 degrees C / 96 degrees F
  Temperature Exhaust A      42 degrees C / 107 degrees F
  Temperature Exhaust B      51 degrees C / 123 degrees F
  Temperature LU 0 TSen      49 degrees C / 120 degrees F
  Temperature LU 0 Chip      50 degrees C / 122 degrees F
  Temperature LU 1 TSen      49 degrees C / 120 degrees F
  Temperature LU 1 Chip      54 degrees C / 129 degrees F
  Temperature LU 2 TSen      49 degrees C / 120 degrees F
  Temperature LU 2 Chip      45 degrees C / 113 degrees F
  Temperature LU 3 TSen      49 degrees C / 120 degrees F
  Temperature LU 3 Chip      46 degrees C / 114 degrees F
  Temperature MQ 0 TSen      40 degrees C / 104 degrees F
  Temperature MQ 0 Chip      41 degrees C / 105 degrees F
  Temperature MQ 1 TSen      40 degrees C / 104 degrees F
  Temperature MQ 1 Chip      44 degrees C / 111 degrees F
```



```
  Temperature MQ 2 TSen      40 degrees C / 104 degrees F
  Temperature MQ 2 Chip      38 degrees C / 100 degrees F
  Temperature MQ 3 TSen      40 degrees C / 104 degrees F
  Temperature MQ 3 Chip      41 degrees C / 105 degrees F
  Power
    AS-BIAS3V3-zl2105         3300 mV
    AS-VDD1V8-zl2006          1805 mV
    AS-VDD2V5-zl2006          2505 mV
    AS-AVDD1V0-zl2004          998 mV
    AS-PCIE_1V0-zl2004         999 mV
    AS-VDD3V3-zl2004          3303 mV
    AS-VDD_1V5A-zl2004        1497 mV
    AS-VDD_1V5B-zl2004        1497 mV
    AS-LU0_1V0-zl2004          998 mV
    AS-LU1_1V0-zl2004         1003 mV
    AS-MQ0_1V0-zl2004          998 mV
    AS-MQ1_1V0-zl2004          998 mV
    AS-LU2_1V0-zl2004          997 mV
    AS-LU3_1V0-zl2004         1001 mV
    AS-MQ2_1V0-zl2004          996 mV
    AS-MQ3_1V0-zl2004          994 mV
    AS-PMB_1V1-zl2006         1097 mV
  I2C Slave Revision         68
FPC 1 status:
  State                      Online
  Temperature Intake         34 degrees C / 93 degrees F
  Temperature Exhaust A      46 degrees C / 114 degrees F
  Temperature Exhaust B      54 degrees C / 129 degrees F
  Temperature LU 0 TSen      45 degrees C / 113 degrees F
  Temperature LU 0 Chip      55 degrees C / 131 degrees F
  Temperature LU 1 TSen      45 degrees C / 113 degrees F
  Temperature LU 1 Chip      44 degrees C / 111 degrees F
  Temperature LU 2 TSen      45 degrees C / 113 degrees F
  Temperature LU 2 Chip      50 degrees C / 122 degrees F
  Temperature LU 3 TSen      45 degrees C / 113 degrees F
  Temperature LU 3 Chip      58 degrees C / 136 degrees F
  Temperature XM 0 TSen      45 degrees C / 113 degrees F
  Temperature XM 0 Chip      51 degrees C / 123 degrees F
  Temperature XF 0 TSen      45 degrees C / 113 degrees F
  Temperature XF 0 Chip      63 degrees C / 145 degrees F
  Temperature PLX Switch TSen45 degrees C / 113 degrees F
  Temperature PLX Switch Chip47 degrees C / 116 degrees F
  Power
    MPC-BIAS3V3-zl2105        3300 mV
    MPC-VDD3V3-zl6100         3294 mV
    MPC-VDD2V5-zl6100         2505 mV
    MPC-VDD1V8-zl2004         1796 mV
    MPC-AVDD1V0-zl2004         991 mV
    MPC-VDD1V2-zl6100         1196 mV
    MPC-VDD1V5A-zl2004        1491 mV
    MPC-VDD1V5B-zl2004        1492 mV
    MPC-XF_0V9-zl2004          996 mV
    MPC-PCIE_1V0-zl6100       1003 mV
    MPC-LU0_1V0-zl2004         996 mV
    MPC-LU1_1V0-zl2004         996 mV
    MPC-LU2_1V0-zl2004         998 mV
    MPC-LU3_1V0-zl2004         994 mV
    MPC-12VA-BMR453          12031 mV
    MPC-12VB-BMR453          12003 mV
    MPC-PMB_1V1-zl2006        1104 mV
```



```
    MPC-PMB_1V2-zl2106        1194 mV
    MPC-XM_0V9-vt273m          911 mV
  I2C Slave Revision         110
FPC 8 status:
  State                      Online
  Temperature Intake         32 degrees C / 89 degrees F
  Temperature Exhaust A      44 degrees C / 111 degrees F
  Temperature Exhaust B      37 degrees C / 98 degrees F
  Temperature LU 0 TCAM TSen 41 degrees C / 105 degrees F
  Temperature LU 0 TCAM Chip 49 degrees C / 120 degrees F
  Temperature LU 0 TSen      41 degrees C / 105 degrees F
  Temperature LU 0 Chip      52 degrees C / 125 degrees F
  Temperature MQ 0 TSen      41 degrees C / 105 degrees F
  Temperature MQ 0 Chip      47 degrees C / 116 degrees F
  Temperature LU 1 TCAM TSen 39 degrees C / 102 degrees F
  Temperature LU 1 TCAM Chip 42 degrees C / 107 degrees F
  Temperature LU 1 TSen      39 degrees C / 102 degrees F
  Temperature LU 1 Chip      46 degrees C / 114 degrees F
  Temperature MQ 1 TSen      39 degrees C / 102 degrees F
  Temperature MQ 1 Chip      45 degrees C / 113 degrees F
  Power
    MPC-BIAS3V3-zl2105        3296 mV
    MPC-VDD3V3-zl2006         3298 mV
    MPC-VDD2V5-zl2006         2505 mV
    MPC-TCAM_1V0-zl2004        997 mV
    MPC-AVDD1V0-zl2006        1007 mV
    MPC-VDD1V8-zl2006         1803 mV
    MPC-PCIE_1V0-zl2006       1004 mV
    MPC-LU0_1V0-zl2004        1000 mV
    MPC-MQ0_1V0-zl2004         999 mV
    MPC-VDD_1V5-zl2004        1498 mV
    MPC-PMB_1V1-zl2006        1102 mV
    MPC-9VA-BMR453            9009 mV
    MPC-9VB-BMR453            8960 mV
    MPC-PMB_1V2-zl2105        1202 mV
    MPC-LU1_1V0-zl2004        1005 mV
    MPC-MQ1_1V0-zl2004        1000 mV
  I2C Slave Revision         70
FPC 9 status:
  State                      Online
  Temperature Intake         34 degrees C / 93 degrees F
  Temperature Exhaust A      41 degrees C / 105 degrees F
  Temperature Exhaust B      54 degrees C / 129 degrees F
  Temperature LU 0 TSen      51 degrees C / 123 degrees F
  Temperature LU 0 Chip      52 degrees C / 125 degrees F
  Temperature LU 1 TSen      51 degrees C / 123 degrees F
  Temperature LU 1 Chip      55 degrees C / 131 degrees F
  Temperature LU 2 TSen      51 degrees C / 123 degrees F
  Temperature LU 2 Chip      47 degrees C / 116 degrees F
  Temperature LU 3 TSen      51 degrees C / 123 degrees F
  Temperature LU 3 Chip      47 degrees C / 116 degrees F
  Temperature MQ 0 TSen      40 degrees C / 104 degrees F
  Temperature MQ 0 Chip      42 degrees C / 107 degrees F
  Temperature MQ 1 TSen      40 degrees C / 104 degrees F
  Temperature MQ 1 Chip      44 degrees C / 111 degrees F
  Temperature MQ 2 TSen      40 degrees C / 104 degrees F
  Temperature MQ 2 Chip      38 degrees C / 100 degrees F
  Temperature MQ 3 TSen      40 degrees C / 104 degrees F
  Temperature MQ 3 Chip      40 degrees C / 104 degrees F
  Power
```

```
    AS-BIAS3V3-zl2105         3302 mV
    AS-VDD1V8-zl2006          1808 mV
    AS-VDD2V5-zl2006          2513 mV
    AS-AVDD1V0-zl2004          997 mV
    AS-PCIE_1V0-zl2004         999 mV
    AS-VDD3V3-zl2004          3294 mV
    AS-VDD_1V5A-zl2004        1503 mV
    AS-VDD_1V5B-zl2004        1502 mV
    AS-LU0_1V0-zl2004          996 mV
    AS-LU1_1V0-zl2004          999 mV
    AS-MQ0_1V0-zl2004          997 mV
    AS-MQ1_1V0-zl2004          999 mV
    AS-LU2_1V0-zl2004          997 mV
    AS-LU3_1V0-zl2004          998 mV
    AS-MQ2_1V0-zl2004         1000 mV
    AS-MQ3_1V0-zl2004         1000 mV
    AS-PMB_1V1-zl2006         1102 mV
  I2C Slave Revision         68
```

show chassis environment fpc (MX2008 Router)

user@host> **show chassis environment fpc**

```
FPC 0 status:
  State                      Online
  Temperature Intake         29 degrees C / 84 degrees F
  Temperature Exhaust A      43 degrees C / 109 degrees F
  Temperature Exhaust B      42 degrees C / 107 degrees F
  Temperature XL 0 TSen      38 degrees C / 100 degrees F
  Temperature XL 0 Chip      53 degrees C / 127 degrees F
  Temperature XL 0 XR2 0 TSen38 degrees C / 100 degrees F
  Temperature XL 0 XR2 0 Chip60 degrees C / 140 degrees F
  Temperature XL 0 XR2 1 TSen38 degrees C / 100 degrees F
  Temperature XL 0 XR2 1 Chip60 degrees C / 140 degrees F
  Temperature XL 1 TSen      30 degrees C / 86 degrees F
  Temperature XL 1 Chip      43 degrees C / 109 degrees F
  Temperature XL 1 XR2 0 TSen30 degrees C / 86 degrees F
  Temperature XL 1 XR2 0 Chip50 degrees C / 122 degrees F
  Temperature XL 1 XR2 1 TSen30 degrees C / 86 degrees F
  Temperature XL 1 XR2 1 Chip50 degrees C / 122 degrees F
  Temperature XM 0 TSen      42 degrees C / 107 degrees F
  Temperature XM 0 Chip      49 degrees C / 120 degrees F
  Temperature XM 1 TSen      42 degrees C / 107 degrees F
  Temperature XM 1 Chip      42 degrees C / 107 degrees F
  Temperature XM 2 TSen      42 degrees C / 107 degrees F
  Temperature XM 2 Chip      42 degrees C / 107 degrees F
  Temperature XM 3 TSen      42 degrees C / 107 degrees F
  Temperature XM 3 Chip      40 degrees C / 104 degrees F
  Temperature PCIe Switch TSen42 degrees C / 107 degrees F
  Temperature PCIe Switch Chip22 degrees C / 71 degrees F
  Power
    MPC-VDD_3V3-vt273m          3304 mV
    MPC-VDD_2V5-vt273m          2503 mV
    MPC-VDD_1V5-vt273m          1499 mV
    MPC-PCIE_0V9-vt273m          900 mV
    MPC-VDD_1V8-vt273m          1799 mV
    MPC-VDD_1V2-vt273m          1203 mV
    MPC-XM01_AVDD_1V0-vt273     1001 mV
    MPC-XM23_AVDD_1V0-vt273     1001 mV
    MPC-XM0_0V9-vt273m           900 mV
```



```
    MPC-XM1_0V9-vt273m           901 mV
    MPC-XM2_0V9-vt273m           903 mV
    MPC-XM3_0V9-vt273m           899 mV
    MPC-XL0_XR0_0V9-vt273m       899 mV
    MPC-XL0_XR1_0V9-vt273m       903 mV
    MPC-XL0_0V9-vt273m           899 mV
    MPC-XL0_AVDD_1V0-vt273m     1000 mV
    MPC-XL0_VDD_1V5-vt273m      1498 mV
    MPC-XL0_XR_1V2-vt273m       1200 mV
    MPC-XL1_XR0_0V9-vt273m       899 mV
    MPC-XL1_XR1_0V9-vt273m       899 mV
    MPC-XL1_0V9-vt273m           900 mV
    MPC-XL1_AVDD_1V0-vt273m     1000 mV
    MPC-XL1_VDD_1V5-vt273m      1501 mV
    MPC-XL1_XR_1V2-vt273m       1199 mV
    MPC-PMB-1V05-ltc2978        1049 mV
    MPC-PMB-1V5-ltc2978         1500 mV
    MPC-PMB-2V5-ltc2978         2500 mV
    MPC-PMB-3V3-ltc2978         3298 mV
  I2C Slave Revision         20
FPC 1 status:
  State                      Online
  Temperature Intake         29 degrees C / 84 degrees F
  Temperature Exhaust A      52 degrees C / 125 degrees F
  Temperature Exhaust B      44 degrees C / 111 degrees F
  Temperature EA0 TSen       55 degrees C / 131 degrees F
  Temperature EA0 Chip       48 degrees C / 118 degrees F
  Temperature EA0_XR0 TSen   55 degrees C / 131 degrees F
  Temperature EA0_XR0 Chip   57 degrees C / 134 degrees F
  Temperature EA0_XR1 TSen   55 degrees C / 131 degrees F
  Temperature EA0_XR1 Chip   54 degrees C / 129 degrees F
  Temperature EA1 TSen       55 degrees C / 131 degrees F
  Temperature EA1 Chip       50 degrees C / 122 degrees F
  Temperature EA1_XR0 TSen   55 degrees C / 131 degrees F
  Temperature EA1_XR0 Chip   59 degrees C / 138 degrees F
  Temperature EA1_XR1 TSen   55 degrees C / 131 degrees F
  Temperature EA1_XR1 Chip   59 degrees C / 138 degrees F
  Temperature PEX TSen       55 degrees C / 131 degrees F
  Temperature PEX Chip       39 degrees C / 102 degrees F
  Temperature EA2 TSen       43 degrees C / 109 degrees F
  Temperature EA2 Chip       39 degrees C / 102 degrees F
  Temperature EA2_XR0 TSen   43 degrees C / 109 degrees F
  Temperature EA2_XR0 Chip   45 degrees C / 113 degrees F
  Temperature EA2_XR1 TSen   43 degrees C / 109 degrees F
  Temperature EA2_XR1 Chip   43 degrees C / 109 degrees F
  Temperature EA3 TSen       43 degrees C / 109 degrees F
  Temperature EA3 Chip       41 degrees C / 105 degrees F
  Temperature EA3_XR0 TSen   43 degrees C / 109 degrees F
  Temperature EA3_XR0 Chip   50 degrees C / 122 degrees F
  Temperature EA3_XR1 TSen   43 degrees C / 109 degrees F
  Temperature EA3_XR1 Chip   46 degrees C / 114 degrees F
  Temperature EA0_HMC0 Logic die 61 degrees C / 141 degrees F
  Temperature EA0_HMC0 DRAM botm 58 degrees C / 136 degrees F
  Temperature EA0_HMC1 Logic die 62 degrees C / 143 degrees F
  Temperature EA0_HMC1 DRAM botm 59 degrees C / 138 degrees F
  Temperature EA0_HMC2 Logic die 59 degrees C / 138 degrees F
  Temperature EA0_HMC2 DRAM botm 56 degrees C / 132 degrees F
  Temperature EA1_HMC0 Logic die 67 degrees C / 152 degrees F
  Temperature EA1_HMC0 DRAM botm 64 degrees C / 147 degrees F
  Temperature EA1_HMC1 Logic die 65 degrees C / 149 degrees F
```



```
Temperature EA1_HMC1 DRAM botm 62 degrees C / 143 degrees F
Temperature EA1_HMC2 Logic die 63 degrees C / 145 degrees F
Temperature EA1_HMC2 DRAM botm 60 degrees C / 140 degrees F
Temperature EA2_HMC0 Logic die 51 degrees C / 123 degrees F
Temperature EA2_HMC0 DRAM botm 48 degrees C / 118 degrees F
Temperature EA2_HMC1 Logic die 55 degrees C / 131 degrees F
Temperature EA2_HMC1 DRAM botm 52 degrees C / 125 degrees F
Temperature EA2_HMC2 Logic die 52 degrees C / 125 degrees F
Temperature EA2_HMC2 DRAM botm 49 degrees C / 120 degrees F
Temperature EA3_HMC0 Logic die 51 degrees C / 123 degrees F
Temperature EA3_HMC0 DRAM botm 48 degrees C / 118 degrees F
Temperature EA3_HMC1 Logic die 52 degrees C / 125 degrees F
Temperature EA3_HMC1 DRAM botm 49 degrees C / 120 degrees F
Temperature EA3_HMC2 Logic die 52 degrees C / 125 degrees F
Temperature EA3_HMC2 DRAM botm 49 degrees C / 120 degrees F
Power
  MPC-EA0_0V9-vt1527mb         950 mV
  MPC-EA1_0V9-vt1527mb         950 mV
  MPC-EA2_0V9-vt1527mb         925 mV
  MPC-EA3_0V9-vt1527mb         924 mV
  MAX20751-1V0                1020 mV
  MAX20731-0V9                 891 mV
  MAX20751-EA0-AVDD1V0        1000 mV
  MAX20731-EA0-1V2            1189 mV
  MAX20731-EA0-HMC-1V2        1182 mV
  MAX20731-EA0-0V906           899 mV
  MAX20731-EA0-HMC-0V9         891 mV
  MAX20751-EA1-AVDD1V0        1000 mV
  MAX20731-EA1-1V2            1189 mV
  MAX20731-EA1-HMC-1V2        1182 mV
  MAX20731-EA1-0V906           899 mV
  MAX20731-EA1-HMC-0V9         889 mV
  MAX20751-EA2-AVDD1V0        1000 mV
  MAX20731-EA2-1V2            1186 mV
  MAX20731-EA2-HMC-1V2        1193 mV
  MAX20731-EA2-0V906           899 mV
  MAX20731-EA2-HMC-0V9         889 mV
  MAX20751-EA3-AVDD1V0        1000 mV
  MAX20731-EA3-1V2            1186 mV
  MAX20731-EA3-HMC-1V2        1193 mV
  MAX20731-EA3-0V906           897 mV
  MAX20731-EA3-HMC-0V9         894 mV
  MAX20731-3V3                3268 mV
  UCD9090_0-CH_1-EA0_PLL_     1010 mV
  UCD9090_0-CH_2-EA0_1V04     1038 mV
  UCD9090_0-CH_3-EA0_2V5      2499 mV
  UCD9090_0-CH_4-EA0_1V5      1494 mV
  UCD9090_0-CH_5-EA1_PLL_     1012 mV
  UCD9090_0-CH_6-EA1_1V04     1038 mV
  UCD9090_0-CH_7-EA1_2V5      2497 mV
  UCD9090_0-CH_8-EA1_1V5      1498 mV
  UCD9090_0-CH_9-VDD_1V8      1804 mV
  UCD9090_0-CH_10-VDD_2V5     2499 mV
  UCD9090_1-CH_1-EA2_PLL_     1017 mV
  UCD9090_1-CH_2-EA2_1V04     1041 mV
  UCD9090_1-CH_3-EA2_2V5      2499 mV
  UCD9090_1-CH_4-EA2_1V5      1503 mV
  UCD9090_1-CH_5-EA3_PLL_     1015 mV
  UCD9090_1-CH_6-EA3_1V04     1048 mV
  UCD9090_1-CH_7-EA3_2V5      2499 mV
```

```
    UCD9090_1-CH_8-EA3_1V5       1500 mV
    UCD9090_1-CH_9-VDD_1V5       1497 mV
    UCD9090_1-CH_10-VDD_1V2      1216 mV
    PMB PVCC 0.7V - 1.05V         802 mV
    PMB PVNN 0V - 1.02V           976 mV
    PMB 1.0V                     1002 mV
    PMB 1.1V                     1076 mV
    PMB 1.35V                    1347 mV
    PMB VDDQ 1.5V                1504 mV
    PMB 1.8V                     1804 mV
    PMB VDD 3.3V                 3292 mV
    PMB BIAS 5.0V                5008 mV
    PMB USB 5.0V                 5000 mV
    PMB 12V                     10866 mV
  I2C Slave Revision         112
FPC 7 status:
  State                      Online
  Temperature Intake         31 degrees C / 87 degrees F
  Temperature Exhaust A      46 degrees C / 114 degrees F
  Temperature Exhaust B      38 degrees C / 100 degrees F
  Temperature QX 0 TSen      49 degrees C / 120 degrees F
  Temperature QX 0 Chip      52 degrees C / 125 degrees F
  Temperature LU 0 TCAM TSen 49 degrees C / 120 degrees F
  Temperature LU 0 TCAM Chip 52 degrees C / 125 degrees F
  Temperature LU 0 TSen      49 degrees C / 120 degrees F
  Temperature LU 0 Chip      51 degrees C / 123 degrees F
  Temperature MQ 0 TSen      49 degrees C / 120 degrees F
  Temperature MQ 0 Chip      55 degrees C / 131 degrees F
  Temperature QX 1 TSen      41 degrees C / 105 degrees F
  Temperature QX 1 Chip      42 degrees C / 107 degrees F
  Temperature LU 1 TCAM TSen 41 degrees C / 105 degrees F
  Temperature LU 1 TCAM Chip 43 degrees C / 109 degrees F
  Temperature LU 1 TSen      41 degrees C / 105 degrees F
  Temperature LU 1 Chip      46 degrees C / 114 degrees F
  Temperature MQ 1 TSen      41 degrees C / 105 degrees F
  Temperature MQ 1 Chip      47 degrees C / 116 degrees F
  Power
    MPC-BIAS3V3-zl2105           3302 mV
    MPC-VDD3V3-zl2006            3307 mV
    MPC-VDD2V5-zl2006            2505 mV
    MPC-TCAM_1V0-zl2004          1000 mV
    MPC-AVDD1V0-zl2006           1006 mV
    MPC-VDD1V8-zl2006            1800 mV
    MPC-PCIE_1V0-zl2006          1000 mV
    MPC-LU0_1V0-zl2004            997 mV
    MPC-MQ0_1V0-zl2004            999 mV
    MPC-VDD_1V5-zl2004           1495 mV
    MPC-PMB_1V1-zl2006           1096 mV
    MPC-9VA-BMR453               9051 mV
    MPC-9VB-BMR453               8990 mV
    MPC-PMB_1V2-zl2106           1200 mV
    MPC-LU1_1V0-zl2004            997 mV
    MPC-MQ1_1V0-zl2004            998 mV
    MPC-QXM0_1V0-zl2006          1000 mV
    MPC-QXM1_1V0-zl2006           999 mV
  I2C Slave Revision         70
```

show chassis environment fpc (MX240 Router)

`user@host>` **show chassis environment fpc**

```
FPC 1 status:
  State                      Online
  Temperature Intake         34 degrees C / 93 degrees F
  Temperature Exhaust A      39 degrees C / 102 degrees F
  Temperature Exhaust B      53 degrees C / 127 degrees F
  Temperature I3 0 TSensor   51 degrees C / 123 degrees F
  Temperature I3 0 Chip      54 degrees C / 129 degrees F
  Temperature I3 1 TSensor   50 degrees C / 122 degrees F
  Temperature I3 1 Chip      53 degrees C / 127 degrees F
  Temperature I3 2 TSensor   48 degrees C / 118 degrees F
  Temperature I3 2 Chip      51 degrees C / 123 degrees F
  Temperature I3 3 TSensor   45 degrees C / 113 degrees F
  Temperature I3 3 Chip      48 degrees C / 118 degrees F
  Temperature IA 0 TSensor   45 degrees C / 113 degrees F
  Temperature IA 0 Chip      45 degrees C / 113 degrees F
  Temperature IA 1 TSensor   45 degrees C / 113 degrees F
  Temperature IA 1 Chip      49 degrees C / 120 degrees F
  Power
    1.5 V                     1492 mV
    2.5 V                     2507 mV
    3.3 V                     3306 mV
    1.8 V PFE 0               1801 mV
    1.8 V PFE 1               1804 mV
    1.8 V PFE 2               1798 mV
    1.8 V PFE 3               1798 mV
    1.2 V PFE 0               1169 mV
    1.2 V PFE 1               1189 mV
    1.2 V PFE 2               1182 mV
    1.2 V PFE 3               1176 mV
  I2C Slave Revision         42
FPC 2 status:
  State                      Online
  Temperature Intake         33 degrees C / 91 degrees F
  Temperature Exhaust A      41 degrees C / 105 degrees F
  Temperature Exhaust B      53 degrees C / 127 degrees F
  Temperature I3 0 TSensor   53 degrees C / 127 degrees F
  Temperature I3 0 Chip      58 degrees C / 136 degrees F
  Temperature I3 1 TSensor   52 degrees C / 125 degrees F
  Temperature I3 1 Chip      56 degrees C / 132 degrees F
  Temperature I3 2 TSensor   50 degrees C / 122 degrees F
  Temperature I3 2 Chip      52 degrees C / 125 degrees F
  Temperature I3 3 TSensor   46 degrees C / 114 degrees F
  Temperature I3 3 Chip      49 degrees C / 120 degrees F
  Temperature IA 0 TSensor   51 degrees C / 123 degrees F
  Temperature IA 0 Chip      49 degrees C / 120 degrees F
  Temperature IA 1 TSensor   48 degrees C / 118 degrees F
  Temperature IA 1 Chip      53 degrees C / 127 degrees F
  Power
    1.5 V                     1492 mV
    2.5 V                     2445 mV
    3.3 V                     3293 mV
    1.8 V PFE 0               1827 mV
    1.8 V PFE 1               1775 mV
    1.8 V PFE 2               1788 mV
    1.8 V PFE 3               1798 mV
    1.2 V PFE 0               1250 mV
    1.2 V PFE 1               1234 mV
    1.2 V PFE 2               1231 mV
    1.2 V PFE 3               1192 mV
  I2C Slave Revision         42
```


show chassis environment fpc (MX480 Router)

user@host> **show chassis environment fpc**

```
FPC 1 status:
  State                        Online
  Temperature Intake           36 degrees C / 96 degrees F
  Temperature Exhaust A        41 degrees C / 105 degrees F
  Temperature Exhaust B        55 degrees C / 131 degrees F
  Temperature I3 0 TSensor     55 degrees C / 131 degrees F
  Temperature I3 0 Chip        57 degrees C / 134 degrees F
  Temperature I3 1 TSensor     53 degrees C / 127 degrees F
  Temperature I3 1 Chip        53 degrees C / 127 degrees F
  Temperature I3 2 TSensor     52 degrees C / 125 degrees F
  Temperature I3 2 Chip        49 degrees C / 120 degrees F
  Temperature I3 3 TSensor     47 degrees C / 116 degrees F
  Temperature I3 3 Chip        47 degrees C / 116 degrees F
  Temperature IA 0 TSensor     54 degrees C / 129 degrees F
  Temperature IA 0 Chip        58 degrees C / 136 degrees F
  Temperature IA 1 TSensor     48 degrees C / 118 degrees F
  Temperature IA 1 Chip        53 degrees C / 127 degrees F
  Power
    1.5 V                       1479 mV
    2.5 V                       2542 mV
    3.3 V                       3319 mV
    1.8 V PFE 0                 1811 mV
    1.8 V PFE 1                 1804 mV
    1.8 V PFE 2                 1804 mV
    1.8 V PFE 3                 1814 mV
    1.2 V PFE 0                 1192 mV
    1.2 V PFE 1                 1202 mV
    1.2 V PFE 2                 1205 mV
    1.2 V PFE 3                 1189 mV
  I2C Slave Revision           40
```

show chassis environment fpc (MX960 Router MPC10E-15C-MRATE)

user@router> **show chassis environment fpc 8**

```

FPC 8 status:
  State                        Online
  Temperature Intake                        37 degrees C / 98 degrees F

  Temperature Exhaust A                     50 degrees C / 122 degrees F

  Temperature Exhaust B                     56 degrees C / 132 degrees F

  Temperature ZT0 Chip                      83 degrees C / 181 degrees F

  Temperature ZT1 Chip                      80 degrees C / 176 degrees F

  Temperature ZT2 Chip                      81 degrees C / 177 degrees F

  Temperature PCIE_SW Chip                  64 degrees C / 147 degrees F

  Temperature ZT0 TestMacro                 73 degrees C / 163 degrees F

  Temperature ZT0 hbmio_grp3                74 degrees C / 165 degrees F
```

```
Temperature ZT0 hbmio_grp0            76 degrees C / 168 degrees F
Temperature ZT0 gumem1                78 degrees C / 172 degrees F
Temperature ZT0 llm                   80 degrees C / 176 degrees F
Temperature ZT0 wanio_sd              78 degrees C / 172 degrees F
Temperature ZT0 fabio_sd              84 degrees C / 183 degrees F
Temperature ZT0 flexmem               84 degrees C / 183 degrees F
Temperature ZT1 TestMacro             70 degrees C / 158 degrees F
Temperature ZT1 hbmio_grp3            71 degrees C / 159 degrees F
Temperature ZT1 hbmio_grp0            74 degrees C / 165 degrees F
Temperature ZT1 gumem1                75 degrees C / 167 degrees F
Temperature ZT1 llm                   78 degrees C / 172 degrees F
Temperature ZT1 wanio_sd              76 degrees C / 168 degrees F
Temperature ZT1 fabio_sd              78 degrees C / 172 degrees F
Temperature ZT1 flexmem               82 degrees C / 179 degrees F
Temperature ZT2 TestMacro             71 degrees C / 159 degrees F
Temperature ZT2 hbmio_grp3            72 degrees C / 161 degrees F
Temperature ZT2 hbmio_grp0            75 degrees C / 167 degrees F
Temperature ZT2 gumem1                76 degrees C / 168 degrees F
Temperature ZT2 llm                   78 degrees C / 172 degrees F
Temperature ZT2 wanio_sd              78 degrees C / 172 degrees F
Temperature ZT2 fabio_sd              80 degrees C / 176 degrees F
Temperature ZT2 flexmem               76 degrees C / 168 degrees F
Temperature ZT0 HBM0                  74 degrees C / 165 degrees F
Temperature ZT0 HBM1                  74 degrees C / 165 degrees F
Temperature ZT1 HBM0                  74 degrees C / 165 degrees F
Temperature ZT1 HBM1                  75 degrees C / 167 degrees F
Temperature ZT2 HBM0                  73 degrees C / 163 degrees F
Temperature ZT2 HBM1                  73 degrees C / 163 degrees F
Temperature FAB RT1.0                 73 degrees C / 163 degrees F
Temperature FAB RT2.0                 75 degrees C / 167 degrees F
```



```
Temperature FAB RT3.0                  73 degrees C / 163 degrees F

Temperature FAB RT4.0                  70 degrees C / 158 degrees F

Temperature FAB RT5.0                  67 degrees C / 152 degrees F

Temperature FAB RT6.0                  67 degrees C / 152 degrees F

Temperature FAB RT7.0                  65 degrees C / 149 degrees F

Temperature FAB RT8.0                  66 degrees C / 150 degrees F

Temperature WAN RT9.0                  64 degrees C / 147 degrees F

Temperature WAN RT9.1                  62 degrees C / 143 degrees F

Temperature WAN RT10.0                 65 degrees C / 149 degrees F

Temperature WAN RT10.1                 63 degrees C / 145 degrees F

Temperature WAN RT11.0                 51 degrees C / 123 degrees F

Temperature WAN RT11.1                 49 degrees C / 120 degrees F

Temperature PIM4820 T1                 72 degrees C / 161 degrees F

Temperature BMR456-12V-BRICK-A T1      83 degrees C / 181 degrees F

Temperature BMR456-12V-BRICK-B T1      91 degrees C / 195 degrees F

Temperature MAX20730-ZT0-AVDDH T1      72 degrees C / 161 degrees F

Temperature MAX20730-ZT0-HBM-VDDQ T1   64 degrees C / 147 degrees F

Temperature MAX20730-ZT0-HBM-VDDC T1   65 degrees C / 149 degrees F

Temperature MAX20730-ZT1-AVDDH T1      65 degrees C / 149 degrees F

Temperature MAX20730-ZT1-HBM-VDDQ T1   60 degrees C / 140 degrees F

Temperature MAX20730-ZT1-HBM-VDDC T1   57 degrees C / 134 degrees F

Temperature MAX20730-ZT2-AVDDH T1      65 degrees C / 149 degrees F

Temperature MAX20730-ZT2-HBM-VDDQ T1   58 degrees C / 136 degrees F

Temperature MAX20730-ZT2-HBM-VDDC T1   55 degrees C / 131 degrees F

Temperature CPU0_PMB                   61 degrees C / 141 degrees F

Temperature CPU7_PMB                   61 degrees C / 141 degrees F

Temperature DDR4 A                     38 degrees C / 100 degrees F

Temperature DDR4 B                     37 degrees C / 98 degrees F

Power
  PIM4820                    56967 mV
  BMR456-12V-BRICK-A         12016 mV
  BMR456-12V-BRICK-B         12039 mV
```

```
    MAX20743-RT01-DVDD           724 mV
    MAX20743-RT234-DVDD          724 mV
    MAX20743-RT567-DVDD          724 mV
    MAX20754-ZT0-VDD             750 mV
    MAX20754-ZT0-VDDM            799 mV
    MAX20743-ZT0-AVDD            904 mV
    MAX20730-ZT0-AVDDH          1103 mV
    MAX20730-ZT0-HBM-VDDQ       1198 mV
    MAX20730-ZT0-HBM-VDDC       1202 mV
    MAX20730-VDD-1V25           1246 mV
    MAX20754-ZT1-VDD             724 mV
    MAX20754-ZT1-VDDM            800 mV
    MAX20743-ZT1-AVDD            904 mV
    MAX20730-ZT1-AVDDH          1103 mV
    MAX20730-ZT1-HBM-VDDQ       1202 mV
    MAX20730-ZT1-HBM-VDDC       1198 mV
    MAX20730-PCIE-0V9            901 mV
    MAX20754-ZT2-VDD             724 mV
    MAX20754-ZT2-VDDM            799 mV
    MAX20743-ZT2-AVDD            904 mV
    MAX20730-ZT2-AVDDH          1103 mV
    MAX20730-ZT2-HBM-VDDQ       1198 mV
    MAX20730-ZT2-HBM-VDDC       1198 mV
    MAX20730-VDD3V3             3308 mV
    MAX20754-WAN-VDD3V3         3301 mV
    MAX20754-WAN-DVDD0V8         799 mV
    MAX20743-WAN-VDD1V0A        1003 mV
    MAX20743-WAN-AVDD0V8         800 mV
    MAX20743-WAN-VDD1V0C        1003 mV
    TPS53631-1V2-VDDQ-PMB       1225 mV
    TPS53641-VCCIN-PMB          1770 mV
    TPS53641-VCCSBUS-PMB        1040 mV
    MAX20730-BIAS3P30-PMB       3308 mV
    MAX20730-BIAS5P0-PMB        5063 mV
    MAX20730-VPP-V2P5-PMB       2503 mV
    MAX20730-VDD1V2             1195 mV
    MAX20730-VDD1V5             1496 mV
    MAX20730-VDD1V8             1799 mV
    MAX20730-VDD2V5             2511 mV
    MAX20754-RT-AVDD-0V8         800 mV
    MAX20743-XGE-VDD-AVS        1012 mV
    PMB VCC1P05_PCH_SW          1048 mV
    PMB VCC1P3                  1294 mV
    PMB VCC1P5                  1485 mV
    PMB VCC1P7                  1705 mV
    PMB DDR4_VPP                2519 mV
    PMB VCC3P3                  3336 mV
    PMB VCC3P3_PCH              3332 mV
  I2C Slave Revision         124
```

show chassis environment fpc (MX960 Router)

user@host> **show chassis environment fpc**

```
FPC 5 status:
  State                      Online
  Temperature Intake         27 degrees C / 80 degrees F
  Temperature Exhaust A      34 degrees C / 93 degrees F
  Temperature Exhaust B      40 degrees C / 104 degrees F
  Temperature I3 0 TSensor   39 degrees C / 102 degrees F
```



```
  Temperature I3 0 Chip      41 degrees C / 105 degrees F
  Temperature I3 1 TSensor   38 degrees C / 100 degrees F
  Temperature I3 1 Chip      37 degrees C / 98 degrees F
  Temperature I3 2 TSensor   37 degrees C / 98 degrees F
  Temperature I3 2 Chip      34 degrees C / 93 degrees F
  Temperature I3 3 TSensor   32 degrees C / 89 degrees F
  Temperature I3 3 Chip      33 degrees C / 91 degrees F
  Temperature IA 0 TSensor   39 degrees C / 102 degrees F
  Temperature IA 0 Chip      44 degrees C / 111 degrees F
  Temperature IA 1 TSensor   36 degrees C / 96 degrees F
  Temperature IA 1 Chip      44 degrees C / 111 degrees F
  Power
    1.5 V                     1479 mV
    2.5 V                     2523 mV
    3.3 V                     3254 mV
    1.8 V PFE 0               1798 mV
    1.8 V PFE 1               1798 mV
    1.8 V PFE 2               1807 mV
    1.8 V PFE 3               1791 mV
    1.2 V PFE 0               1173 mV
    1.2 V PFE 1               1179 mV
    1.2 V PFE 2               1179 mV
    1.2 V PFE 3               1185 mV
  I2C Slave Revision         6
FPC 6 status:
  State                      Online
  Temperature Intake         25 degrees C / 77 degrees F
  Temperature Exhaust A      38 degrees C / 100 degrees F
  Temperature Exhaust B      38 degrees C / 100 degrees F
  Temperature I3 0 TSensor   40 degrees C / 104 degrees F
  Temperature I3 0 Chip      40 degrees C / 104 degrees F
  Temperature I3 1 TSensor   40 degrees C / 104 degrees F
  Temperature I3 1 Chip      38 degrees C / 100 degrees F
  Temperature I3 2 TSensor   37 degrees C / 98 degrees F
  Temperature I3 2 Chip      32 degrees C / 89 degrees F
  Temperature I3 3 TSensor   34 degrees C / 93 degrees F
  Temperature I3 3 Chip      33 degrees C / 91 degrees F
  Temperature IA 0 TSensor   45 degrees C / 113 degrees F
  Temperature IA 0 Chip      47 degrees C / 116 degrees F
  Temperature IA 1 TSensor   37 degrees C / 98 degrees F
  Temperature IA 1 Chip      42 degrees C / 107 degrees F
  Power
    1.5 V                     1485 mV
    2.5 V                     2510 mV
    3.3 V                     3332 mV
    1.8 V PFE 0               1801 mV
    1.8 V PFE 1               1814 mV
    1.8 V PFE 2               1804 mV
    1.8 V PFE 3               1820 mV
    1.2 V PFE 0               1192 mV
    1.2 V PFE 1               1189 mV
    1.2 V PFE 2               1202 mV
    1.2 V PFE 3               1156 mV
  I2C Slave Revision         40
```

show chassis environment fpc (MX480 Router with 100-Gigabit Ethernet CFP)

`user@host>` **show chassis environment fpc**

```
FPC 0 status:
  State                      Online
  Temperature Intake         32 degrees C / 89 degrees F
  Temperature Exhaust A      39 degrees C / 102 degrees F
  Temperature Exhaust B      37 degrees C / 98 degrees F
  Temperature QX 0 TSen      44 degrees C / 111 degrees F
  Temperature QX 0 Chip      48 degrees C / 118 degrees F
  Temperature LU 0 TCAM TSen 44 degrees C / 111 degrees F
  Temperature LU 0 TCAM Chip 47 degrees C / 116 degrees F
  Temperature LU 0 TSen      44 degrees C / 111 degrees F
  Temperature LU 0 Chip      48 degrees C / 118 degrees F
  Temperature MQ 0 TSen      44 degrees C / 111 degrees F
  Temperature MQ 0 Chip      47 degrees C / 116 degrees F
  Power
    MPC-BIAS3V3-zl2105        3297 mV
    MPC-VDD3V3-zl2105         3306 mV
    MPC-VDD2V5-zl2105         2498 mV
    MPC-TCAM_1V0-zl2004        999 mV
    MPC-AVDD1V0-zl2006         999 mV
    MPC-VDD1V8-zl2006         1796 mV
    MPC-PCIE_1V0-zl2006       1002 mV
    MPC-LU0_1V0-zl2004         997 mV
    MPC-MQ0_1V0-zl2004         995 mV
    MPC-VDD_1V5-zl2004        1496 mV
    MPC-PMB_1V1-zl2006        1094 mV
    MPC-9VA-BMR453            9054 mV
    MPC-9VB-BMR453            9037 mV
    MPC-PMB_1V2-zl2106        1191 mV
    MPC-QXM0_1V0-zl2006       1000 mV
  I2C Slave Revision         66
FPC 1 status:
  State                      Online
  Temperature Intake         35 degrees C / 95 degrees F
  Temperature Exhaust A      50 degrees C / 122 degrees F
  Temperature Exhaust B      56 degrees C / 132 degrees F
  Temperature LU 0 TSen      46 degrees C / 114 degrees F
  Temperature LU 0 Chip      59 degrees C / 138 degrees F
  Temperature LU 1 TSen      46 degrees C / 114 degrees F
  Temperature LU 1 Chip      45 degrees C / 113 degrees F
  Temperature LU 2 TSen      46 degrees C / 114 degrees F
  Temperature LU 2 Chip      60 degrees C / 140 degrees F
  Temperature LU 3 TSen      46 degrees C / 114 degrees F
  Temperature LU 3 Chip      71 degrees C / 159 degrees F
  Temperature XM 0 TSen      46 degrees C / 114 degrees F
  Temperature XM 0 Chip      -18 degrees C / 0 degrees F
  Temperature XF 0 TSen      46 degrees C / 114 degrees F
  Temperature XF 0 Chip      76 degrees C / 168 degrees F
  Power
    MPC-BIAS3V3-zl2105        3292 mV
    MPC-VDD3V3-zl6100         3303 mV
    MPC-VDD2V5-zl6100         2501 mV
    MPC-VDD1V8-zl2004         1801 mV
    MPC-AVDD1V0-zl2006         996 mV
    MPC-VDD1V2-zl6100         1199 mV
    MPC-VDD1V5A-zl2004        1493 mV
    MPC-VDD1V5B-zl2004        1498 mV
    MPC-XF_0V9-zl2006          996 mV
    MPC-PCIE_1V0-zl6100       1000 mV
    MPC-LU0_1V0-zl2004         994 mV
    MPC-LU1_1V0-zl2004         994 mV
```



```
    MPC-LU2_1V0-zl2004         992 mV
    MPC-LU3_1V0-zl2004         993 mV
    MPC-12VA-BMR453          12003 mV
    MPC-12VB-BMR453          12043 mV
    MPC-PMB_1V1-zl2006        1091 mV
    MPC-PMB_1V2-zl2106        1196 mV
    MPC-XM_0V9-vt273m          899 mV
  I2C Slave Revision         106
```

show chassis environment fpc (MX240, MX480, MX960 with Application Services Modular Line Card

`user@host>`**show chassis environment fpc 1**

```
FPC 1 status:
  State                      Online
  Temperature Intake         36 degrees C / 96 degrees F
  Temperature Exhaust A      39 degrees C / 102 degrees F
  Temperature LU TSen        52 degrees C / 125 degrees F
  Temperature LU Chip        54 degrees C / 129 degrees F
  Temperature XM TSen        52 degrees C / 125 degrees F
  Temperature XM Chip        60 degrees C / 140 degrees F
  Temperature PCIe TSen      52 degrees C / 125 degrees F
  Temperature PCIe Chip      69 degrees C / 156 degrees F
  Power
    MPC-BIAS3V3-zl2106        3302 mV
    MPC-VDD3V3-zl6100         3325 mV
    MPC-AVDD1V0-zl6100        1007 mV
    MPC-PCIE_1V0-zl6100        904 mV
    MPC-LU0_1V0-zl2004         996 mV
    MPC-VDD_1V5-zl2004        1498 mV
    MPC-12VA-BMR453          11733 mV
    MPC-12VB-BMR453          11728 mV
    MPC-XM_0V9-vt273m          900 mV
  I2C Slave Revision         81
```

show chassis environment fpc (MX10003 Router)

`user@host>` **show chassis environment fpc**

```

FPC 0 status:
  State                      Online
  FPC 0 Intake Temp Sensor   29 degrees C / 84 degrees F
  FPC 0 Exhaust-A Temp Sensor56 degrees C / 132 degrees F
  FPC 0 Exhaust-B Temp Sensor44 degrees C / 111 degrees F
  FPC 0 EA0 Chip             58 degrees C / 136 degrees F
  FPC 0 EA0-XR0 Chip         61 degrees C / 141 degrees F
  FPC 0 EA0-XR1 Chip         62 degrees C / 143 degrees F
  FPC 0 EA1 Chip             67 degrees C / 152 degrees F
  FPC 0 EA1-XR0 Chip         72 degrees C / 161 degrees F
  FPC 0 EA1-XR1 Chip         72 degrees C / 161 degrees F
  FPC 0 PEX Chip             77 degrees C / 170 degrees F
  FPC 0 EA2 Chip             48 degrees C / 118 degrees F
  FPC 0 EA2-XR0 Chip         54 degrees C / 129 degrees F
  FPC 0 EA2-XR1 Chip         56 degrees C / 132 degrees F
  FPC 0 PF Chip              68 degrees C / 154 degrees F
  FPC 0 EA0_HMC0 Logic die   72 degrees C / 161 degrees F
  FPC 0 EA0_HMC0 DRAM botm   69 degrees C / 156 degrees F
  FPC 0 EA0_HMC1 Logic die   71 degrees C / 159 degrees F
```



```
FPC 0 EA0_HMC1 DRAM botm   68 degrees C / 154 degrees F
FPC 0 EA0_HMC2 Logic die   75 degrees C / 167 degrees F
FPC 0 EA0_HMC2 DRAM botm   72 degrees C / 161 degrees F
FPC 0 EA1_HMC0 Logic die   81 degrees C / 177 degrees F
FPC 0 EA1_HMC0 DRAM botm   78 degrees C / 172 degrees F
FPC 0 EA1_HMC1 Logic die   80 degrees C / 176 degrees F
FPC 0 EA1_HMC1 DRAM botm   77 degrees C / 170 degrees F
FPC 0 EA1_HMC2 Logic die   82 degrees C / 179 degrees F
FPC 0 EA1_HMC2 DRAM botm   79 degrees C / 174 degrees F
FPC 0 EA2_HMC0 Logic die   60 degrees C / 140 degrees F
FPC 0 EA2_HMC0 DRAM botm   57 degrees C / 134 degrees F
FPC 0 EA2_HMC1 Logic die   61 degrees C / 141 degrees F
FPC 0 EA2_HMC1 DRAM botm   58 degrees C / 136 degrees F
FPC 0 EA2_HMC2 Logic die   63 degrees C / 145 degrees F
FPC 0 EA2_HMC2 DRAM botm   60 degrees C / 140 degrees F
Power
  LTC3887-PF-VDD0V9-RAIL       898 mV
  LTC3887-PF-VDD0V9-DEV0-      898 mV
  LTC3887-PF-VDD0V9-DEV0-      900 mV
  LTC3887-PF-VDD0V9-DEV1-      899 mV
  LTC3887-PF-VDD0V9-DEV1-      901 mV
  LTC3887-PF-AVDD1V0-RAIL      998 mV
  LTC3887-PF-AVDD1V0-CH0       998 mV
  LTC3887-PF-AVDD1V0-CH1       999 mV
  LTC3887-ETHSW-VDD1V0        1000 mV
  LTC3887-VDD2V5              2499 mV
  LTC3887-PCIE-VDD0V9          899 mV
  LTC3887-V1P0                 999 mV
  LTC3887-PHY-VDD1V0-A         999 mV
  LTC3887-3V3                 3300 mV
  LTC3887-VDD1V8              1799 mV
  UCD9090_0-CH_1-EA0_PLL_     1005 mV
  UCD9090_0-CH_2-EA0_1V4      1049 mV
  UCD9090_0-CH_3-EA0_2V5      2499 mV
  UCD9090_0-CH_4-EA0_1V5      1499 mV
  UCD9090_0-CH_5-EA1_PLL_      999 mV
  UCD9090_0-CH_6-EA1_1V4      1037 mV
  UCD9090_0-CH_7-EA1_2V5      2499 mV
  UCD9090_0-CH_8-EA1_1V5      1510 mV
  UCD9090_0-CH_9-PVCC          797 mV
  UCD9090_0-CH_10-PVNN         991 mV
  UCD9090_1-CH_1-EA2_PLL_     1008 mV
  UCD9090_1-CH_2-EA2_1V4      1009 mV
  UCD9090_1-CH_3-EA2_2V5      2499 mV
  UCD9090_1-CH_4-EA2_1V5      1513 mV
  UCD9090_1-CH_5-1V0_PFPL     1009 mV
  UCD9090_1-CH_6-V1P1         1075 mV
  UCD9090_1-CH_7-V1P5         1531 mV
  UCD9090_1-CH_8-V1P35        1359 mV
  UCD9090_1-CH_9-VDD1V5       1511 mV
  UCD9090_1-CH_10-VDD1V2      1210 mV
  LTC3887-EA0-VDD0V9-RAIL      949 mV
  LTC3887-EA0-VDD0V9-DEV0      949 mV
  LTC3887-EA0-VDD0V9-DEV0      951 mV
  LTC3887-EA0-VDD0V9-DEV1      949 mV
  LTC3887-EA0-VDD0V9-DEV1      951 mV
  LTC3887-EA0-VDD0V9R2-RA      947 mV
  LTC3887-EA0-VDD0V9R2-CH      947 mV
  LTC3887-EA0-VDD0V9R2-CH      949 mV
  LTC3887-EA0-VDD1V0-RAIL      999 mV
```



```
    LTC3887-EA0-VDD1V0-CH0       999 mV
    LTC3887-EA0-VDD1V0-CH1      1001 mV
    LTC3887-EA0-XR-VDD0V9        900 mV
    LTC3887-EA0-XR-VDD1V2       1199 mV
    LTC3887-EA0-HM1-VDD0V9       899 mV
    LTC3887-EA0-HM-VDD1V2       1200 mV
    LTC3887-EA0-HM-VDDM1V2      1199 mV
    LTC3887-EA1-VDD0V9-RAIL      949 mV
    LTC3887-EA1-VDD0V9-DEV0      952 mV
    LTC3887-EA1-VDD0V9-DEV0      952 mV
    LTC3887-EA1-VDD0V9-DEV1      951 mV
    LTC3887-EA1-VDD0V9-DEV1      951 mV
    LTC3887-EA1-VDD0V9R2-RA      948 mV
    LTC3887-EA1-VDD0V9R2-CH      948 mV
    LTC3887-EA1-VDD0V9R2-CH      950 mV
    LTC3887-EA1-VDD1V0-RAIL     1000 mV
    LTC3887-EA1-VDD1V0-CH0      1000 mV
    LTC3887-EA1-VDD1V0-CH1      1001 mV
  I2C Slave Revision        13
FPC 1 status:
  State                     Online
  FPC 1 Intake Temp Sensor   27 degrees C / 80 degrees F
  FPC 1 Exhaust-A Temp Sensor60 degrees C / 140 degrees F
  FPC 1 Exhaust-B Temp Sensor46 degrees C / 114 degrees F
  FPC 1 EA0 Chip            63 degrees C / 145 degrees F
  FPC 1 EA0-XR0 Chip        67 degrees C / 152 degrees F
  FPC 1 EA0-XR1 Chip        68 degrees C / 154 degrees F
  FPC 1 EA1 Chip            70 degrees C / 158 degrees F
  FPC 1 EA1-XR0 Chip        75 degrees C / 167 degrees F
  FPC 1 EA1-XR1 Chip        75 degrees C / 167 degrees F
  FPC 1 PEX Chip            89 degrees C / 192 degrees F
  FPC 1 EA2 Chip            49 degrees C / 120 degrees F
  FPC 1 EA2-XR0 Chip        53 degrees C / 127 degrees F
  FPC 1 EA2-XR1 Chip        56 degrees C / 132 degrees F
  FPC 1 PF Chip             71 degrees C / 159 degrees F
  FPC 1 EA0_HMC0 Logic die   74 degrees C / 165 degrees F
  FPC 1 EA0_HMC0 DRAM botm   71 degrees C / 159 degrees F
  FPC 1 EA0_HMC1 Logic die   78 degrees C / 172 degrees F
  FPC 1 EA0_HMC1 DRAM botm   75 degrees C / 167 degrees F
  FPC 1 EA0_HMC2 Logic die   78 degrees C / 172 degrees F
  FPC 1 EA0_HMC2 DRAM botm   75 degrees C / 167 degrees F
  FPC 1 EA1_HMC0 Logic die   84 degrees C / 183 degrees F
  FPC 1 EA1_HMC0 DRAM botm   81 degrees C / 177 degrees F
  FPC 1 EA1_HMC1 Logic die   82 degrees C / 179 degrees F
  FPC 1 EA1_HMC1 DRAM botm   79 degrees C / 174 degrees F
  FPC 1 EA1_HMC2 Logic die   85 degrees C / 185 degrees F
  FPC 1 EA1_HMC2 DRAM botm   82 degrees C / 179 degrees F
  FPC 1 EA2_HMC0 Logic die   62 degrees C / 143 degrees F
  FPC 1 EA2_HMC0 DRAM botm   59 degrees C / 138 degrees F
  FPC 1 EA2_HMC1 Logic die   60 degrees C / 140 degrees F
  FPC 1 EA2_HMC1 DRAM botm   57 degrees C / 134 degrees F
  FPC 1 EA2_HMC2 Logic die   65 degrees C / 149 degrees F
  FPC 1 EA2_HMC2 DRAM botm   62 degrees C / 143 degrees F
  Power
    LTC3887-PF-VDD0V9-RAIL       899 mV
    LTC3887-PF-VDD0V9-DEV0-      899 mV
    LTC3887-PF-VDD0V9-DEV0-      901 mV
    LTC3887-PF-VDD0V9-DEV1-      899 mV
    LTC3887-PF-VDD0V9-DEV1-      901 mV
    LTC3887-PF-AVDD1V0-RAIL      998 mV
```

```
    LTC3887-PF-AVDD1V0-CH0        998 mV
    LTC3887-PF-AVDD1V0-CH1        999 mV
    LTC3887-ETHSW-VDD1V0          999 mV
    LTC3887-VDD2V5               2499 mV
    LTC3887-PCIE-VDD0V9           900 mV
    LTC3887-V1P0                 1000 mV
    LTC3887-PHY-VDD1V0-A         1000 mV
    LTC3887-3V3                  3300 mV
    LTC3887-VDD1V8               1799 mV
    UCD9090_0-CH_1-EA0_PLL_      1004 mV
    UCD9090_0-CH_2-EA0_1V4       1004 mV
    UCD9090_0-CH_3-EA0_2V5       2499 mV
    UCD9090_0-CH_4-EA0_1V5       1511 mV
    UCD9090_0-CH_5-EA1_PLL_       999 mV
    UCD9090_0-CH_6-EA1_1V4       1008 mV
    UCD9090_0-CH_7-EA1_2V5       2499 mV
    UCD9090_0-CH_8-EA1_1V5       1510 mV
    UCD9090_0-CH_9-PVCC           839 mV
    UCD9090_0-CH_10-PVNN         1016 mV
    UCD9090_1-CH_1-EA2_PLL_      1011 mV
    UCD9090_1-CH_2-EA2_1V4       1046 mV
    UCD9090_1-CH_3-EA2_2V5       2499 mV
    UCD9090_1-CH_4-EA2_1V5       1501 mV
    UCD9090_1-CH_5-1V0_PFPL      1000 mV
    UCD9090_1-CH_6-V1P1          1037 mV
    UCD9090_1-CH_7-V1P5          1530 mV
    UCD9090_1-CH_8-V1P35         1360 mV
    UCD9090_1-CH_9-VDD1V5        1513 mV
    UCD9090_1-CH_10-VDD1V2       1217 mV
    LTC3887-EA0-VDD0V9-RAIL       949 mV
    LTC3887-EA0-VDD0V9-DEV0       949 mV
    LTC3887-EA0-VDD0V9-DEV0       951 mV
    LTC3887-EA0-VDD0V9-DEV1       949 mV
    LTC3887-EA0-VDD0V9-DEV1       952 mV
    LTC3887-EA0-VDD0V9R2-RA       947 mV
    LTC3887-EA0-VDD0V9R2-CH       947 mV
    LTC3887-EA0-VDD0V9R2-CH       949 mV
    LTC3887-EA0-VDD1V0-RAIL      1000 mV
    LTC3887-EA0-VDD1V0-CH0       1000 mV
    LTC3887-EA0-VDD1V0-CH1       1001 mV
    LTC3887-EA0-XR-VDD0V9         899 mV
    LTC3887-EA0-XR-VDD1V2        1200 mV
    LTC3887-EA0-HM1-VDD0V9        899 mV
    LTC3887-EA0-HM-VDD1V2        1199 mV
    LTC3887-EA0-HM-VDDM1V2       1199 mV
    LTC3887-EA1-VDD0V9-RAIL       948 mV
    LTC3887-EA1-VDD0V9-DEV0       950 mV
    LTC3887-EA1-VDD0V9-DEV0       950 mV
    LTC3887-EA1-VDD0V9-DEV1       951 mV
    LTC3887-EA1-VDD0V9-DEV1       951 mV
    LTC3887-EA1-VDD0V9R2-RA       947 mV
    LTC3887-EA1-VDD0V9R2-CH       947 mV
    LTC3887-EA1-VDD0V9R2-CH       949 mV
    LTC3887-EA1-VDD1V0-RAIL      1000 mV
    LTC3887-EA1-VDD1V0-CH0       1000 mV
    LTC3887-EA1-VDD1V0-CH1       1002 mV
  I2C Slave Revision         99
```

show chassis environment fpc (MX204 Router)

user@host> **show chassis environment fpc**

```
FPC 0 status:
  State                        Online
  FPC 0 EA0_HMC0 Logic die   77 degrees C / 170 degrees F
  FPC 0 EA0_HMC0 DRAM botm   74 degrees C / 165 degrees F
  FPC 0 EA0_HMC1 Logic die   80 degrees C / 176 degrees F
  FPC 0 EA0_HMC1 DRAM botm   77 degrees C / 170 degrees F
  FPC 0 EA0 Chip             93 degrees C / 199 degrees F
  FPC 0 EA0-XR0 Chip         63 degrees C / 145 degrees F
  FPC 0 EA0-XR1 Chip         64 degrees C / 147 degrees F
  Power
  I2C Slave Revision         0
```

show chassis environment fpc (MX10008 Router)

user@host> **show chassis environment fpc**

```
FPC 0 status:
  State                        Online
  FPC 0 Intake-A Temp Sensor               32 degrees C / 89 degrees F
  FPC 0 Exhaust-A Temp Sensor              44 degrees C / 111 degrees F
  FPC 0 Exhaust-B Temp Sensor              50 degrees C / 122 degrees F
  FPC 0 EA0 Temp Sensor                    67 degrees C / 152 degrees F
  FPC 0 EA0_XR0 Temp Sensor                69 degrees C / 156 degrees F
  FPC 0 EA0_XR1 Temp Sensor                73 degrees C / 163 degrees F
  FPC 0 EA1 Temp Sensor                    61 degrees C / 141 degrees F
  FPC 0 EA1_XR0 Temp Sensor                65 degrees C / 149 degrees F
  FPC 0 EA1_XR1 Temp Sensor                63 degrees C / 145 degrees F
  FPC 0 EA2 Temp Sensor                    69 degrees C / 156 degrees F
  FPC 0 EA2_XR0 Temp Sensor                73 degrees C / 163 degrees F
  FPC 0 EA2_XR1 Temp Sensor                72 degrees C / 161 degrees F
  FPC 0 EA3 Temp Sensor                    64 degrees C / 147 degrees F
  FPC 0 EA3_XR0 Temp Sensor                66 degrees C / 150 degrees F
  FPC 0 EA3_XR1 Temp Sensor                66 degrees C / 150 degrees F
  FPC 0 EA4 Temp Sensor                    70 degrees C / 158 degrees F
  FPC 0 EA4_XR0 Temp Sensor                72 degrees C / 161 degrees F
  FPC 0 EA4_XR1 Temp Sensor                72 degrees C / 161 degrees F
  FPC 0 EA5 Temp Sensor                    58 degrees C / 136 degrees F
  FPC 0 EA5_XR0 Temp Sensor                61 degrees C / 141 degrees F
  FPC 0 EA5_XR1 Temp Sensor                64 degrees C / 147 degrees F
  FPC 0 EA0_HMC0 Logic die                 75 degrees C / 167 degrees F
  FPC 0 EA0_HMC0 DRAM botm                 72 degrees C / 161 degrees F
  FPC 0 EA0_HMC1 Logic die                 76 degrees C / 168 degrees F
  FPC 0 EA0_HMC1 DRAM botm                 73 degrees C / 163 degrees F
  FPC 0 EA0_HMC2 Logic die                 77 degrees C / 170 degrees F
  FPC 0 EA0_HMC2 DRAM botm                 74 degrees C / 165 degrees F
  FPC 0 EA1_HMC0 Logic die                 72 degrees C / 161 degrees F
  FPC 0 EA1_HMC0 DRAM botm                 69 degrees C / 156 degrees F
  FPC 0 EA1_HMC1 Logic die                 73 degrees C / 163 degrees F
  FPC 0 EA1_HMC1 DRAM botm                 70 degrees C / 158 degrees F
  FPC 0 EA1_HMC2 Logic die                 72 degrees C / 161 degrees F
  FPC 0 EA1_HMC2 DRAM botm                 69 degrees C / 156 degrees F
  FPC 0 EA2_HMC0 Logic die                 80 degrees C / 176 degrees F
  FPC 0 EA2_HMC0 DRAM botm                 77 degrees C / 170 degrees F
  FPC 0 EA2_HMC1 Logic die                 81 degrees C / 177 degrees F
```



```
FPC 0 EA2_HMC1 DRAM botm            78 degrees C / 172 degrees F
FPC 0 EA2_HMC2 Logic die            80 degrees C / 176 degrees F
FPC 0 EA2_HMC2 DRAM botm            77 degrees C / 170 degrees F
FPC 0 EA3_HMC0 Logic die            77 degrees C / 170 degrees F
FPC 0 EA3_HMC0 DRAM botm            74 degrees C / 165 degrees F
FPC 0 EA3_HMC1 Logic die            78 degrees C / 172 degrees F
FPC 0 EA3_HMC1 DRAM botm            75 degrees C / 167 degrees F
FPC 0 EA3_HMC2 Logic die            77 degrees C / 170 degrees F
FPC 0 EA3_HMC2 DRAM botm            74 degrees C / 165 degrees F
FPC 0 EA4_HMC0 Logic die            80 degrees C / 176 degrees F
FPC 0 EA4_HMC0 DRAM botm            77 degrees C / 170 degrees F
FPC 0 EA4_HMC1 Logic die            81 degrees C / 177 degrees F
FPC 0 EA4_HMC1 DRAM botm            78 degrees C / 172 degrees F
FPC 0 EA4_HMC2 Logic die            80 degrees C / 176 degrees F
FPC 0 EA4_HMC2 DRAM botm            77 degrees C / 170 degrees F
FPC 0 EA5_HMC0 Logic die            69 degrees C / 156 degrees F
FPC 0 EA5_HMC0 DRAM botm            66 degrees C / 150 degrees F
FPC 0 EA5_HMC1 Logic die            68 degrees C / 154 degrees F
FPC 0 EA5_HMC1 DRAM botm            65 degrees C / 149 degrees F
FPC 0 EA5_HMC2 Logic die            68 degrees C / 154 degrees F
FPC 0 EA5_HMC2 DRAM botm            65 degrees C / 149 degrees F
Power
       12V SS 1                 12259 mV    9841 mA  120642 mW
       12V SS 2                 12259 mV   21054 mA  258104 mW
       12V SS 3                 12285 mV    9841 mA  120902 mW
       12V SS 4                 12232 mV   20968 mA  256496 mW
       12V SS 5                 12179 mV   14993 mA  182614 mW
       VDD 1.0V_A                1000 mV   95375 mA   95375 mW
       VDD 1.0V_B                   0 mV       0 mA       0 mW
       VDD 3.3V                  3298 mV   12500 mA   41235 mW
       VDD 0.9V                   894 mV    3569 mA    3192 mW
       ETH SW 1V                  980 mV    4500 mA    4410 mW
       VDD 1.8V                  1809 mV     895 mA    1619 mW
       PVCC                       951 mV       0 mA       0 mW
       PVNN                      1009 mV       0 mA       0 mW
       V1P0                      1006 mV       0 mA       0 mW
       V1P1                      1070 mV       0 mA       0 mW
       V1P3                      1351 mV       0 mA       0 mW
       VDDQ                      1500 mV       0 mA       0 mW
       V1P8                      1816 mV       0 mA       0 mW
       VDD3V3                    3296 mV       0 mA       0 mW
       V5V0_BIAS                 5025 mV       0 mA       0 mW
       VDD12V0                  12174 mV       0 mA       0 mW
       EA0 Core 0.9V              900 mV   40625 mA   36578 mW
       EA0 AVDD 1.0V             1000 mV   32500 mA   32500 mW
       EA0 HMC Core 0.9V          894 mV   10081 mA    9017 mW
       EA0 1.2V                  1189 mV   15081 mA   17945 mW
       EA01_HMC_VDDM 1.2V        1193 mV    -151 mA    -180 mW
       EA0_XR 0.906V              905 mV   13802 mA   12496 mW
       EA1 Core 0.9V              900 mV   41000 mA   36916 mW
       EA1 AVDD 1.0V             1000 mV   28000 mA   28000 mW
       EA1 HMC Core 0.9V          897 mV    9848 mA    8835 mW
       EA1 1.2V                  1197 mV   15313 mA   18332 mW
       EA0_PLL_1V0               1003 mV       0 mA       0 mW
       EA0_1V04                  1032 mV       0 mA       0 mW
       EA0_2V5                   2445 mV       0 mA       0 mW
       EA0_1V5                   1512 mV       0 mA       0 mW
       EA1_PLL_1V0               1000 mV       0 mA       0 mW
       EA1_1V04                  1051 mV       0 mA       0 mW
       EA1_2V5                   2516 mV       0 mA       0 mW
```



```
         EA1_1V5                     1503 mV       0 mA       0 mW
         EA1_XR 0.906V                908 mV   14151 mA   12850 mW
         EA2 Core 0.9V                899 mV   40625 mA   36538 mW
         EA2 AVDD 1.0V               1000 mV   27250 mA   27276 mW
         EA2 HMC Core 0.9V            897 mV    9616 mA    8627 mW
         EA2 1.2V                    1193 mV   15779 mA   18832 mW
         EA23_HMC_VDDM 1.2V          1197 mV      81 mA      97 mW
         EA2_XR 0.906V                908 mV   14848 mA   13484 mW
         EA3 Core 0.9V                899 mV   40625 mA   36538 mW
         EA3 AVDD 1.0V               1000 mV   28000 mA   28000 mW
         EA3 HMC Core 0.9V            897 mV   10546 mA    9461 mW
         EA3 1.2V                    1197 mV   15895 mA   19028 mW
         EA2_PLL_1V0                 1025 mV       0 mA       0 mW
         EA2_1V04                    1048 mV       0 mA       0 mW
         EA2_2V5                     2516 mV       0 mA       0 mW
         EA2_1V5                     1500 mV       0 mA       0 mW
         EA3_PLL_1V0                 1009 mV       0 mA       0 mW
         EA3_1V04                    1032 mV       0 mA       0 mW
         EA3_2V5                     2551 mV       0 mA       0 mW
         EA3_1V5                     1496 mV       0 mA       0 mW
         EA3_XR 0.906V                908 mV   15895 mA   14434 mW
         EA4 Core 0.9V                900 mV   41000 mA   36916 mW
         EA4 AVDD 1.0V                999 mV   31250 mA   31219 mW
         EA4 HMC Core 0.9V            894 mV    9965 mA    8913 mW
         EA4 1.2V                    1197 mV   15779 mA   18889 mW
         EA45_HMC_VDDM 1.2V          1197 mV     546 mA     654 mW
         EA4_XR 0.906V                908 mV   15197 mA   13801 mW
         EA5 Core 0.9V                900 mV   39750 mA   35790 mW
         EA5 AVDD 1.0V               1000 mV   28000 mA   28000 mW
         EA5 HMC Core 0.9V            897 mV    9965 mA    8940 mW
         EA5 1.2V                    1197 mV   15546 mA   18610 mW
         EA4_PLL_1V0                 1003 mV       0 mA       0 mW
         EA4_1V04                    1041 mV       0 mA       0 mW
         EA4_2V5                     2541 mV       0 mA       0 mW
         EA4_1V5                     1506 mV       0 mA       0 mW
         EA5_PLL_1V0                 1022 mV       0 mA       0 mW
         EA5_1V04                    1048 mV       0 mA       0 mW
         EA5_2V5                     2532 mV       0 mA       0 mW
         EA5_1V5                     1509 mV       0 mA       0 mW
         VDD2V5                      2503 mV       0 mA       0 mW
         VDD1V5                      1509 mV       0 mA       0 mW
         VDD1V2                      1206 mV       0 mA       0 mW
         EA5_XR 0.906V                902 mV   14500 mA   13088 mW
FPC 2 status:
  State                      Online
  FPC 2 Intake-A Temp Sensor             33 degrees C / 91 degrees F
  FPC 2 Exhaust-A Temp Sensor            52 degrees C / 125 degrees F
  FPC 2 Exhaust-B Temp Sensor            50 degrees C / 122 degrees F
  FPC 2 EA0 Temp Sensor                  72 degrees C / 161 degrees F
  FPC 2 EA0_XR0 Temp Sensor              76 degrees C / 168 degrees F
  FPC 2 EA0_XR1 Temp Sensor              79 degrees C / 174 degrees F
  FPC 2 EA1 Temp Sensor                  64 degrees C / 147 degrees F
  FPC 2 EA1_XR0 Temp Sensor              68 degrees C / 154 degrees F
  FPC 2 EA1_XR1 Temp Sensor              66 degrees C / 150 degrees F
  FPC 2 EA2 Temp Sensor                  75 degrees C / 167 degrees F
  FPC 2 EA2_XR0 Temp Sensor              81 degrees C / 177 degrees F
  FPC 2 EA2_XR1 Temp Sensor              81 degrees C / 177 degrees F
  FPC 2 EA3 Temp Sensor                  67 degrees C / 152 degrees F
  FPC 2 EA3_XR0 Temp Sensor              69 degrees C / 156 degrees F
  FPC 2 EA3_XR1 Temp Sensor              69 degrees C / 156 degrees F
```

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FPC 2 EA4 Temp Sensor              76 degrees C / 168 degrees F
FPC 2 EA4_XR0 Temp Sensor          77 degrees C / 170 degrees F
FPC 2 EA4_XR1 Temp Sensor          76 degrees C / 168 degrees F
FPC 2 EA5 Temp Sensor              60 degrees C / 140 degrees F
FPC 2 EA5_XR0 Temp Sensor          65 degrees C / 149 degrees F
FPC 2 EA5_XR1 Temp Sensor          65 degrees C / 149 degrees F
FPC 2 EA0_HMC0 Logic die           84 degrees C / 183 degrees F
FPC 2 EA0_HMC0 DRAM botm           81 degrees C / 177 degrees F
FPC 2 EA0_HMC1 Logic die           86 degrees C / 186 degrees F
FPC 2 EA0_HMC1 DRAM botm           83 degrees C / 181 degrees F
FPC 2 EA0_HMC2 Logic die           83 degrees C / 181 degrees F
FPC 2 EA0_HMC2 DRAM botm           80 degrees C / 176 degrees F
FPC 2 EA1_HMC0 Logic die           76 degrees C / 168 degrees F
FPC 2 EA1_HMC0 DRAM botm           73 degrees C / 163 degrees F
FPC 2 EA1_HMC1 Logic die           77 degrees C / 170 degrees F
FPC 2 EA1_HMC1 DRAM botm           74 degrees C / 165 degrees F
FPC 2 EA1_HMC2 Logic die           76 degrees C / 168 degrees F
FPC 2 EA1_HMC2 DRAM botm           73 degrees C / 163 degrees F
FPC 2 EA2_HMC0 Logic die           87 degrees C / 188 degrees F
FPC 2 EA2_HMC0 DRAM botm           84 degrees C / 183 degrees F
FPC 2 EA2_HMC1 Logic die           89 degrees C / 192 degrees F
FPC 2 EA2_HMC1 DRAM botm           86 degrees C / 186 degrees F
FPC 2 EA2_HMC2 Logic die           88 degrees C / 190 degrees F
FPC 2 EA2_HMC2 DRAM botm           85 degrees C / 185 degrees F
FPC 2 EA3_HMC0 Logic die           80 degrees C / 176 degrees F
FPC 2 EA3_HMC0 DRAM botm           77 degrees C / 170 degrees F
FPC 2 EA3_HMC1 Logic die           81 degrees C / 177 degrees F
FPC 2 EA3_HMC1 DRAM botm           78 degrees C / 172 degrees F
FPC 2 EA3_HMC2 Logic die           81 degrees C / 177 degrees F
FPC 2 EA3_HMC2 DRAM botm           78 degrees C / 172 degrees F
FPC 2 EA4_HMC0 Logic die           88 degrees C / 190 degrees F
FPC 2 EA4_HMC0 DRAM botm           85 degrees C / 185 degrees F
FPC 2 EA4_HMC1 Logic die           90 degrees C / 194 degrees F
FPC 2 EA4_HMC1 DRAM botm           87 degrees C / 188 degrees F
FPC 2 EA4_HMC2 Logic die           81 degrees C / 177 degrees F
FPC 2 EA4_HMC2 DRAM botm           78 degrees C / 172 degrees F
FPC 2 EA5_HMC0 Logic die           73 degrees C / 163 degrees F
FPC 2 EA5_HMC0 DRAM botm           70 degrees C / 158 degrees F
FPC 2 EA5_HMC1 Logic die           69 degrees C / 156 degrees F
FPC 2 EA5_HMC1 DRAM botm           66 degrees C / 150 degrees F
FPC 2 EA5_HMC2 Logic die           73 degrees C / 163 degrees F
FPC 2 EA5_HMC2 DRAM botm           70 degrees C / 158 degrees F
Power
       12V SS 1                 12285 mV    9408 mA  115582 mW
       12V SS 2                 12338 mV   20881 mA  257637 mW
       12V SS 3                 12351 mV   10317 mA  127430 mW
       12V SS 4                 12285 mV   21054 mA  258660 mW
       12V SS 5                 12153 mV   13954 mA  169591 mW
       VDD 1.0V_A                1000 mV   91000 mA   91000 mW
       VDD 1.0V_B                   0 mV       0 mA       0 mW
       VDD 3.3V                  3298 mV    9125 mA   30101 mW
       VDD 0.9V                   897 mV    3337 mA    2993 mW
       ETH SW 1V                    0 mV       0 mA       0 mW
       VDD 1.8V                  1809 mV    1127 mA    2040 mW
       PVCC                       835 mV       0 mA       0 mW
       PVNN                      1000 mV       0 mA       0 mW
       V1P0                      1003 mV       0 mA       0 mW
       V1P1                      1070 mV       0 mA       0 mW
       V1P3                      1348 mV       0 mA       0 mW
       VDDQ                      1493 mV       0 mA       0 mW
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```
         V1P8                           1806 mV        0 mA        0 mW
         VDD3V3                         3303 mV        0 mA        0 mW
         V5V0_BIAS                      5000 mV        0 mA        0 mW
         VDD12V0                       12116 mV        0 mA        0 mW
         EA0 Core 0.9V                   900 mV    38875 mA    35002 mW
         EA0 AVDD 1.0V                   999 mV    31875 mA    31843 mW
         EA0 HMC Core 0.9V               894 mV     9034 mA     8081 mW
         EA0 1.2V                       1197 mV    15430 mA    18471 mW
         EA01_HMC_VDDM 1.2V             1200 mV     -267 mA     -321 mW
         EA0_XR 0.906V                   908 mV    15430 mA    14012 mW
         EA1 Core 0.9V                   900 mV    38875 mA    35002 mW
         EA1 AVDD 1.0V                  1000 mV    28250 mA    28250 mW
         EA1 HMC Core 0.9V               899 mV     8802 mA     7920 mW
         EA1 1.2V                       1197 mV    15081 mA    18054 mW
         EA0_PLL_1V0                    1003 mV        0 mA        0 mW
         EA0_1V04                       1048 mV        0 mA        0 mW
         EA0_2V5                        2425 mV        0 mA        0 mW
         EA0_1V5                        1483 mV        0 mA        0 mW
         EA1_PLL_1V0                    1019 mV        0 mA        0 mW
         EA1_1V04                       1019 mV        0 mA        0 mW
         EA1_2V5                        2490 mV        0 mA        0 mW
         EA1_1V5                        1480 mV        0 mA        0 mW
         EA1_XR 0.906V                   908 mV    14965 mA    13590 mW
         EA2 Core 0.9V                   900 mV    44000 mA    39617 mW
         EA2 AVDD 1.0V                  1000 mV    28625 mA    28625 mW
         EA2 HMC Core 0.9V               891 mV    10546 mA     9404 mW
         EA2 1.2V                       1200 mV    15313 mA    18387 mW
         EA23_HMC_VDDM 1.2V             1193 mV     -267 mA     -319 mW
         EA2_XR 0.906V                   908 mV    15197 mA    13801 mW
         EA3 Core 0.9V                   900 mV    39750 mA    35790 mW
         EA3 AVDD 1.0V                  1000 mV    27750 mA    27750 mW
         EA3 HMC Core 0.9V               897 mV     9267 mA     8314 mW
         EA3 1.2V                       1197 mV    15430 mA    18471 mW
         EA2_PLL_1V0                    1009 mV        0 mA        0 mW
         EA2_1V04                       1041 mV        0 mA        0 mW
         EA2_2V5                        2496 mV        0 mA        0 mW
         EA2_1V5                        1493 mV        0 mA        0 mW
         EA3_PLL_1V0                    1003 mV        0 mA        0 mW
         EA3_1V04                       1041 mV        0 mA        0 mW
         EA3_2V5                        2490 mV        0 mA        0 mW
         EA3_1V5                        1500 mV        0 mA        0 mW
         EA3_XR 0.906V                   908 mV    15081 mA    13695 mW
         EA4 Core 0.9V                   899 mV    45750 mA    41148 mW
         EA4 AVDD 1.0V                  1000 mV    32250 mA    32250 mW
         EA4 HMC Core 0.9V               897 mV    10779 mA     9670 mW
         EA4 1.2V                       1193 mV    16011 mA    19110 mW
         EA45_HMC_VDDM 1.2V             1200 mV     -267 mA     -321 mW
         EA4_XR 0.906V                   905 mV    15779 mA    14286 mW
         EA5 Core 0.9V                   900 mV    38375 mA    34552 mW
         EA5 AVDD 1.0V                  1000 mV    27750 mA    27777 mW
         EA5 HMC Core 0.9V               899 mV     8453 mA     7606 mW
         EA5 1.2V                       1200 mV    14732 mA    17689 mW
         EA4_PLL_1V0                    1012 mV        0 mA        0 mW
         EA4_1V04                       1029 mV        0 mA        0 mW
         EA4_2V5                        2496 mV        0 mA        0 mW
         EA4_1V5                        1490 mV        0 mA        0 mW
         EA5_PLL_1V0                    1003 mV        0 mA        0 mW
         EA5_1V04                       1032 mV        0 mA        0 mW
         EA5_2V5                        2503 mV        0 mA        0 mW
         EA5_1V5                        1480 mV        0 mA        0 mW
```

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        VDD2V5                    2461 mV       0 mA       0 mW
        VDD1V5                    1490 mV       0 mA       0 mW
        VDD1V2                    1212 mV       0 mA       0 mW
        EA5_XR 0.906V              910 mV   13686 mA   12466 mW
FPC 3 status:
  State                      Online
  FPC 3 Intake-A Temp Sensor           30 degrees C / 86 degrees F
  FPC 3 Exhaust-A Temp Sensor          48 degrees C / 118 degrees F
  FPC 3 Exhaust-B Temp Sensor          45 degrees C / 113 degrees F
  FPC 3 EA0 Temp Sensor                60 degrees C / 140 degrees F
  FPC 3 EA0_XR0 Temp Sensor            65 degrees C / 149 degrees F
  FPC 3 EA0_XR1 Temp Sensor            67 degrees C / 152 degrees F
  FPC 3 EA1 Temp Sensor                54 degrees C / 129 degrees F
  FPC 3 EA1_XR0 Temp Sensor            60 degrees C / 140 degrees F
  FPC 3 EA1_XR1 Temp Sensor            58 degrees C / 136 degrees F
  FPC 3 EA2 Temp Sensor                62 degrees C / 143 degrees F
  FPC 3 EA2_XR0 Temp Sensor            67 degrees C / 152 degrees F
  FPC 3 EA2_XR1 Temp Sensor            67 degrees C / 152 degrees F
  FPC 3 EA3 Temp Sensor                55 degrees C / 131 degrees F
  FPC 3 EA3_XR0 Temp Sensor            57 degrees C / 134 degrees F
  FPC 3 EA3_XR1 Temp Sensor            57 degrees C / 134 degrees F
  FPC 3 EA4 Temp Sensor                69 degrees C / 156 degrees F
  FPC 3 EA4_XR0 Temp Sensor            71 degrees C / 159 degrees F
  FPC 3 EA4_XR1 Temp Sensor            70 degrees C / 158 degrees F
  FPC 3 EA5 Temp Sensor                55 degrees C / 131 degrees F
  FPC 3 EA5_XR0 Temp Sensor            58 degrees C / 136 degrees F
  FPC 3 EA5_XR1 Temp Sensor            59 degrees C / 138 degrees F
  FPC 3 EA0_HMC0 Logic die             69 degrees C / 156 degrees F
  FPC 3 EA0_HMC0 DRAM botm             66 degrees C / 150 degrees F
  FPC 3 EA0_HMC1 Logic die             70 degrees C / 158 degrees F
  FPC 3 EA0_HMC1 DRAM botm             67 degrees C / 152 degrees F
  FPC 3 EA0_HMC2 Logic die             70 degrees C / 158 degrees F
  FPC 3 EA0_HMC2 DRAM botm             67 degrees C / 152 degrees F
  FPC 3 EA1_HMC0 Logic die             68 degrees C / 154 degrees F
  FPC 3 EA1_HMC0 DRAM botm             65 degrees C / 149 degrees F
  FPC 3 EA1_HMC1 Logic die             65 degrees C / 149 degrees F
  FPC 3 EA1_HMC1 DRAM botm             62 degrees C / 143 degrees F
  FPC 3 EA1_HMC2 Logic die             64 degrees C / 147 degrees F
  FPC 3 EA1_HMC2 DRAM botm             61 degrees C / 141 degrees F
  FPC 3 EA2_HMC0 Logic die             74 degrees C / 165 degrees F
  FPC 3 EA2_HMC0 DRAM botm             71 degrees C / 159 degrees F
  FPC 3 EA2_HMC1 Logic die             77 degrees C / 170 degrees F
  FPC 3 EA2_HMC1 DRAM botm             74 degrees C / 165 degrees F
  FPC 3 EA2_HMC2 Logic die             74 degrees C / 165 degrees F
  FPC 3 EA2_HMC2 DRAM botm             71 degrees C / 159 degrees F
  FPC 3 EA3_HMC0 Logic die             70 degrees C / 158 degrees F
  FPC 3 EA3_HMC0 DRAM botm             67 degrees C / 152 degrees F
  FPC 3 EA3_HMC1 Logic die             68 degrees C / 154 degrees F
  FPC 3 EA3_HMC1 DRAM botm             65 degrees C / 149 degrees F
  FPC 3 EA3_HMC2 Logic die             68 degrees C / 154 degrees F
  FPC 3 EA3_HMC2 DRAM botm             65 degrees C / 149 degrees F
  FPC 3 EA4_HMC0 Logic die             82 degrees C / 179 degrees F
  FPC 3 EA4_HMC0 DRAM botm             79 degrees C / 174 degrees F
  FPC 3 EA4_HMC1 Logic die             80 degrees C / 176 degrees F
  FPC 3 EA4_HMC1 DRAM botm             77 degrees C / 170 degrees F
  FPC 3 EA4_HMC2 Logic die             81 degrees C / 177 degrees F
  FPC 3 EA4_HMC2 DRAM botm             78 degrees C / 172 degrees F
  FPC 3 EA5_HMC0 Logic die             69 degrees C / 156 degrees F
  FPC 3 EA5_HMC0 DRAM botm             66 degrees C / 150 degrees F
  FPC 3 EA5_HMC1 Logic die             70 degrees C / 158 degrees F
```



```
FPC 3 EA5_HMC1 DRAM botm                67 degrees C / 152 degrees F
FPC 3 EA5_HMC2 Logic die                69 degrees C / 156 degrees F
FPC 3 EA5_HMC2 DRAM botm                66 degrees C / 150 degrees F
Power
       12V SS 1                   12259 mV    9538 mA  116927 mW
       12V SS 2                   12259 mV   20491 mA  251202 mW
       12V SS 3                   12298 mV    9711 mA  119433 mW
       12V SS 4                   12219 mV   20491 mA  250391 mW
       12V SS 5                   12206 mV   10447 mA  127520 mW
       VDD 1.0V_A                  1000 mV   42250 mA   42291 mW
       VDD 1.0V_B                   996 mV    8918 mA    8890 mW
       VDD 3.3V                    3301 mV   10375 mA   34255 mW
       VDD 0.9V                     897 mV    3569 mA    3202 mW
       ETH SW 1V                    983 mV    4267 mA    4195 mW
       VDD 1.8V                    1812 mV    1825 mA    3309 mW
       PVCC                         974 mV       0 mA       0 mW
       PVNN                        1003 mV       0 mA       0 mW
       V1P0                        1003 mV       0 mA       0 mW
       V1P1                        1070 mV       0 mA       0 mW
       V1P3                        1351 mV       0 mA       0 mW
       VDDQ                        1496 mV       0 mA       0 mW
       V1P8                        1809 mV       0 mA       0 mW
       VDD3V3                      3309 mV       0 mA       0 mW
       V5V0_BIAS                   4987 mV       0 mA       0 mW
       VDD12V0                    12212 mV       0 mA       0 mW
       EA0 Core 0.9V                900 mV   38125 mA   34327 mW
       EA0 AVDD 1.0V                999 mV   31125 mA   31094 mW
       EA0 HMC Core 0.9V            897 mV    9500 mA    8522 mW
       EA0 1.2V                    1193 mV   15430 mA   18416 mW
       EA01_HMC_VDDM 1.2V          1193 mV     313 mA     374 mW
       EA0_XR 0.906V                913 mV   14965 mA   13671 mW
       EA1 Core 0.9V                900 mV   39750 mA   35790 mW
       EA1 AVDD 1.0V               1000 mV   26000 mA   26000 mW
       EA1 HMC Core 0.9V            897 mV    8918 mA    8001 mW
       EA1 1.2V                    1200 mV   15779 mA   18946 mW
       EA0_PLL_1V0                 1003 mV       0 mA       0 mW
       EA0_1V04                    1019 mV       0 mA       0 mW
       EA0_2V5                     2448 mV       0 mA       0 mW
       EA0_1V5                     1470 mV       0 mA       0 mW
       EA1_PLL_1V0                 1016 mV       0 mA       0 mW
       EA1_1V04                    1035 mV       0 mA       0 mW
       EA1_2V5                     2506 mV       0 mA       0 mW
       EA1_1V5                     1483 mV       0 mA       0 mW
       EA1_XR 0.906V                908 mV   13918 mA   12639 mW
       EA2 Core 0.9V                900 mV   38625 mA   34777 mW
       EA2 AVDD 1.0V               1000 mV   26375 mA   26400 mW
       EA2 HMC Core 0.9V            897 mV    9383 mA    8418 mW
       EA2 1.2V                    1200 mV   15779 mA   18946 mW
       EA23_HMC_VDDM 1.2V          1193 mV      81 mA      97 mW
       EA2_XR 0.906V                908 mV   13918 mA   12639 mW
       EA3 Core 0.9V                899 mV   40250 mA   36201 mW
       EA3 AVDD 1.0V               1000 mV   26750 mA   26776 mW
       EA3 HMC Core 0.9V            894 mV    9267 mA    8289 mW
       EA3 1.2V                    1197 mV   16127 mA   19306 mW
       EA2_PLL_1V0                  993 mV       0 mA       0 mW
       EA2_1V04                    1045 mV       0 mA       0 mW
       EA2_2V5                     2474 mV       0 mA       0 mW
       EA2_1V5                     1490 mV       0 mA       0 mW
       EA3_PLL_1V0                  980 mV       0 mA       0 mW
       EA3_1V04                    1032 mV       0 mA       0 mW
```



```
         EA3_2V5                     2506 mV       0 mA       0 mW
         EA3_1V5                     1474 mV       0 mA       0 mW
         EA3_XR 0.906V                910 mV   14732 mA   13419 mW
         EA4 Core 0.9V                900 mV   42500 mA   38266 mW
         EA4 AVDD 1.0V               1000 mV   32250 mA   32281 mW
         EA4 HMC Core 0.9V            899 mV   10081 mA    9071 mW
         EA4 1.2V                    1193 mV   16360 mA   19526 mW
         EA45_HMC_VDDM 1.2V          1193 mV     662 mA     791 mW
         EA4_XR 0.906V                908 mV   15430 mA   14012 mW
         EA5 Core 0.9V                899 mV   37000 mA   33278 mW
         EA5 AVDD 1.0V               1000 mV   26125 mA   26150 mW
         EA5 HMC Core 0.9V            897 mV    9267 mA    8314 mW
         EA5 1.2V                    1197 mV   15662 mA   18750 mW
         EA4_PLL_1V0                 1000 mV       0 mA       0 mW
         EA4_1V04                    1029 mV       0 mA       0 mW
         EA4_2V5                     2487 mV       0 mA       0 mW
         EA4_1V5                     1496 mV       0 mA       0 mW
         EA5_PLL_1V0                 1009 mV       0 mA       0 mW
         EA5_1V04                    1032 mV       0 mA       0 mW
         EA5_2V5                     2503 mV       0 mA       0 mW
         EA5_1V5                     1496 mV       0 mA       0 mW
         VDD2V5                      2483 mV       0 mA       0 mW
         VDD1V5                      1470 mV       0 mA       0 mW
         VDD1V2                      1203 mV       0 mA       0 mW
         EA5_XR 0.906V                908 mV   14500 mA   13167 mW
```

show chassis environment fpc (T320, T640, and T1600 Routers)

`user@host>` **show chassis environment fpc**

```
FPC 0 status:
  State                            Online
  Temperature Top              42 degrees C / 107 degrees F
  Temperature Bottom           36 degrees C / 96 degrees F
  Temperature MMB1             39 degrees C / 102 degrees F
  Power:
    1.8 V                    1959 mV
    2.5 V                    2495 mV
    3.3 V                    3344 mV
    5.0 V                    5047 mV
    1.8 V bias               1787 mV
    3.3 V bias               3291 mV
    5.0 V bias               4998 mV
    8.0 V bias               7343 mV
  BUS Revision                 40
FPC 1 status:
  State                            Online
  Temperature Top              42 degrees C / 107 degrees F
  Temperature Bottom           39 degrees C / 102 degrees F
  Temperature MMB1             40 degrees C / 104 degrees F
  Power:
    1.8 V                    1956 mV
    2.5 V                    2498 mV
    3.3 V                    3340 mV
    5.0 V                    5023 mV
    1.8 V bias               1782 mV
    3.3 V bias               3277 mV
    5.0 V bias               4989 mV
    8.0 V bias               7289 mV
  BUS Revision                 40
```



```
FPC 2 status:
  State                            Online
  Temperature Top               43 degrees C / 109 degrees F
  Temperature Bottom            39 degrees C / 102 degrees F
  Temperature MMB1              41 degrees C / 105 degrees F
  Power:
    1.8 V                     1963 mV
    2.5 V                     2503 mV
    3.3 V                     3340 mV
    5.0 V                     5042 mV
    1.8 V bias                1797 mV
    3.3 V bias                3311 mV
    5.0 V bias                5013 mV
    8.0 V bias                7221 mV
  BUS Revision                  40
```

show chassis environment fpc (T4000 Router)

user@host> **show chassis environment fpc**

```
FPC 0 status:
  State                       Online
  Fan Intake                  34 degrees C / 93 degrees F
  Fan Exhaust                 48 degrees C / 118 degrees F
  PMB                         47 degrees C / 116 degrees F
  LMB0                        50 degrees C / 122 degrees F
  LMB1                        41 degrees C / 105 degrees F
  LMB2                        35 degrees C / 95 degrees F
  PFE1 LU2                    46 degrees C / 114 degrees F
  PFE1 LU0                    41 degrees C / 105 degrees F
  PFE0 LU0                    57 degrees C / 134 degrees F
  XF1                         47 degrees C / 116 degrees F
  XF0                         52 degrees C / 125 degrees F
  XM1                         41 degrees C / 105 degrees F
  XM0                         50 degrees C / 122 degrees F
  PFE0 LU1                    56 degrees C / 132 degrees F
  PFE0 LU2                    45 degrees C / 113 degrees F
  PFE1 LU1                    37 degrees C / 98 degrees F
  Power 1
    1.0 V                       991 mV
    1.2 V bias                 1195 mV
    1.8 V                      1788 mV
    2.5 V                      2483 mV
    3.3 V                      3289 mV
    3.3 V bias                 3299 mV
    12.0 V A                  10608 mV
    12.0 V B                  10637 mV
  Power 2
    0.9 V                       881 mV
    0.9 V PFE0                  916 mV
    0.9 V PFE1                  903 mV
    1.0 V PFE0                 1012 mV
    1.0 V PFE1                 1002 mV
    1.1 V                      1095 mV
    1.5 V_0                    1494 mV
    1.5 V_1                    1479 mV
  Power 3
    1.0 V PFE0                 1000 mV
    1.0 V PFE1                 1002 mV
    1.0 V PFE0 *                995 mV
```

```
    1.0 V PFE1 *               995 mV
    1.8 V PFE 0               1788 mV
    1.8 V PFE 1               1789 mV
    2.5 V                     2482 mV
    12.0 V                   11614 mV
  Power 4
    1.0 V PFE0 LU0            1003 mV
    1.0 V PFE1 LU0            1003 mV
    1.0 V PFE1 LU2            1004 mV
    1.0 V PFE0 LU0 *           995 mV
    1.0 V PFE1 LU0 *           998 mV
    1.0 V PFE1 LU2 *           996 mV
    12.0 V                   11643 mV
    12.0 V C                 11711 mV
  Power (Base/PMB/MMB)
    LMB0 VDD2V5               2488 mV
    LMB0 VDD1V8               1788 mV
    LMB0 VDD1V5               1496 mV
    LMB0 PFE0 LU0 AVDD1V0     1002 mV
    LMB0 PFE0 LU0 VDD1V0      1000 mV
    LMB0 VDD12V0             10752 mV
    LMB1 VDD2V5               2472 mV
    LMB1 VDD1V8               1792 mV
    LMB1 VDD1V5               1480 mV
    LMB1 PFE0 LU2 AVDD1V0      994 mV
    LMB1 PFE0 LU2 VDD1V0      1002 mV
    LMB1 VDD12V0             10800 mV
    LMB2 VDD2V5               2472 mV
    LMB2 VDD1V8               1792 mV
    LMB2 VDD1V5               1486 mV
    LMB2 PFE1 LU1 AVDD1V0      996 mV
    LMB2 PFE1 LU1 VDD1V0       998 mV
    LMB2 VDD12V0             10704 mV
    PMB 1.05v                 1049 mV
    PMB 1.5v                  1500 mV
    PMB 2.5v                  2500 mV
    PMB 3.3v                  3299 mV
  Bus Revision               113
FPC 3 status:
  State                      Online
  Fan Intake                 37 degrees C / 98 degrees F
  Fan Exhaust                51 degrees C / 123 degrees F
  PMB                        43 degrees C / 109 degrees F
  LMB0                       57 degrees C / 134 degrees F
  LMB1                       54 degrees C / 129 degrees F
  LMB2                       38 degrees C / 100 degrees F
  PFE1 LU2                   63 degrees C / 145 degrees F
  PFE1 LU0                   45 degrees C / 113 degrees F
  PFE0 LU0                   69 degrees C / 156 degrees F
  XF1                        62 degrees C / 143 degrees F
  XF0                        63 degrees C / 145 degrees F
  XM1                        43 degrees C / 109 degrees F
  XM0                        67 degrees C / 152 degrees F
  PFE0 LU1                   63 degrees C / 145 degrees F
  PFE0 LU2                   66 degrees C / 150 degrees F
  PFE1 LU1                   41 degrees C / 105 degrees F
  Power 1
    1.0 V                     1002 mV
    1.2 V bias                1201 mV
    1.8 V                     1785 mV
```



```
    2.5 V                      2485 mV
    3.3 V                      3288 mV
    3.3 V bias                 3285 mV
    12.0 V A                  10412 mV
    12.0 V B                  10515 mV
  Power 2
    0.9 V                       882 mV
    0.9 V PFE0                  920 mV
    0.9 V PFE1                  905 mV
    1.0 V PFE0                 1015 mV
    1.0 V PFE1                 1001 mV
    1.1 V                      1094 mV
    1.5 V_0                    1495 mV
    1.5 V_1                    1478 mV
  Power 3
    0.92 V PFE1                 998 mV
    1.0 V PFE0                  997 mV
    1.0 V PFE0 *                992 mV
    1.0 V PFE1 *                991 mV
    1.8 V PFE 0                1780 mV
    1.8 V PFE 1                1797 mV
    2.5 V                      2492 mV
    12.0 V                    11604 mV
  Power 4
    1.0 V PFE0 LU0             1003 mV
    1.0 V PFE1 LU0             1004 mV
    1.0 V PFE1 LU2             1003 mV
    1.0 V PFE0 LU0 *           1000 mV
    1.0 V PFE1 LU0 *           1001 mV
    1.0 V PFE1 LU2 *           1003 mV
    12.0 V                    11653 mV
    12.0 V C                  11672 mV
  Power (Base/PMB/MMB)
    LMB0 VDD2V5                2512 mV
    LMB0 VDD1V8                1790 mV
    LMB0 VDD1V5                1500 mV
    LMB0 PFE0 LU0 AVDD1V0      1004 mV
    LMB0 PFE0 LU0 VDD1V0       1002 mV
    LMB0 VDD12V0              10608 mV
    LMB1 VDD2V5                2472 mV
    LMB1 VDD1V8                1788 mV
    LMB1 VDD1V5                1480 mV
    LMB1 PFE0 LU2 AVDD1V0      1000 mV
    LMB1 PFE0 LU2 VDD1V0       1004 mV
    LMB1 VDD12V0              10672 mV
    LMB2 VDD2V5                2488 mV
    LMB2 VDD1V8                1798 mV
    LMB2 VDD1V5                1494 mV
    LMB2 PFE1 LU1 AVDD1V0      1000 mV
    LMB2 PFE1 LU1 VDD1V0       1004 mV
    LMB2 VDD12V0              10528 mV
    PMB 1.05v                  1050 mV
    PMB 1.5v                   1500 mV
    PMB 2.5v                   2499 mV
    PMB 3.3v                   3299 mV
  Bus Revision                113
FPC 5 status:
  State                       Online
  Temperature Top             39 degrees C / 102 degrees F
  Temperature Bottom          38 degrees C / 100 degrees F
```

```
  Power
    1.8 V                    1804 mV
    1.8 V bias               1802 mV
    3.3 V                    3294 mV
    3.3 V bias               3277 mV
    5.0 V bias               5008 mV
    5.0 V TOP                5067 mV
    8.0 V bias               6642 mV
  Power (Base/PMB/MMB)
    1.2 V                    1202 mV
    1.5 V                    1504 mV
    5.0 V BOT                5079 mV
    12.0 V TOP Base         11848 mV
    12.0 V BOT Base         11780 mV
    1.1 V PMB                1111 mV
    1.2 V PMB                1189 mV
    1.5 V PMB                1494 mV
    1.8 V PMB                1819 mV
    2.5 V PMB                2503 mV
    3.3 V PMB                3294 mV
    5.0 V PMB                5035 mV
    12.0  V PMB             11788 mV
    0.75 MMB TOP              766 mV
    1.5 V MMB TOP            1484 mV
    1.8 V MMB TOP            1772 mV
    2.5 V MMB TOP            2485 mV
    1.2 V MMB TOP            1137 mV
    5.0 V MMB TOP            4946 mV
    12.0 V MMB TOP          11772 mV
    3.3 V MMB TOP            3289 mV
    0.75 MMB BOT              759 mV
    1.5 V MMB BOT            1482 mV
    1.8 V MMB BOT            1792 mV
    2.5 V MMB BOT            2490 mV
    1.2 V MMB BOT            1145 mV
    5.0 V MMB BOT            4922 mV
    12.0 V MMB BOT          11625 mV
    3.3 V MMB BOT            3282 mV
    APS 00                   2495 mV
    APS 01                   3308 mV
    APS 02                   3301 mV
    5.0 V PIC 0              4967 mV
    APS 10                   2512 mV
    APS 11                   3316 mV
    APS 12                   3304 mV
    5.0 V PIC 1              5081 mV
  Bus Revision              49
FPC 6 status:
  State                     Online
  Fan Intake                34 degrees C / 93 degrees F
  Fan Exhaust               49 degrees C / 120 degrees F
  PMB                       40 degrees C / 104 degrees F
  LMB0                      60 degrees C / 140 degrees F
  LMB1                      58 degrees C / 136 degrees F
  LMB2                      40 degrees C / 104 degrees F
  PFE1 LU2                  69 degrees C / 156 degrees F
  PFE1 LU0                  45 degrees C / 113 degrees F
  PFE0 LU0                  71 degrees C / 159 degrees F
  XF1                       58 degrees C / 136 degrees F
  XF0                       65 degrees C / 149 degrees F
```



```
XM1                           40 degrees C / 104 degrees F
XM0                           66 degrees C / 150 degrees F
PFE0 LU1                      69 degrees C / 156 degrees F
PFE0 LU2                      68 degrees C / 154 degrees F
PFE1 LU1                      42 degrees C / 107 degrees F
Power 1
  1.0 V                         998 mV
  1.2 V bias                   1191 mV
  1.8 V                        1781 mV
  2.5 V                        2487 mV
  3.3 V                        3302 mV
  3.3 V bias                   3300 mV
  12.0 V A                    10388 mV
  12.0 V B                    10388 mV
Power 2
  0.9 V                         902 mV
  0.9 V PFE0                    921 mV
  0.9 V PFE1                    907 mV
  1.0 V PFE0                    996 mV
  1.0 V PFE1                    974 mV
  1.1 V                        1095 mV
  1.5 V_0                      1495 mV
  1.5 V_1                      1478 mV
Power 3
  1.0 V PFE0                    997 mV
  1.0 V PFE1                    998 mV
  1.0 V PFE0 *                  993 mV
  1.0 V PFE1 *                  991 mV
  1.8 V PFE 0                  1796 mV
  1.8 V PFE 1                  1789 mV
  2.5 V                        2465 mV
  12.0 V                      11609 mV
Power 4
  1.0 V PFE0 LU0               1003 mV
  1.0 V PFE1 LU0               1006 mV
  1.0 V PFE1 LU2               1002 mV
  1.0 V PFE0 LU0 *             1000 mV
  1.0 V PFE1 LU0 *              998 mV
  1.0 V PFE1 LU2 *              998 mV
  12.0 V                      11638 mV
  12.0 V C                    11702 mV
Power (Base/PMB/MMB)
  LMB0 VDD2V5                  2484 mV
  LMB0 VDD1V8                  1780 mV
  LMB0 VDD1V5                  1496 mV
  LMB0 PFE0 LU0 AVDD1V0         998 mV
  LMB0 PFE0 LU0 VDD1V0         1004 mV
  LMB0 VDD12V0                10528 mV
  LMB1 VDD2V5                  2472 mV
  LMB1 VDD1V8                  1776 mV
  LMB1 VDD1V5                  1474 mV
  LMB1 PFE0 LU2 AVDD1V0         994 mV
  LMB1 PFE0 LU2 VDD1V0         1004 mV
  LMB1 VDD12V0                10544 mV
  LMB2 VDD2V5                  2476 mV
  LMB2 VDD1V8                  1790 mV
  LMB2 VDD1V5                  1492 mV
  LMB2 PFE1 LU1 AVDD1V0         996 mV
  LMB2 PFE1 LU1 VDD1V0         1010 mV
  LMB2 VDD12V0                10528 mV
```

```
    PMB 1.05v                  1050 mV
    PMB 1.5v                   1499 mV
    PMB 2.5v                   2500 mV
    PMB 3.3v                   3300 mV
  Bus Revision                80
```

show chassis environment fpc lcc (TX Matrix Router)

user@host> **show chassis environment fpc lcc 0**

```
lcc0-re0:
--------------------------------------------------------------------------
FPC 1 status:
  State                           Online
  Temperature Top              30 degrees C / 86 degrees F
  Temperature Bottom           25 degrees C / 77 degrees F
  Temperature MMB0                Absent
  Temperature MMB1             27 degrees C / 80 degrees F
  Power:
    1.8 V                    1813 mV
    2.5 V                    2504 mV
    3.3 V                    3338 mV
    5.0 V                    5037 mV
    1.8 V bias               1797 mV
    3.3 V bias               3301 mV
    5.0 V bias               5013 mV
    8.0 V bias               7345 mV
  BUS Revision                 40
FPC 2 status:
  State                           Online
  Temperature Top              37 degrees C / 98 degrees F
  Temperature Bottom           26 degrees C / 78 degrees F
  Temperature MMB0             32 degrees C / 89 degrees F
  Temperature MMB1             27 degrees C / 80 degrees F
  Power:
    1.8 V                    1791 mV
    2.5 V                    2517 mV
    3.3 V                    3308 mV
    5.0 V                    5052 mV
    1.8 V bias               1797 mV
    3.3 V bias               3289 mV
    5.0 V bias               4991 mV
    8.0 V bias               7477 mV
  BUS Revision                 40
```

show chassis environment fpc lcc (TX Matrix Plus Router)

user@host> **show chassis environment fpc lcc 0**

```
lcc0-re0:
--------------------------------------------------------------------------
FPC 1 status:
  State                      Online
  Temperature Top            46 degrees C / 114 degrees F
  Temperature Bottom         47 degrees C / 116 degrees F
  Power
    1.8 V                     1788 mV
    1.8 V bias                1787 mV
    3.3 V                     3321 mV
```



```
    3.3 V bias                  3306 mV
    5.0 V bias                  5018 mV
    5.0 V TOP                   5037 mV
    8.0 V bias                  7223 mV
  Power (Base/PMB/MMB)
    1.2 V                       1205 mV
    1.5 V                       1503 mV
    5.0 V BOT                   5084 mV
    12.0 V TOP Base            11775 mV
    12.0 V BOT Base            11794 mV
    1.1 V PMB                   1108 mV
    1.2 V PMB                   1196 mV
    1.5 V PMB                   1499 mV
    1.8 V PMB                   1811 mV
    2.5 V PMB                   2515 mV
    3.3 V PMB                   3318 mV
    5.0 V PMB                   5030 mV
    12.0  V PMB                11832 mV
    0.75 MMB TOP                 752 mV
    1.5 V MMB TOP               1489 mV
    1.8 V MMB TOP               1782 mV
    2.5 V MMB TOP               2498 mV
    1.2 V MMB TOP               1155 mV
    5.0 V MMB TOP               4902 mV
    12.0 V MMB TOP             11721 mV
    3.3 V MMB TOP               3316 mV
    0.75 MMB BOT                 754 mV
    1.5 V MMB BOT               1482 mV
    1.8 V MMB BOT               1758 mV
    2.5 V MMB BOT               2488 mV
    1.2 V MMB BOT               1157 mV
    5.0 V MMB BOT               4962 mV
    12.0 V MMB BOT             11691 mV
    3.3 V MMB BOT               3308 mV
    APS 00                      1484 mV
    APS 01                      2503 mV
    APS 02                      3313 mV
    5.0 V PIC 0                 5025 mV
    APS 10                      1501 mV
    APS 11                      2466 mV
    APS 12                      3311 mV
    5.0 V PIC 1                 5081 mV
  Bus Revision                 49
```

show chassis environment fpc (QFX Series and OCX Series)

`user@switch>` **show chassis environment fpc 0**

```
FPC 0 status:
  State                        Online
  Temperature                  42 degrees C / 107 degrees F
```

show chassis environment fpc interconnect-device (QFabric Systems)

`user@switch>` **show chassis environment fpc interconnect-device interconnect1 0**

```
FC 0 FPC 0 status:
  State                        Online
  Left Intake Temperature      24 degrees C / 75 degrees F
```

```
  Right Intake Temperature   24 degrees C / 75 degrees F
  Left Exhaust Temperature   27 degrees C / 80 degrees F
  Right Exhaust Temperature  27 degrees C / 80 degrees F
  Power
    BIAS 3V3                  3330 mV
    VDD 3V3                   3300 mV
    VDD 2V5                   2502 mV
    VDD 1V5                   1496 mV
    VDD 1V2                   1194 mV
    VDD 1V0                   1000 mV
    SW0 VDD  1V0              1020 mV
    SW0 CVDD 1V025            1032 mV
    SW1 VDD  1V0              1022 mV
    SW1 CVDD 1V025            1030 mV
    VDD 12V0 DIV3_33          3414 mV
```

show chassis environment fpc 5(PTX3000 Packet Transport Router)

user@host> **show chassis environment fpc 5**

```
FPC 5 status:
  State                      Online
  Intake Temperature         31 degrees C / 87 degrees F
  Exhaust Temperature        41 degrees C / 105 degrees F
  Power
    FPC 12.0v                  12221 mV
    FPC VCC 0.5-1.3v            1640 mV
    FPC VNN 0.5-1.3v            1640 mV
    FPC 1.0v                    1640 mV
    FPC 1.1v                    1640 mV
    FPC 1.35v                   1640 mV
    FPC VDDQ 1.5v               1640 mV
    FPC 1.8v                    1640 mV
    FPC 3.3v                    3280 mV
    FPC 5.0v bias               5143 mV
    FPC 5.0v usb                5143 mV
    FPC VCC 12.0v              12289 mV
    FPC Vref 3.3v               3280 mV
    MAIN 12.0v-i                2265 mA
```

show chassis environment fpc 0 (PTX5000 Packet Transport Router)

user@host> **show chassis environment fpc 0**

```
FPC 0 status:
  State                      Online
  PMB Temperature            35 degrees C / 95 degrees F
  Intake Temperature         33 degrees C / 91 degrees F
  Exhaust A Temperature      51 degrees C / 123 degrees F
  Exhaust B Temperature      43 degrees C / 109 degrees F
  TL0 Temperature            48 degrees C / 118 degrees F
  TQ0 Temperature            53 degrees C / 127 degrees F
  TL1 Temperature            56 degrees C / 132 degrees F
  TQ1 Temperature            58 degrees C / 136 degrees F
  TL2 Temperature            55 degrees C / 131 degrees F
  TQ2 Temperature            57 degrees C / 134 degrees F
  TL3 Temperature            59 degrees C / 138 degrees F
  TQ3 Temperature            59 degrees C / 138 degrees F
  Power
```



```
    PMB   1.05v                 1049 mV
    PMB   1.5v                  1500 mV
    PMB   2.5v                  2500 mV
    PMB   3.3v                  3299 mV
    PFE0  1.5v                  1500 mV
    PFE0  1.0v                   999 mV
    TQ0   0.9v                   900 mV
    TL0   0.9v                   900 mV
    PFE1  1.5v                  1499 mV
    PFE1  1.0v                   999 mV
    TQ1   0.9v                   899 mV
    TL1   0.9v                   900 mV
    PFE2  1.5v                  1500 mV
    PFE2  1.0v                  1000 mV
    TQ2   0.9v                   900 mV
    TL2   0.9v                   900 mV
    PFE3  1.5v                  1499 mV
    PFE3  1.0v                  1000 mV
    TQ3   0.9v                   900 mV
    TL3   0.9v                   900 mV
    Bias  3.3v                  3327 mV
    FPC   3.3v                  3300 mV
    FPC   2.5v                  2500 mV
    SAM   0.9v                   900 mV
    A    12.0v                  2014 mV
    B    12.0v                  2030 mV
```

show chassis environment fpc 07 (PTX5000 Packet Transport Router with FPC2-PTX-P1A)

`user@host>` **show chassis environment fpc 07**

```
FPC 7 status:
  State                        Online
  PMB TEMP0 Temperature        32 degrees C / 89 degrees F
  PMB TEMP1 Temperature        28 degrees C / 82 degrees F
  PMB CPU Temperature          46 degrees C / 114 degrees F
  Intake Temperature           35 degrees C / 95 degrees F
  Exhaust A Temperature        55 degrees C / 131 degrees F
  Exhaust B Temperature        54 degrees C / 129 degrees F
  TL5 Temperature              59 degrees C / 138 degrees F
  TQ5 Temperature              57 degrees C / 134 degrees F
  TL6 Temperature              57 degrees C / 134 degrees F
  TQ6 Temperature              51 degrees C / 123 degrees F
  TL1 Temperature              76 degrees C / 168 degrees F
  TQ1 Temperature              58 degrees C / 136 degrees F
  TL2 Temperature              75 degrees C / 167 degrees F
  TQ2 Temperature              57 degrees C / 134 degrees F
  TL4 Temperature              52 degrees C / 125 degrees F
  TQ4 Temperature              66 degrees C / 150 degrees F
  TL7 Temperature              52 degrees C / 125 degrees F
  TQ7 Temperature              60 degrees C / 140 degrees F
  TL0 Temperature              72 degrees C / 161 degrees F
  TQ0 Temperature              73 degrees C / 163 degrees F
  TL3 Temperature              64 degrees C / 147 degrees F
  TQ3 Temperature              70 degrees C / 158 degrees F
  Power
    PMB   1.05v                 1049 mV
    PMB   3.3v                  3299 mV
    PMB   1.1v-a                1100 mV
    PMB   1.5v                  1499 mV
```

```
    PMB   1.1v-b              1100 mV
    Base  3.3v                3300 mV
    FPC Base  2.5v            2499 mV
    TL1   0.9v                 897 mV
    TQ1   0.9v                 897 mV
    PFE1  1.0v                 999 mV
    PFE1  1.5v                1499 mV
    TL2   0.9v                 897 mV
    TQ2   0.9v                 897 mV
    PFE2  1.0v                 999 mV
    PFE2  1.5v                1499 mV
    FPC Base  1.0v            1000 mV
    FPC Base  1.2v            1199 mV
    TL5   0.9v                 898 mV
    TQ5   0.9v                 898 mV
    PFE5  1.0v                1000 mV
    PFE5  1.5v                1500 mV
    TL6   0.9v                 897 mV
    TQ6   0.9v                 897 mV
    PFE6  1.0v                1000 mV
    PFE6  1.5v                1499 mV
    Mezz Base  2.5v           2500 mV
    TL0   0.9v                 896 mV
    TQ0   0.9v                 896 mV
    PFE0  1.0v                 999 mV
    PFE0  1.5v                1499 mV
```

show chassis environment fpc (PTX10008 router)

user@host> **show chassis environment fpc**

```
FPC 0 status:
  State                      Online
  FPC 0 Intake-A Temp Sensor 37 degrees C / 98 degrees F
  FPC 0 Intake-B Temp Sensor 34 degrees C / 93 degrees F
  FPC 0 Exhaust-A Temp Sensor37 degrees C / 98 degrees F
  FPC 0 Exhaust-B Temp Sensor38 degrees C / 100 degrees F
  FPC 0 Exhaust-C Temp Sensor40 degrees C / 104 degrees F
  FPC 0 PE0 Temp Sensor      41 degrees C / 105 degrees F
  FPC 0 PE1 Temp Sensor      42 degrees C / 107 degrees F
  FPC 0 PE2 Temp Sensor      44 degrees C / 111 degrees F
  FPC 0 LCPU Temp Sensor     40 degrees C / 104 degrees F
  Power
         PE0 Core 0.9V               872 mV   28777 mA   25146 mW
         PE0 HMC0 Core 0.9V          899 mV   10359 mA    9328 mW
         PE1 Core 0.9V               896 mV   29476 mA   26414 mW
         PE1 HMC0 Core 0.9V          899 mV   10218 mA    9187 mW
         PE2 Core 0.9V               872 mV   28839 mA   25199 mW
         PE2 HMC0 Core 0.9V          900 mV   10296 mA    9265 mW
         PE0 Serdes 1.0V            1020 mV   29000 mA   29593 mW
         PE1 Serdes 1.0V            1019 mV   29109 mA   29718 mW
         PE2 Serdes 1.0V            1019 mV   28484 mA   29078 mW
         LCPU Platform 1.1V         1099 mV    3515 mA    3867 mW
         LCPU Core 1.0V             1000 mV    8750 mA    8703 mW
         PHY VDD B 1.0V             1000 mV   17062 mA   17031 mW
         PHY VDD A 1.0V              999 mV   15640 mA   15625 mW
         BCM Core 1.0V               999 mV    7054 mA    7054 mW
         BCM PEX 1.0V                999 mV    3562 mA    3558 mW
         HMC Core 1.2V              1199 mV    1280 mA    1513 mW
         HMC Serdes 1.2V            1199 mV   32937 mA   39500 mW
```

```
        VDD 1.5V                    1500 mV    2824 mA    4234 mW
        VDD 2.5V                    2449 mV    3812 mA    9343 mW
        VDD 3.3V                    3299 mV    5085 mA   16796 mW
        12V                        12259 mV   29609 mA  368196 mW
FPC 1 status:
  State                      Online
  FPC 1 Intake-A Temp Sensor 37 degrees C / 98 degrees F
  FPC 1 Intake-B Temp Sensor 34 degrees C / 93 degrees F
  FPC 1 Exhaust-A Temp Sensor38 degrees C / 100 degrees F
  FPC 1 Exhaust-B Temp Sensor38 degrees C / 100 degrees F
  FPC 1 Exhaust-C Temp Sensor40 degrees C / 104 degrees F
  FPC 1 PE0 Temp Sensor      41 degrees C / 105 degrees F
  FPC 1 PE1 Temp Sensor      42 degrees C / 107 degrees F
  FPC 1 PE2 Temp Sensor      44 degrees C / 111 degrees F
  FPC 1 LCPU Temp Sensor     39 degrees C / 102 degrees F
  Power
        PE0 Core 0.9V                898 mV   29351 mA   26421 mW
        PE0 HMC0 Core 0.9V           899 mV    9734 mA    8750 mW
        PE1 Core 0.9V                873 mV   28539 mA   24933 mW
        PE1 HMC0 Core 0.9V           899 mV    9937 mA    8937 mW
        PE2 Core 0.9V                875 mV   28906 mA   25316 mW
        PE2 HMC0 Core 0.9V           899 mV   10140 mA    9125 mW
        PE0 Serdes 1.0V             1019 mV   28312 mA   28890 mW
        PE1 Serdes 1.0V             1020 mV   28656 mA   29234 mW
        PE2 Serdes 1.0V             1020 mV   29437 mA   30015 mW
        LCPU Platform 1.1V          1100 mV    4617 mA    5078 mW
        LCPU Core 1.0V              1000 mV    8781 mA    8781 mW
        PHY VDD B 1.0V              1000 mV   15953 mA   15984 mW
        PHY VDD A 1.0V              1000 mV   15484 mA   15484 mW
        BCM Core 1.0V                999 mV    7945 mA    7937 mW
        BCM PEX 1.0V                 999 mV    3515 mA    3515 mW
        HMC Core 1.2V               1199 mV    1269 mA    1521 mW
        HMC Serdes 1.2V             1199 mV   33000 mA   39593 mW
        VDD 1.5V                    1500 mV    2691 mA    4062 mW
        VDD 2.5V                    2449 mV    3582 mA    8781 mW
        VDD 3.3V                    3300 mV    2563 mA    8458 mW
        12V                        12311 mV   29002 mA  357577 mW
FPC 2 status:
  State                      Online
  FPC 2 Intake-A Temp Sensor 43 degrees C / 109 degrees F
  FPC 2 Intake-B Temp Sensor 30 degrees C / 86 degrees F
  FPC 2 Exhaust-A Temp Sensor50 degrees C / 122 degrees F
  FPC 2 Exhaust-B Temp Sensor52 degrees C / 125 degrees F
  FPC 2 Exhaust-C Temp Sensor51 degrees C / 123 degrees F
  FPC 2 PE0 Temp Sensor      48 degrees C / 118 degrees F
  FPC 2 PE1 Temp Sensor      56 degrees C / 132 degrees F
  FPC 2 PE2 Temp Sensor      48 degrees C / 118 degrees F
  FPC 2 PE3 Temp Sensor      57 degrees C / 134 degrees F
  FPC 2 PE4 Temp Sensor      48 degrees C / 118 degrees F
  FPC 2 PE5 Temp Sensor      60 degrees C / 140 degrees F
  FPC 2 LCPU Temp Sensor     47 degrees C / 116 degrees F
  Power
        PE0 Core 0.9V                874 mV   28117 mA   24617 mW
        PE1 Core 0.9V                899 mV   29601 mA   26632 mW
        PE0 Serdes 1.0V             1019 mV   41031 mA   41843 mW
        PE1 Serdes 1.0V             1019 mV   35656 mA   36343 mW
        PE0 HMC Core 0.9V            899 mV    8125 mA    7312 mW
        PE0,1 HMC Memory 1.2V       1199 mV     565 mA     688 mW
        PE1 HMC Core 0.9V            899 mV    7921 mA    7125 mW
        PE0,1 HMC Serdes 1.2V       1199 mV   21281 mA   25562 mW
```

```
        PE2 Core 0.9V               899 mV   29187 mA   26242 mW
        PE3 Core 0.9V               899 mV   29976 mA   27074 mW
        PE2 Serdes 1.0V            1019 mV   38562 mA   39343 mW
        PE3 Serdes 1.0V            1019 mV   34937 mA   35656 mW
        PE2 HMC Core 0.9V           899 mV    8093 mA    7281 mW
        PE2,3 HMC Memory 1.2V      1199 mV     610 mA     732 mW
        PE3 HMC Core 0.9V           899 mV    7710 mA    6937 mW
        PE2,3 HMC Serdes 1.2V      1199 mV   21500 mA   25812 mW
        VDD 3.3V                   3300 mV    7937 mA   26187 mW
        VDD 1.5V                   1499 mV    3234 mA    4851 mW
        VDD 2.5V                   2449 mV    4539 mA   11109 mW
        PE4 Core 0.9V               874 mV   29914 mA   26183 mW
        PE5 Core 0.9V               874 mV   29820 mA   26031 mW
        PE4 Serdes 1.0V            1020 mV   43968 mA   44843 mW
        PE5 Serdes 1.0V            1019 mV   27453 mA   28031 mW
        PE4 HMC Core 0.9V           900 mV    7937 mA    7140 mW
        PE4,5 HMC Memory 1.2V      1200 mV    1185 mA    1421 mW
        PE5 HMC Core 0.9V           899 mV    8718 mA    7843 mW
        PE4,5 HMC Serdes 1.2V      1199 mV   21125 mA   25343 mW
        LCPU platform 1.1V         1099 mV    3777 mA    4156 mW
        LCPU core 1.0V             1000 mV    9062 mA    9062 mW
        BCM core 1.0V              1000 mV    9328 mA    9328 mW
        BCM & PEX Serdes 1.0V       999 mV    4125 mA    4125 mW
        12V                       12311 mV   53347 mA  660345 mW
FPC 3 status:
  State                      Online
  FPC 3 Intake-A Temp Sensor 43 degrees C / 109 degrees F
  FPC 3 Intake-B Temp Sensor 30 degrees C / 86 degrees F
  FPC 3 Exhaust-A Temp Sensor48 degrees C / 118 degrees F
  FPC 3 Exhaust-B Temp Sensor49 degrees C / 120 degrees F
  FPC 3 Exhaust-C Temp Sensor47 degrees C / 116 degrees F
  FPC 3 PE0 Temp Sensor      48 degrees C / 118 degrees F
  FPC 3 PE1 Temp Sensor      55 degrees C / 131 degrees F
  FPC 3 PE2 Temp Sensor      47 degrees C / 116 degrees F
  FPC 3 PE3 Temp Sensor      54 degrees C / 129 degrees F
  FPC 3 PE4 Temp Sensor      48 degrees C / 118 degrees F
  FPC 3 PE5 Temp Sensor      58 degrees C / 136 degrees F
  FPC 3 LCPU Temp Sensor     46 degrees C / 114 degrees F
  Power
        PE0 Core 0.9V               899 mV   29695 mA   26718 mW
        PE1 Core 0.9V               899 mV   29695 mA   26710 mW
        PE0 Serdes 1.0V            1020 mV   40156 mA   40906 mW
        PE1 Serdes 1.0V            1020 mV   35281 mA   35968 mW
        PE0 HMC Core 0.9V           900 mV    7492 mA    6742 mW
        PE0,1 HMC Memory 1.2V      1199 mV     569 mA     683 mW
        PE1 HMC Core 0.9V           899 mV    7570 mA    6812 mW
        PE0,1 HMC Serdes 1.2V      1199 mV   20562 mA   24656 mW
        PE2 Core 0.9V               899 mV   29734 mA   26765 mW
        PE3 Core 0.9V               900 mV   29960 mA   26968 mW
        PE2 Serdes 1.0V            1019 mV   37718 mA   38500 mW
        PE3 Serdes 1.0V            1020 mV   35250 mA   35937 mW
        PE2 HMC Core 0.9V           899 mV    7750 mA    6976 mW
        PE2,3 HMC Memory 1.2V      1200 mV     546 mA     656 mW
        PE3 HMC Core 0.9V           899 mV    7718 mA    6945 mW
        PE2,3 HMC Serdes 1.2V      1199 mV   20625 mA   24750 mW
        VDD 3.3V                   3299 mV    5917 mA   19515 mW
        VDD 1.5V                   1499 mV    4015 mA    6015 mW
        VDD 2.5V                   2449 mV    4335 mA   10625 mW
        PE4 Core 0.9V               899 mV   29835 mA   26875 mW
        PE5 Core 0.9V               924 mV   30554 mA   28277 mW
```



```
        PE4 Serdes 1.0V             1019 mV   43281 mA   44187 mW
        PE5 Serdes 1.0V             1020 mV   27140 mA   27703 mW
        PE4 HMC Core 0.9V            899 mV    7476 mA    6726 mW
        PE4,5 HMC Memory 1.2V       1199 mV     531 mA     637 mW
        PE5 HMC Core 0.9V            899 mV    7539 mA    6781 mW
        PE4,5 HMC Serdes 1.2V       1199 mV   20375 mA   24468 mW
        LCPU platform 1.1V          1099 mV    3453 mA    3796 mW
        LCPU core 1.0V               999 mV    8984 mA    8984 mW
        BCM core 1.0V                999 mV    7929 mA    7921 mW
        BCM & PEX Serdes 1.0V       1000 mV    4046 mA    4046 mW
        12V                        12351 mV   51918 mA  644880 mW
FPC 5 status:
  State                      Online
  FPC 5 Intake-A Temp Sensor Failed
  FPC 5 Intake-B Temp Sensor Failed
  FPC 5 Exhaust-A Temp Sensor41 degrees C / 105 degrees F
  FPC 5 Exhaust-B Temp Sensor41 degrees C / 105 degrees F
  FPC 5 Exhaust-C Temp Sensor42 degrees C / 107 degrees F
  FPC 5 PE0 Temp Sensor      47 degrees C / 116 degrees F
  FPC 5 PE1 Temp Sensor      49 degrees C / 120 degrees F
  FPC 5 PE2 Temp Sensor      53 degrees C / 127 degrees F
  FPC 5 LCPU Temp Sensor     Failed
  Power
        PE0 Core 0.9V                923 mV   30976 mA   28578 mW
        PE0 HMC0 Core 0.9V           899 mV   10093 mA    9078 mW
        PE1 Core 0.9V                897 mV   29398 mA   26414 mW
        PE1 HMC0 Core 0.9V           899 mV    9734 mA    8750 mW
        PE2 Core 0.9V                922 mV   30226 mA   27886 mW
        PE2 HMC0 Core 0.9V           899 mV    9984 mA    8968 mW
        PE0 Serdes 1.0V             1019 mV   29296 mA   29890 mW
        PE1 Serdes 1.0V             1020 mV   28687 mA   29296 mW
        PE2 Serdes 1.0V             1020 mV   28187 mA   28765 mW
        LCPU Platform 1.1V          1100 mV    3664 mA    4031 mW
        LCPU Core 1.0V               999 mV    9125 mA    9125 mW
        PHY VDD B 1.0V               999 mV   15593 mA   15593 mW
        PHY VDD A 1.0V              1000 mV   15453 mA   15453 mW
        BCM Core 1.0V                999 mV    7773 mA    7765 mW
        BCM PEX 1.0V                1000 mV    3460 mA    3464 mW
        HMC Core 1.2V               1199 mV    1328 mA    1628 mW
        HMC Serdes 1.2V             1199 mV   32203 mA   38625 mW
        VDD 1.5V                    1499 mV    2675 mA    4007 mW
        VDD 2.5V                    2450 mV    3675 mA    9000 mW
        VDD 3.3V                    3300 mV    1814 mA    5980 mW
        12V                        12272 mV   29045 mA  361369 mW
FPC 6 status:
  State                      Online
  FPC 6 Intake-A Temp Sensor 41 degrees C / 105 degrees F
  FPC 6 Intake-B Temp Sensor 37 degrees C / 98 degrees F
  FPC 6 Exhaust-A Temp Sensor40 degrees C / 104 degrees F
  FPC 6 Exhaust-B Temp Sensor40 degrees C / 104 degrees F
  FPC 6 Exhaust-C Temp Sensor40 degrees C / 104 degrees F
  FPC 6 PE0 Temp Sensor      45 degrees C / 113 degrees F
  FPC 6 PE1 Temp Sensor      47 degrees C / 116 degrees F
  FPC 6 PE2 Temp Sensor      51 degrees C / 123 degrees F
  FPC 6 LCPU Temp Sensor     41 degrees C / 105 degrees F
  Power
        PE0 Core 0.9V                897 mV   30214 mA   27179 mW
        PE0 HMC0 Core 0.9V           899 mV   10000 mA    8984 mW
        PE1 Core 0.9V                873 mV   29332 mA   25601 mW
        PE1 HMC0 Core 0.9V           899 mV    9828 mA    8828 mW
```

```
        PE2 Core 0.9V                898 mV   30781 mA   27675 mW
        PE2 HMC0 Core 0.9V           899 mV   10328 mA    9296 mW
        PE0 Serdes 1.0V             1019 mV   28921 mA   29531 mW
        PE1 Serdes 1.0V             1020 mV   29437 mA   30046 mW
        PE2 Serdes 1.0V             1019 mV   29671 mA   30281 mW
        LCPU Platform 1.1V          1100 mV    3671 mA    4039 mW
        LCPU Core 1.0V              1000 mV    8218 mA    8187 mW
        PHY VDD B 1.0V              1000 mV   15984 mA   15984 mW
        PHY VDD A 1.0V               999 mV   16093 mA   16093 mW
        BCM Core 1.0V               1000 mV    8046 mA    8062 mW
        BCM PEX 1.0V                1000 mV    3500 mA    3500 mW
        HMC Core 1.2V               1199 mV    1327 mA    1579 mW
        HMC Serdes 1.2V             1199 mV   33031 mA   39593 mW
        VDD 1.5V                    1499 mV    2722 mA    4078 mW
        VDD 2.5V                    2449 mV    3539 mA    8671 mW
        VDD 3.3V                    3299 mV    8082 mA   26656 mW
        12V                        12311 mV   31124 mA  385270 mW
```

show chassis environment fpc (PTX10016 router)

user@host> **show chassis environment fpc**

```
FPC 1 status:
  State                      Online
  FPC 1 Intake-A Temp Sensor 36 degrees C / 96 degrees F
  FPC 1 Intake-B Temp Sensor 32 degrees C / 89 degrees F
  FPC 1 Exhaust-A Temp Sensor37 degrees C / 98 degrees F
  FPC 1 Exhaust-B Temp Sensor36 degrees C / 96 degrees F
  FPC 1 Exhaust-C Temp Sensor36 degrees C / 96 degrees F
  FPC 1 PE0 Temp Sensor      45 degrees C / 113 degrees F
  FPC 1 PE1 Temp Sensor      46 degrees C / 114 degrees F
  FPC 1 PE2 Temp Sensor      53 degrees C / 127 degrees F
  FPC 1 LCPU Temp Sensor     35 degrees C / 95 degrees F
  Power
        PE0 Core 0.9V                897 mV   28992 mA   26027 mW
        PE0 HMC0 Core 0.9V           899 mV   10156 mA    9156 mW
        PE1 Core 0.9V                871 mV   28800 mA   25164 mW
        PE1 HMC0 Core 0.9V           899 mV   10125 mA    9109 mW
        PE2 Core 0.9V                898 mV   29914 mA   26906 mW
        PE2 HMC0 Core 0.9V           899 mV   10343 mA    9296 mW
        PE0 Serdes 1.0V             1019 mV   27515 mA   28093 mW
        PE1 Serdes 1.0V             1020 mV   27968 mA   28546 mW
        PE2 Serdes 1.0V             1019 mV   27796 mA   28359 mW
        LCPU Platform 1.1V          1100 mV    3347 mA    3289 mW
        LCPU Core 1.0V              1000 mV    7960 mA    7960 mW
        PHY VDD B 1.0V              1000 mV   16437 mA   16437 mW
        PHY VDD A 1.0V               999 mV   15656 mA   15656 mW
        BCM Core 1.0V               1000 mV    7289 mA    7335 mW
        BCM PEX 1.0V                 999 mV    3453 mA    3453 mW
        HMC Core 1.2V               1199 mV    1218 mA    1453 mW
        HMC Serdes 1.2V             1199 mV   32093 mA   38562 mW
        VDD 1.5V                    1500 mV    2859 mA    4289 mW
        VDD 2.5V                    2449 mV    3875 mA    9500 mW
        VDD 3.3V                    3299 mV    2806 mA    9257 mW
        12V                        12351 mV   28569 mA  354877 mW
FPC 3 status:
  State                      Online
  FPC 3 Intake-A Temp Sensor 35 degrees C / 95 degrees F
  FPC 3 Intake-B Temp Sensor 31 degrees C / 87 degrees F
  FPC 3 Exhaust-A Temp Sensor36 degrees C / 96 degrees F
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  FPC 3 Exhaust-B Temp Sensor34 degrees C / 93 degrees F
  FPC 3 Exhaust-C Temp Sensor33 degrees C / 91 degrees F
  FPC 3 PE0 Temp Sensor      43 degrees C / 109 degrees F
  FPC 3 PE1 Temp Sensor      45 degrees C / 113 degrees F
  FPC 3 PE2 Temp Sensor      49 degrees C / 120 degrees F
  FPC 3 LCPU Temp Sensor     35 degrees C / 95 degrees F
  Power
         PE0 Core 0.9V               897 mV   28832 mA   25871 mW
         PE0 HMC0 Core 0.9V          899 mV   10359 mA    9328 mW
         PE1 Core 0.9V               873 mV   28230 mA   24671 mW
         PE1 HMC0 Core 0.9V          899 mV   10468 mA    9421 mW
         PE2 Core 0.9V               898 mV   29539 mA   26539 mW
         PE2 HMC0 Core 0.9V          899 mV   10656 mA    9593 mW
         PE0 Serdes 1.0V            1020 mV   27484 mA   28031 mW
         PE1 Serdes 1.0V            1019 mV   27515 mA   28078 mW
         PE2 Serdes 1.0V            1020 mV   27625 mA   28187 mW
         LCPU Platform 1.1V         1099 mV    3050 mA    3355 mW
         LCPU Core 1.0V              999 mV    7820 mA    7804 mW
         PHY VDD B 1.0V              999 mV   15406 mA   15406 mW
         PHY VDD A 1.0V             1000 mV   14953 mA   14953 mW
         BCM Core 1.0V              1000 mV    7648 mA    7648 mW
         BCM PEX 1.0V               1000 mV    3531 mA    3531 mW
         HMC Core 1.2V              1200 mV    1234 mA    1476 mW
         HMC Serdes 1.2V            1199 mV   34671 mA   41593 mW
         VDD 1.5V                   1499 mV    3484 mA    5226 mW
         VDD 2.5V                   2449 mV    3218 mA    7890 mW
         VDD 3.3V                   3299 mV    2468 mA    8148 mW
         12V                       12311 mV   28785 mA  355950 mW
FPC 6 status:
  State                      Online
  FPC 6 Intake-A Temp Sensor 34 degrees C / 93 degrees F
  FPC 6 Intake-B Temp Sensor 31 degrees C / 87 degrees F
  FPC 6 Exhaust-A Temp Sensor34 degrees C / 93 degrees F
  FPC 6 Exhaust-B Temp Sensor35 degrees C / 95 degrees F
  FPC 6 Exhaust-C Temp Sensor35 degrees C / 95 degrees F
  FPC 6 PE0 Temp Sensor      42 degrees C / 107 degrees F
  FPC 6 PE1 Temp Sensor      43 degrees C / 109 degrees F
  FPC 6 PE2 Temp Sensor      47 degrees C / 116 degrees F
  FPC 6 LCPU Temp Sensor     34 degrees C / 93 degrees F
  Power
         PE0 Core 0.9V               922 mV   29394 mA   27160 mW
         PE0 HMC0 Core 0.9V          899 mV   10078 mA    9062 mW
         PE1 Core 0.9V               923 mV   29636 mA   27304 mW
         PE1 HMC0 Core 0.9V          899 mV    9890 mA    8890 mW
         PE2 Core 0.9V               898 mV   29734 mA   26757 mW
         PE2 HMC0 Core 0.9V          899 mV    9968 mA    8968 mW
         PE0 Serdes 1.0V            1020 mV   26968 mA   27515 mW
         PE1 Serdes 1.0V            1019 mV   27421 mA   27984 mW
         PE2 Serdes 1.0V            1019 mV   27625 mA   28171 mW
         LCPU Platform 1.1V         1099 mV    3230 mA    4742 mW
         LCPU Core 1.0V              999 mV    8171 mA    8171 mW
         PHY VDD B 1.0V             1000 mV   15671 mA   15687 mW
         PHY VDD A 1.0V              999 mV   15703 mA   15703 mW
         BCM Core 1.0V               999 mV    7500 mA    7492 mW
         BCM PEX 1.0V               1000 mV    3480 mA    3468 mW
         HMC Core 1.2V              1199 mV    1199 mA    1440 mW
         HMC Serdes 1.2V            1199 mV   31046 mA   37250 mW
         VDD 1.5V                   1499 mV    2804 mA    4203 mW
         VDD 2.5V                   2449 mV    3746 mA    9171 mW
         VDD 3.3V                   3300 mV    3173 mA   10476 mW
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        12V                     12311 mV   28786 mA  355654 mW
FPC 8 status:
  State                      Online
  FPC 8 Intake-A Temp Sensor 34 degrees C / 93 degrees F
  FPC 8 Intake-B Temp Sensor 30 degrees C / 86 degrees F
  FPC 8 Exhaust-A Temp Sensor37 degrees C / 98 degrees F
  FPC 8 Exhaust-B Temp Sensor37 degrees C / 98 degrees F
  FPC 8 Exhaust-C Temp Sensor37 degrees C / 98 degrees F
  FPC 8 PE0 Temp Sensor      42 degrees C / 107 degrees F
  FPC 8 PE1 Temp Sensor      44 degrees C / 111 degrees F
  FPC 8 PE2 Temp Sensor      47 degrees C / 116 degrees F
  FPC 8 LCPU Temp Sensor     33 degrees C / 91 degrees F
  Power
        PE0 Core 0.9V             897 mV   29382 mA   26437 mW
        PE0 HMC0 Core 0.9V        899 mV   10265 mA    9250 mW
        PE1 Core 0.9V             872 mV   28867 mA   25175 mW
        PE1 HMC0 Core 0.9V        899 mV   10171 mA    9109 mW
        PE2 Core 0.9V             899 mV   30210 mA   27214 mW
        PE2 HMC0 Core 0.9V        900 mV   10187 mA    9171 mW
        PE0 Serdes 1.0V          1020 mV   27843 mA   28421 mW
        PE1 Serdes 1.0V          1020 mV   28265 mA   28828 mW
        PE2 Serdes 1.0V          1019 mV   28406 mA   29000 mW
        LCPU Platform 1.1V       1099 mV    3000 mA    3300 mW
        LCPU Core 1.0V           1000 mV    7937 mA    7937 mW
        PHY VDD B 1.0V           1000 mV   15843 mA   15843 mW
        PHY VDD A 1.0V           1000 mV   15250 mA   15250 mW
        BCM Core 1.0V             999 mV    6914 mA    6898 mW
        BCM PEX 1.0V              999 mV    3445 mA    3445 mW
        HMC Core 1.2V            1199 mV    1162 mA    1390 mW
        HMC Serdes 1.2V          1199 mV   33437 mA   40125 mW
        VDD 1.5V                 1499 mV    2851 mA    4273 mW
        VDD 2.5V                 2450 mV    3867 mA    9484 mW
        VDD 3.3V                 3300 mV    3258 mA   10753 mW
        12V                     12338 mV   28656 mA  356171 mW
FPC 9 status:
  State                      Online
  FPC 9 Intake-A Temp Sensor 44 degrees C / 111 degrees F
  FPC 9 Intake-B Temp Sensor 28 degrees C / 82 degrees F
  FPC 9 Exhaust-A Temp Sensor51 degrees C / 123 degrees F
  FPC 9 Exhaust-B Temp Sensor52 degrees C / 125 degrees F
  FPC 9 Exhaust-C Temp Sensor48 degrees C / 118 degrees F
  FPC 9 PE0 Temp Sensor      52 degrees C / 125 degrees F
  FPC 9 PE1 Temp Sensor      65 degrees C / 149 degrees F
  FPC 9 PE2 Temp Sensor      50 degrees C / 122 degrees F
  FPC 9 PE3 Temp Sensor      65 degrees C / 149 degrees F
  FPC 9 PE4 Temp Sensor      50 degrees C / 122 degrees F
  FPC 9 PE5 Temp Sensor      67 degrees C / 152 degrees F
  FPC 9 LCPU Temp Sensor     45 degrees C / 113 degrees F
  Power
        PE0 Core 0.9V             875 mV   28316 mA   24808 mW
        PE1 Core 0.9V             875 mV   28546 mA   24996 mW
        PE0 Serdes 1.0V          1019 mV   38906 mA   39687 mW
        PE1 Serdes 1.0V          1020 mV   33078 mA   33781 mW
        PE0 HMC Core 0.9V         899 mV    7718 mA    6945 mW
        PE0,1 HMC Memory 1.2V    1199 mV     579 mA     695 mW
        PE1 HMC Core 0.9V         899 mV    7289 mA    6570 mW
        PE0,1 HMC Serdes 1.2V    1199 mV   20187 mA   24250 mW
        PE2 Core 0.9V             924 mV   29062 mA   26894 mW
        PE3 Core 0.9V             900 mV   28914 mA   26039 mW
        PE2 Serdes 1.0V          1020 mV   36375 mA   37093 mW
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```
        PE3 Serdes 1.0V            1019 mV   32640 mA   33296 mW
        PE2 HMC Core 0.9V           900 mV    7695 mA    6921 mW
        PE2,3 HMC Memory 1.2V      1199 mV     562 mA     674 mW
        PE3 HMC Core 0.9V           899 mV    7554 mA    6796 mW
        PE2,3 HMC Serdes 1.2V      1199 mV   20156 mA   24218 mW
        VDD 3.3V                   3300 mV    8964 mA   29609 mW
        VDD 1.5V                   1499 mV    3968 mA    5945 mW
        VDD 2.5V                   2449 mV    4414 mA   10890 mW
        PE4 Core 0.9V               900 mV   28527 mA   25679 mW
        PE5 Core 0.9V               899 mV   28902 mA   26035 mW
        PE4 Serdes 1.0V            1019 mV   41281 mA   42125 mW
        PE5 Serdes 1.0V            1019 mV   25781 mA   26328 mW
        PE4 HMC Core 0.9V           900 mV    7382 mA    6648 mW
        PE4,5 HMC Memory 1.2V      1199 mV     626 mA     750 mW
        PE5 HMC Core 0.9V           899 mV    7562 mA    6796 mW
        PE4,5 HMC Serdes 1.2V      1199 mV   20312 mA   24375 mW
        LCPU platform 1.1V         1099 mV    3687 mA    4054 mW
        LCPU core 1.0V             1000 mV    9000 mA    9000 mW
        BCM core 1.0V               999 mV    7843 mA    7835 mW
        BCM & PEX Serdes 1.0V       999 mV    4062 mA    4062 mW
        12V                       12417 mV   51659 mA  643215 mW
```

show chassis environment FPC 1 (MX Routers with Media Services Blade [MSB])

user@switch> **show chassis environment fpc 1**

```
FPC 1 status:
  State                      Online
  Temperature Intake         36 degrees C / 96 degrees F
  Temperature Exhaust A      39 degrees C / 102 degrees F
  Temperature LU TSen        52 degrees C / 125 degrees F
  Temperature LU Chip        54 degrees C / 129 degrees F
  Temperature XM TSen        52 degrees C / 125 degrees F
  Temperature XM Chip        60 degrees C / 140 degrees F
  Temperature PCIe TSen      52 degrees C / 125 degrees F
  Temperature PCIe Chip      69 degrees C / 156 degrees F
  Power
    MPC-BIAS3V3-zl2106        3302 mV
    MPC-VDD3V3-zl6100         3325 mV
    MPC-AVDD1V0-zl6100        1007 mV
    MPC-PCIE_1V0-zl6100        904 mV
    MPC-LU0_1V0-zl2004         996 mV
    MPC-VDD_1V5-zl2004        1498 mV
    MPC-12VA-BMR453          11733 mV
    MPC-12VB-BMR453          11728 mV
    MPC-XM_0V9-vt273m          900 mV
  I2C Slave Revision         81
```

show chassis environment FPC (Junos OS Evolved)

user@switch> **show chassis environment fpc**

```
FPC 0 status:
  State                      Online
  Intake Temperature         32 degrees C / 89 degrees F
  Exhaust-A Temperature      43 degrees C / 109 degrees F
  Exhaust-B Temperature      32 degrees C / 89 degrees F
  PE0 Temperature            34 degrees C / 93 degrees F
```

```
PE1 Temperature            38 degrees C / 100 degrees F
PE2 Temperature            38 degrees C / 100 degrees F
PE3 Temperature            36 degrees C / 96 degrees F
PE4 Temperature            35 degrees C / 95 degrees F
PE5 Temperature            35 degrees C / 95 degrees F
Power 1
  RT_1  1.0v                  1018 mV
  RT_2  1.0v                  1018 mV
Power 2
  FPC 1 1.0v                   999 mV
  FPC 2 1.0v                   998 mV
Power 3
  FPC   2.5v                  2499 mV
  FPC   3.3v                  3299 mV
Power 4
  FPC   0.9v                   899 mV
  FPC   1.5v                  1499 mV
Power 5
  PE0 1 1.0v                  1039 mV
  PE0 2 1.0v                  1039 mV
Power 6
  PE0 1 0.9v                   900 mV
  PE0 2 0.9v                   900 mV
Power 7
  PE0 3 0.9v                   902 mV
  PE0 4 0.9v                   902 mV
Power 8
  PE0 H 0.9v                   899 mV
  PE0 H 1.2v                  1199 mV
Power 9
  PE1 1 1.0v                  1040 mV
  PE1 2 1.0v                  1039 mV
Power 10
  PE1 1 0.9v                   901 mV
  PE1 2 0.9v                   901 mV
Power 11
  PE1 3 0.9v                   900 mV
  PE1 4 0.9v                   900 mV
Power 12
  PE1 H 0.9v                   899 mV
  PE1 H 1.2v                  1199 mV
Power 13
  PE2 1 1.0v                  1039 mV
  PE2 2 1.0v                  1039 mV
Power 14
  PE2 1 0.9v                   900 mV
  PE2 2 0.9v                   900 mV
Power 15
  PE2 3 0.9v                   900 mV
  PE2 4 0.9v                   900 mV
Power 16
  PE2 H 0.9v                   899 mV
  PE2 H 1.2v                  1199 mV
Power 17
  PE3 1 1.0v                  1039 mV
  PE3 2 1.0v                  1039 mV
Power 18
  PE3 1 0.9v                   899 mV
  PE3 2 0.9v                   900 mV
Power 19
```



```
    PE3 3 0.9v                  899 mV
    PE3 4 0.9v                  900 mV
  Power 20
    PE3 H 0.9v                  899 mV
    PE3 H 1.2v                 1199 mV
  Power 21
    PE4 1 1.0v                 1039 mV
    PE4 2 1.0v                 1039 mV
  Power 22
    PE4 1 0.9v                  900 mV
    PE4 2 0.9v                  900 mV
  Power 23
    PE4 3 0.9v                  901 mV
    PE4 4 0.9v                  901 mV
  Power 24
    PE4 H 0.9v                  899 mV
    PE4 H 1.2v                 1199 mV
  Power 25
    PE5 1 1.0v                 1040 mV
    PE5 2 1.0v                 1039 mV
  Power 26
    PE5 1 0.9v                  901 mV
    PE5 2 0.9v                  901 mV
  Power 27
    PE5 3 0.9v                  901 mV
    PE5 4 0.9v                  901 mV
  Power 28
    PE5 H 0.9v                  899 mV
    PE5 H 1.2v                 1199 mV
  Power 29
    PIC0 12.0v                12342 mV
  Power 30
    PIC1 12.0v                12342 mV
  Power 31
    A    12.0v                12375 mV
    B    12.0v                 1008 mV
  Bus Revision               115
FPC 1 status:
  State                      Online
  Intake Temperature         33 degrees C / 91 degrees F
  Exhaust-A Temperature      44 degrees C / 111 degrees F
  Exhaust-B Temperature      33 degrees C / 91 degrees F
  PE0 Temperature            34 degrees C / 93 degrees F
  PE1 Temperature            38 degrees C / 100 degrees F
  PE2 Temperature            37 degrees C / 98 degrees F
  PE3 Temperature            36 degrees C / 96 degrees F
  PE4 Temperature            34 degrees C / 93 degrees F
  PE5 Temperature            36 degrees C / 96 degrees F
  Power 1
    RT_1  1.0v                 1018 mV
    RT_2  1.0v                 1018 mV
  Power 2
    FPC 1 1.0v                  999 mV
    FPC 2 1.0v                  999 mV
  Power 3
    FPC   2.5v                 2499 mV
    FPC   3.3v                 3300 mV
  Power 4
    FPC   0.9v                  899 mV
    FPC   1.5v                 1500 mV
```



```
Power 5
  PE0 1 1.0v                  1039 mV
  PE0 2 1.0v                  1039 mV
Power 6
  PE0 1 0.9v                   925 mV
  PE0 2 0.9v                   925 mV
Power 7
  PE0 3 0.9v                   925 mV
  PE0 4 0.9v                   926 mV
Power 8
  PE0 H 0.9v                   899 mV
  PE0 H 1.2v                  1199 mV
Power 9
  PE1 1 1.0v                  1040 mV
  PE1 2 1.0v                  1039 mV
Power 10
  PE1 1 0.9v                   900 mV
  PE1 2 0.9v                   901 mV
Power 11
  PE1 3 0.9v                   899 mV
  PE1 4 0.9v                   900 mV
Power 12
  PE1 H 0.9v                   899 mV
  PE1 H 1.2v                  1199 mV
Power 13
  PE2 1 1.0v                  1040 mV
  PE2 2 1.0v                  1039 mV
Power 14
  PE2 1 0.9v                   926 mV
  PE2 2 0.9v                   926 mV
Power 15
  PE2 3 0.9v                   927 mV
  PE2 4 0.9v                   927 mV
Power 16
  PE2 H 0.9v                   899 mV
  PE2 H 1.2v                  1199 mV
Power 17
  PE3 1 1.0v                  1039 mV
  PE3 2 1.0v                  1039 mV
Power 18
  PE3 1 0.9v                   926 mV
  PE3 2 0.9v                   927 mV
Power 19
  PE3 3 0.9v                   925 mV
  PE3 4 0.9v                   926 mV
Power 20
  PE3 H 0.9v                   899 mV
  PE3 H 1.2v                  1199 mV
Power 21
  PE4 1 1.0v                  1039 mV
  PE4 2 1.0v                  1040 mV
Power 22
  PE4 1 0.9v                   925 mV
  PE4 2 0.9v                   925 mV
Power 23
  PE4 3 0.9v                   925 mV
  PE4 4 0.9v                   926 mV
Power 24
  PE4 H 0.9v                   900 mV
  PE4 H 1.2v                  1199 mV
```



```
  Power 25
    PE5 1 1.0v                 1039 mV
    PE5 2 1.0v                 1039 mV
  Power 26
    PE5 1 0.9v                  898 mV
    PE5 2 0.9v                  899 mV
  Power 27
    PE5 3 0.9v                  900 mV
    PE5 4 0.9v                  900 mV
  Power 28
    PE5 H 0.9v                  899 mV
    PE5 H 1.2v                 1199 mV
  Power 29
    PIC0 12.0v                    0 mV
  Power 30
    PIC1 12.0v                12402 mV
  Power 31
    A    12.0v                12344 mV
    B    12.0v                 1008 mV
  Bus Revision              115
FPC 2 status:
  State                     Online
  Intake Temperature        31 degrees C / 87 degrees F
  Exhaust-A Temperature     38 degrees C / 100 degrees F
  Exhaust-B Temperature     28 degrees C / 82 degrees F
  PE0 Temperature           28 degrees C / 82 degrees F
  PE1 Temperature           33 degrees C / 91 degrees F
  PE2 Temperature           34 degrees C / 93 degrees F
  PE3 Temperature           31 degrees C / 87 degrees F
  Power 1
    RT_1  1.0v                 1018 mV
    RT_2  1.0v                 1018 mV
  Power 2
    FPC 1 1.0v                  999 mV
    FPC 2 1.0v                  999 mV
  Power 3
    FPC   2.5v                 2499 mV
    FPC   3.3v                 3299 mV
  Power 4
    FPC   0.9v                  899 mV
    FPC   1.5v                 1500 mV
  Power 5
    PE0 1 1.0v                 1039 mV
    PE0 2 1.0v                 1040 mV
  Power 6
    PE0 1 0.9v                  900 mV
    PE0 2 0.9v                  901 mV
  Power 7
    PE0 3 0.9v                  900 mV
    PE0 4 0.9v                  900 mV
  Power 8
    PE0 H 0.9v                  899 mV
    PE0 H 1.2v                 1199 mV
  Power 9
    PE1 1 1.0v                 1039 mV
    PE1 2 1.0v                 1039 mV
  Power 10
    PE1 1 0.9v                  875 mV
    PE1 2 0.9v                  876 mV
  Power 11
```

```
    PE1 3 0.9v                   875 mV
    PE1 4 0.9v                   875 mV
  Power 12
    PE1 H 0.9v                   899 mV
    PE1 H 1.2v                  1199 mV
  Power 13
    PE2 1 1.0v                  1039 mV
    PE2 2 1.0v                  1039 mV
  Power 14
    PE2 1 0.9v                   900 mV
    PE2 2 0.9v                   900 mV
  Power 15
    PE2 3 0.9v                   900 mV
    PE2 4 0.9v                   900 mV
  Power 16
    PE2 H 0.9v                   899 mV
    PE2 H 1.2v                  1199 mV
  Power 17
    PE3 1 1.0v                  1039 mV
    PE3 2 1.0v                  1039 mV
  Power 18
    PE3 1 0.9v                   875 mV
    PE3 2 0.9v                   875 mV
  Power 19
    PE3 3 0.9v                   875 mV
    PE3 4 0.9v                   875 mV
  Power 20
    PE3 H 0.9v                   899 mV
    PE3 H 1.2v                  1200 mV
  Power 21
    PIC0 12.0v                 12281 mV
  Power 22
    PIC1 12.0v                     0 mV
  Power 23
    A    12.0v                 12406 mV
    B    12.0v                  1006 mV
  Bus Revision               115
FPC 3 status:
  State                      Online
  Intake Temperature         33 degrees C / 91 degrees F
  Exhaust-A Temperature      44 degrees C / 111 degrees F
  Exhaust-B Temperature      30 degrees C / 86 degrees F
  PE0 Temperature            33 degrees C / 91 degrees F
  PE1 Temperature            37 degrees C / 98 degrees F
  PE2 Temperature            38 degrees C / 100 degrees F
  PE3 Temperature            34 degrees C / 93 degrees F
  PE4 Temperature            33 degrees C / 91 degrees F
  PE5 Temperature            36 degrees C / 96 degrees F
  Power 1
    RT_1  1.0v                  1018 mV
    RT_2  1.0v                  1018 mV
  Power 2
    FPC 1 1.0v                   999 mV
    FPC 2 1.0v                   999 mV
  Power 3
    FPC   2.5v                  2500 mV
    FPC   3.3v                  3299 mV
  Power 4
    FPC   0.9v                   899 mV
    FPC   1.5v                  1500 mV
```



```
Power 5
  PE0 1 1.0v                  1039 mV
  PE0 2 1.0v                  1039 mV
Power 6
  PE0 1 0.9v                   900 mV
  PE0 2 0.9v                   900 mV
Power 7
  PE0 3 0.9v                   898 mV
  PE0 4 0.9v                   899 mV
Power 8
  PE0 H 0.9v                   899 mV
  PE0 H 1.2v                  1199 mV
Power 9
  PE1 1 1.0v                  1040 mV
  PE1 2 1.0v                  1039 mV
Power 10
  PE1 1 0.9v                   926 mV
  PE1 2 0.9v                   926 mV
Power 11
  PE1 3 0.9v                   925 mV
  PE1 4 0.9v                   925 mV
Power 12
  PE1 H 0.9v                   900 mV
  PE1 H 1.2v                  1199 mV
Power 13
  PE2 1 1.0v                  1039 mV
  PE2 2 1.0v                  1039 mV
Power 14
  PE2 1 0.9v                   873 mV
  PE2 2 0.9v                   873 mV
Power 15
  PE2 3 0.9v                   875 mV
  PE2 4 0.9v                   875 mV
Power 16
  PE2 H 0.9v                   899 mV
  PE2 H 1.2v                  1199 mV
Power 17
  PE3 1 1.0v                  1039 mV
  PE3 2 1.0v                  1039 mV
Power 18
  PE3 1 0.9v                   899 mV
  PE3 2 0.9v                   900 mV
Power 19
  PE3 3 0.9v                   899 mV
  PE3 4 0.9v                   899 mV
Power 20
  PE3 H 0.9v                   899 mV
  PE3 H 1.2v                  1199 mV
Power 21
  PE4 1 1.0v                  1040 mV
  PE4 2 1.0v                  1040 mV
Power 22
  PE4 1 0.9v                   949 mV
  PE4 2 0.9v                   950 mV
Power 23
  PE4 3 0.9v                   950 mV
  PE4 4 0.9v                   951 mV
Power 24
  PE4 H 0.9v                   899 mV
  PE4 H 1.2v                  1199 mV
```



```
  Power 25
    PE5 1 1.0v                   1039 mV
    PE5 2 1.0v                   1039 mV
  Power 26
    PE5 1 0.9v                    900 mV
    PE5 2 0.9v                    900 mV
  Power 27
    PE5 3 0.9v                    900 mV
    PE5 4 0.9v                    900 mV
  Power 28
    PE5 H 0.9v                    899 mV
    PE5 H 1.2v                   1199 mV
  Power 29
    PIC0 12.0v                      0 mV
  Power 30
    PIC1 12.0v                      0 mV
  Power 31
    A    12.0v                  12406 mV
    B    12.0v                   1008 mV
  Bus Revision                115
FPC 6 status:
  State                       Onlining
  Bus Revision                115
```

show chassis environment pem

List of Syntax

Syntax

```
show chassis environment pem
<slot>
```

Syntax (ACX4000 Router)

```
show chassis environment pem
```

Syntax (TX Matrix Routers)

```
show chassis environment pem
<lcc number | scc>
<slot>
```

Syntax (TX Matrix Plus Routers)

```
show chassis environment pem
<lcc number | sfc number>
<slot>
```

Syntax (MX Series Router)

```
show chassis environment pem
<slot>
<all-members>
<local>
<member member-id>
```

Syntax (PTX Series Router)

```
show chassis environment pem
<slot>
<all-members>
<local>
<member member-id>
```

Syntax (MX104 Universal Routing Platforms)

```
show chassis environment pem
<slot>
<satellite [fpc-slot slot-id |device-alias alias-name]
```


Syntax (MX10003 , MX204, and MX10008 Universal Routing Platforms)

```
show chassis environment pem
<slot>
```

Syntax (QFX Series)

```
show chassis environment pem
<slot (interconnect-device name slot ) | (node-device name)>
```

Syntax (OCX Series)

```
show chassis environment pem
<slot>
```

Syntax (EX9251, EX9253 Switches)

```
show chassis environment pem
<slot>
```

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 11.3 for the QFX Series.
Command introduced in Junos OS Release 12.3R2 for EX Series.
Command introduced in Junos OS Release 13.2 for MX104 Universal Routing Platforms.
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
satellite option introduced in Junos OS Release 14.2R3.
Command introduced in Junos OS Release 17.2 for PTX10008 Routers.
Command introduced in Junos OS Release 17.3 for MX10003 Universal Routing Platforms.
Command introduced in Junos OS Release 17.4 for MX204 Universal Routing Platforms.
Command introduced in Junos OS Release 17.3 for MX150 Router Appliance.
Command introduced in Junos OS Release 18.1R1 for EX9251 Switches.
Command introduced in Junos OS Release 18.2 for EX9253 Switches.
Command introduced in Junos OS Release 18.2R1 for MX10008 Routers

Description

Display Power Entry Module (PEM) environmental status information.

NOTE: The new high-capacity (4100W) enhanced DC PEM on MX960 routers includes a new design that can condition the input voltage. This results in the output voltage differing from the input voltage. The earlier generation of DC PEMs coupled the input power directly to the output, thereby making it safe to assume that the output voltage was equal to the input voltage.

Options

none—Display environmental information about both PEMs. For the TX Matrix router, display environmental information about the PEMs, the TX Matrix router, and its attached T640 routers. For the TX Matrix Plus router, display environmental information about the PEMs, the TX Matrix Plus router, and its attached routers.

all-members—(MX Series routers only) (Optional) Display environmental information about the PEMs in all the member routers of the Virtual Chassis configuration.

interconnect-device *name*—(QFabric systems only) (Optional) Display chassis environmental information about the PEMs in the Interconnect device.

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.

local—(MX Series routers only) (Optional) Display environmental information about the PEM in the local Virtual Chassis member.

member *member-id*—(MX Series routers only) (Optional) Display environmental information about the PEM in the specified member of the Virtual Chassis configuration. Replace *member-id* with a value of 0 or 1.

node-device *name*—(QFabric systems only) (Optional) Display chassis environmental information about the PEMs in the Node device.

satellite [fpc-slot *slot-id* | device-alias *alias-name*]—(Junos Fusion only)(Optional) Display environmental information about the PEM in the specified satellite device in a Junos Fusion, or for all satellite devices in the Junos Fusion if no satellite devices are specified.

scc—(TX Matrix routers only) (Optional) Display environmental information about the PEM in the TX Matrix router (or switch-card chassis).

sfc—(TX Matrix Plus routers only) (Optional) Display environmental information about the PEM in the TX Matrix Plus router (or switch-fabric chassis).

slot —(Optional) Display environmental information about an individual PEM. Replace *slot* with 0 or 1.

Required Privilege Level

view

Related Documentation

- show chassis hardware on page 426

List of Sample Output

show chassis environment pem (M40e Router) on page 371
show chassis environment pem (M120 Router) on page 371

Output Fields

Table 18 on page 370 lists the output fields for the **show chassis environment pem** command. Output fields are listed in the approximate order in which they appear.

Table 18: show chassis environment pem Output Fields

Field Name	Field Description
PEM*slot*status	Number of the PEM slot.
State	Status of the PEM.
Temperature	Temperature of the air flowing past the PEM.
AC Input	Status of the AC input for the specified component
AC Output	Status of the AC output for the specified component.
DC input	Status of the DC input for the specified component.
DC output	Status of the DC output for the specified component.

Table 18: show chassis environment pem Output Fields (continued)

Field Name	Field Description
Load	(Not available on M40e or M160 routers) Information about the load on supply, in percentage of rated current being used.
Voltage	(M120, M160, M320, T640, T1600, TX Matrix, and TX Matrix Plus routers only) Information about voltage supplied to the PEM. (MX104 routers only) Information about voltage supplied by the PEM to the system.
Current	(T640, T1600, TX Matrix, and TX Matrix Plus routers only) Information about the PEM current.
Power	(T640, T1600, TX Matrix, and TX Matrix Plus routers only) Information about the PEM power.
SCG/CB/SIB	(T640, T1600, TX Matrix, and TX Matrix Plus routers only) SONET Clock Generator/Control Board/Switch Interface Board.
FAN	(T640, T1600, and T4000 routers with six-input DC power supply only) Information about the DC output to the fan.

Sample Output

show chassis environment pem (M40e Router)

user@host> **show chassis environment pem**

```
PEM 0 status:
  State                            Online
  Temperature                      OK
  AC input                         OK
  DC output                        OK
```

show chassis environment pem (M120 Router)

user@host> **show chassis environment pem**

```
PEM 0 status:
  State                       Online
  Temperature                 OK
  DC Input:                   OK
  DC Output:                  OK
  Load                        Less than 20 percent
  Voltage:
    48.0 V input              52864 mV
    48.0 V fan supply         41655 mV
    3.3 V                      3399 mV
PEM 1 status:
  State                       Online
  Temperature                 OK
  DC Input:                   OK
  DC Output:                  OK
  Load                        Less than 20 percent
  Voltage:
    48.0 V input              54537 mV
```

```
    48.0 V fan supply        42910 mV
    3.3 V                     3506 mV
```

show chassis environment pem (M160 Router)

user@host> **show chassis environment pem**

```
PEM 0 status:
  State                           Online
  Temperature                     OK
  DC input                        OK
  DC output                       OK
  Load                            Less than 20 percent
  Voltage:
    48.0 V input             54833 mV
    48.0 V fan supply        50549 mV
    8.0 V bias               8239 mV
    5.0 V bias               5006 mV
```

show chassis environment pem (M320 Router)

user@host> **show chassis environment pem**

```
PEM 2 status:
  State                           Online
  Temperature                     OK
  DC input                        OK
  Load                            Less than 40 percent
    48.0 V input            51853 mV
    48.0 V fan supply       48877 mV
    8.0 V bias               8449 mV
    5.0 V bias               4998 mV
PEM 3 status:
  State                           Online
  Temperature                     OK
  DC input                        OK
  Load                            Less than 40 percent
    48.0 V input            51717 mV
    48.0 V fan supply       49076 mV
    8.0 V bias               8442 mV
    5.0 V bias               4998 mV
```

show chassis environment pem (MX150)

user@host> **show chassis environment pem**

```
FPC 0 PEM 0 status:
  State                      Online
  Airflow                    Front to Back
  Temperature                OK
```

show chassis environment pem (MX104 Router)

user@host> **show chassis environment pem**

```
PEM 0 status:
  State                      Online
  Temperature                OK
```



```
  DC Output:                 OK
  Voltage:
    12.0 V output            12281 mV
    3.3 V output              3353 mV
PEM 1 status:
  State                      Empty
```

show chassis environment pem (MX240 Router)

`user@host>` **show chassis environment pem**

```
PEM 0 status:
  State                      Online
  Temperature                 OK
  DC Output:                  OK
PEM 1 status:
  State                      Online
  Temperature                 OK
  DC Output:                  OK
```

show chassis environment pem (MX480 Router)

`user@host>` **show chassis environment pem**

```
PEM 0 status:
  State                      Online
  Temperature                 OK
  DC Input:                   OK
  DC Output:                  OK
  Voltage:
PEM 1 status:
  State                      Online
  Temperature                 OK
  DC Input:                   OK
  DC Output:                  OK
  Voltage:
```

show chassis environment pem (MX960 Router)

`user@host>` **show chassis environment pem**

```
PEM 2 status:
  State                      Present
PEM 3 status:
  State                      Online
  Temperature                 OK
  DC Output:                  OK
```

show chassis environment pem (MX10003 Router)

`user@host>` **show chassis environment pem**

```

PEM 0 status:
  State                      Online
  Airflow                    Front to Back
  Temperature                OK    34 degrees C / 93 degrees F
  Temperature                OK    26 degrees C / 78 degrees F
  Temperature                OK    24 degrees C / 75 degrees F
```



```
  Firmware version           0x22
  Cooling Fan                8752 RPM
  DC Output           Voltage(V) Current(A)  Power(W)  Load(%)
                          12.00     26           312      10
PEM 1 status:
  State                      Online
  Airflow                    Front to Back
  Temperature                OK   35 degrees C / 95 degrees F
  Temperature                OK   26 degrees C / 78 degrees F
  Temperature                OK   25 degrees C / 77 degrees F
  Firmware version           0x22
  Cooling Fan                8480 RPM
  DC Output           Voltage(V) Current(A)  Power(W)  Load(%)
                          12.00     27           324      11
PEM 2 status:
  State                      Online
  Airflow                    Front to Back
  Temperature                OK   37 degrees C / 98 degrees F
  Temperature                OK   29 degrees C / 84 degrees F
  Temperature                OK   25 degrees C / 77 degrees F
  Firmware version           0x22
  Cooling Fan                8656 RPM
  DC Output           Voltage(V) Current(A)  Power(W)  Load(%)
                          12.00     25           300      10
PEM 3 status:
  State                      Online
  Airflow                    Front to Back
  Temperature                OK   35 degrees C / 95 degrees F
  Temperature                OK   26 degrees C / 78 degrees F
  Temperature                OK   25 degrees C / 77 degrees F
  Firmware version           0x22
  Cooling Fan                8448 RPM
  DC Output           Voltage(V) Current(A)  Power(W)  Load(%)
                          12.00     26           312      10
PEM 4 status:
  State                      Empty
PEM 5 status:
  State                      Empty
```

show chassis environment pem (MX204 Router)

`user@host>` **show chassis environment pem**

```
PEM 0 status:
  State                      Empty
PEM 1 status:
  State                      Online
  Airflow                    Front to Back
  Temperature                OK   48 degrees C / 118 degrees F
  Temperature                OK   51 degrees C / 123 degrees F
  Fan Sensor                 5400 RPM
  DC Output           Voltage(V) Current(A)  Power(W)  Load(%)
                          11.94     16           191      29
```

show chassis environment pem (MX10008 Router)

`user@host>` **show chassis environment pem**


```
PEM 0 status:
  State                       Online
  Airflow                     Front to Back
  Temperature                              OK   29 degrees C / 84 degrees F
  Firmware version            0x36
  Fan 0                       5880 RPM
  DC Output            Voltage(V) Current(A)  Power(W)  Load(%)
                         12.00       104          1248     46
PEM 1 status:
  State                       Online
  Airflow                     Front to Back
  Temperature                              OK   27 degrees C / 80 degrees F
  Firmware version            0x36
  Fan 0                       5940 RPM
  DC Output            Voltage(V) Current(A)  Power(W)  Load(%)
                         12.00       104          1248     46
PEM 2 status:
  State                       Online
  Airflow                     Front to Back
  Temperature                              OK   30 degrees C / 86 degrees F
  Firmware version            0x36
  Fan 0                       5940 RPM
  DC Output            Voltage(V) Current(A)  Power(W)  Load(%)
                         12.00       105          1260     46
PEM 3 status:
  State                       Present
PEM 4 status:
  State                       Present
PEM 5 status:
  State                       Present
```

show chassis environment pem (PTX10016 Router)

`user@host>` **show chassis environment pem**

```
PEM 0 status:
  State                       Online
  Airflow                     Front to Back
  Temperature                 OK   21 degrees C / 69 degrees F
  Firmware version            0x36
  Fan 0                       5760 RPM
  DC Output            Voltage(V) Current(A)  Power(W)  Load(%)
                           12.00     51           612      22
PEM 1 status:
  State                       Online
  Airflow                     Front to Back
  Temperature                 OK   23 degrees C / 73 degrees F
  Firmware version            0x36
  Fan 0                       5760 RPM
  DC Output            Voltage(V) Current(A)  Power(W)  Load(%)
                           12.00     52           624      23
PEM 2 status:
  State                       Online
  Airflow                     Front to Back
  Temperature                 OK   23 degrees C / 73 degrees F
  Firmware version            0x36
  Fan 0                       5760 RPM
  DC Output            Voltage(V) Current(A)  Power(W)  Load(%)
                           12.00     51           612      22
PEM 3 status:
```

```
  State                       Online
  Airflow                     Front to Back
  Temperature                 OK   21 degrees C / 69 degrees F
  Firmware version            0x36
  Fan 0                       5760 RPM
  DC Output            Voltage(V) Current(A)  Power(W)  Load(%)
                           12.00     51            612      22
PEM 4 status:
  State                       Online
  Airflow                     Front to Back
  Temperature                 OK   22 degrees C / 71 degrees F
  Firmware version            0x36
  Fan 0                       5760 RPM
  DC Output            Voltage(V) Current(A)  Power(W)  Load(%)
                           12.00     52            624      23
PEM 5 status:
  State                       Online
  Airflow                     Front to Back
  Temperature                 OK   24 degrees C / 75 degrees F
  Firmware version            0x36
  Fan 0                       5700 RPM
  DC Output            Voltage(V) Current(A)  Power(W)  Load(%)
                           12.00     51            612      22
PEM 6 status:
  State                       Online
  Airflow                     Front to Back
  Temperature                 OK   21 degrees C / 69 degrees F
  Firmware version            0x36
  Fan 0                       5700 RPM
  DC Output            Voltage(V) Current(A)  Power(W)  Load(%)
                           12.00     50            600      22
```

show chassis environment pem (T320 Router)

user@host> **show chassis environment pem**

```
PEM 0 status:
  State                            Online
  Temperature                      OK
  DC input:                        OK
```

show chassis environment pem (T640 Router)

user@host> **show chassis environment pem**

```
PEM 0 status:
  State                            Online
  Temperature                   22 degrees C / 71 degrees F
  AC input: OK
  DC output:              Voltage    Current        Power     Load
       FPC 0                56875        606           34        4
       FPC 1                57016        525           29        3
       FPC 2                    0          0            0        0
       FPC 3                    0          0            0        0
       FPC 4                    0          0            0        0
       FPC 5                    0          0            0        0
       FPC 6                57158       1581           90       12
       FPC 7                    0          0            0        0
  SCG/CB/SIB                56750       1125           63        5
```

show chassis environment pem (T4000 Router)

user@host> **show chassis environment pem**

```
PEM 0 status:
  State                          Online
  Temperature                    33 degrees C / 91 degrees F
  DC Input:                      OK
                      Voltage(V)  Current(A)  Power(W)  Load(%)
      INPUT 0           54.625       9.812      535       22
      INPUT 1           54.625      10.250      559       23
      INPUT 2           55.125       0.125        6        0
      INPUT 3           54.500      10.062      548       22
      INPUT 4           54.750       9.375      513       21
      INPUT 5           54.750      10.187      557       23
  DC Output           Voltage(V)  Current(A)  Power(W)  Load(%)
      FPC 0             55.750      10.125      564       37
      FPC 1             51.625       0.000        0        0
      FPC 2             52.000       0.000        0        0
      FPC 3             55.062      10.437      574       38
      FPC 4             52.125       0.000        0        0
      FPC 5             55.000       9.375      515       34
      FPC 6             55.187       9.687      534       35
      FPC 7             51.437       0.000        0        0
      SCG/CB/SIB        55.375      15.750      872       35
      FAN               54.562      14.750      804       42
```

show chassis environment pem (T640/T1600/T4000 Routers With Six-Input DC Power Supply)

user@host> **show chassis environment pem**

```
PEM 1 status:
  State                          Online
  Temperature                    36 degrees C / 96 degrees F
  DC Input:                      OK
                      Voltage(V)  Current(A)  Power(W)  Load(%)
      INPUT 0            0.000       0.000        0        0
      INPUT 1           54.875       3.812      209       27
      INPUT 2           55.375       3.937      218       29
      INPUT 3           54.625       3.750      204       27
      INPUT 4           55.125       3.375      186       24
      INPUT 5           55.125       3.375      186       24
  DC Output           Voltage(V)  Current(A)  Power(W)  Load(%)
      FPC 0             52.312       0.000        0        0
      FPC 1             52.687       0.000        0        0
      FPC 2             52.812       0.000        0        0
      FPC 3             55.812       7.062      394       52
      FPC 4             52.625       0.000        0        0
      FPC 5             52.625       0.000        0        0
      FPC 6             52.750       0.000        0        0
      FPC 7             52.750       0.000        0        0
      SCG/CB/SIB        55.937      11.937      667       55
      FAN               55.812       4.937      275       36
```

show chassis environment pem lcc (TX Matrix Routing Matrix)

user@host> **show chassis environment pem 0 lcc 0**

```
lcc0-re0:
--------------------------------------------------------------------------
```

```
PEM 0 status:
  State                            Present
  Temperature                   27 degrees C / 80 degrees F
  DC input:                        Check
  DC output:              Voltage   Current       Power    Load
       FPC 0                    0         0           0       0
       FPC 1                    0         0           0       0
       FPC 2                    0         0           0       0
       FPC 3                    0         0           0       0
       FPC 4                    0         0           0       0
       FPC 5                    0         0           0       0
       FPC 6                    0         0           0       0
       FPC 7                    0         0           0       0
  SCG/CB/SIB                    0         0           0       0
```

show chassis environment pem scc (TX Matrix Routing Matrix)

`user@host>` **show chassis environment pem scc**

```
scc-re0:
--------------------------------------------------------------------------
PEM 1 status:
  State                            Online
  Temperature                   24 degrees C / 75 degrees F
  DC input:                        OK
  DC output:              Voltage   Current       Power    Load
       SIB 0                    0         0           0       0
       SIB 1                    0         0           0       0
       SIB 2                    0         0           0       0
       SIB 3                56550         0           0       0
       SIB 4                55958      6912         386      51
```

show chassis environment pem sfc (TX Matrix Plus Routing Matrix)

`user@host>` **show chassis environment pem sfc 0**

```
sfc0-re0:
--------------------------------------------------------------------------
PEM 0 status:
  State                       Online
  Temperature                 35 degrees C / 95 degrees F
  DC Input:                    OK
  DC Output               Voltage   Current       Power    Load
      Channel 0             53820     14140         761      59
      Channel 1             53550     12720         681      53
      Channel 2             53840     12930         696      54
      Channel 3             53690     14990         804      63
      Channel 4             53620     15070         808      63
      Channel 5             53900     14820         798      62
      Channel 6             54120     5020          271      21
```

show chassis environment pem lcc (TX Matrix Plus Routing Matrix)

`user@host>` **show chassis environment lcc 0**

```

lcc0-re1:
--------------------------------------------------------------------------
PEM 0 status:
```

```
  State                       Online
  Temperature                 38 degrees C / 100 degrees F
  DC Input:                   OK
  DC Output              Voltage   Current       Power    Load
      FPC 0                0         0             0        0
      FPC 1                0         0             0        0
      FPC 2                0         0             0        0
      FPC 3                0         0             0        0
      FPC 4                56408     7575          427      56
      FPC 5                0         0             0        0
      FPC 6                56266     7956          447      59
      FPC 7                56283     6100          343      45
      SCG/CB/SIB           55916     8950          500      41
PEM 1 status:
  State                       Present
  Temperature                 35 degrees C / 95 degrees F
  DC Input:                   Check
  DC Output              Voltage   Current       Power    Load
      FPC 0                0         0             0        0
      FPC 1                0         0             0        0
      FPC 2                0         0             0        0
      FPC 3                0         0             0        0
      FPC 4                0         0             0        0
      FPC 5                0         0             0        0
      FPC 6                0         0             0        0
      FPC 7                0         0             0        0
      SCG/CB/SIB           0         0             0        0
```

show chassis environment pem node-device (QFabric System)

`user@switch>` **show chassis environment pem node-device node1**

```
FPC 0 PEM 0 status:
  State                       Check
  Airflow                     Front to Back
  Temperature                 OK
  AC Input:                   OK
  DC Output             Voltage(V) Current(A)  Power(W)  Load(%)
                            12         10           120      18
FPC 0 PEM 1 status:
  State                       Online
  Airflow                     Back to Front
  Temperature                 OK
  AC Input:                   OK
  DC Output             Voltage(V) Current(A)  Power(W)  Load(%)
                            11         10          110      17
```

show chassis environment pem (QFX Series and OCX Series)

`user@switch>` **show chassis environment pem**

```
FPC 0 PEM 1 status:
  State                       Online
  Airflow                     Front to Back
  Temperature                 OK
  AC Input:                   OK
  DC Output             Voltage(V) Current(A)  Power(W)  Load(%)
                            12         17           204      31
```

show chassis environment pem (QFX 10016)

user@router> show chassis environment pem 1

```
PEM 1 status:
  State                      Present
  Input                      Voltage(V)  Current(A) Power(W)
  INP 1                      229.9       0.4        96.6
  INP 2                      233.7       0.4        98.2
  Health check Information:
      Status:                    Scheduled
      Last Result:               Pass
      Last Execution:            2019-04-23 15:09:54
      Next Scheduled Run:        2019-04-23 15:32:59
```

show chassis environment pem interconnect-device (QFabric System)

user@switch> **show chassis environment pem interconnect-device IC1 1**

```
IC1 PEM 1 status:
  State                      Online
  Airflow                    Front to Back
  Temperature                OK
  AC Input:                  OK
  DC Output           Voltage(V) Current(A)  Power(W)  Load(%)
                          12         18          216      33
```

show chassis environment pem (EX9251 Switches)

user@switch> **show chassis environment pem**

```
PEM 0 status:
  State                      Present
PEM 1 status:
  State                      Online
  Airflow                    Front to Back
  Temperature                OK   36 degrees C / 96 degrees F
  Temperature                OK   35 degrees C / 95 degrees F
  Fan Sensor                 5940 RPM
  DC Output           Voltage(V) Current(A)  Power(W)  Load(%)
                        11.85        17          201      30
```

show chassis environment pem (EX9253 Switches)

user@switch> **show chassis environment pem**

```
PEM 0 status:
  State                      Online
  Airflow                    Front to Back
  Temperature                OK   56 degrees C / 132 degrees F
  Temperature                OK   46 degrees C / 114 degrees F
  Temperature                OK   28 degrees C / 82 degrees F
  Firmware version           04.10
  Cooling Fan                9056 RPM
  DC Output           Voltage(V) Current(A)  Power(W)  Load(%)
                          12.00     47           564      19
PEM 1 status:
  State                      Present
PEM 2 status:
```



```
  State                        Empty
PEM 3 status:
  State                        Empty
PEM 4 status:
  State                        Present
PEM 5 status:
  State                        Online
  Airflow                      Front to Back
  Temperature                  OK   61 degrees C / 141 degrees F
  Temperature                  OK   49 degrees C / 120 degrees F
  Temperature                  OK   28 degrees C / 82 degrees F
  Firmware version             04.10
  Cooling Fan                  8656 RPM
  DC Output             Voltage(V) Current(A)  Power(W)  Load(%)
                            12.00     51           612      21
```

show chassis environment pem (PTX1000 Packet Transport Routers)

`user@router>` **show chassis environment pem**

```

PEM 0 status:
  State                        Online
  Airflow                      Front to Back
  Temp Sensor 0                OK   22 degrees C / 71 degrees F
  Temp Sensor 1                OK   23 degrees C / 73 degrees F
  Fan 0                        9184 RPM
  Fan 1                        7936 RPM
  DC Output             Voltage(V) Current(A)  Power(W)  Load(%)
                          12          24           288      18
PEM 2 status:
  State                        Online
  Airflow                      Front to Back
  Temp Sensor 0                OK   22 degrees C / 71 degrees F
  Temp Sensor 1                OK   26 degrees C / 78 degrees F
  Fan 0                        9056 RPM
  Fan 1                        7808 RPM
  DC Output             Voltage(V) Current(A)  Power(W)  Load(%)
                          12          24           288      18
```

On PTX1000 Packet Transport Routers, you cannot view the **show chassis environment pem** output at the PEM slot level, by using the command **show chassis environment pem *slot***.

show chassis environment routing-engine

List of Syntax

Syntax

```
show chassis environment routing-engine
<slot>
```

Syntax (TX Matrix Routers)

```
show chassis environment routing-engine
<lcc number | scc>
<slot>
```

Syntax (TX Matrix Plus Routers)

```
show chassis environment routing-engine
<lcc number | sfc number>
<slot>
```

Syntax (MX104, MX2010, MX2020, MX10003, MX204, and MX2008 Universal Routing Platforms)

```
show chassis environment routing-engine
<slot>
<satellite [fpc-slot slot-id |device-alias alias-name]
```

Syntax (MX Series Routers)

```
show chassis environment routing-engine
<slot>
<all-members>
<local>
<member member-id>
```

Syntax (PTX Series Routers)

```
show chassis environment routing-engine
<slot>
<all-members>
<local>
<member member-id>
```


Syntax (QFX Series)

```
show chassis environment routing-engine
interconnect-device name
```

Syntax (OCX Series)

```
show chassis environment routing-engine
interconnect-device name
```

Syntax (ACX5048 and ACX5096 Routers)

```
show chassis environment routing-engine
```

Syntax (ACX500 Routers)

```
show chassis environment routing-engine
```

Syntax (EX9251, EX9253 Switches)

```
show chassis environment routing-engine
```

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.
Command introduced in Junos OS Release 11.1 for the QFX Series.
Command introduced in Junos OS Release 12.1 for the PTX Series Packet Transport Routers and T4000 Core Routers.
Command introduced in Junos OS Release 12.3 for MX2010 and MX2020 Universal Routing Platforms.
Command introduced in Junos OS Release 13.2 for MX104 Universal Routing Platforms.
Command introduced in Junos OS Release 15.1X54-D20 for ACX5048 and ACX5096 Routers.
Command introduced in Junos OS Release 17.2 for MX2008 Universal Routing Platforms.
Command introduced in Junos OS Release 17.2 for PTX10008 Routers.
Command introduced in Junos OS Release 17.3 for MX150 Router Appliance.
Command introduced in Junos OS Release 17.4 for MX204 Universal Routing Platforms.
Command introduced in Junos OS Release 17.3 for MX10003 Universal Routing Platforms.
Command introduced in Junos OS Release 18.1R1 for EX9251 Switches.
Command introduced in Junos OS Release 18.2 for EX9253 Switches.
Command introduced in Junos OS Release 18.2R1 for MX10008 Routers.

Description

Display Routing Engine environmental status information.

Options

none—Display environmental information about all Routing Engines. For a TX Matrix router, display environmental information about all Routing Engines on the TX Matrix router and its attached T640 routers. For a TX Matrix Plus router, display environmental information about all Routing Engines on the TX Matrix Plus router and its attached routers.

all-members—(MX Series routers only) (Optional) Display environmental information about the Routing Engines in all member routers in the Virtual Chassis configuration.

interconnect-device *name*—(QFabric systems only) (Optional) Display environmental information about the Routing Engines for the Interconnect device.

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.

local—(MX Series routers only) (Optional) Display environmental information about the Routing Engines in the local Virtual Chassis member.

member *member-id*—(MX Series routers only) (Optional) Display environmental information about the Routing Engines in the specified member in the Virtual Chassis configuration. Replace *member-id* with the value of 0 or 1.

satellite [fpc-slot *slot-id* | device-alias *alias-name*]—(Junos Fusion only)(Optional) Display environmental information for the specified satellite device in a Junos Fusion, or for all satellite devices in the Junos Fusion if no satellite devices are specified.

scc—(TX Matrix router only) (Optional) Display environmental information about the Routing Engine in the TX Matrix router (switch-card chassis).

sfc—(TX Matrix Plus router only) (Optional) Display environmental information about the Routing Engine in the TX Matrix Plus router (or switch-fabric chassis).

slot—(Optional) Display environmental information about an individual Routing Engine. On M10i, M20, M40e, M120, M160, M320, MX Series, MX104 routers, MX2010 routers, MX2020 routers, MX2008 routers, and T Series routers, replace *slot* with 0 or 1. On M5, M7i, M10, and M40 routers, replace *slot* with 0. On EX3200 and EX4200 standalone switches, replace *slot* with 0. On EX4200 switches in a Virtual Chassis configuration and on EX8208 and EX8216 switches, replace *slot* with 0 or 1. On the QFX3500 switch, there is only one Routing Engine, so you do not need to specify the slot number. On PTX Series Packet Transport Routers, replace *slot* with 0 or 1

Required Privilege Level

view

Related Documentation

- *request chassis routing-engine master*
- show chassis routing-engine on page 445

List of Sample Output

Output Fields

Table 19 on page 385 lists the output fields for the **show chassis environment routing-engine** command. Output fields are listed in the approximate order in which they appear.

Table 19: show chassis environment routing-engine Output Fields

Field Name	Field Description
Routing engine *slot* status	Number of the Routing Engine slot: 0 or 1.
State	Status of the Routing Engine: • Online Master—Routing Engine is online, operating as Master. • Online Standby—Routing Engine is online, operating as Standby. • Offline—Routing Engine is offline.
Temperature	Temperature of the air flowing past the Routing Engine.
CPU Temperature	(PTX Series and T4000 Core Routers only) Temperature of the air flowing past the Routing Engine CPU.

Sample Output

show chassis environment routing-engine (Nonredundant)

user@host> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                            Online Master
  Temperature                   27 degrees C / 80 degrees
```

show chassis environment routing-engine (Redundant)

user@host> **show chassis environment routing-engine**

```
Route Engine 0 status:
  State:                       Online Master
  Temperature:               26 degrees C / 78 degrees F
Route Engine 1 status:
  State:                       Online Standby
  Temperature:               26 degrees C / 78 degrees F
```

show chassis enviroenment routing-engine (MX150)

user@ host >**show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                       Online Master
  CPU Temperature             42 degrees C / 107 degrees F
```

show chassis environment routing-engine (MX104 Router)

user@ host >**show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                       Online Master
  Temperature                 34 degrees C / 93 degrees F
  CPU Temperature             43 degrees C / 109 degrees F
Routing Engine 1 status:
  State                       Online Standby
  Temperature                 33 degrees C / 91 degrees F
  CPU Temperature             39 degrees C / 102 degrees F
```

show chassis environment routing-engine (MX2010 Router)

user@host> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                       Online Master
  Temperature                 37 degrees C / 98 degrees F
  CPU Temperature             37 degrees C / 98 degrees F
Routing Engine 1 status:
  State                       Online Standby
  Temperature                 35 degrees C / 95 degrees F
  CPU Temperature             34 degrees C / 93 degrees F
```

show chassis environment routing-engine (MX2020 Router)

user@host> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                         Online Master
  Temperature                   35 degrees C / 95 degrees F
  CPU Temperature               34 degrees C / 93 degrees F
Routing Engine 1 status:
  State                         Online Standby
  Temperature                   44 degrees C / 111 degrees F
  CPU Temperature               43 degrees C / 109 degrees F
```

show chassis environment routing-engine (MX2008 Router)

`user@host>` **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                         Online Master
  CPU Temperature               75 degrees C / 167 degrees F
Routing Engine 1 status:
  State                         Online Standby
  CPU Temperature               47 degrees C / 116 degrees F
```

show chassis environment routing-engine (TX Matrix Plus Router)

`user@host>` **show chassis environment routing-engine**

```
sfc0-re0:
--------------------------------------------------------------------------
Routing Engine 0 status:
  State                         Online Master
  Temperature                   26 degrees C / 78 degrees F
Routing Engine 1 status:
  State                         Online Standby
  Temperature                   28 degrees C / 82 degrees F

lcc0-re0:
--------------------------------------------------------------------------
Routing Engine 0 status:
  State                         Online Master
  Temperature                   30 degrees C / 86 degrees F
Routing Engine 1 status:
  State                         Online Standby
  Temperature                   29 degrees C / 84 degrees F
```

show chassis environment routing-engine (T4000 Core Router)

`user@host>` **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                         Online Master
  Temperature                   33 degrees C / 91 degrees F
  CPU Temperature               50 degrees C / 122 degrees F
Routing Engine 1 status:
  State                         Online Standby
  Temperature                   33 degrees C / 91 degrees F
  CPU Temperature               46 degrees C / 114 degrees F
```

show chassis environment routing-engine (QFX Series and OCX Series)

`user@switch>` **show chassis environment routing-engine**


```
Routing Engine 0 status:
  State                      Online Master
  Temperature                42 degrees C / 107 degrees F
```

show chassis environment routing-engine interconnect-device (QFabric System)

user@switch> **show chassis environment routing-engine interconnect-device interconnect1**

```
routing-engine interconnect-device interconnect1
Routing Engine 0 status:
  State                      Online Standby
  Temperature                52 degrees C / 125 degrees F
Routing Engine 1 status:
  State                      Online Master
  Temperature                57 degrees C / 134 degrees F
```

show chassis environment routing-engine (PTX5000 Packet Transport Router)

user@switch> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                      Online Master
  Temperature                55 degrees C / 131 degrees F
  CPU Temperature            66 degrees C / 150 degrees F
Routing Engine 1 status:
  State                      Online Standby
  Temperature                52 degrees C / 125 degrees F
  CPU Temperature            64 degrees C / 147 degrees F
```

show chassis environment routing-engine (PTX10008 Router)

user@switch> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                      Online Master
  CPU Temperature            40 degrees C / 104 degrees F
Routing Engine 1 status:
  State                      Online Standby
  CPU Temperature            40 degrees C / 104 degrees F
```

show chassis environment routing-engine (PTX10016 Router)

user@switch> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                      Online Master
  CPU Temperature            33 degrees C / 91 degrees F
Routing Engine 1 status:
  State                      Online Standby
  CPU Temperature            38 degrees C / 100 degrees F
```

show chassis environment routing-engine (ACX5048 and ACX5096 Routers)

user@host> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                      Online Master
  Temperature                33 degrees C / 91 degrees F
```

show chassis environment routing-engine (ACX500 Routers)

user@host> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                        Online Master
  Temperature                  54 degrees C / 129 degrees F
```

Sample Output

show chassis environment routing-engine (PTX5000 (RE-PTX-X8-64G), MX240 (RE-S-X6-64G), MX480 (RE-S-X6-64G), MX960 (RE-S-X6-64G), MX2010 (RE-MX2K-X8-64G), MX2020 (RE-MX2K-X8-64G)

user@switch> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                        Online Master
  Temperature                  37 degrees C / 98 degrees F
  CPU Temperature              52 degrees C / 125 degrees F
Routing Engine 1 status:
  State                        Online Standby
  Temperature                  37 degrees C / 98 degrees F
  CPU Temperature              51 degrees C / 123 degrees F
```

show chassis environment routing-engine (MX204 Routers)

user@host> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                        Online Master
```

show chassis environment routing-engine (MX10008 Routers)

```
Routing Engine 0 status:
  State                        Online Master
  CPU Temperature                            41 degrees C / 105 degrees F
Routing Engine 1 status:
  State                        Online Standby
  CPU Temperature                            40 degrees C / 104 degrees F
```

show chassis environment routing-engine (EX9251 Switches)

user@switch> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                        Online Master
```

show chassis environment routing-engine (EX9253 Switches)

user@switch> **show chassis environment routing-engine**

```
Routing Engine 0 status:
  State                        Online Master
Routing Engine 1 status:
  State                        Present
```


show chassis fan

List of Syntax

Syntax

```
show chassis fan
```

Syntax (ACX4000 Series Router)

```
show chassis fan
```

Syntax (ACX5048 and ACX5096 Routers)

```
show chassis fan
```

Syntax (MX Series Routers)

```
show chassis fan
<all-members>
<local>
<member member-id>
```

Syntax (T Series Routers)

```
show chassis fan
```

Syntax (MX104, MX204, MX2010, MX2020, MX2008, and MX10003 Universal Routing Platform)

```
show chassis fan
<satellite [slot-id slot-id |device-alias alias-name]>
```

Syntax (MX10003 Universal Routing Platform)

```
show chassis fan
```

Syntax (PTX Series)

```
show chassis fan
```

Syntax (QFX Series)

```
show chassis fan
<interconnect-device name>
```

Syntax (OCX Series)

```
show chassis fan
```

Syntax (TX Matrix Router)

```
show chassis fan
<lcc number | scc>
```

Syntax (TX Matrix Plus Router)

```
show chassis fan
<lcc number | sfc number>
```

Syntax (EX9251, EX9253 Switches)

```
show chassis fan
```

Release Information

Command introduced in Junos OS Release 10.0 on MX Series 5G Universal Routing Platforms, M120 routers, and M320 routers, T320 routers, T640 routers, T1600 routers, TX Matrix Routers, and TX Matrix Plus routers.
Command introduced in Junos OS Release 11.1 for the QFX Series.
Command introduced in Junos OS Release 11.4 for EX Series switches.
Command introduced in Junos OS Release 12.1 for T4000 routers.
Command introduced in Junos OS Release 12.3 for PTX5000 Packet Transport Routers.
Command introduced in Junos OS Release 12.3 for MX2010 and MX2020 Universal Routing Platforms, and ACX Series Routers.
Command introduced in Junos OS Release 13.2 for MX104 Universal Routing Platforms.
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
satellite option introduced in Junos OS Release 14.2R3.
Command introduced in Junos OS Release 17.2 for MX2008 Universal Routing Platforms.
Command introduced in Junos OS Release 17.3 for MX150 Router Appliance.
Command introduced in Junos OS Release 17.2 for PTX10008 Routers.
Command introduced in Junos OS Release 17.4 for MX204 Universal Routing Platforms.
Command introduced in Junos OS Release 18.1R1 for EX9251 Switches.
Command introduced in Junos OS Release 18.2 for EX9253 Switches.
Command introduced in Junos OS Release 18.2 for MX10008 Universal Routing Platforms.
Command output introduced for Junos OS Evolved Release 19.1R1.

Description

(T Series routers, TX Matrix routers, TX Matrix Plus routers, M120 routers, M320 routers, MX104 routers, MX2010 routers, MX2020 routers, MX2008 routers, MX Series 5G Universal Routing Platforms, QFX3008-I Interconnect devices, QFX Series, OCX Series, EX Series switches, and PTX Series Packet Transport Routers only) Show information about the fan tray and fans.

Options

all-members—(MX Series routers only) (Optional) Display information about the fan tray and fans for all members of the Virtual Chassis configuration.

local—(MX Series routers only) (Optional) Display information about the fan tray and fans for the local Virtual Chassis member.

member ***member-id***—(MX Series routers only) (Optional) Display information about the fan tray and fans for the specified member of the Virtual Chassis configuration. For an MX Series Virtual Chassis, replace *member-id* variable with a value 0 or 1.

interconnect-device ***name***—(QFX3000-G QFabric systems only) (Optional) Display information about the fan tray and fans for the specified QFX3008-I Interconnect device.

lcc ***number***—(TX Matrix and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display information about the fan tray and fans for the specified T640 router (line-card chassis) that is connected to a TX Matrix router. On a TX Matrix Plus router, display information about the fan tray and fans for the specified router (line-card chassis) that is connected to a 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.

satellite [slot-id ***slot-id*** **| device-alias** ***alias-name*****]**—(Junos Fusion only) (Optional) Display information about the fan tray and fans for the specified satellite device or devices in a Junos Fusion, or for all satellite devices if no satellite devices are specified.

scc —(TX Matrix routers only) (Optional) Display information about the fan tray and fans for the TX Matrix router (switch-card chassis).

sfc ***number***—(TX Matrix Plus routers only) (Optional) Display information about the fan tray and fans for the TX Matrix Plus router (switch-fabric chassis). Replace *number* variable with **0**.

Required Privilege Level view

List of Sample Output

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show chassis fan (QFabric Systems) on page 395
show chassis fan (EX Series Switches) on page 397
show chassis fan (T320 Router) on page 397
show chassis fan (T640 Router) on page 397
show chassis fan (T1600 Router) on page 398
show chassis fan (T4000 Core Router) on page 398

show chassis fan (TX Matrix Router) on page 399
show chassis fan (TX Matrix Plus Router) on page 400
show chassis fan (TX Matrix Plus Router with 3D SIBs) on page 401
show chassis fan (PTX5000 Packet Transport Router) on page 403
show chassis fan (PTX10008 Router) on page 404
show chassis fan (MX150) on page 404
show chassis fan (MX104 Router) on page 404
show chassis fan (MX2010 Router) on page 404
show chassis fan (MX2020 Router) on page 405
show chassis fan (MX2008 Router) on page 405
show chassis fan (MX10003 Router) on page 406
show chassis fan (MX204 Router) on page 406
show chassis fan (MX10008 Router) on page 406
show chassis fan (ACX4000 Router) on page 407
show chassis fan (ACX5048 Router) on page 407
show chassis fan (QFX5100 Switch and OCX Series) on page 407
show chassis fan (EX9251 switches) on page 407
show chassis fan (EX9253 switches) on page 408
show chassis fan (Junos OS Evolved) on page 408

Output Fields

Table 20 on page 394 lists the output fields for the **show chassis fan** command. Output fields are listed in the approximate order in which they appear.

Table 20: show chassis fan Output Fields

Field Name	Field Description
Item	Fan item identifier.
Status	Status of the fan: • **OK**—Fan is running properly and within the normal range. • **Check**—Fan is in **Check** state because of some fault or alarm condition.
RPM	(T Series routers, TX Matrix routers, TX Matrix Plus routers, MX Series 5G Universal Routing Platforms, QFX3108 Interconnect devices, and EX Series switches only) Fan speed in revolutions per minute (RPM).
% RPM	(PTX10003, MX2010 routers, MX2020 routers, MX2008 routers, and PTX Series Packet Transport Routers only) Percentage of the fan speed being used.

Table 20: show chassis fan Output Fields (continued)

Field Name	Field Description
Measurement	(T Series routers, TX Matrix routers, TX Matrix Plus routers, MX Series 5G Universal Routing Platforms, QFX3108 Interconnect devices, and EX Series switches only) Fan speed status based on different chassis cooling requirements: • Spinning at high speed • Spinning at intermediate speed • Spinning at normal speed • Spinning at low speed (except EX Series switches) (PTX10003, MX2010 routers, MX2020 routers, MX2008 routers, and PTX Series Packet Transport Routers only) Fan speed in revolutions per minute (RPM) for each fan in the fan tray.

Sample Output

show chassis fan

`user@host>` **show chassis fan**

```
Item                      Status   RPM     Measurement
Top Tray Fan 1            OK       3790    Spinning at normal speed
Top Tray Fan 2            OK       3769    Spinning at normal speed
Top Tray Fan 3            OK       3769    Spinning at normal speed
Top Tray Fan 4            OK       3790    Spinning at normal speed
Top Tray Fan 5            OK       3790    Spinning at normal speed
Top Tray Fan 6            OK       3769    Spinning at normal speed
Top Tray Fan 7            OK       3790    Spinning at normal speed
Top Tray Fan 8            OK       3769    Spinning at normal speed
Top Tray Fan 9            OK       3769    Spinning at normal speed
Top Tray Fan 10           OK       3790    Spinning at normal speed
Top Tray Fan 11           OK       3790    Spinning at normal speed
Top Tray Fan 12           OK       3769    Spinning at normal speed
Bottom Tray Fan 1         OK       2880    Spinning at normal speed
Bottom Tray Fan 2         OK       2912    Spinning at normal speed
Bottom Tray Fan 3         OK       2928    Spinning at normal speed
Bottom Tray Fan 4         OK       2896    Spinning at normal speed
Bottom Tray Fan 5         OK       2896    Spinning at normal speed
Bottom Tray Fan 6         OK       2928    Spinning at normal speed
```

show chassis fan (QFabric Systems)

`user@host>` **show chassis fan interconnect-device** ***interconnect1***

```
Item                      Status   RPM     Measurement
TFT 0 Fan 0               OK       2849    Spinning at normal speed
TFT 0 Fan 1               OK       2821    Spinning at normal speed
TFT 0 Fan 2               OK       2735    Spinning at normal speed
TFT 0 Fan 3               OK       2815    Spinning at normal speed
TFT 0 Fan 4               OK       2828    Spinning at normal speed
TFT 0 Fan 5               OK       2863    Spinning at normal speed
BFT 1 Fan 0               OK       2941    Spinning at normal speed
```

```
BFT 1 Fan 1              OK       3008    Spinning at normal speed
BFT 1 Fan 2              OK       3073    Spinning at normal speed
BFT 1 Fan 3              OK       2925    Spinning at normal speed
BFT 1 Fan 4              OK       2863    Spinning at normal speed
BFT 1 Fan 5              OK       2933    Spinning at normal speed
SFT 0 Fan 0 Rotor 0      OK       15472   Spinning at normal speed
SFT 0 Fan 0 Rotor 1      OK       14477   Spinning at normal speed
SFT 0 Fan 1 Rotor 0      OK       15561   Spinning at normal speed
SFT 0 Fan 1 Rotor 1      OK       14210   Spinning at normal speed
SFT 0 Fan 2 Rotor 0      OK       16167   Spinning at normal speed
SFT 0 Fan 2 Rotor 1      OK       14248   Spinning at normal speed
SFT 0 Fan 3 Rotor 0      OK       16463   Spinning at normal speed
SFT 0 Fan 3 Rotor 1      OK       14099   Spinning at normal speed
SFT 1 Fan 0 Rotor 0      OK       15083   Spinning at normal speed
SFT 1 Fan 0 Rotor 1      OK       13533   Spinning at normal speed
SFT 1 Fan 1 Rotor 0      OK       16071   Spinning at normal speed
SFT 1 Fan 1 Rotor 1      OK       14400   Spinning at normal speed
SFT 1 Fan 2 Rotor 0      OK       15517   Spinning at normal speed
SFT 1 Fan 2 Rotor 1      OK       14210   Spinning at normal speed
SFT 1 Fan 3 Rotor 0      OK       16413   Spinning at normal speed
SFT 1 Fan 3 Rotor 1      OK       14400   Spinning at normal speed
SFT 2 Fan 0 Rotor 0      OK       15297   Spinning at normal speed
SFT 2 Fan 0 Rotor 1      OK       14634   Spinning at normal speed
SFT 2 Fan 1 Rotor 0      OK       15561   Spinning at normal speed
SFT 2 Fan 1 Rotor 1      OK       14285   Spinning at normal speed
SFT 2 Fan 2 Rotor 0      OK       15835   Spinning at normal speed
SFT 2 Fan 2 Rotor 1      OK       14400   Spinning at normal speed
SFT 2 Fan 3 Rotor 0      OK       15789   Spinning at normal speed
SFT 2 Fan 3 Rotor 1      OK       14323   Spinning at normal speed
SFT 3 Fan 0 Rotor 0      OK       16314   Spinning at normal speed
SFT 3 Fan 0 Rotor 1      OK       14876   Spinning at normal speed
SFT 3 Fan 1 Rotor 0      OK       15835   Spinning at normal speed
SFT 3 Fan 1 Rotor 1      OK       14323   Spinning at normal speed
SFT 3 Fan 2 Rotor 0      OK       16265   Spinning at normal speed
SFT 3 Fan 2 Rotor 1      OK       14594   Spinning at normal speed
SFT 3 Fan 3 Rotor 0      OK       16071   Spinning at normal speed
SFT 3 Fan 3 Rotor 1      OK       14323   Spinning at normal speed
SFT 4 Fan 0 Rotor 0      OK       15652   Spinning at normal speed
SFT 4 Fan 0 Rotor 1      OK       14438   Spinning at normal speed
SFT 4 Fan 1 Rotor 0      OK       16167   Spinning at normal speed
SFT 4 Fan 1 Rotor 1      OK       14555   Spinning at normal speed
SFT 4 Fan 2 Rotor 0      OK       16023   Spinning at normal speed
SFT 4 Fan 2 Rotor 1      OK       14361   Spinning at normal speed
SFT 4 Fan 3 Rotor 0      OK       16216   Spinning at normal speed
SFT 4 Fan 3 Rotor 1      OK       14438   Spinning at normal speed
SFT 5 Fan 0 Rotor 0      OK       15297   Spinning at normal speed
SFT 5 Fan 0 Rotor 1      OK       14173   Spinning at normal speed
SFT 5 Fan 1 Rotor 0      OK       15472   Spinning at normal speed
SFT 5 Fan 1 Rotor 1      OK       13846   Spinning at normal speed
SFT 5 Fan 2 Rotor 0      OK       15340   Spinning at normal speed
SFT 5 Fan 2 Rotor 1      OK       13917   Spinning at normal speed
SFT 5 Fan 3 Rotor 0      OK       15835   Spinning at normal speed
SFT 5 Fan 3 Rotor 1      OK       13917   Spinning at normal speed
SFT 6 Fan 0 Rotor 0      OK       15743   Spinning at normal speed
SFT 6 Fan 0 Rotor 1      OK       14594   Spinning at normal speed
SFT 6 Fan 1 Rotor 0      OK       16167   Spinning at normal speed
SFT 6 Fan 1 Rotor 1      OK       14634   Spinning at normal speed
SFT 6 Fan 2 Rotor 0      OK       16167   Spinning at normal speed
SFT 6 Fan 2 Rotor 1      OK       14516   Spinning at normal speed
SFT 6 Fan 3 Rotor 0      OK       16666   Spinning at normal speed
```

```
SFT 6 Fan 3 Rotor 1        OK       14438    Spinning at normal speed
SFT 7 Fan 0 Rotor 0        OK       15517    Spinning at normal speed
SFT 7 Fan 0 Rotor 1        OK       14438    Spinning at normal speed
SFT 7 Fan 1 Rotor 0        OK       15517    Spinning at normal speed
SFT 7 Fan 1 Rotor 1        OK       14361    Spinning at normal speed
SFT 7 Fan 2 Rotor 0        OK       16167    Spinning at normal speed
SFT 7 Fan 2 Rotor 1        OK       14555    Spinning at normal speed
SFT 7 Fan 3 Rotor 0        OK       15697    Spinning at normal speed
SFT 7 Fan 3 Rotor 1        OK       14361    Spinning at normal speed
```

show chassis fan (EX Series Switches)

user@host> **show chassis fan**

```
Item                       Status   RPM      Measurement
Fan 1                      OK       3477     Spinning at normal speed
Fan 2                      OK       3477     Spinning at normal speed
Fan 3                      OK       3479     Spinning at normal speed
Fan 4                      OK       3508     Spinning at normal speed
Fan 5                      OK       3517     Spinning at normal speed
Fan 6                      OK       3531     Spinning at normal speed
Fan 7                      OK       3439     Spinning at normal speed
Fan 8                      OK       3424     Spinning at normal speed
Fan 9                      OK       3413     Spinning at normal speed
Fan 10                     OK       3439     Spinning at normal speed
Fan 11                     OK       3446     Spinning at normal speed
Fan 12                     OK       3432     Spinning at normal speed
```

show chassis fan (T320 Router)

user@host> **show chassis fan**

```
     Item                 Status    RPM      Measurement
Top Left Front fan         OK       2850     Spinning at normal speed
Top Left Middle fan        OK       2820     Spinning at normal speed
Top Left Rear fan          OK       2970     Spinning at normal speed
Top Right Front fan        OK       2790     Spinning at normal speed
Top Right Middle fan       OK       2640     Spinning at normal speed
Top Right Rear fan         OK       2790     Spinning at normal speed
Bottom Left Front fan      OK       2520     Spinning at normal speed
Bottom Left Middle fan     OK       2610     Spinning at normal speed
Bottom Left Rear fan       OK       2550     Spinning at normal speed
Bottom Right Front fan     OK       2610     Spinning at normal speed
Bottom Right Middle fan    OK       2880     Spinning at normal speed
Bottom Right Rear fan      OK       2790     Spinning at normal speed
Rear Tray Top fan          OK       2130     Spinning at normal speed
Rear Tray Second fan       OK       2190     Spinning at normal speed
Rear Tray Middle fan       OK       2250     Spinning at normal speed
Rear Tray Fourth fan       OK       2220     Spinning at normal speed
Rear Tray Bottom fan       OK       2280     Spinning at normal speed
```

show chassis fan (T640 Router)

user@host> **show chassis fan**

```
   Item                   Status    RPM      Measurement
```

```
Top Left Front fan          OK       3420     Spinning at normal speed
Top Left Middle fan         OK       3420     Spinning at normal speed
Top Left Rear fan           OK       3420     Spinning at normal speed
Top Right Front fan         OK       3420     Spinning at normal speed
Top Right Middle fan        OK       3420     Spinning at normal speed
Top Right Rear fan          OK       3450     Spinning at normal speed
Bottom Left Front fan       OK       3390     Spinning at normal speed
Bottom Left Middle fan      OK       3420     Spinning at normal speed
Bottom Left Rear fan        OK       3390     Spinning at normal speed
Bottom Right Front fan      OK       3390     Spinning at normal speed
Bottom Right Middle fan     OK       3390     Spinning at normal speed
Bottom Right Rear fan       OK       3390     Spinning at normal speed
Rear Tray Top fan           OK       5220     Spinning at normal speed
Rear Tray Second fan        OK       5220     Spinning at normal speed
Rear Tray Third fan         OK       5220     Spinning at normal speed
Rear Tray Fourth fan        OK       5220     Spinning at normal speed
Rear Tray Fifth fan         OK       5220     Spinning at normal speed
Rear Tray Sixth fan         OK       5220     Spinning at normal speed
Rear Tray Seventh fan       OK       5220     Spinning at normal speed
Rear Tray Bottom fan        OK       5220     Spinning at normal speed
```

show chassis fan (T1600 Router)

user@host> **show chassis fan**

```
  Item                     Status    RPM      Measurement
Top Left Front fan          OK       3420     Spinning at normal speed
Top Left Middle fan         OK       3420     Spinning at normal speed
Top Left Rear fan           OK       3450     Spinning at normal speed
Top Right Front fan         OK       3420     Spinning at normal speed
Top Right Middle fan        OK       3420     Spinning at normal speed
Top Right Rear fan          OK       3390     Spinning at normal speed
Bottom Left Front fan       OK       3420     Spinning at normal speed
Bottom Left Middle fan      OK       3420     Spinning at normal speed
Bottom Left Rear fan        OK       3390     Spinning at normal speed
Bottom Right Front fan      OK       3390     Spinning at normal speed
Bottom Right Middle fan     OK       3420     Spinning at normal speed
Bottom Right Rear fan       OK       3390     Spinning at normal speed
Rear Tray Top fan           OK       5190     Spinning at normal speed
Rear Tray Second fan        OK       5190     Spinning at normal speed
Rear Tray Third fan         OK       5190     Spinning at normal speed
Rear Tray Fourth fan        OK       5190     Spinning at normal speed
Rear Tray Fifth fan         OK       5190     Spinning at normal speed
Rear Tray Sixth fan         OK       5190     Spinning at normal speed
Rear Tray Seventh fan       OK       5190     Spinning at normal speed
Rear Tray Bottom fan        OK       5190     Spinning at normal speed
```

show chassis fan (T4000 Core Router)

user@host> **show chassis fan**

```
Item                        Status   RPM      Measurement
Top Left Front fan          OK       5190     Spinning at high speed
Top Left Middle fan         OK       5220     Spinning at high speed
Top Left Rear fan           OK       5190     Spinning at high speed
Top Right Front fan         OK       5160     Spinning at high speed
Top Right Middle fan        OK       5190     Spinning at high speed
```



```
      Top Right Rear fan         OK       5160     Spinning at high speed
      Bottom Left Front fan      OK       6030     Spinning at high speed
      Bottom Left Middle fan     OK       6090     Spinning at high speed
      Bottom Left Rear fan       OK       6090     Spinning at high speed
      Bottom Right Front fan     OK       6030     Spinning at high speed
      Bottom Right Middle fan    OK       6060     Spinning at high speed
      Bottom Right Rear fan      OK       6060     Spinning at high speed
      Rear Tray Top fan          OK       10000    Spinning at high speed
      Rear Tray Second fan       OK       10000    Spinning at high speed
      Rear Tray Third fan        OK       10000    Spinning at high speed
      Rear Tray Fourth fan       OK       10000    Spinning at high speed
      Rear Tray Fifth fan        OK       10000    Spinning at high speed
      Rear Tray Sixth fan        OK       10000    Spinning at high speed
      Rear Tray Seventh fan      OK       10000    Spinning at high speed
      Rear Tray Bottom fan       OK       10000    Spinning at high speed
```

show chassis fan (TX Matrix Router)

user@host> **show chassis fan**

```
scc-re0:
--------------------------------------------------------------------------
      Item                       Status   RPM      Measurement
      Top Left Front fan         OK       3420     Spinning at normal speed
      Top Left Middle fan        OK       3390     Spinning at normal speed
      Top Left Rear fan          OK       3420     Spinning at normal speed
      Top Right Front fan        OK       3390     Spinning at normal speed
      Top Right Middle fan       OK       3420     Spinning at normal speed
      Top Right Rear fan         OK       3390     Spinning at normal speed
      Bottom Left Front fan      OK       3420     Spinning at normal speed
      Bottom Left Middle fan     OK       3450     Spinning at normal speed
      Bottom Left Rear fan       OK       3420     Spinning at normal speed
      Bottom Right Front fan     OK       3420     Spinning at normal speed
      Bottom Right Middle fan    OK       3420     Spinning at normal speed
      Bottom Right Rear fan      OK       3420     Spinning at normal speed
      Rear Tray Top fan          OK       3420     Spinning at normal speed
      Rear Tray Second fan       OK       5190     Spinning at normal speed
      Rear Tray Third fan        OK       5190     Spinning at normal speed
      Rear Tray Fourth fan       OK       5190     Spinning at normal speed
      Rear Tray Fifth fan        OK       3420     Spinning at normal speed
      Rear Tray Sixth fan        OK       3420     Spinning at normal speed
      Rear Tray Seventh fan      OK       3420     Spinning at normal speed
      Rear Tray Bottom fan       OK       3420     Spinning at normal speed

lcc2-re0:
--------------------------------------------------------------------------
      Item                       Status   RPM      Measurement
      Top Left Front fan         OK       3420     Spinning at normal speed
      Top Left Middle fan        OK       3420     Spinning at normal speed
      Top Left Rear fan          OK       3450     Spinning at normal speed
      Top Right Front fan        OK       3420     Spinning at normal speed
      Top Right Middle fan       OK       3450     Spinning at normal speed
      Top Right Rear fan         OK       3360     Spinning at normal speed
      Bottom Left Front fan      OK       3420     Spinning at normal speed
      Bottom Left Middle fan     OK       3480     Spinning at normal speed
      Bottom Left Rear fan       OK       3420     Spinning at normal speed
      Bottom Right Front fan     OK       3420     Spinning at normal speed
      Bottom Right Middle fan    OK       3390     Spinning at normal speed
      Bottom Right Rear fan      OK       3420     Spinning at normal speed
      Rear Tray Top fan          OK       3420     Spinning at normal speed
```

```
      Rear Tray Second fan      OK        3420     Spinning at normal speed
      Rear Tray Third fan       OK        3420     Spinning at normal speed
      Rear Tray Fourth fan      OK        3420     Spinning at normal speed
      Rear Tray Fifth fan       OK        3420     Spinning at normal speed
      Rear Tray Sixth fan       OK        3420     Spinning at normal speed
      Rear Tray Seventh fan     OK        3420     Spinning at normal speed
      Rear Tray Bottom fan      OK        3420     Spinning at normal speed
```

show chassis fan (TX Matrix Plus Router)

user@host> **show chassis fan**

```
  sfc0-re0:
--------------------------------------------------------------------------
      Item                      Status    RPM      Measurement
      Fan Tray 0 Fan 1          OK        4350     Spinning at normal speed
      Fan Tray 0 Fan 2          OK        4380     Spinning at normal speed
      Fan Tray 0 Fan 3          OK        4410     Spinning at normal speed
      Fan Tray 0 Fan 4          OK        4380     Spinning at normal speed
      Fan Tray 0 Fan 5          OK        4350     Spinning at normal speed
      Fan Tray 0 Fan 6          OK        4380     Spinning at normal speed
      Fan Tray 1 Fan 1          OK        4410     Spinning at normal speed
      Fan Tray 1 Fan 2          OK        4380     Spinning at normal speed
      Fan Tray 1 Fan 3          OK        4410     Spinning at normal speed
      Fan Tray 1 Fan 4          OK        4380     Spinning at normal speed
      Fan Tray 1 Fan 5          OK        4410     Spinning at normal speed
      Fan Tray 1 Fan 6          OK        4410     Spinning at normal speed
      Fan Tray 2 Fan 1          OK        4380     Spinning at normal speed
      Fan Tray 2 Fan 2          OK        4380     Spinning at normal speed
      Fan Tray 2 Fan 3          OK        4380     Spinning at normal speed
      Fan Tray 2 Fan 4          OK        4410     Spinning at normal speed
      Fan Tray 2 Fan 5          OK        4380     Spinning at normal speed
      Fan Tray 2 Fan 6          OK        4410     Spinning at normal speed
      Fan Tray 2 Fan 7          OK        4410     Spinning at normal speed
      Fan Tray 2 Fan 8          OK        4380     Spinning at normal speed
      Fan Tray 2 Fan 9          OK        4380     Spinning at normal speed
      Fan Tray 3 Fan 1          OK        4350     Spinning at normal speed
      Fan Tray 3 Fan 2          OK        4380     Spinning at normal speed
      Fan Tray 3 Fan 3          OK        4410     Spinning at normal speed
      Fan Tray 3 Fan 4          OK        4440     Spinning at normal speed
      Fan Tray 3 Fan 5          OK        4380     Spinning at normal speed
      Fan Tray 3 Fan 6          OK        4410     Spinning at normal speed
      Fan Tray 3 Fan 7          OK        4410     Spinning at normal speed
      Fan Tray 3 Fan 8          OK        4380     Spinning at normal speed
      Fan Tray 3 Fan 9          OK        4410     Spinning at normal speed
      Fan Tray 4 Fan 1          OK        4410     Spinning at normal speed
      Fan Tray 4 Fan 2          OK        4410     Spinning at normal speed
      Fan Tray 4 Fan 3          OK        4380     Spinning at normal speed
      Fan Tray 4 Fan 4          OK        4380     Spinning at normal speed
      Fan Tray 4 Fan 5          OK        4410     Spinning at normal speed
      Fan Tray 4 Fan 6          OK        4410     Spinning at normal speed
      Fan Tray 4 Fan 7          OK        4410     Spinning at normal speed
      Fan Tray 4 Fan 8          OK        4410     Spinning at normal speed
      Fan Tray 4 Fan 9          OK        4410     Spinning at normal speed
      Fan Tray 5 Fan 1          OK        4350     Spinning at normal speed
      Fan Tray 5 Fan 2          OK        4380     Spinning at normal speed
      Fan Tray 5 Fan 3          OK        4380     Spinning at normal speed
      Fan Tray 5 Fan 4          OK        4350     Spinning at normal speed
      Fan Tray 5 Fan 5          OK        4380     Spinning at normal speed
      Fan Tray 5 Fan 6          OK        4410     Spinning at normal speed
```

```
      Fan Tray 5 Fan 7          OK       4410     Spinning at normal speed
      Fan Tray 5 Fan 8          OK       4380     Spinning at normal speed
      Fan Tray 5 Fan 9          OK       4410     Spinning at normal speed

lcc0-re0:
--------------------------------------------------------------------------
      Item                      Status   RPM      Measurement
      Top Left Front fan        OK       3420     Spinning at normal speed
      Top Left Middle fan       OK       3420     Spinning at normal speed
      Top Left Rear fan         OK       3420     Spinning at normal speed
      Top Right Front fan       OK       3450     Spinning at normal speed
      Top Right Middle fan      OK       3420     Spinning at normal speed
      Top Right Rear fan        OK       3420     Spinning at normal speed
      Bottom Left Front fan     OK       3420     Spinning at normal speed
      Bottom Left Middle fan    OK       3420     Spinning at normal speed
      Bottom Left Rear fan      OK       3390     Spinning at normal speed
      Bottom Right Front fan    OK       3420     Spinning at normal speed
      Bottom Right Middle fan   OK       3390     Spinning at normal speed
      Bottom Right Rear fan     OK       3390     Spinning at normal speed
      Rear Tray Top fan         OK       7050     Spinning at normal speed
      Rear Tray Second fan      OK       7050     Spinning at normal speed
      Rear Tray Third fan       OK       7050     Spinning at normal speed
      Rear Tray Fourth fan      OK       7050     Spinning at normal speed
      Rear Tray Fifth fan       OK       7050     Spinning at normal speed
      Rear Tray Sixth fan       OK       7050     Spinning at normal speed
      Rear Tray Seventh fan     OK       7050     Spinning at normal speed
      Rear Tray Bottom fan      OK       7050     Spinning at normal speed
```

show chassis fan (TX Matrix Plus Router with 3D SIBs)

user@host> **show chassis fan**

```
sfc0-re0:
--------------------------------------------------------------------------
      Item                      Status   RPM      Measurement
      Fan Tray 0 Fan 1          OK       4830     Spinning at normal speed
      Fan Tray 0 Fan 2          OK       4860     Spinning at normal speed
      Fan Tray 0 Fan 3          OK       4830     Spinning at normal speed
      Fan Tray 0 Fan 4          OK       4800     Spinning at normal speed
      Fan Tray 0 Fan 5          OK       4830     Spinning at normal speed
      Fan Tray 0 Fan 6          OK       4770     Spinning at normal speed
      Fan Tray 1 Fan 1          OK       4800     Spinning at normal speed
      Fan Tray 1 Fan 2          OK       4770     Spinning at normal speed
      Fan Tray 1 Fan 3          OK       4800     Spinning at normal speed
      Fan Tray 1 Fan 4          OK       4770     Spinning at normal speed
      Fan Tray 1 Fan 5          OK       4770     Spinning at normal speed
      Fan Tray 1 Fan 6          OK       4800     Spinning at normal speed
      Fan Tray 2 Fan 1          OK       4800     Spinning at normal speed
      Fan Tray 2 Fan 2          OK       4800     Spinning at normal speed
      Fan Tray 2 Fan 3          OK       4830     Spinning at normal speed
      Fan Tray 2 Fan 4          OK       4830     Spinning at normal speed
      Fan Tray 2 Fan 5          OK       4830     Spinning at normal speed
      Fan Tray 2 Fan 6          OK       4830     Spinning at normal speed
      Fan Tray 2 Fan 7          OK       4800     Spinning at normal speed
      Fan Tray 2 Fan 8          OK       4830     Spinning at normal speed
      Fan Tray 2 Fan 9          OK       4800     Spinning at normal speed
      Fan Tray 3 Fan 1          OK       4860     Spinning at normal speed
      Fan Tray 3 Fan 2          OK       4860     Spinning at normal speed
      Fan Tray 3 Fan 3          OK       4800     Spinning at normal speed
      Fan Tray 3 Fan 4          OK       4830     Spinning at normal speed
```

```
      Fan Tray 3 Fan 5          OK       4830    Spinning at normal speed
      Fan Tray 3 Fan 6          OK       4830    Spinning at normal speed
      Fan Tray 3 Fan 7          OK       4830    Spinning at normal speed
      Fan Tray 3 Fan 8          OK       4800    Spinning at normal speed
      Fan Tray 3 Fan 9          OK       4800    Spinning at normal speed
      Fan Tray 4 Fan 1          OK       4830    Spinning at normal speed
      Fan Tray 4 Fan 2          OK       4830    Spinning at normal speed
      Fan Tray 4 Fan 3          OK       4830    Spinning at normal speed
      Fan Tray 4 Fan 4          OK       4830    Spinning at normal speed
      Fan Tray 4 Fan 5          OK       4830    Spinning at normal speed
      Fan Tray 4 Fan 6          OK       4860    Spinning at normal speed
      Fan Tray 4 Fan 7          OK       4800    Spinning at normal speed
      Fan Tray 4 Fan 8          OK       4860    Spinning at normal speed
      Fan Tray 4 Fan 9          OK       4770    Spinning at normal speed
      Fan Tray 5 Fan 1          OK       4830    Spinning at normal speed
      Fan Tray 5 Fan 2          OK       4830    Spinning at normal speed
      Fan Tray 5 Fan 3          OK       4830    Spinning at normal speed
      Fan Tray 5 Fan 4          OK       4800    Spinning at normal speed
      Fan Tray 5 Fan 5          OK       4800    Spinning at normal speed
      Fan Tray 5 Fan 6          OK       4800    Spinning at normal speed
      Fan Tray 5 Fan 7          OK       4830    Spinning at normal speed
      Fan Tray 5 Fan 8          OK       4830    Spinning at normal speed
      Fan Tray 5 Fan 9          Check    2010

lcc0-re0:
--------------------------------------------------------------------------
      Item                      Status   RPM     Measurement
      Top Left Front fan        OK       3420    Spinning at normal speed
      Top Left Middle fan       OK       3390    Spinning at normal speed
      Top Left Rear fan         OK       3390    Spinning at normal speed
      Top Right Front fan       OK       3420    Spinning at normal speed
      Top Right Middle fan      OK       3420    Spinning at normal speed
      Top Right Rear fan        OK       3450    Spinning at normal speed
      Bottom Left Front fan     OK       3420    Spinning at normal speed
      Bottom Left Middle fan    OK       3390    Spinning at normal speed
      Bottom Left Rear fan      OK       3420    Spinning at normal speed
      Bottom Right Front fan    OK       3420    Spinning at normal speed
      Bottom Right Middle fan   OK       3390    Spinning at normal speed
      Bottom Right Rear fan     OK       3420    Spinning at normal speed
      Rear Tray fan 1 (Top)     OK       7740    Spinning at normal speed
      Rear Tray fan 2           OK       7740    Spinning at normal speed
      Rear Tray fan 3           OK       7740    Spinning at normal speed
      Rear Tray fan 4           OK       7740    Spinning at normal speed
      Rear Tray fan 5           OK       7740    Spinning at normal speed
      Rear Tray fan 6           OK       7740    Spinning at normal speed
      Rear Tray fan 7           OK       7740    Spinning at normal speed
      Rear Tray fan 8           OK       7740    Spinning at normal speed
      Rear Tray fan 9           OK       7740    Spinning at normal speed
      Rear Tray fan 10          OK       7740    Spinning at normal speed
      Rear Tray fan 11          OK       7740    Spinning at normal speed
      Rear Tray fan 12          OK       7740    Spinning at normal speed
      Rear Tray fan 13          OK       7740    Spinning at normal speed
      Rear Tray fan 14          OK       7740    Spinning at normal speed
      Rear Tray fan 15          OK       7740    Spinning at normal speed
      Rear Tray fan 16 (Bottom) OK       7740    Spinning at normal speed

lcc2-re0:
--------------------------------------------------------------------------
      Item                      Status   RPM     Measurement
      Top Left Front fan        OK       3420    Spinning at normal speed
```



```
Top Left Middle fan         OK        3390     Spinning at normal speed
Top Left Rear fan           OK        3420     Spinning at normal speed
Top Right Front fan         OK        3420     Spinning at normal speed
Top Right Middle fan        OK        3420     Spinning at normal speed
Top Right Rear fan          OK        3450     Spinning at normal speed
Bottom Left Front fan       OK        3420     Spinning at normal speed
Bottom Left Middle fan      OK        3390     Spinning at normal speed
Bottom Left Rear fan        OK        3420     Spinning at normal speed
Bottom Right Front fan      OK        3420     Spinning at normal speed
Bottom Right Middle fan     OK        3390     Spinning at normal speed
Bottom Right Rear fan       OK        3420     Spinning at normal speed
Rear Tray fan 1 (Top)       OK        7740     Spinning at normal speed
Rear Tray fan 2             OK        7740     Spinning at normal speed
Rear Tray fan 3             OK        7740     Spinning at normal speed
Rear Tray fan 4             OK        7740     Spinning at normal speed
Rear Tray fan 5             OK        7740     Spinning at normal speed
Rear Tray fan 6             OK        7740     Spinning at normal speed
Rear Tray fan 7             OK        7740     Spinning at normal speed
Rear Tray fan 8             OK        7740     Spinning at normal speed
Rear Tray fan 9             OK        7740     Spinning at normal speed
Rear Tray fan 10            OK        7740     Spinning at normal speed
Rear Tray fan 11            OK        7740     Spinning at normal speed
Rear Tray fan 12            OK        7740     Spinning at normal speed
Rear Tray fan 13            OK        7740     Spinning at normal speed
Rear Tray fan 14            OK        7740     Spinning at normal speed
Rear Tray fan 15            OK        7740     Spinning at normal speed
Rear Tray fan 16 (Bottom)   OK        7740     Spinning at normal speed
```

show chassis fan (PTX5000 Packet Transport Router)

user@host> **show chassis fan**

```
user@host> show chassis fan
      Item                      Status    % RPM     Measurement
      Fan Tray 0 Fan 1          OK        29%       2700 RPM
      Fan Tray 0 Fan 2          OK        29%       2700 RPM
      Fan Tray 0 Fan 3          OK        29%       2742 RPM
      Fan Tray 0 Fan 4          OK        29%       2700 RPM
      Fan Tray 0 Fan 5          OK        30%       2828 RPM
      Fan Tray 0 Fan 6          OK        30%       2828 RPM
      Fan Tray 0 Fan 7          OK        29%       2700 RPM
      Fan Tray 0 Fan 8          OK        30%       2785 RPM
      Fan Tray 0 Fan 9          OK        30%       2828 RPM
      Fan Tray 0 Fan 10         OK        30%       2828 RPM
      Fan Tray 0 Fan 11         OK        30%       2785 RPM
      Fan Tray 0 Fan 12         OK        30%       2828 RPM
      Fan Tray 0 Fan 13         OK        31%       2871 RPM
      Fan Tray 0 Fan 14         OK        30%       2828 RPM
      Fan Tray 1 Fan 1          OK        42%       3033 RPM
      Fan Tray 1 Fan 2          OK        42%       3066 RPM
      Fan Tray 1 Fan 3          OK        43%       3099 RPM
      Fan Tray 1 Fan 4          OK        43%       3166 RPM
      Fan Tray 1 Fan 5          OK        45%       3266 RPM
      Fan Tray 1 Fan 6          OK        43%       3133 RPM
      Fan Tray 2 Fan 1          OK        29%       2099 RPM
      Fan Tray 2 Fan 2          OK        30%       2199 RPM
      Fan Tray 2 Fan 3          OK        30%       2166 RPM
      Fan Tray 2 Fan 4          OK        33%       2399 RPM
      Fan Tray 2 Fan 5          OK        29%       2133 RPM
      Fan Tray 2 Fan 6          OK        32%       2366 RPM
```


show chassis fan (PTX10008 Router)

user@host> **show chassis fan**

```
       Item                          Status    RPM     Measurement
       Fan Tray 0 Fan 0              OK        9000    Spinning at normal speed
       Fan Tray 0 Fan 1              OK        9000    Spinning at normal speed
       Fan Tray 0 Fan 2              OK        9150    Spinning at normal speed
       Fan Tray 0 Fan 3              OK        9150    Spinning at normal speed
       Fan Tray 0 Fan 4              OK        9000    Spinning at normal speed
       Fan Tray 0 Fan 5              OK        9150    Spinning at normal speed
       Fan Tray 0 Fan 6              OK        9000    Spinning at normal speed
       Fan Tray 0 Fan 7              OK        9150    Spinning at normal speed
       Fan Tray 0 Fan 8              OK        8850    Spinning at normal speed
       Fan Tray 0 Fan 9              OK        8850    Spinning at normal speed
       Fan Tray 0 Fan 10             OK        9000    Spinning at normal speed
       Fan Tray 1 Fan 0              OK        9150    Spinning at normal speed
       Fan Tray 1 Fan 1              OK        9150    Spinning at normal speed
       Fan Tray 1 Fan 2              OK        9000    Spinning at normal speed
       Fan Tray 1 Fan 3              OK        9000    Spinning at normal speed
       Fan Tray 1 Fan 4              OK        9000    Spinning at normal speed
       Fan Tray 1 Fan 5              OK        9000    Spinning at normal speed
       Fan Tray 1 Fan 6              OK        9000    Spinning at normal speed
       Fan Tray 1 Fan 7              OK        9150    Spinning at normal speed
       Fan Tray 1 Fan 8              OK        9000    Spinning at normal speed
       Fan Tray 1 Fan 9              OK        9000    Spinning at normal speed
       Fan Tray 1 Fan 10             OK        9000    Spinning at normal speed
```

show chassis fan (MX150)

user@host > **show chassis fan**

```
Item                          Status    RPM     Measurement
       FPC 0 Tray 0 Fan 0            OK        7419    Spinning at normal speed
       FPC 0 Tray 1 Fan 0            OK        7419    Spinning at normal speed
```

show chassis fan (MX104 Router)

user@host > **show chassis fan**

```
Item                          Status    RPM     Measurement
       Fan 1                         OK        5640    Spinning at normal speed
       Fan 2                         OK        5640    Spinning at normal speed
       Fan 3                         OK        5760    Spinning at normal speed
       Fan 4                         OK        5640    Spinning at normal speed
       Fan 5                         OK        5640    Spinning at normal speed
```

show chassis fan (MX2010 Router)

user@host > **show chassis fan**

```
Item                          Status    % RPM     Measurement
       Fan Tray 0 Fan 1              OK        37%        3360 RPM
       Fan Tray 0 Fan 2              OK        38%        3480 RPM
       Fan Tray 0 Fan 3              OK        37%        3360 RPM
       Fan Tray 0 Fan 4              OK        37%        3360 RPM
       Fan Tray 0 Fan 5              OK        38%        3480 RPM
       Fan Tray 0 Fan 6              OK        37%        3360 RPM
       Fan Tray 1 Fan 1              OK        38%        3480 RPM
```



```
Fan Tray 1 Fan 2          OK        40%       3600 RPM
Fan Tray 1 Fan 3          OK        38%       3480 RPM
Fan Tray 1 Fan 4          OK        38%       3480 RPM
Fan Tray 1 Fan 5          OK        38%       3480 RPM
Fan Tray 1 Fan 6          OK        38%       3480 RPM
Fan Tray 2 Fan 1          OK        38%       3480 RPM
Fan Tray 2 Fan 2          OK        41%       3720 RPM
Fan Tray 2 Fan 3          OK        38%       3480 RPM
Fan Tray 2 Fan 4          OK        38%       3480 RPM
Fan Tray 2 Fan 5          OK        38%       3480 RPM
Fan Tray 2 Fan 6          OK        38%       3480 RPM
Fan Tray 3 Fan 1          OK        38%       3480 RPM
Fan Tray 3 Fan 2          OK        40%       3600 RPM
Fan Tray 3 Fan 3          OK        40%       3600 RPM
Fan Tray 3 Fan 4          OK        40%       3600 RPM
Fan Tray 3 Fan 5          OK        40%       3600 RPM
Fan Tray 3 Fan 6          OK        38%       3480 RPM
```

show chassis fan (MX2020 Router)

user@host > **show chassis fan**

```
Item                      Status    % RPM     Measurement
Fan Tray 0 Fan 1          OK        37%       3360 RPM
Fan Tray 0 Fan 2          OK        37%       3360 RPM
Fan Tray 0 Fan 3          OK        36%       3240 RPM
Fan Tray 0 Fan 4          OK        37%       3360 RPM
Fan Tray 0 Fan 5          OK        37%       3360 RPM
Fan Tray 0 Fan 6          OK        37%       3360 RPM
Fan Tray 1 Fan 1          OK        37%       3360 RPM
Fan Tray 1 Fan 2          OK        37%       3360 RPM
Fan Tray 1 Fan 3          OK        37%       3360 RPM
Fan Tray 1 Fan 4          OK        37%       3360 RPM
Fan Tray 1 Fan 5          OK        37%       3360 RPM
Fan Tray 1 Fan 6          OK        36%       3240 RPM
Fan Tray 2 Fan 1          OK        37%       3360 RPM
Fan Tray 2 Fan 2          OK        37%       3360 RPM
Fan Tray 2 Fan 3          OK        37%       3360 RPM
Fan Tray 2 Fan 4          OK        37%       3360 RPM
Fan Tray 2 Fan 5          OK        37%       3360 RPM
Fan Tray 2 Fan 6          OK        38%       3480 RPM
Fan Tray 3 Fan 1          OK        38%       3480 RPM
Fan Tray 3 Fan 2          OK        38%       3480 RPM
Fan Tray 3 Fan 3          OK        38%       3480 RPM
Fan Tray 3 Fan 4          OK        37%       3360 RPM
Fan Tray 3 Fan 5          OK        37%       3360 RPM
Fan Tray 3 Fan 6          OK        37%       3360 RPM
```

show chassis fan (MX2008 Router)

user@host > **show chassis fan**

```
Item                      Status    % RPM     Measurement
Fan Tray 0 Fan 1          OK        64%       5760 RPM
Fan Tray 0 Fan 2          OK        62%       5640 RPM
Fan Tray 0 Fan 3          OK        64%       5760 RPM
Fan Tray 0 Fan 4          OK        60%       5400 RPM
Fan Tray 0 Fan 5          OK        61%       5520 RPM
Fan Tray 0 Fan 6          OK        62%       5640 RPM
```

```
    Fan Tray 1 Fan 1            OK        61%        5520 RPM
    Fan Tray 1 Fan 2            OK        61%        5520 RPM
    Fan Tray 1 Fan 3            OK        61%        5520 RPM
    Fan Tray 1 Fan 4            OK        62%        5640 RPM
    Fan Tray 1 Fan 5            OK        62%        5640 RPM
    Fan Tray 1 Fan 6            OK        64%        5760 RPM
```

show chassis fan (MX10003 Router)

user@host> **show chassis fan**

```
    Item                        Status    % RPM      Measurement
    Fan Tray 0 Fan 0            OK        40%        7296 RPM
    Fan Tray 0 Fan 1            OK        40%        6656 RPM
    Fan Tray 0 Fan 2            OK        40%        7296 RPM
    Fan Tray 0 Fan 3            OK        40%        6400 RPM
    Fan Tray 1 Fan 0            OK        40%        7296 RPM
    Fan Tray 1 Fan 1            OK        40%        6528 RPM
    Fan Tray 1 Fan 2            OK        40%        7296 RPM
    Fan Tray 1 Fan 3            OK        40%        6784 RPM
    Fan Tray 2 Fan 0            OK        40%        7552 RPM
    Fan Tray 2 Fan 1            OK        40%        6784 RPM
    Fan Tray 2 Fan 2            OK        40%        7424 RPM
    Fan Tray 2 Fan 3            OK        40%        6528 RPM
    Fan Tray 3 Fan 0            OK        40%        7552 RPM
    Fan Tray 3 Fan 1            OK        40%        6528 RPM
    Fan Tray 3 Fan 2            OK        40%        7296 RPM
    Fan Tray 3 Fan 3            OK        40%        6656 RPM
```

show chassis fan (MX204 Router)

user@host> **show chassis fan**

```
    Item                        Status    % RPM      Measurement
    Fan Tray 0 Fan 0            OK        40%        9344 RPM
    Fan Tray 0 Fan 1            OK        40%        8576 RPM
    Fan Tray 1 Fan 0            OK        40%        9344 RPM
    Fan Tray 1 Fan 1            OK        40%        8832 RPM
    Fan Tray 2 Fan 0            OK        40%        9344 RPM
    Fan Tray 2 Fan 1            OK        40%        8576 RPM
```

show chassis fan (MX10008 Router)

user@host> **show chassis fan**

```
Item                        Status   RPM      Measurement
     Fan Tray 0 Fan 0            OK        9750     Spinning at normal speed
     Fan Tray 0 Fan 1            OK        9750     Spinning at normal speed
     Fan Tray 0 Fan 2            OK        9900     Spinning at normal speed
     Fan Tray 0 Fan 3            OK        9600     Spinning at normal speed
     Fan Tray 0 Fan 4            Failed
     Fan Tray 0 Fan 5            Failed
     Fan Tray 0 Fan 6            OK        9750     Spinning at normal speed
     Fan Tray 0 Fan 7            OK        9750     Spinning at normal speed
     Fan Tray 0 Fan 8            OK        9600     Spinning at normal speed
     Fan Tray 0 Fan 9            OK        9600     Spinning at normal speed
```



```
    Fan Tray 0 Fan 10          OK       9600    Spinning at normal speed
    Fan Tray 1 Fan 0           OK       9600    Spinning at normal speed
    Fan Tray 1 Fan 1           OK       9600    Spinning at normal speed
    Fan Tray 1 Fan 2           OK       9750    Spinning at normal speed
    Fan Tray 1 Fan 3           OK       9600    Spinning at normal speed
    Fan Tray 1 Fan 4           OK       9600    Spinning at normal speed
    Fan Tray 1 Fan 5           OK       9600    Spinning at normal speed
    Fan Tray 1 Fan 6           OK       9600    Spinning at normal speed
    Fan Tray 1 Fan 7           OK       9750    Spinning at normal speed
    Fan Tray 1 Fan 8           OK       9750    Spinning at normal speed
    Fan Tray 1 Fan 9           OK       9600    Spinning at normal speed
    Fan Tray 1 Fan 10          OK       9600    Spinning at normal speed
```

show chassis fan (ACX4000 Router)

user@host > **show chassis fan**

```
    Item                       Status   RPM     Measurement
    Fan 1                      OK       4140    Spinning at normal speed
    Fan 2                      OK       4200    Spinning at normal speed
```

show chassis fan (ACX5048 Router)

user@host > **show chassis fan**

```
    Item                       Status   RPM     Measurement
    FPC 0 Tray 0 Fan 0         OK       18305   Spinning at normal speed
    FPC 0 Tray 0 Fan 1         OK       15743   Spinning at normal speed
    FPC 0 Tray 1 Fan 0         OK       18305   Spinning at normal speed
    FPC 0 Tray 1 Fan 1         OK       15606   Spinning at normal speed
    FPC 0 Tray 2 Fan 0         OK       19014   Spinning at normal speed
    FPC 0 Tray 2 Fan 1         OK       16167   Spinning at normal speed
    FPC 0 Tray 3 Fan 0         OK       18947   Spinning at normal speed
    FPC 0 Tray 3 Fan 1         OK       16265   Spinning at normal speed
    FPC 0 Tray 4 Fan 0         OK       18120   Spinning at normal speed
    FPC 0 Tray 4 Fan 1         OK       15743   Spinning at normal speed
```

show chassis fan (QFX5100 Switch and OCX Series)

user@switch > **show chassis fan**

```
Item                       Status   RPM     Measurement
FPC 0 Tray 0 Fan 0         OK       6428    Spinning at normal speed
FPC 0 Tray 0 Fan 1         OK       5515    Spinning at normal speed
FPC 0 Tray 1 Fan 0         OK       6360    Spinning at normal speed
FPC 0 Tray 1 Fan 1         OK       5532    Spinning at normal speed
```

show chassis fan (EX9251 switches)

user@switch > **show chassis fan**

```

       Item                       Status   % RPM     Measurement
       Fan Tray 0 Fan 0           OK       40%       9600 RPM
       Fan Tray 0 Fan 1           OK       40%       8832 RPM
       Fan Tray 1 Fan 0           OK       40%       9728 RPM
       Fan Tray 1 Fan 1           OK       40%       9088 RPM
       Fan Tray 2                 Absent
```

show chassis fan (EX9253 switches)

`user@switch >` **show chassis fan**

```
Item                        Status   % RPM    Measurement
Fan Tray 0 Fan 0            OK       40%       7552 RPM
Fan Tray 0 Fan 1            OK       40%       6272 RPM
Fan Tray 0 Fan 2            OK       40%       7552 RPM
Fan Tray 0 Fan 3            OK       40%       6272 RPM
Fan Tray 1 Fan 0            OK       40%       7552 RPM
Fan Tray 1 Fan 1            OK       40%       6272 RPM
Fan Tray 1 Fan 2            OK       40%       7552 RPM
Fan Tray 1 Fan 3            OK       40%       6272 RPM
Fan Tray 2 Fan 0            OK       40%       7552 RPM
Fan Tray 2 Fan 1            OK       40%       6400 RPM
Fan Tray 2 Fan 2            OK       40%       7552 RPM
Fan Tray 2 Fan 3            OK       40%       6272 RPM
Fan Tray 3 Fan 0            OK       40%       7552 RPM
Fan Tray 3 Fan 1            OK       40%       6400 RPM
Fan Tray 3 Fan 2            OK       40%       7552 RPM
Fan Tray 3 Fan 3            OK       40%       6272 RPM
```

show chassis fan (Junos OS Evolved)

`user@device>` **show chassis fan**

```
Item                        Status   % RPM     Measurement
Fan Tray 1 Fan 1            Ok       48%       6597 RPM
Fan Tray 1 Fan 2            Ok       49%       5649 RPM
Fan Tray 2 Fan 1            Ok       49%       6687 RPM
Fan Tray 2 Fan 2            Ok       49%       5649 RPM
Fan Tray 3 Fan 1            Ok       49%       6642 RPM
Fan Tray 3 Fan 2            Ok       49%       5649 RPM
```

show chassis firmware

List of Syntax

Syntax

```
show chassis firmware
```

Syntax (TX Matrix Routers)

```
show chassis firmware
<lcc number | scc>
```

Syntax (TX Matrix Plus Routers)

```
show chassis firmware
<lcc number | sfc number>
```

Syntax (MX Series Routers)

```
show chassis firmware
<all-members>
<local>
<member member-id>
```

Syntax (MX104, MX204, MX2010, MX2020, MX10003, and MX2008 Universal Routing Platforms)

```
show chassis firmware
<satellite [slot-id slot-id |device-alias alias-name]>
```

Syntax (MX10008 Universal Routing Platforms)

```
show chassis firmware
```

Syntax (PTX Series)

```
show chassis firmware
```

Syntax (QFX Series)

```
show chassis firmware
interconnect-device name
node-device name
```

Syntax (OCX Series)

```
show chassis firmware
```

Syntax (ACX Series Universal Metro Routers)

```
show chassis firmware
```

Syntax (ACX5048 and ACX5096 Routers)

```
show chassis firmware
interconnect-device name
node-device name
```

Syntax (ACX500 Routers)

```
show chassis firmware
```

Syntax (EX Series Switches)

```
show chassis firmware
<detail>
<satellite [slot-id slot-id |device-alias alias-name]>
```

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.4 for EX Series switches.
sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.
Command introduced for EX8200 switches in Junos OS Release 10.2 for EX Series switches.
Command introduced in Junos OS Release 11.1 for QFX Series.
Command introduced in Junos OS Release 12.2 for ACX Series Universal Metro Routers.
Command introduced in Junos OS Release 12.3 for MX2010 and MX2020 Universal Routing Platforms, and ACX4000 Universal Metro Routers.
Command introduced in Junos OS Release 13.2 for MX104 Universal Routing Platforms.
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
Command introduced in Junos OS Release 15.1X54-D20 for ACX5048 and ACX5096 Routers.
satellite option introduced in Junos OS Release 14.2R3.
Command introduced in Junos OS Release 17.2 for MX2008 Universal Routing Platforms.
Command introduced in Junos OS Release 17.2 for PTX10008 Routers.
Command introduced in Junos OS Release 17.3 for MX10003 Universal Routing Platforms.
Command introduced in Junos OS Release 17.4 for MX204 Universal Routing Platforms.
Command introduced in Junos OS Release 17.3 for MX150 Router Appliance.
Command introduced in Junos OS Release 18.1R1 for EX9251 switches.
Command introduced in Junos OS Release 18.2 for EX9253 Switches.
Command introduced in Junos OS Release 18.2 for MX10008 Universal Routing Platforms.

Description On routers and switches, display the version levels of the firmware running on the System Control Board (SCB), Switching and Forwarding Module (SFM), System and Switch Board (SSB), Forwarding Engine Board (FEB), Flexible PIC Concentrators (FPCs), and Routing Engines. On a TX Matrix Plus router, display the version levels of the firmware running on the FPCs and the Switch Processor Mezzanine Board (SPMBs).

On EX2200, EX3200, EX4200, QFX Series, and OCX Series switches, display the version levels of the firmware running on the switch. On an EX8208 switch, display the version levels of the firmware running on the Switch Fabric and Routing Engine (SRE) modules and on the line cards (shown as FPCs). On an EX8216 switch, display the version levels of the firmware running on the Routing Engine (RE) modules and on the line cards (shown as FPCs).

Options **none**—Display the version levels of the firmware running. For an EX4200 switch that is a member of a Virtual Chassis, display version levels for all members. For a TX Matrix router, display version levels for the firmware on the TX Matrix router and on all the T640 routers connected to the TX Matrix router. For a TX Matrix Plus router, display version levels for the firmware on the TX Matrix Plus router and on all the routers connected to the TX Matrix Plus router.

all-members—(MX Series routers only) (Optional) Display the version levels of the firmware running for all members of the Virtual Chassis configuration.

interconnect-device ***name***—(QFabric systems) (Optional) Display the version levels of the firmware running on the Interconnect device.

lcc ***number***—(TX Matrix and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display version levels for the firmware on a specified T640 router (line-card chassis) that is connected to the TX Matrix router. On a TX Matrix Plus router, display the version levels for the firmware on a specified router (line-card chassis) 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—(MX Series routers only) (Optional) Display the version levels of the firmware running for the local Virtual Chassis member.

member ***member-id***—(MX Series routers only) (Optional) Display the version levels of the firmware running for the specified member of the Virtual Chassis configuration. Replace *member-id* with a value of 0 or 1.

node-device—(QFabric systems only) (Optional) Display the version levels of the firmware running on the Node device.

satellite [slot-id ***slot-id*** **| device-alias** ***alias-name*****]**—(Junos Fusion only) (Optional) Display version levels of the firmware running for the specified satellite device or devices in a Junos Fusion, or for all satellite devices if no satellite devices are specified.

scc—(TX Matrix router only) (Optional) Display version levels for the firmware on the TX Matrix router (switch-card chassis).

sfc ***number***—(TX Matrix Plus router only) (Optional) Display version levels for the firmware on the TX Matrix Plus router (or switch-fabric chassis). Replace *number* with 0.

detail—(EX3200, EX3300, EX4200, and EX4500 standalone and Virtual Chassis member switches only) (Optional) Display version levels of the firmware running on the switch for its programmable hardware components.

Required Privilege Level

view

List of Sample Output

Output Fields

Table 21 on page 413 lists the output fields for the show chassis firmware command. Output fields are listed in the approximate order in which they appear.

Table 21: show chassis firmware Output Fields

Field Name	Field Description
Part	(MX Series, MX2010, MX2020, and MX2008 routers) Chassis part name.
Type	(MX Series, MX2010, MX2020, and MX2008 routers) Type of firmware: On routers: ROM or O/S. On switches: uboot or loader.
Version	(MX Series, MX2010, MX2020, and MX2008 routers) Version of firmware running on the chassis part.
FPC	(*detail* option only) Number of FPC. For a standalone switch, the value is 0. For a Virtual Chassis configuration, value in the range of 0-9; refers to the member ID assigned to the switch.
AFEB	(MX104 routers) Version of the compact Forwarding Engine Board.
Boot	(*detail* option only) Version of the SYSPLD.
PoE	(*detail* option only) Version of the PoE firmware.
PFE-<*number*>	(*detail* option only) Version of the Packet Forwarding Engine used in the switch.
PHY-	(*detail* option only) Version of the physical layer device (PHY) used in the switch.
microcode	(*detail* option only) Microcode of the physical layer devices (PHY) used in the switch.
uboot	(*detail* option only) Version of the u-boot used in the switch.
loader	(*detail* option only) Version of the loader used in the switch.

Sample Output

show chassis firmware (M10 Router)

user@host> **show chassis firmware**

```
Part                     Type       Version
Forwarding engine board  ROM        Juniper ROM Monitor Version 4.1b2
                         O/S        Version 4.1I1 by usera on 2000-04-24 11:27
```

show chassis firmware (M20 Router)

user@host> **show chassis firmware**

```
Part                     Type       Version
System switch board      ROM        Juniper ROM Monitor Version 3.4b26
                         O/S        Version 3.4I16 by userc on 2000-02-29 2
FPC 1                    ROM        Juniper ROM Monitor Version 3.0b1
                         O/S        Version 3.4I4 by userc on 2000-02-25 21
FPC 2                    ROM        Juniper ROM Monitor Version 3.0b1
                         O/S        Version 3.4I4 by userc on 2000-02-25 21
```

show chassis firmware (M40 Router)

user@host> **show chassis firmware**

```
Part                     Type       Version
System control board     ROM        Juniper ROM Monitor Version 2.0i126Copyri
                         O/S        Version 2.0i1 by root on Thu Jul 23 00:51
FPC 5                    ROM        Juniper ROM Monitor Version 2.0i49Copyrig
                         O/S        Version 2.0i1 by root on Thu Jul 23 00:59
```

show chassis firmware (M120 Router)

user@host> **show chassis firmware**

```
FPC 2                    ROM        Juniper ROM Monitor Version 8.0b29
                         O/S        Version 8.2B1 by userb on 2006-10-18 16:2
FPC 3                    ROM        Juniper ROM Monitor Version 8.0b29
                         O/S        Version 8.2B1 by userb on 2006-10-18 16:2
FPC 4                    ROM        Juniper ROM Monitor Version 8.0b29
                         O/S        Version 8.2B1 by userb on 2006-10-18 16:2
FEB 3                    ROM        Juniper ROM Monitor Version 8.0b29
                         O/S        Version 8.2B1 by userb on 2006-10-18 16:1
FEB 4                    ROM        Juniper ROM Monitor Version 8.0b29
                         O/S        Version 8.2B1 by userb on 2006-10-18 16:1
```

show chassis firmware (M160 Router)

user@host> **show chassis firmware**

```
Part                     Type       Version
SFM 0                    ROM        Juniper ROM Monitor Version 4.0b2
                         O/S        Version 4.0I1 by usera on 2000-02-29 11:50
SFM 1                    ROM        Juniper ROM Monitor Version 4.0b2
                         O/S        Version 4.0I1 by usera on 2000-02-29 11:50
FPC 0                    ROM        Juniper ROM Monitor Version 4.0b2
                         O/S        Version 4.0I1 by usera on 2000-02-29 11:56
FPC 1                    ROM        Juniper ROM Monitor Version 4.0b2
```

```
                         O/S          Version 4.0I1 by usera on 2000-02-29 11:56
FPC 2                    ROM          Juniper ROM Monitor Version 4.0b3
                         O/S          Version 4.0I1 by usera on 2000-02-29 11:56
```

show chassis firmware (MX150)

user@host > **show chassis firmware**

```
Part                     Type         Version
FPC                      ROM          PC Bios
                         O/S          Version 17.2I20170220_0929_rohitn by rohitn
on 2017-02-20 09:38:59 UTC
```

show chassis firmware (MX104 Router)

user@host > **show chassis firmware**

```
Part                     Type         Version
FPC 0                    ROM          Juniper ROM Monitor Version 13.1b24
                         O/S          Version 13.2-20130514.1 by userb on 2013-
FPC 1                    ROM          Juniper ROM Monitor Version 13.1b24
                         O/S          Version 13.2-20130514.1 by userb on 2013-
FPC 2                    ROM          Juniper ROM Monitor Version 13.1b24
                         O/S          Version 13.2-20130514.1 by userb on 2013-
AFEB                     ROM          Juniper ROM Monitor Version 13.1b24
                         O/S          Version 13.2-20130514.1 by userb on 2013-
```

show chassis firmware (MX240 Router)

user@host> **show chassis firmware**

```
Part                     Type         Version
FPC 1                    ROM          Juniper ROM Monitor Version 8.3b1
                         O/S          Version 9.0-20080103.0 by userb on 2008-0
FPC 2                    ROM          Juniper ROM Monitor Version 8.3b1
                         O/S          Version 9.0-20080103.0 by userb on 2008-0
```

show chassis firmware (MX480 Router)

user@host> **show chassis firmware**

```
Part                     Type         Version
FPC 1                    ROM          Juniper ROM Monitor Version 8.3b1
                         O/S          Version 9.0-20070916.3 by userb on 2007-0
```

show chassis firmware (MX960 Router)

user@host> **show chassis firmware**

```
Part                     Type         Version
FPC 4                    ROM          Juniper ROM Monitor Version 8.0b8
                         O/S          Version 8.2I59 by user3 on 2006-10-31 19:22
FPC 7                    ROM          Juniper ROM Monitor Version 8.2b1
                         O/S          Version 8.2-20061026.1 by userb on 2006-1
```

show chassis firmware (MX2010 Router)

user@host> **show chassis firmware**

```
Part                     Type        Version
FPC 0                    ROM         Juniper ROM Monitor Version 12.3b1
                         O/S         Version 12.3-20121220.0 by userb on 2012-
FPC 1                    ROM         Juniper ROM Monitor Version 10.1b3
                         O/S         Version 12.3-20121220.0 by userb on 2012-
FPC 2                    ROM         Juniper ROM Monitor Version 10.1b3
                         O/S         Version 12.3-20121220.0 by userb on 2012-
FPC 3                    ROM         Juniper ROM Monitor Version 10.1b3
                         O/S         Version 12.3-20121220.0 by userb on 2012-
FPC 4                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20121220.0 by userb on 2012-
FPC 5                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20121220.0 by userb on 2012-
FPC 6                    ROM         Juniper ROM Monitor Version 10.4b1
                         O/S         Version 12.3-20121220.0 by userb on 2012-
FPC 7                    ROM         Juniper ROM Monitor Version 10.1b3
                         O/S         Version 12.3-20121220.0 by userb on 2012-
FPC 8                    ROM         Juniper ROM Monitor Version 10.4b1
                         O/S         Version 12.3-20121220.0 by userb on 2012-
FPC 9                    ROM         Juniper ROM Monitor Version 10.4b1
                         O/S         Version 12.3-20121220.0 by userb on 2012-
SPMB 0                   ROM         Juniper ROM Monitor Version 12.1b1
                         O/S         Version 12.3-20121220.0 by userb on 2012-
SPMB 1                   ROM         Juniper ROM Monitor Version 12.1b1
                         O/S         Version 12.3-20121220.0 by userb on 2012-
```

show chassis firmware (MX2020 Router)

`user@host>` **show chassis firmware**

```
Part                     Type        Version
FPC 0                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 1                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 2                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 3                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 4                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 5                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 6                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 7                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 8                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 9                    ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 10                   ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 11                   ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 12                   ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 13                   ROM         Juniper ROM Monitor Version 10.0b39
                         O/S         Version 12.3-20130415.0 by userb on 2013-
FPC 14                   ROM         Juniper ROM Monitor Version 10.0b39
```

```
                         O/S        Version 12.3-20130415.0 by userb on 2013-
FPC 15                   ROM        Juniper ROM Monitor Version 10.0b39
                         O/S        Version 12.3-20130415.0 by userb on 2013-
FPC 16                   ROM        Juniper ROM Monitor Version 10.0b39
                         O/S        Version 12.3-20130415.0 by userb on 2013-
FPC 17                   ROM        Juniper ROM Monitor Version 10.0b39
                         O/S        Version 12.3-20130415.0 by userb on 2013-
FPC 18                   ROM        Juniper ROM Monitor Version 10.0b39
                         O/S        Version 12.3-20130415.0 by userb on 2013-
FPC 19                   ROM        Juniper ROM Monitor Version 10.0b39
                         O/S        Version 12.3-20130415.0 by userb on 2013-
SPMB 0                   ROM        Juniper ROM Monitor Version 12.1b1
                         O/S        Version 12.3-20130415.0 by userb on 2013-
SPMB 1                   ROM        Juniper ROM Monitor Version 12.1b1
                         O/S        Version 12.3-20130415.0 by userb on 2013-
```

show chassis firmware (MX2008 Router)

user@host> **show chassis firmware**

```
Part                     Type       Version
FPC 0                    ROM        Juniper ROM Monitor Version 10.1b3
                         O/S        Version 17.2-20170412.0 by builder on
2017-04-12 01:15:48 UTC
FPC 3                    ROM        Juniper ROM Monitor Version 13.3b1
                         O/S        Version 17.2-20170412.0 by builder on
2017-04-12 01:16:31 UTC
FPC 5                    ROM        Juniper ROM Monitor Version 13.3b1
                         O/S        Version 17.2-20170412.0 by builder on
2017-04-12 01:16:31 UTC
FPC 7                    ROM        Juniper ROM Monitor Version 11.4b2
                         O/S        Version 17.2-20170412.0 by builder on
2017-04-12 01:15:48 UTC
FPC 9                    ROM        Juniper ROM Monitor Version 13.2b1
                         O/S        Version 17.2-20170412.0 by builder on
2017-04-12 01:15:58 UTC
```

show chassis firmware (MX10003)

user@host> **show chassis firmware**

```
Part                     Type       Version
RE 0                     PRI BIOS   CBEP_P_SUM0_00.11.01
                         RE-FPGA    402
RE 1                     PRI BIOS   CBEP_P_SUM0_00.11.01
                         RE-FPGA    301
FPC 0                    ROM        PC Bios
                         O/S        Version 17.3-20170719.0 by builder on
2017-07-19 01:27:58 UTC
FPC 1                    ROM        PC Bios
                         O/S        Version 17.3-20170719.0 by builder on
2017-07-19 01:27:58 UTC
```

show chassis firmware (MX204 Router)

user@host> **show chassis firmware**

```
Part                      Type       Version
RE 0                      PRI BIOS   CBEP_P_SUM1_00.11.01
                          RE-FPGA    300
FPC                       ROM        PC Bios
                          O/S        Version 17.4I20171105_0609_aahluwalia by
aahluwalia on 2017-11-05 06:09:28 UTC
```

show chassis firmware (MX10008 Router)

`user@host>` **show chassis firmware**

```
Part                      Type       Version
RE 0                      PRI BIOS   CBEP_P_VAL0_00.14.1
                          FPGA       264.0
                          RE-FPGA    41.0
                          RE-SSD1    SF-SBR12050
                          RE-SSD2    SF-SBR12050
                          i40e-NVM   6.01
RE 1                      PRI BIOS   CBEP_P_VAL0_00.13.01
                          FPGA       261.0
                          RE-FPGA    41.0
                          RE-SSD1    SF-SBR12034
                          RE-SSD2    SF-SBR12034
                          i40e-NVM   5.02
FPC 0                     ROM        PC Bios
                         O/S        Version 18.4-20180716_dev_common.0 by builder
 on 2018-07-16 00:43:35 UTC
                          ROM Monitor 0 9.14.0
                          PCIE Sw(0) 1.0.0
                          MPCS(0)    0.2.0
                          I2CS CPLD  0.4.0
                          BOOT CPLD  0.4.0
FPC 2                     ROM        PC Bios
                         O/S        Version 18.4-20180716_dev_common.0 by builder
 on 2018-07-16 00:43:35 UTC
                          ROM Monitor 0 9.14.0
                          PCIE Sw(0) 1.0.0
                          MPCS(0)    0.2.0
                          I2CS CPLD  0.4.0
                          BOOT CPLD  0.4.0
FPC 3                     ROM        PC Bios
                         O/S        Version 18.4-20180716_dev_common.0 by builder
 on 2018-07-16 00:43:35 UTC
                          ROM Monitor 0 9.14.0
                          PCIE Sw(0) 1.0.0
                          MPCS(0)    0.4.0
                          I2CS CPLD  0.8.0
                          BOOT CPLD  0.8.0
FPM                       FPGA       1.9
FTC 0                     FPGA       2.0
FTC 1                     FPGA       2.0
SFB 0                     FPGA       3.0
SFB 1                     FPGA       3.0
SFB 2                     FPGA       3.0
SFB 3                     FPGA       3.0
SFB 4                     FPGA       3.0
SFB 5                     FPGA       3.0
```

show chassis firmware (MX240, MX480, MX960 Router with Application Services Modular Line Card)

user@host> **show chassis firmware**

```
Part                    Type        Version
FPC 1                   ROM         Juniper ROM Monitor Version 12.1b1
                        O/S         Version 12.2I21 by user1 on 2012-06-19 17:
```

show chassis firmware (EX4200 Switch)

user@switch> **show chassis firmware**

```
Part                  Type        Version
FPC 0                 uboot       U-Boot 1.1.6 (Feb  6 2008 - 11:27:42)
                      loader      FreeBSD/PowerPC U-Boot bootstrap loader 2.1
FPC 1                 uboot       U-Boot 1.1.6 (Feb  6 2008 - 11:27:42)
                      loader      FreeBSD/PowerPC U-Boot bootstrap loader 2.1
FPC 2                 uboot       U-Boot 1.1.6 (Feb  6 2008 - 11:27:42)
                      loader      FreeBSD/PowerPC U-Boot bootstrap loader 2.1
```

show chassis firmware (EX8200 Switch)

user@switch> **show chassis firmware**

```
Part                    Type        Version
FPC 0                   U-Boot      U-Boot 1.1.6 (Mar 25 2009 - 06:13:12) 2.4.0
                        loader      FreeBSD/PowerPC U-Boot bootstrap loader 2.2
FPC 3                   U-Boot      U-Boot 1.1.6 (Dec  4 2009 - 13:17:34) 3.1.0
                        loader      FreeBSD/PowerPC U-Boot bootstrap loader 2.2
FPC 5                   U-Boot      U-Boot 1.1.6 (Mar 25 2009 - 06:13:12) 2.4.0
                        loader      FreeBSD/PowerPC U-Boot bootstrap loader 2.2
FPC 7                   U-Boot      U-Boot 1.1.6 (Feb  6 2009 - 05:31:46) 2.4.0
                        loader      FreeBSD/PowerPC U-Boot bootstrap loader 2.2
Routing Engine 0        U-Boot      U-Boot 1.1.6 (Mar 25 2009 - 06:13:12) 2.4.0
                                    FreeBSD/PowerPC U-Boot bootstrap loader 2.2
                        loader
Routing Engine 1        U-Boot      U-Boot 1.1.6 (Mar 25 2009 - 06:13:12) 2.4.0
                        loader      FreeBSD/PowerPC U-Boot bootstrap loader 2.2
```

show chassis firmware (EX9200 Switch)

user@switch> **show chassis firmware**

```
 Part                    Type        Version
 FPC 2                   ROM         Juniper ROM Monitor Version 11.4b2
                         O/S         Version 14.1I20140312_0741 by userd o
FPC 3                    ROM         Juniper ROM Monitor Version 10.4b1
                         O/S         Version 14.1I20140312_0741 by userd o
```

show chassis firmware (EX9251 Switch)

user@switch> **show chassis firmware**

```
Part                    Type        Version
RE 0                    PRI BIOS    CBEP_P_SUM1_00.11.01
```

```
                         RE-FPGA     301
FPC                      ROM         PC Bios
                         O/S         Version 18.1R1.4 by builder on 2018-03-06
00:31:54 UTC
```

show chassis firmware (EX9253 Switch)

user@switch> **show chassis firmware**

```
Part                     Type        Version
RE 0                     PRI BIOS    CBEP_P_SUM1_00.11.01
                         RE-FPGA     402
RE 1                     PRI BIOS    CBEP_P_SUM1_00.11.01
                         RE-FPGA     402
FPC 0                    ROM         PC Bios
                        O/S         Version 18.2-20180129_dev_common.1 by builder
 on 2018-01-29 13:35:11 UTC
FPC 1                    ROM         PC Bios
                        O/S         Version 18.2-20180129_dev_common.1 by builder
 on 2018-01-29 13:35:11 UTC
```

show chassis firmware lcc (TX Matrix Router)

user@host> **show chassis firmware lcc 0**

```
lcc0-re0:
--------------------------------------------------------------------------
Part                     Type        Version
FPC 1                    ROM         Juniper ROM Monitor Version 6.4b18
                         O/S         Version 7.0-20040804.0 by userb on 2004-0
FPC 2                    ROM         Juniper ROM Monitor Version 6.4b20
                         O/S         Version 7.0-20040804.0 by userb on 2004-0
SPMB 0                   ROM         Juniper ROM Monitor Version 6.4b18
                         O/S         Version 7.0-20040804.0 by userb on 2004-0
```

show chassis firmware scc (TX Matrix Router)

user@host> **show chassis firmware scc**

```
scc-re0:
--------------------------------------------------------------------------
Part                     Type        Version
SPMB 0                   ROM         Juniper ROM Monitor Version 6.4b18
                         O/S         Version 7.0-20040804.0 by userb on 2004-0
```

show chassis firmware (TX Matrix Plus Router)

user@host> **show chassis firmware**

```
sfc0-re0:
--------------------------------------------------------------------------
Part                     Type        Version
Global FPC 4
Global FPC 6
Global FPC 7
Global FPC 12
Global FPC 14
Global FPC 15
Global FPC 20
```

```
Global FPC 21
Global FPC 22
Global FPC 23
Global FPC 24
Global FPC 25
Global FPC 26
Global FPC 28
Global FPC 29
Global FPC 31
SPMB 0                  ROM        Juniper ROM Monitor Version 9.5b1
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
SPMB 1                  ROM        Juniper ROM Monitor Version 9.5b1
                        O/S        Version 9.6-20090507.0 by userb on 2009-0

lcc0-re1:
--------------------------------------------------------------------------
Part                    Type       Version
FPC 4                   ROM        Juniper ROM Monitor Version 9.0b2
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
FPC 6                   ROM        Juniper ROM Monitor Version 9.0b2
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
FPC 7                   ROM        Juniper ROM Monitor Version 9.0b2
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
SPMB 0                  ROM        Juniper ROM Monitor Version 9.5b1
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
SPMB 1                  ROM        Juniper ROM Monitor Version 9.5b1
                        O/S        Version 9.6-20090507.0 by userb on 2009-0

lcc1-re1:
--------------------------------------------------------------------------
Part                    Type       Version
FPC 4                   ROM        Juniper ROM Monitor Version 9.0b2
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
FPC 6                   ROM        Juniper ROM Monitor Version 9.0b2
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
FPC 7                   ROM        Juniper ROM Monitor Version 9.0b2
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
SPMB 0                  ROM        Juniper ROM Monitor Version 9.5b1
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
SPMB 1                  ROM        Juniper ROM Monitor Version 9.5b1
                        O/S        Version 9.6-20090507.0 by userb on 2009-0

lcc2-re1:
--------------------------------------------------------------------------
Part                    Type       Version
FPC 4                   ROM        Juniper ROM Monitor Version 9.0b2
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
FPC 5                   ROM        Juniper ROM Monitor Version 9.0b2
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
FPC 6                   ROM        Juniper ROM Monitor Version 9.0b2
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
FPC 7                   ROM        Juniper ROM Monitor Version 7.5b4
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
SPMB 0                  ROM        Juniper ROM Monitor Version 9.5b1
                        O/S        Version 9.6-20090507.0 by userb on 2009-0
SPMB 1                  ROM        Juniper ROM Monitor Version 9.5b1
                        O/S        Version 9.6-20090507.0 by userb on 2009-0

lcc3-re1:
--------------------------------------------------------------------------
```



```
Part                    Type        Version
FPC 0                   ROM         Juniper ROM Monitor Version 9.0b2
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
FPC 1                   ROM         Juniper ROM Monitor Version 9.0b2
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
FPC 2                   ROM         Juniper ROM Monitor Version 9.0b2
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
FPC 4                   ROM         Juniper ROM Monitor Version 7.5b4
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
FPC 5                   ROM         Juniper ROM Monitor Version 9.0b2
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
FPC 7                   ROM         Juniper ROM Monitor Version 9.0b2
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
SPMB 0                  ROM         Juniper ROM Monitor Version 9.5b1
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
SPMB 1                  ROM         Juniper ROM Monitor Version 9.5b1
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
```

show chassis firmware lcc (TX Matrix Plus Router)

`user@host>` **show chassis firmware lcc 0**

```
lcc0-re1:
--------------------------------------------------------------------------
Part                    Type        Version
FPC 4                   ROM         Juniper ROM Monitor Version 9.0b2
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
FPC 6                   ROM         Juniper ROM Monitor Version 9.0b2
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
FPC 7                   ROM         Juniper ROM Monitor Version 9.0b2
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
SPMB 0                  ROM         Juniper ROM Monitor Version 9.5b1
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
SPMB 1                  ROM         Juniper ROM Monitor Version 9.5b1
                        O/S         Version 9.6-20090507.0 by userb on 2009-0
```

show chassis firmware sfc (TX Matrix Plus Router)

`user@host>` **show chassis firmware sfc 0**

```
sfc0-re0:
--------------------------------------------------------------------------
Part                    Type        Version
Global FPC 4
Global FPC 6
Global FPC 7
Global FPC 12
Global FPC 14
Global FPC 15
Global FPC 20
Global FPC 21
Global FPC 22
Global FPC 23
Global FPC 24
Global FPC 25
Global FPC 26
Global FPC 28
Global FPC 29
Global FPC 31
```



```
SPMB 0                   ROM        Juniper ROM Monitor Version 9.5b1
                         O/S        Version 9.6-20090507.0 by userb on 2009-0
SPMB 1                   ROM        Juniper ROM Monitor Version 9.5b1
                         O/S        Version 9.6-20090507.0 by userb on 2009-0
```

show chassis firmware (QFX Series and OCX Series)

`user@switch>` **show chassis firmware**

```
Part                     Type       Version
FPC 0
Routing Engine 0         U-Boot     U-Boot 1.1.6 (Sep 15 2010 - 02:11:11) 1.0.5
                         loader     FreeBSD/MIPS U-Boot bootstrap loader 0.1
```

show chassis firmware (PTX1000 Packet Transport Routers)

`user@host>` **show chassis firmware**

```
Part                     Type       Version
FPC 0                    U-Boot      ***
                         loader           FreeBSD/i386 bootstrap loader 1.2
                         BIOS       V0018.2U
                         EC FPGA    2.0
                         MAIN_CPLD  1.f
                         MEZZ_CPLD  1.f
                         RE FPGA    2.3
```

show chassis firmware (PTX10008 Routers)

`user@host>` **show chassis firmware**

```
Part                     Type       Version
RE 0                     PRI BIOS   QFXS_SFP_00.31_01.01
                         GDN BIOS   QFXS_SFP_00.31_01.01
                         FPGA       2.4
                         RE-FPGA    3.2
RE 1                     PRI BIOS   QFXS_SFP_00.31_01.01
                         GDN BIOS   QFXS_SFP_00.31_01.01
                         FPGA       2.3
                         RE-FPGA    3.2
FPC 0                    U-Boot     Bank A: U-Boot 2011.12-gfbea47a (Feb 26 2016
 - 22:56:52)
                         CTRL FPGA  4.1
                         PORT FPGA  2.0
FPC 5                    U-Boot     Bank A: U-Boot 2011.12-gfbea47a (Feb 26 2016
 - 22:56:52)
                         CTRL FPGA  3.1
                         PORT FPGA  2.0
FPC 6                    U-Boot     Bank B: U-Boot 2011.12-gfbea47a (Feb 26 2016
 - 22:56:52)
                         CTRL FPGA  3.1
                         PORT FPGA  2.0
FPM                      FPGA       1.9
FTC 0                    FPGA       2.0
FTC 1                    FPGA       2.0
SIB 0                    FPGA       3.0
SIB 1                    FPGA       3.0
```

show chassis firmware interconnect-device (QFabric System)

user@switch> **show chassis firmware interconnect-device interconnect1**

```
Part                     Type       Version
Routing Engine 0         U-Boot     U-Boot 1.1.6 (May 10 2011 - 04:52:59) 1.1.1
                         loader     FreeBSD/MIPS U-Boot bootstrap loader 0.1
Routing Engine 1         U-Boot     U-Boot 1.1.6 (May 10 2011 - 04:52:59) 1.1.1
                         loader     FreeBSD/MIPS U-Boot bootstrap loader 0.1
```

show chassis firmware (ACX2000 Universal Metro Router)

user@switch> **show chassis firmware**

```
Part                     Type       Version
FPC                      O/S        Version 12.2I13 by user2 on 2012-05-29 06:
FEB                      O/S        Version 12.2I13 by user2 on 2012-05-29 06:
```

show chassis firmware detail (EX3300 Switch)

user@switch> **show chassis firmware detail**

```
FPC 0
   Boot SYSPLD              3
   PoE firmware             4.1.6
   PFE-0                    3
   PFE-1                    3
   PHY
      microcode             0x514
   Boot Firmware
      uboot                 U-Boot 1.1.6 (Aug 21 2011 - 01:45:26)   1.0.0
      loader                FreeBSD/arm U-Boot loader 1.0
```

show chassis firmware (MX Routers with Media Services Blade [MSB])

user@switch> **show chassis firmware**

```
Part                     Type       Version
FPC 1                    ROM        Juniper ROM Monitor Version 12.1b1
                         O/S        Version 12.2I21 by user1 on 2012-06-19 17:
```

show chassis firmware (ACX5048 Router)

user@host> **show chassis firmware**

```
Part                     Type       Version
FPC                      loader           FreeBSD/i386 bootstrap loader 1.2
                         BIOS       V0018.7
                         TMC FPGA   6.d8
                         PICO CPLD0 7.b
                         PICO CPLD1 7.b
                         PICO CPLD2 7.b
                         PICO CPLD3 7.b
                         PICO CPLD4 7.b
                         PICO CPLD5 7.b
                         PICO CPLD6 6.a
                         MRE        17.9
                         Power CPLD 3.a
```


show chassis firmware (ACX5096 Router)

user@host> **show chassis firmware**

```
Part                     Type       Version
FPC                      loader           FreeBSD/i386 bootstrap loader 1.2
                         BIOS       V0018.7
                         TMC FPGA   3000001.5
                         PICO CPLD0 7.b
                         PICO CPLD1 7.b
                         PICO CPLD2 7.b
                         PICO CPLD3 7.b
                         PICO CPLD4 7.b
                         PICO CPLD5 7.b
                         PICO CPLD6 c6.a
                         PICO CPLD7 -NA-
                         PICO CPLD8 7.b
                         PICO CPLD9 7.b
                         PICO CPLD10 7.b

                         PICO CPLD11 7.b

                         PICO CPLD12 7.b

                         PICO CPLD13 7.b

                         PICO CPLD14 c6.a

                         MRE        7.5
                         Power CPLD 4.1
```

show chassis firmware (ACX500 Router)

user@host> **show chassis firmware**

```

Part                     Type       Version
FPC                      O/S        Version 15.2-20150815_dev_rbu_1_16q1.0 by
userb on 2015-08-15 04:18:02 UTC
FEB                      O/S        Version 15.2-20150815_dev_rbu_1_16q1.0 by
userb on 2015-08-15 04:18:02 UTC
```


show chassis hardware

List of Syntax

Syntax

```
show chassis hardware
<detail | extensive>
<clei-models>
<models>
```

Syntax (EX Series, MX104, MX204, MX2010, MX2020, MX10003, MX10008, and MX2008 Universal Routing Platforms)

```
show chassis hardware
<clei-models>
<detail | extensive>
<models>
<satellite [slot-id slot-id |device-alias alias-name]>
```

Syntax (TX Matrix Router)

```
show chassis hardware
<clei-models>
<detail | extensive>
<models>
<lcc number |  scc>
```

Syntax (TX Matrix Plus Router)

```
show chassis hardware
<clei-models>
<detail | extensive>
<models>
<lcc number |  sfc number>
```

Syntax (MX Series Routers)

```
show chassis hardware
<detail | extensive>
<clei-models>
<models>
<all-members>
<local>
<member member-id>
```

Syntax (QFX Series)

```
show chassis hardware
<detail | extensive>
<clei-models>
```

```
<interconnect-device name>
<node-device name>
<models>
```

Release Information

Command introduced before Junos OS Release 7.4.
models option introduced in Junos OS Release 8.2.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.
Command introduced in Junos OS Release 11.1 for QFX Series.
Command introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers.
Command introduced in Junos OS Release 12.2 for ACX Series Universal Metro Routers.
Command introduced in Junos OS Release 12.3 for MX2010 and MX2020 Universal Routing Platforms.
Information for **disk** and **usb** introduced in Junos OS Release 15.1X53-D60 for QFX10002, QFX10008, and QFX10016 switches.
Command introduced in Junos OS Release 15.1X54-D20 for ACX5048 and ACX5096 Routers.
Command introduced in Junos OS Release 17.2 for MX2008 Universal Routing Platforms.
Command introduced in Junos OS Release 17.2 for PTX10008 Routers.
Command introduced in Junos OS Release 17.3 for MX10003 Universal Routing Platforms.
Command introduced in Junos OS Release 17.3 for MX150 Router Appliance.
Command introduced in Junos OS Release 17.4 for MX204 Routers.
Command introduced in Junos OS Release 18.1R1 for EX9251 Switches.
Command introduced in Junos OS Release 18.2 for EX9253 Switches.
Command introduced in Junos OS Release 18.2R1 for MX10008 Routers

NOTE: **Routers and routing platforms use the basic syntax, unless otherwise listed. For example, the EX Series has an additional satellite parameter available.**

Description

Display a list of all Flexible PIC Concentrators (FPCs) and PICs installed in the router or switch chassis, including the hardware version level and serial number.

In the EX Series switch command output, FPC refers to the following:

- On EX2200 switches, EX3200 switches, EX4200 standalone switches, and EX4500 switches—Refers to the switch; FPC *number* is always 0.
- On EX4200 switches in a Virtual Chassis configuration—Refers to the member of a Virtual Chassis; FPC *number* equals the member ID, from 0 through 9.
- On EX8208 and EX8216 switches—Refers to a line card; FPC *number* equals the slot number for the line card.

On QFX3500, QFX5100, and OCX Series standalone switches, and PTX1000 routers both the FPC and FPC *number* are always **0**.

On T4000 Type 5 FPCs, there are no **top temperature sensor** or **bottom temperature sensor** parameters. Instead, **fan intake temperature sensor** and **fan exhaust temperature sensors** parameters are displayed.

Starting from Junos OS Release 11.4, the output of the **show chassis hardware models** operational mode command displays the enhanced midplanes FRU model numbers (CHAS-BP3-MX240-S, CHAS-BP3-MX480-S or CHAS-BP3-MX960-S) based on the router. Prior to release 11.4, the FRU model numbers are left blank when the router has enhanced midplanes. Note that the enhanced midplanes are introduced through the Junos OS Release 13.3, but can be supported on all Junos OS releases.

Starting with Junos OS Release 14.1, the output of the **show chassis hardware detail | extensive | clei-models | models** operational mode command displays the new DC power supply module (PSM) and power distribution unit (PDU) that are added to provide power to the high-density FPC (FPC2-PTX-P1A) and other components in a PTX5000 Packet Transport Router.

NOTE: The output samples provided here are intended only as representative examples of the various types of show chassis hardware outputs. They are not exhaustive samples of every possible option or platform variant.

Options

none—Display information about hardware. For a TX Matrix router, display information about the TX Matrix router and its attached T640 routers. For a TX Matrix Plus router, display information about the TX Matrix Plus router and its attached routers.

clei-models—(Optional) Display Common Language Equipment Identifier (CLEI) barcode and model number for orderable field-replaceable units (FRUs).

detail—(Optional) Include RAM and disk information in output.

extensive—(Optional) Display ID EEPROM information.

all-members—(MX Series routers only) (Optional) Display hardware-specific information for all the members of the Virtual Chassis configuration.

interconnect-device *name*—(QFabric systems only) (Optional) Display hardware-specific information for the Interconnect device.

lcc *number*—(TX Matrix routers and TX Matrix Plus router only) (Optional) On a TX Matrix router, display hardware information for a specified T640 router (line-card chassis) that is connected to the TX Matrix router. On a TX Matrix Plus router, display hardware information for a specified router (line-card chassis) 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—(MX Series routers only) (Optional) Display hardware-specific information for the local Virtual Chassis members.

member ***member-id***—(MX Series routers and EX Series switches) (Optional) Display hardware-specific information for the specified member of the Virtual Chassis configuration. Replace *member-id* variable with a value 0 or 1.

models—(Optional) Display model numbers and part numbers for orderable FRUs and, for components that use ID EEPROM format v2, the CLEI code.

node-device ***name***—(QFabric systems only) (Optional) Display hardware-specific information for the Node device.

satellite [slot-id ***slot-id*** **| device-alias** ***alias-name*****]**—(Junos Fusion only) (Optional) Display hardware information for the specified satellite device in a Junos Fusion, or for all satellite devices in the Junos Fusion if no satellite devices are specified.

scc—(TX Matrix router only) (Optional) Display hardware information for the TX Matrix router (switch-card chassis).

sfc ***number***—(TX Matrix Plus router only) (Optional) Display hardware information for the TX Matrix Plus router (switch-fabric chassis). Replace *number* variable with **0**.

Additional Information

The **show chassis hardware detail** command now displays DIMM information for the following Routing Engines, as shown in Table 22 on page 429.

Table 22: Routing Engines Displaying DIMM Information

Routing Engines	Routers
RE-S-1800x2 and RE-S-1800x4	MX240, MX480, and MX960 routers
RE-A-1800x2	M120 and M320 routers

In Junos OS Release 11.4 and later, the output for the **show chassis hardware models** operational mode command for MX Series routers display the enhanced midplanes FRU model numbers—CHAS-BP3-MX240-S, CHAS-BP3-MX480-S, or CHAS-BP3-MX960-S—based on the router. In releases before Junos OS Release 11.4, the FRU model numbers are left blank when the router has enhanced midplanes. Note that the enhanced midplanes are introduced through Junos OS Release 13.3, but can be supported on all Junos OS releases.

Starting with Junos OS Release 17.3R1, the output of the **show chassis hardware** command displays the mode in which vMX is running (performance mode or lite mode) in the part number field for the FPC. **RIOT-PERF** indicates performance mode and **RIOT-LITE** indicates lite mode.

Required Privilege Level

view

Related Documentation

- *show chassis power*

List of Sample Output

Output Fields

Table 23 on page 431 lists the output fields for the **show chassis hardware** command. Output fields are listed in the approximate order in which they appear.

Table 23: show chassis hardware Output Fields

Field Name	Field Description	Level of Output
Item	Chassis component: • (EX Series switches)—Information about the chassis, Routing Engine (SRE and Routing Engine modules in EX8200 switches), power supplies, fan trays, and LCD panel. Also displays information about Flexible PIC Concentrators (FPCs) and associated Physical Interface Cards (PICs). Information about the backplane, midplane, and SIBs (SF modules) is displayed for EX8200 switches. • (MX Series routers and EX Series switches)—Information about the backplane, Routing Engine, Power Entry Modules (PEMs), and fan trays. Also displays information about Flexible PIC Concentrators (FPCs) and associated Physical Interface Cards (PICs), Modular Port Concentrators (MPCs) and associated Modular Interface Cards (MICs), or Dense Port Concentrators (DPCs). MX80 routers have a single Routing Engine and a built-in Packet Forwarding Engine that attaches directly to MICs. The Packet Forwarding Engine has two “pseudo” FPCs (FPC 0 and FPC1). MX80 routers also have a Forwarding Engine Board (FEB). MX104 routers have a built-in Packet forwarding Engine and a Forwarding Engine Board (FEB). The Packet Forwarding Engine of the MX104 router has three “pseudo” FPCs (FPC0, FPC1, and FPC2). • (M Series routers, except for the M320 router)—Information about the backplane; power supplies; fan trays; Routing Engine; maxicab (the connection between the Routing Engine and the backplane, for the M40 router only); SCB, SSB, SFM, or FEB; MCS and PCG (for the M160 router only); each FPC and PIC; and each fan, blower, and impeller. • (M120, M320, and T Series routers)—Information about the backplane, power supplies, fan trays, midplane, FPM (craft interface), CIP, PEM, SCG, CB, FPC, PIC, SFP, SPMB, and SIB. • (QFX Series)—Information about the chassis, Pseudo CB, Routing Engine, power supplies, fan trays, Interconnect devices, and Node devices. Also displays information about Flexible PIC Concentrators (FPCs) and associated Physical Interface Cards (PICs). • (PTX Series)—Information about the chassis, midplane, craft interface (FPM), power distribution units (PDUs) and Power Supply Modules (PSMs), Centralized Clock Generators (CCGs), Routing Engines, Control Boards (CBs) and Switch Processor Mezzanine Boards (SPMBs), Flexible PIC Concentrators (FPCs), PICs, Switch Interface Boards (SIBs), and fan trays (vertical and horizontal). • (MX2010, MX2020, and MX2008 routers)—Information about the chassis, midplane, craft interface (FPM), power midplane (PMP), Power Supply Modules (PSMs), Power Distribution Modules (PDMs), Routing Engines, Control Boards (CBs) and Switch Processor Mezzanine Boards (SPMBs), Switch Fabric Boards (SFBs), Flexible PIC Concentrators (FPCs), PICs, adapter cards (ADCs) and fan trays. • (vMX routers)—Information about the chassis, midplane, Routing Engines, and Control Boards (CBs). Also displays information about Flexible PIC Concentrators (FPCs) and associated Modular Interface Cards (MICs) and Physical Interface Cards (PICs).	All levels
Version	Revision level of the chassis component.	All levels
Part number	Part number of the chassis component.	All levels

Table 23: show chassis hardware Output Fields (continued)

Field Name	Field Description	Level of Output
Serial number	Serial number of the chassis component. The serial number of the backplane is also the serial number of the router chassis. Use this serial number when you need to contact Juniper Networks Customer Support about the router or switch chassis.	All levels
Assb ID or **Assembly ID**	(**extensive** keyword only) Identification number that describes the FRU hardware.	**extensive**
Assembly Version	(**extensive** keyword only) Version number of the FRU hardware.	**extensive**
Assembly Flags	(**extensive** keyword only) Flags.	**extensive**
FRU model number	(**clei-models**, **extensive**, and **models** keyword only) Model number of the FRU hardware component.	none specified
CLEI code	(**clei-models** and **extensive** keyword only) Common Language Equipment Identifier code. This value is displayed only for hardware components that use ID EEPROM format v2. This value is not displayed for components that use ID EEPROM format v1.	none specified
EEPROM Version	ID EEPROM version used by the hardware component: **0x00** (version 0), **0x01** (version 1), or **0x02** (version 2).	**extensive**
Description	Brief description of the hardware item: • Type of power supply. • Type of PIC. If the PIC type is not supported on the current software release, the output states **Hardware Not Supported**. • Type of FPC: **FPC Type 1**, **FPC Type 2**, **FPC Type 3**, **FPC Type 4** , or **FPC TypeOC192**. On EX Series switches, a brief description of the FPC. The following list shows the PIM abbreviation in the output and the corresponding PIM name. ◦ **2x FE**—Either two built-in Fast Ethernet interfaces (fixed PIM) or dual-port Fast Ethernet PIM ◦ **4x FE**—4-port Fast Ethernet ePIM ◦ **1x GE Copper**—Copper Gigabit Ethernet ePIM (one 10-Mbps, 100-Mbps, or 1000-Mbps port) ◦ **1x GE SFP**—SFP Gigabit Ethernet ePIM (one fiber port) ◦ **2x Serial**—Dual-port serial PIM ◦ **2x T1**—Dual-port T1 PIM ◦ **2x E1**—Dual-port E1 PIM ◦ **2x CT1E1**—Dual-port channelized T1/E1 PIM ◦ **1x T3**—T3 PIM (one port) ◦ **1x E3**—E3 PIM (one port) ◦ **4x BRI S/T**—4-port ISDN BRI S/T PIM ◦ **4x BRI U**—4-port ISDN BRI U PIM ◦ **1x ADSL Annex A**—ADSL 2/2+ Annex A PIM (one port, for POTS)	All levels

Table 23: show chassis hardware Output Fields (continued)

Field Name	Field Description	Level of Output
	◦ **1x ADSL Annex B**—ADSL 2/2+ Annex B PIM (one port, for ISDN) ◦ **2x SHDSL (ATM)**—G SHDSL PIM (2-port two-wire module or 1-port four-wire module) ◦ **1x TGM550**—TGM550 Telephony Gateway Module (Avaya VoIP gateway module with one console port, two analog **LINE** ports, and two analog **TRUNK** ports) ◦ **1x DS1 TIM510**—TIM510 E1/T1 Telephony Interface Module (Avaya VoIP media module with one E1 or T1 trunk termination port and ISDN PRI backup) ◦ **4x FXS, 4xFXO, TIM514**—TIM514 Analog Telephony Interface Module (Avaya VoIP media module with four analog **LINE** ports and four analog **TRUNK** ports) ◦ **4x BRI TIM521**—TIM521 BRI Telephony Interface Module (Avaya VoIP media module with four ISDN BRI ports) ◦ **Crypto Accelerator Module**—For enhanced performance of cryptographic algorithms used in IP Security (IPsec) services • **MPC M 16x 10GE**—16-port 10-Gigabit Module Port Concentrator that supports SFP+ optical transceivers. (Not on EX Series switches.) • For hosts, the Routing Engine type. • For small form-factor pluggable transceiver (SFP) modules, the type of fiber: **LX**, **SX**, **LH**, or **T**. • LCD description for EX Series switches (except EX2200 switches). • **MPC2**—1-port MPC2 that supports two separate slots for MICs. • **MPC3E**—1-port MPC3E that supports two separate slots for MICs (MIC-3D-1X100GE-CFP and MIC-3D-20GE-SFP) on MX960, MX480, and MX240 routers. The MPC3E maps one MIC to one PIC (1 MIC, 1 PIC), which differs from the mapping of legacy MPCs. • 100GBASE-LR4, pluggable CFP optics • Supports the Enhanced MX Switch Control Board with fabric redundancy and existing SCBs without fabric redundancy. • Interoperates with existing MX Series line cards, including Flexible Port Concentrators (FPC), Dense Port Concentrators (DPCs), and Modular Port Concentrators (MPCs). • **MPC4E**—Fixed configuration MPC4E that is available in two flavors: MPC4E-3D-32XGE-SFPP and MPC4E-3D-2CGE-8XGE on MX2020, MX960, MX480, and MX240 routers. • LCD description for MX Series routers	

Sample Output

The following output samples are intended to serve as representative examples only and are not exhaustive representations of every single possible command or hardware variation.

show chassis hardware (MX10008 Router)

user@host> **show chassis hardware**

```
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                DE487             JNP10008 [MX10008]
Midplane         REV 27   750-054097   ACPD4307          Midplane 8
Routing Engine 0          BUILTIN      BUILTIN           RE X10 LT
Routing Engine 1          BUILTIN      BUILTIN           RE X10
CB 0             REV 02   750-079563   CAFF4580          Control Board
CB 1             REV 04   750-079563   CAGL8034          Control Board
..
...
..
4
FPC 3            REV 04   750-084779   CAKR7019          JNP10K-LC2101
  CPU            REV 05   750-073391   CAKJ2854          LC 2101 PMB
  PIC 0                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-058734   1ACQ104300K       QSFP-100GBASE-SR4
  PIC 1                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-061405   1ACQ12110AN       QSFP-100GBASE-SR4
  PIC 2                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-046565   QG1105B2          QSFP+-40G-SR4
  PIC 3                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-045627   QH08036X          40GBASE eSR4
  PIC 4                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 0       REV 01   740-067443   XWR0RY7           QSFP+-40G-SR4
    Xcvr 1       REV 01   740-067443   XWR0RYH           QSFP+-40G-SR4
    Xcvr 2       REV 01   740-067443   XWR0RYP           QSFP+-40G-SR4
    Xcvr 3       REV 01   740-067443   XWS028S           QSFP+-40G-SR4
  PIC 5                   BUILTIN      BUILTIN           4xQSFP28 SYNCE
    Xcvr 3       REV 01   740-058734   1ACQ113406C       QSFP-100GBASE-SR4
FPD Board        REV 07   711-054687   ACPC7142          Front Panel Display
PEM 0            REV 02   740-049388   1EDL62102N9       Power Supply AC
PEM 1            REV 02   740-049388   1EDL60300KX       Power Supply AC
PEM 2            REV 02   740-049388   1EDL60300DL       Power Supply AC
PEM 3            REV 02   740-049388   1EDL61701BT       Power Supply AC
PEM 4            REV 02   740-049388   1EDL62102P7       Power Supply AC
PEM 5            REV 02   740-049388   1EDL62102PP       Power Supply AC
FTC 0            REV 14   750-050108   ACPE4038          Fan Controller 8
FTC 1            REV 14   750-050108   ACPE4032          Fan Controller 8
Fan Tray 0       REV 09   760-054372   ACPD6799          Fan Tray 8
Fan Tray 1       REV 09   760-054372   ACNZ3584          Fan Tray 8
SFB 0            REV 24   750-050058   ACPD4587          Switch Fabric (SIB) 8
SFB 1            REV 24   750-050058   ACNZ0635          Switch Fabric (SIB) 8
SFB 2            REV 24   750-050058   ACPD4908          Switch Fabric (SIB) 8
SFB 3            REV 24   750-050058   ACNZ0617          Switch Fabric (SIB) 8
SFB 4            REV 24   750-050058   ACNZ0527          Switch Fabric (SIB) 8
SFB 5            REV 23   750-050058   ACNX6980          Switch Fabric (SIB) 8
```


show chassis hardware clei-models (PTX10016 Routers)

`user@host>` **show chassis hardware clei-models**

```
Hardware inventory:
Item             Version  Part number  CLEI code        FRU model number
Midplane         REV 24   750-077138   CMMUN00ARA       JNP10016
CB 0             REV 04   711-065897   PROTOXCLEI       PROTO-ASSEMBLY
CB 1             REV 05   711-065897   PROTOXCLEI       PROTO-ASSEMBLY
FPC 2
  PIC 0                   BUILTIN
FPC 4            REV 35   750-071976   CMUIANABAA       JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 5            REV 13   750-068822   CMUIAM9BAC       QFX10000-36Q
  PIC 0                   BUILTIN
FPC 6            REV 41   750-071976   CMUIANABAB       JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 7            REV 35   750-071976   CMUIANABAA       JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 8            REV 35   750-071976   CMUIANABAA       JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 9            REV 41   750-071976   CMUIANABAB       JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 10           REV 35   750-071976   CMUIANABAA       JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 11           REV 35   750-071976   CMUIANABAA       JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 13           REV 41   750-071976   CMUIANABAB       JNP10K-LC1101
  PIC 0                   BUILTIN
FPC 15           REV 37   750-071976   CMUIANABAA       JNP10K-LC1101
  PIC 0                   BUILTIN
Power Supply 0   REV 01   740-073147   CMUPADPBAA       JNP10K-PWR-DC
Power Supply 1   REV 01   740-073147   CMUPADPBAA       JNP10K-PWR-DC
Power Supply 2   REV 01   740-073147   CMUPADPBAA       JNP10K-PWR-DC
Power Supply 3   REV 01   740-073147   CMUPADPBAA       JNP10K-PWR-DC
Power Supply 4   REV 01   740-073147   CMUPADPBAA       JNP10K-PWR-DC
Power Supply 5   REV 01   740-073147   CMUPADPBAA       JNP10K-PWR-DC
Power Supply 6   REV 01   740-073147   CMUPADPBAA       JNP10K-PWR-DC
Power Supply 7   REV 01   740-073147   CMUPADPBAA       JNP10K-PWR-DC
Power Supply 8   REV 01   740-073147   CMUPADPBAA       JNP10K-PWR-DC
Power Supply 9   REV 01   740-073147   CMUPADPBAA       JNP10K-PWR-DC
Fan Tray 0                                              QFX5100-FAN-AFO
Fan Tray 1                                              QFX5100-FAN-AFO
SIB 0            REV 15   750-077140   CMUCAH6CAA       JNP10016-SF
SIB 1            REV 15   750-077140   CMUCAH6CAA       JNP10016-SF
SIB 2            REV 15   750-077140   CMUCAH6CAA       JNP10016-SF
SIB 3            REV 15   750-077140   CMUCAH6CAA       JNP10016-SF
SIB 4            REV 15   750-077140   CMUCAH6CAA       JNP10016-SF
SIB 5            REV 15   750-077140   CMUCAH6CAA       JNP10016-SF
FPD Board        REV 07   711-054687
```

show chassis hardware detail (EX9251 Switch)

`user@switch>` **show chassis hardware**

```
Hardware inventory:
Item             Version  Part number  Serial number    Description
Chassis                                BLANK            EX9251
Routing Engine 0          BUILTIN      BUILTIN          RE-S-2X00x6
CB 0             REV 05   750-069579   CAGT1382         EX9251
```



```
FPC 0                     BUILTIN      BUILTIN          MPC
  PIC 0                   BUILTIN      BUILTIN          4XQSFP28 PIC
    Xcvr 0       REV 01   740-044512   APF14500007NHC   QSFP+-40G-CU50CM
    Xcvr 2       REV 01   740-046565   QH21035H         QSFP+-40G-SR4
  PIC 1                   BUILTIN      BUILTIN          8XSFPP PIC
    Xcvr 0       REV 01   740-031980   AA15393URH7      SFP+-10G-SR
    Xcvr 1       REV 01   740-031980   AA162832LVG      SFP+-10G-SR
    Xcvr 2       REV 01   740-031980   MXA0NKJ          SFP+-10G-SR
    Xcvr 3       REV 01   740-031980   MXA0K75          SFP+-10G-SR
    Xcvr 4       REV 01   740-021308   MXA138L          SFP+-10G-SR
    Xcvr 5       REV 01   740-021308   13T511102684     SFP+-10G-SR
    Xcvr 6       REV 01   740-021308   MXA138E          SFP+-10G-SR
    Xcvr 7       REV 01   740-021308   MXA152N          SFP+-10G-SR
PEM 0            REV 02   740-070749   1F186390060      AC AFO 650W PSU
PEM 1            REV 02   740-070749   1F186390045      AC AFO 650W PSU
Fan Tray 0                                              Fan Tray, Front to Back
 Airflow - AFO
Fan Tray 1                                              Fan Tray, Front to Back
 Airflow - AFO
```

show chassis hardware extensive (T640 Router)

user@host> **show chassis hardware extensive**

```
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                                  T640
 Jedec Code:   0x7fb0           EEPROM Version:    0x01
 P/N:        ...........       S/N:            ...........
 Assembly ID:  0x0507           Assembly Version:  00.00
 Date:         00-00-0000       Assembly Flags:    0x00
 Version:    ...........
 ID: Gibson LCC Chassis
 Board Information Record:
  Address 0x00: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 I2C Hex Data:
  Address 0x00: 7f b0 01 ff 05 07 00 00 00 00 00 00 00 00 00 00
  Address 0x10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x20: ff ff ff ff ff ff ff ff ff ff ff ff 00 00 00 00
  Address 0x30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
  Address 0x40: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Midplane         REV 04   710-002726   AX5633
 Jedec Code:   0x7fb0           EEPROM Version:    0x01
 P/N:          710-002726.      S/N:               AX5633.
 Assembly ID:  0x0127           Assembly Version:  01.04
 Date:         06-27-2001       Assembly Flags:    0x00
 Version:      REV 04.....
 ID: Gibson Backplane
 Board Information Record:
  Address 0x00: ad 01 08 00 00 90 69 0e f8 00 ff ff ff ff ff ff
 I2C Hex Data:
  Address 0x00: 7f b0 01 ff 01 27 01 04 52 45 56 20 30 34 00 00
  Address 0x10: 00 00 00 00 37 31 30 2d 30 30 32 37 32 36 00 00
  Address 0x20: 53 2f 4e 20 41 58 35 36 33 33 00 00 00 1b 06 07
  Address 0x30: d1 ff ff ff ad 01 08 00 00 90 69 0e f8 00 ff ff
  Address 0x40: ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
FPM GBUS         REV 02   710-002901   HE3245
 ...
FPM Display      REV 02   710-002897   HA4873
 ...
```



```
CIP              REV 05    710-002895    HA4729
...
PEM 1            RevX02    740-002595    MD21815          Power Entry Module
 ...
SCG 0            REV 04    710-003423    HF6023
 ...
SCG 1            REV 04    710-003423    HF6061
 ...
Routing Engine 0 REV 01    740-005022    210865700292     RE-3.0
...
CB 0             REV 06    710-002728    HE3614
...
FPC 1            REV 01    710-002385    HE3009           FPC Type 1
...              REV 06    710-001726    HC0010
```

show chassis hardware interconnect-device (QFabric Systems)

`user@switch>` **show chassis hardware interconnect-device interconnect1**

```
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis          REV 07                                  QFX_olive
Midplane         REV 07   750-021261   BH0208188289      QFX Midplane
CB 0             REV 07   750-021261   BH0208188289      QFXIC08-CB4S
```

show chassis hardware lcc (TX Matrix Router)

`user@host>` **show chassis hardware lcc 0**

```
lcc0-re0:
--------------------------------------------------------------------------
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                65751             T640
Midplane         REV 03   710-005608   RA1408            T640 Backplane
FPM GBUS         REV 09   710-002901   RA2784            T640 FPM Board
FPM Display      REV 05   710-002897   RA2825            FPM Display
CIP              REV 06   710-002895   HT0684            T Series CIP
PEM 0            Rev 11   740-002595   PM18483           Power Entry Module
PEM 1            Rev 11   740-002595   qb13984           Power Entry Module
SCG 0            REV 11   710-003423   HT0022            T640 Sonet Clock Gen.
Routing Engine 0 REV 13   740-005022   210865700363      RE-3.0 (RE-600)
CB 0             REV 03   710-007655   HW1195            Control Board (CB-T)
FPC 1            REV 05   710-007527   HM3245            FPC Type 2
  CPU            REV 14   710-001726   HM1084            FPC CPU
  PIC 0          REV 02   750-007218   AZ1112            2x OC-12 ATM2 IQ, SMIR
  PIC 1          REV 02   750-007745   HG3462            4x OC-3 SONET, SMIR
  PIC 2          REV 14   750-001901   BA5390            4x OC-12 SONET, SMIR
  PIC 3          REV 09   750-008155   HS3012            2x G/E IQ, 1000 BASE
    SFP 0                 NON-JNPR     P1186TY           SFP-S
    SFP 1        REV 01   740-007326   P11WLTF           SFP-SX
  MMB 1          REV 02   710-005555   HL7514            MMB-288mbit
  PPB 0          REV 04   710-003758   HM4405            PPB Type 2
  PPB 1          REV 04   710-003758   AV1960            PPB Type 2
FPC 2            REV 08   710-010154   HZ3578            E-FPC Type 3
  CPU            REV 05   710-010169   HZ3219            FPC CPU-Enhanced
  PIC 0          REV 02   750-009567   HX2882            1x 10GE(LAN),XENPAK
    SFP 0        REV 01   740-009898   USC202U709        XENPAK-LR
  PIC 1          REV 03   750-003336   HJ9954            4x OC-48 SONET, SMSR
```



```
  PIC 2          REV 01   750-004535   HC0235           1x OC-192 SM SR1
  PIC 3          REV 07   750-007141   HX1699           10x 1GE(LAN), 1000 BASE

    SFP 0        REV 01   740-007326   2441042          SFP-SX
    SFP 1        REV 01   740-007326   2441027          SFP-SX
  MMB 0          REV 03   710-010171   HV2365           MMB-5M3-288mbit
  MMB 1          REV 03   710-010171   HZ3888           MMB-5M3-288mbit
SPMB 0           REV 09   710-003229   HW5245           T Series Switch CPU
SIB 3            REV 07   710-005781   HR5927           SIB-L8-F16
  B Board        REV 06   710-005782   HR5971           SIB-L8-F16 (B)
SIB 4            REV 07   710-005781   HR5903           SIB-L8-F16
  B Board        REV 06   710-005782   HZ5275           SIB-L8-F16 (B)
```

show chassis hardware models (MX2010 Router)

`user@host >` **show chassis hardware models**

```
Hardware inventory:
Item             Version  Part number  Serial number    FRU model number
FPM Board        REV 06   711-032349   ZX8744           711-032349
PSM 4            REV 0C   740-033727   VK00254          0000000000000000000000
PSM 5            REV 0B   740-033727   VG00015          0000000000000000000000
PSM 6            REV 0B   740-033727   VH00097          0000000000000000000000
PSM 7            REV 0C   740-033727   VJ00151          0000000000000000000000
PSM 8            REV 0C   740-033727   VJ00149          0000000000000000000000
PDM 0            REV 0B   740-038109   WA00008
PDM 1            REV 0B   740-038109   WA00014
Routing Engine 0 REV 02   740-041821   9009094134       RE-S-1800X4-16G-S
Routing Engine 1 REV 02   740-041821   9009094141       RE-S-1800X4-16G-S
CB 0             REV 08   750-040257   CAAB3491         750-040257
CB 1             REV 08   750-040257   CAAB3489         750-040257
SFB 0            REV 06   711-032385   ZV1828           711-032385
SFB 1            REV 07   711-032385   ZZ2568           711-032385
SFB 2            REV 07   711-032385   ZZ2563           711-032385
SFB 3            REV 07   711-032385   ZZ2564           711-032385
SFB 4            REV 07   711-032385   ZZ2580           711-032385
SFB 5            REV 07   711-032385   ZZ2579           711-0323856
SFB 6            REV 07   711-032385   CAAB4882         711-044170
SFB 7            REV 07   711-032385   CAAB4898         711-044170
FPC 0            REV 33   750-028467   CAAB1919         MPC-3D-16XGE-SFPP
FPC 1            REV 21   750-033205   ZG5027           MX-MPC3-3D
  MIC 0          REV 03   750-033307   ZV6299           MIC3-3D-10XGE-SFPP
  MIC 1          REV 03   750-033307   ZV6268           MIC3-3D-10XGE-SFPP
FPC 8            REV 22   750-031089   ZT9746           MX-MPC2-3D
  MIC 0          REV 26   750-028392   ABBS1150         MIC-3D-20GE-SFP
  MIC 1          REV 26   750-028387   ABBR9582         MIC-3D-4XGE-XFP
FPC 9            REV 11   750-036284   ZL3591           MPCE-3D-16XGE-SFPP
ADC 0            REV 05   750-043596   CAAC2073         750-043596
ADC 1            REV 01   750-043596   ZV4117           750-043596
ADC 8            REV 01   750-043596   ZV4107           750-043596
ADC 9            REV 02   750-043596   ZW1555           750-043596
Fan Tray 0       REV 2A   760-046960   ACAY0015
Fan Tray 1       REV 2A   760-046960   ACAY0019
Fan Tray 2       REV 2A   760-046960   ACAY0020
Fan Tray 3       REV 2A   760-046960   ACAY0021
```

show chassis hardware node-device (QFabric Systems)

`user@switch>` **show chassis hardware node-device node1**

```
Routing Engine 0   BUILTIN      BUILTIN          QFX Routing Engine
node1            REV 05   711-032234   ED3694           QFX3500-48S4Q-AFI

  CPU                     BUILTIN      BUILTIN          FPC CPU
  PIC 0                   BUILTIN      BUILTIN          48x 10G-SFP+
    Xcvr 8       REV 01   740-030658   AD0946A028B      SFP+-10G-USR
```

show chassis hardware scc (TX Matrix Router)

`user@host>` **show chassis hardware scc**

```
scc-re0:
--------------------------------------------------------------------------
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                                  TX Matrix
Midplane         REV 04   710-004396   RB0014            SCC Midplane
FPM GBUS         REV 04   710-004617   HW9141            SCC FPM Board
FPM Display      REV 04   710-004619   HS5950            SCC FPM
CIP 0            REV 01   710-010218   HV9151            SCC CIP
CIP 1            REV 01   710-010218   HV9152            SCC CIP
PEM 1            Rev 11   740-002595   QB13977           Power Entry Module
Routing Engine 0 REV 05   740-008883   P11123900153      RE-4.0 (RE-1600)
CB 0             REV 01   710-011709   HR5964            Control Board (CB-TX)
SPMB 0           REV 09   710-003229   HW5293            T Series Switch CPU
SIB 3
SIB 4            REV 01   710-005839   HW1177            SIB-S8-F16
  B Board        REV 01   710-005840   HW1202            SIB-S8-F16 (B)
```

show chassis hardware sfc (TX Matrix Plus Router)

`user@host>` **show chassis hardware sfc 0**

```
sfc0-re0:
--------------------------------------------------------------------------
Hardware inventory:
Item             Version  Part number  Serial number     Description
Chassis                                JN112F007AHB      TXP
Midplane         REV 05   710-022574   TS4027            SFC Midplane
FPM Display      REV 03   710-024027   DX0282            TXP FPM Display
CIP 0            REV 04   710-023792   DW4889            TXP CIP
CIP 1            REV 04   710-023792   DW4887            TXP CIP
PEM 0            Rev 07   740-027463   UM26368           Power Entry Module
Routing Engine 0 REV 01   740-026942   737A-1064         SFC RE
Routing Engine 1 REV 01   740-026942   737A-1082         SFC RE
CB 0             REV 09   710-022606   DW6099            SFC Control Board
CB 1             REV 09   710-022606   DW6096            SFC Control Board
SPMB 0                    BUILTIN                        SFC Switch CPU
SPMB 1                    BUILTIN                        SFC Switch CPU
SIB F13 0        REV 04   710-022600   DX0841            F13 SIB
  B Board        REV 03   710-023431   DX0966            F13 SIB Mezz
SIB F13 1        REV 04   750-024564   DW5776            F13 SIB
  B Board        REV 03   710-023431   DW9028            F13 SIB
SIB F13 3        REV 04   750-024564   DW5762            F13 SIB
  B Board        REV 03   710-023431   DW9059            F13 SIB
SIB F13 4        REV 04   750-024564   DW5797            F13 SIB
  B Board        REV 03   710-023431   DW9041            F13 SIB
SIB F13 6        REV 04   750-024564   DW5770            F13 SIB
  B Board        REV 03   710-023431   DW9079            F13 SIB Mezz
```

```
SIB F13 7        REV 04   750-024564   DW5758           F13 SIB
  B Board        REV 03   710-023431   DW9047           F13 SIB
SIB F13 8        REV 04   750-024564   DW5761           F13 SIB
  B Board        REV 03   710-023431   DW9043           F13 SIB Mezz
SIB F13 9        REV 04   750-024564   DW5754           F13 SIB
  B Board        REV 03   710-023431   DW9078           F13 SIB Mezz
SIB F13 11       REV 04   710-022600   DX0826           F13 SIB
  B Board        REV 03   710-023431   DX0967           F13 SIB Mezz
SIB F13 12       REV 04   750-024564   DW5794           F13 SIB
  B Board        REV 03   710-023431   DW9044           F13 SIB Mezz
SIB F2S 0/0      REV 05   710-022603   DW7897           F2S SIB
  B Board        REV 05   710-023787   DW7657           NEO PMB
SIB F2S 0/2      REV 05   710-022603   DW7833           F2S SIB
  B Board        REV 05   710-023787   DW7526           NEO PMB
SIB F2S 0/4      REV 05   710-022603   DW7875           F2S SIB
  B Board        REV 05   710-023787   DW7588           NEO PMB
SIB F2S 0/6      REV 05   710-022603   DW7860           F2S SIB
  B Board        REV 05   710-023787   DW7589           NEO PMB
SIB F2S 1/0      REV 04   710-022603   DW4820           F2S SIB
  B Board        REV 05   710-023787   DW8510           NEO PMB
SIB F2S 1/2      REV 05   710-022603   DW7849           F2S SIB
  B Board        REV 05   710-023787   DW7525           NEO PMB
SIB F2S 1/4      REV 05   710-022603   DW7927           F2S SIB
  B Board        REV 05   710-023787   DW7556           F2S SIB Mezz
SIB F2S 1/6      REV 05   710-022603   DW7866           F2S SIB
  B Board        REV 05   710-023787   DW7651           NEO PMB
SIB F2S 2/0      REV 05   710-022603   DW7880           F2S SIB
  B Board        REV 05   710-023787   DW7523           NEO PMB
SIB F2S 2/2      REV 05   710-022603   DW7895           F2S SIB
  B Board        REV 05   710-023787   DW7591           NEO PMB
SIB F2S 2/4      REV 05   710-022603   DW7907           F2S SIB
  B Board        REV 05   710-023787   DW7590           NEO PMB
SIB F2S 2/6      REV 05   710-022603   DW7785           F2S SIB
  B Board        REV 05   710-023787   DW7524           NEO PMB
SIB F2S 3/0      REV 05   710-022603   DW7782           F2S SIB
  B Board        REV 05   710-023787   DW7634           NEO PMB
SIB F2S 3/2      REV 05   710-022603   DW7793           F2S SIB
  B Board        REV 05   710-023787   DW7548           NEO PMB
SIB F2S 3/4      REV 05   710-022603   DW7779           F2S SIB
  B Board        REV 05   710-023787   DW7587           NEO PMB
SIB F2S 3/6      REV 05   710-022603   DW7930           F2S SIB
  B Board        REV 05   710-023787   DW7505           NEO PMB
SIB F2S 4/0      REV 05   710-022603   DW7867           F2S SIB
  B Board        REV 05   710-023787   DW7656           NEO PMB
SIB F2S 4/2      REV 05   710-022603   DW7917           F2S SIB
  B Board        REV 05   710-023787   DW7640           NEO PMB
SIB F2S 4/4      REV 05   710-022603   DW7929           F2S SIB
  B Board        REV 05   710-023787   DW7643           NEO PMB
SIB F2S 4/6      REV 05   710-022603   DW7870           F2S SIB
  B Board        REV 05   710-023787   DW7635           NEO PMB
Fan Tray 0       REV 06   760-024497   DV7831           Front Fan Tray
Fan Tray 1       REV 06   760-024497   DV9614           Front Fan Tray
Fan Tray 2       REV 06   760-024502   DV9618           Rear Fan Tray
Fan Tray 3       REV 06   760-024502   DV9616           Rear Fan Tray
Fan Tray 4       REV 06   760-024502   DV7807           Rear Fan Tray
Fan Tray 5       REV 06   760-024502   DV7828           Rear Fan Tray
```

show chassis led satellite

Syntax

```
show chassis led satellite [slot-id slot-id |device-alias alias-name]
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.

Description

Display the status and colors of the chassis LEDs of the satellite devices in a Junos Fusion. A major alarm (red) indicates a critical error condition that requires immediate action. A minor alarm (yellow) indicates a noncritical condition that requires monitoring or maintenance. A minor alarm that is left unchecked might cause interruption in service or performance degradation.

Options

none—Display the status of the chassis status LEDs of every satellite device in the Junos Fusion.

slot-id ***slot-id***—(Optional) Display the status of the chassis status LEDs of the satellite device using the specified FPC slot identifier in the Junos Fusion. The *slot-id* is the FPC slot ID number.

device-alias ***alias-name***—(Optional) Display the status of the chassis status LEDs of the satellite device using the specified alias in the Junos Fusion.

Required Privilege Level

view

Related Documentation

- Configuring Satellite Device Alarm Handling Using an Environment Monitoring Satellite Policy in a Junos Fusion on page 84
- *Understanding Junos Fusion Provider Edge Components*
- Understanding Junos Fusion Enterprise Components on page 5

List of Sample Output

show chassis led satellite on page 443

Output Fields

Table 24 on page 442 lists the output fields for the **show chassis led satellite** command. Output fields are listed in the approximate order in which they appear.

Table 24: show chassis led Output Fields

Field Name	Field Description
Beacon LED	(Applies when QFX5100, QFX5110, and QFX5200 switches are in an satellite device role only) Indicates if the beacon feature is on or off. The beacon feature is always off in a Junos Fusion. The **Beacon LED** output maps to the **ID–Identification** LED state. For more information, see: • *Chassis Status LEDs on a QFX5100 Device* • *QFX5110 Chassis Status LEDs* • *QFX5200 Chassis Status LEDs*
System LED	Indicates the state of the System (**SYS**) LED on the satellite device. For more information, see: • *Chassis Status LEDs on EX4300 Switches* • *Chassis Status LEDs on a QFX5100 Device* • *QFX5110 Chassis Status LEDs* • *QFX5200 Chassis Status LEDs*
Master LED	Indicates the state of the Master (**MST**) LED on the satellite device. For more information, see: • *Chassis Status LEDs on EX4300 Switches* • *Chassis Status LEDs on a QFX5100 Device* • *QFX5110 Chassis Status LEDs* • *QFX5200 Chassis Status LEDs*
Alarm LED	Indicates the state of the Alarm (**ALM**) LED on the satellite device. For more information, see: • *Chassis Status LEDs on EX4300 Switches* • *Chassis Status LEDs on a QFX5100 Device* • *QFX5110 Chassis Status LEDs* • *QFX5200 Chassis Status LEDs*
Mgmt Port0 LED	(Applies when QFX5100, QFX5110, and QFX5200 switches are in an satellite device role only) Indicates the state of the management port 0 (**em0**) LED status on the satellite device. This port is always off in a Junos Fusion. For more information, see: • *Management Port LEDs on a QFX5100 Device* • *QFX5110 Management Port LEDs* • *QFX5200 Management Port LEDs*

Table 24: show chassis led Output Fields (continued)

Field Name	Field Description
Mgmt Port1 LED	(Applies when QFX5100, QFX5110, and QFX5200 switches are in an satellite device role only) Indicates the state of the management port 1(**em0**) LED status on the satellite device. This port is always off in a Junos Fusion. For more information, see: • *Management Port LEDs on a QFX5100 Device* • *QFX5110 Management Port LEDs* • *QFX5200 Management Port LEDs*
Interface	The interface name on the satellite device. For more information, see: • *Management Port LEDs on a QFX5100 Device* • *QFX5110 Management Port LEDs* • *QFX5200 Management Port LEDs*
Status LED	The state of the Status LED for the particular interface on the satellite device. For more information, see: • *Network Port, Built-In QSFP+ Port, Uplink Port, and Uplink Module Port LEDs on EX4300 Switches* • *Access Port and Uplink Port LEDs on a QFX5100 Device* • *QFX5110 Network Port LEDs* • *QFX5200 Access Port and Uplink Port LEDs*
Link/Activity LED	The state of the Link/Activity LED for the particular interface on the satellite device. For more information, see: • *Network Port, Built-In QSFP+ Port, Uplink Port, and Uplink Module Port LEDs on EX4300 Switches* • *Access Port and Uplink Port LEDs on a QFX5100 Device* • *QFX5110 Network Port LEDs* • *QFX5200 Access Port and Uplink Port LEDs*

Sample Output

show chassis led satellite

```
user@aggregation-device> show chassis led satellite
                LED status for: FPC 101
                -----------------------------------
LEDs status:
    Beacon LED: OFF
    System LED: GREEN
```



```
    Master LED: OFF
    Alarm LED : YELLOW
    Mgmt Port0 LED: OFF
    Mgmt Port1 LED: OFF

Interface               STATUS LED      LINK/ACTIVITY LED
---------------------------------------------------------
xe-101/0/0              green
xe-101/0/1              green
xe-101/0/10             off
xe-101/0/48:0           green
xe-101/0/48:1           green
xe-101/0/48:2           green
xe-101/0/48:3           green

                LED status for: FPC 102
                -----------------------------------
LEDs status:
    Beacon LED: OFF
    System LED: GREEN
    Master LED: OFF
    Alarm LED : YELLOW
    Mgmt Port0 LED: OFF
    Mgmt Port1 LED: OFF

Interface               STATUS LED      LINK/ACTIVITY LED
---------------------------------------------------------
xe-102/0/0              green
xe-102/0/1              green
xe-102/0/10             off
xe-102/0/48:0           green
xe-102/0/48:1           green
xe-102/0/48:2           green
xe-102/0/48:3           green
```


show chassis routing-engine

List of Syntax

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Syntax

show chassis routing-engine
<bios | *slot*>

Syntax (ACX Series Universal Metro Routers)

show chassis routing-engine

Syntax (EX Series Switches)

show chassis routing-engine
<*slot*>
<satellite [slot-id *slot-id* |device-alias *alias-name*>

Syntax (QFX Series)

show chassis routing-engine
<interconnect-device *name*>
<node-device *name*>
<*slot*>
<*bios*>
<*errors*>

Syntax (MX Series Routers)

show chassis routing-engine
<all-members>
<bios | *slot*>
<local>
<member *member-id*>
<satellite [slot-id *slot-id* |device-alias *alias-name*>

Syntax (MX2010 Universal Routing Platforms)

show chassis routing-engine
<bios | *slot*>

Syntax (MX2020 Universal Routing Platforms)

```
show chassis routing-engine
<bios | slot>
```

Syntax (MX104 Universal Routing Platforms)

```
show chassis routing-engine
```

Syntax (MX204 and MX10003 Universal Routing Platforms)

```
show chassis routing-engine
<slot>
<bios>
<errors>
```

Syntax (PTX Series Packet Transport Routers)

```
show chassis routing-engine
```

Syntax (T Series Routers)

```
show chassis routing-engine
<bios | slot>
```

Syntax (TX Matrix Routers)

```
show chassis routing-engine
<bios | slot>
<lcc number | scc>
```

Syntax (TX Matrix Plus Routers)

```
show chassis routing-engine
<bios | slot>
<lcc number | sfc number>
```

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc option introduced in Junos OS Release in 9.6 for the TX Matrix Plus router.
Command introduced in Junos OS Release 11.1 for QFX Series.
5 sec CPU Utilization, **1 min CPU Utilization**, **5 min CPU Utilization**, and **15 min CPU Utilization** output fields introduced in Junos OS Release 11.3R1.
Command introduced in Junos OS Release 12.2 for ACX Series Universal Metro Routers.
Command introduced in Junos OS Release 12.3 for MX2010 and MX2020 Universal Routing Platforms.
Command introduced in Junos OS Release 13.2 for MX104 Universal Routing Platforms.
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
satellite option introduced in Junos OS Release 14.2R3.
Command introduced in Junos OS Release 17.2 for PTX10008 Routers.
Command introduced in Junos OS Release 17.3 for MX10003 Universal Routing Platforms.
Command introduced in Junos OS Release 17.4 for MX204 Universal Routing Platforms.
Command introduced in Junos OS Release 18.1R1 for EX9251 switches.

Description Display the status of the Routing Engine.

Options **none**—Display information about one or more Routing Engines. On a TX Matrix router, display information about all Routing Engines on the TX Matrix router and its attached T640 routers. On a TX Matrix Plus router, display information about all Routing Engines on the TX Matrix Plus router and its attached routers.

all-members—(MX Series routers only) (Optional) Display Routing Engine information for all members of the Virtual Chassis configuration.

bios—(Optional) Display the (BIOS) firmware version.

errors—(Optional) Display routing engine errors.

interconnect-device ***number***—(QFabric systems only) (Optional) Display Routing Engine information for a specified Interconnect device.

lcc ***number***—(TX Matrix and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display Routing Engine information for a specified T640 router (line-card chassis) that is connected to the TX Matrix router. On a TX Matrix Plus router, display Routing Engine information for a specified router (line-card chassis) 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—(MX Series routers only) (Optional) Display Routing Engine information for the local Virtual Chassis member.

member ***member-id***—(MX Series routers only) (Optional) Display Routing Engine information for the specified member of the Virtual Chassis configuration. For an MX Series Virtual Chassis, replace *member-id* with a value of 0 or 1.

node-device ***number***—(QFabric systems only) (Optional) Display Routing Engine information for a specified Node device.

satellite [slot-id ***slot-id*** **|device-alias** ***alias-name*****]**—(Junos Fusion only) (Optional) Display Routing Engine information for the specified satellite device in a Junos Fusion, or for all satellite devices in the Junos Fusion if no satellite devices are specified.

scc—(TX Matrix routers only) (Optional) Display Routing Engine information for the TX Matrix router (switch-card chassis).

sfc ***number***—(TX Matrix Plus routers only) (Optional) Display Routing Engine information for the TX Matrix Plus router (or switch-fabric chassis). Replace ***number*** with 0.

slot—(Systems with multiple Routing Engines) (Optional) Display information for an individual Routing Engine. Replace ***slot*** with 0 or 1. For QFX3500 switches, there is only one Routing Engine, so you do not need to specify the slot number.

Required Privilege Level

view

Related Documentation

- *request chassis routing-engine master*
- *Configuring Routing Engine Redundancy*
- *Switching the Global Master and Backup Roles in a Virtual Chassis Configuration*

List of Sample Output

show chassis routing-engine (Displaying the guest reboot reason on PTX5000,MX240, MX480, MX960< MX2010, and MX2020) on page 473

Output Fields Table 25 on page 449 lists the output fields for the **show chassis routing-engine** command. Output fields are listed in the approximate order in which they appear.

Table 25: show chassis routing-engine Output Fields

Field Name	Field Description
Slot	(Systems with single and multiple Routing Engines) Slot number.
Current state	(Systems with multiple Routing Engines) Current state of the Routing Engine: **Master**, **Backup**, or **Disabled**.
Election priority	(Systems with multiple Routing Engines) Election priority for the Routing Engine: **Master** or **Backup**.
Temperature	Temperature of the air flowing past the Routing Engine.
CPU Temperature	Temperature of the CPU.
DRAM	Total DRAM available to the Routing Engine's processor. Starting with Junos OS Release 12.3R1, the DRAM field displays both available memory and installed memory.
Memory utilization	Percentage of Routing Engine memory being used. NOTE: For platforms running Junos OS with upgraded FreeBSD, the way memory utilization is calculated has changed. Starting in Junos OS Release 15.1R1, inactive memory is no longer included in the calculation for memory utilization. Inactive memory is now considered as free. That is, the value for used memory decreases and results in more memory to be available for other processes. For platforms that run Junos OS with upgraded FreeBSD, see *Release Information for Junos OS with Upgraded FreeBSD*.
CPU utilization	Information about the Routing Engine's CPU utilization: • **User**—Percentage of CPU time being used by user processes. • **Background**—Percentage of CPU time being used by background processes. • **Kernel**—Percentage of CPU time being used by kernel processes. • **Interrupt**—Percentage of CPU time being used by interrupts. • **Idle**—Percentage of CPU time that is idle.
5 sec CPU Utilization	Information about the Routing Engine's CPU utilization in the past 5 seconds: • **User**—Percentage of CPU time being used by user processes. • **Background**—Percentage of CPU time being used by background processes. • **Kernel**—Percentage of CPU time being used by kernel processes. • **Interrupt**—Percentage of CPU time being used by interrupts. • **Idle**—Percentage of CPU time that is idle.

Table 25: show chassis routing-engine Output Fields (continued)

Field Name	Field Description
1 min CPU Utilization	Information about the Routing Engine's CPU utilization in the past 1 minute: • **User**—Percentage of CPU time being used by user processes. • **Background**—Percentage of CPU time being used by background processes. • **Kernel**—Percentage of CPU time being used by kernel processes. • **Interrupt**—Percentage of CPU time being used by interrupts. • **Idle**—Percentage of CPU time that is idle.
5 min CPU Utilization	Information about the Routing Engine's CPU utilization in the past 5 minutes: • **User**—Percentage of CPU time being used by user processes. • **Background**—Percentage of CPU time being used by background processes. • **Kernel**—Percentage of CPU time being used by kernel processes. • **Interrupt**—Percentage of CPU time being used by interrupts. • **Idle**—Percentage of CPU time that is idle.
15 min CPU Utilization	Information about the Routing Engine's CPU utilization in the past 15 minutes: • **User**—Percentage of CPU time being used by user processes. • **Background**—Percentage of CPU time being used by background processes. • **Kernel**—Percentage of CPU time being used by kernel processes. • **Interrupt**—Percentage of CPU time being used by interrupts. • **Idle**—Percentage of CPU time that is idle.
Model	Routing Engine model number.
Serial ID	(Systems with multiple Routing Engines) Identification number of the Routing Engine in this slot.
Start time	Time at which the Routing Engine started running.
Uptime	How long the Routing Engine has been running.
Routing Engine BIOS Version	BIOS version being run by the Routing Engine.

Table 25: show chassis routing-engine Output Fields (continued)

Field Name	Field Description
Last reboot reason	Reason for last reboot, including: • **power cycle/failure**—Halt of the Routing Engine using the **halt** command, powering down using the power button on the chassis or any other method (such as removal of the control board or Routing Engine), and then powering back the Routing Engine. A halt of the operating system also occurs if you enter the **request system halt** command. You can enter this command to halt the system operations on the chassis or specific Routing Engines. To restart the software, press any key on the keyboard. • **watchdog**—Reboot due to a hardware watchdog. A watchdog is a hardware monitoring process that examines the health and performance of the router to enable the device to recover from failures. A watchdog checks for problems at certain intervals, and reboots the routing engine if a problem is encountered. • **reset-button reset**—(Not available on the EX Series switch) Reboot due to pressing of the reset button on the Routing Engine. • **power-button hard power off**—Reboot due to pressing of the power button on the chassis. A powering down of the software also occurs if you enter the **request system power-off** command. You can enter this command to power down the chassis or specific Routing Engines; you can then restart the software. • **misc hardware reason**—Reboot due to miscellaneous hardware reasons. • **thermal shutdown**—Reboot due to the router or switch reaching a critical temperature at which point it is unsafe to continue operations. • **hard disk failure**—Reboot due to a hard disk or solid-state drive (SSD) failure. • **reset from debugger**—Reboot due to reset from the debugger. • **chassis control reset**—Restart the chassis process that manages PICs, FPCs, and other hardware components. The chassis control module that runs the Routing Engine performs management and monitoring functions, and it provides a single access point for operational and maintenance functions. A reset of the chassis management process occurs when you enter the **restart chassis-control** command. • **bios auto recovery reset**—Reboot due to a BIOS auto-recovery reset. • **could not be determined**—Reboot due to an undetermined reason. • **Router rebooted after a normal shutdown**—Reboot due to a normal shutdown. This reason is displayed if the Routing Engine is powered down by pushing and holding the online/offline button on the Routing Engine faceplate for 30 seconds, and then powered back. A reboot of the software also occurs if you enter the **request system reboot** command. You can enter this command to reboot the chassis or specific Routing Engines. • **Hypervisor reboot**—When both Linux host and Junos OS is rebooted using the **request vmhost reboot** command. • **VJUNOS Reboot**—When Junos OS is rebooted using the **request system reboot** command.
Load averages	Routing Engine load averages for the last 1, 5, and 15 minutes.

Sample Output

show chassis routing-engine (M5 Router)

user@host> **show chassis routing-engine**

```
Routing Engine status:
    Temperature                 25 degrees C / 77 degrees F
    DRAM                       768 MB
    Memory utilization          21 percent
```

```
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
    Model                          RE-2.0
    Serial ID                      31000007349bf701
    Start time                     2003-12-04 09:42:17 PST
    Uptime                         26 days, 1 hour, 12 minutes, 27 seconds
    Last reboot reason             Router rebooted after a normal shutdown
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.01       0.00
```

show chassis routing-engine (M10 Router)

user@host> **show chassis routing-engine**

```
Routing Engine status:
    Temperature                 25 degrees C / 77 degrees F
    DRAM                       768 MB
    Memory utilization          21 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
    Model                          RE-2.0
    Serial ID                      31000007349bf701
    Start time                     2003-12-04 09:42:17 PST
    Uptime                         26 days, 1 hour, 12 minutes, 27 seconds
    Last reboot reason             Router rebooted after a normal shutdown
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.01       0.00
```

show chassis routing-engine (M20 Router)

user@host> **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 29 degrees C / 84 degrees F
    DRAM                       768 MB
    Memory utilization          20 percent
    CPU utilization:
      User                       1 percent
      Background                 0 percent
      Kernel                     2 percent
      Interrupt                  0 percent
      Idle                      97 percent
    Model                          RE-2.0
    Serial ID                      58000007348d9a01
    Start time                     2003-12-30 07:05:47 PST
    Uptime                        3 hours, 41 minutes, 14 seconds
    Last reboot reason             Router rebooted after a normal shutdown
    Load averages:                 1 minute   5 minute  15 minute
```



```
                                       0.00       0.02       0.00
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 29 degrees C / 84 degrees F
    DRAM                       768 MB
    Memory utilization           0 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      99 percent
    Model                          RE-2.0
    Serial ID                      d800000734745701
    Start time                     2003-06-17 16:37:33 PDT
    Uptime                        195 days, 18 hours, 47 minutes, 9 seconds
    Last reboot reason             Router rebooted after a normal shutdown
```

show chassis routing-engine (M40 Router)

`user@host>` **show chassis routing-engine**

```
Routing Engine status:
    Temperature                 25 degrees C / 77 degrees F
    DRAM                       768 MB
    Memory utilization          21 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
    Model                          RE-2.0
    Serial ID                      31000007349bf701
    Start time                     2003-12-04 09:42:17 PST
    Uptime                         26 days, 1 hour, 12 minutes, 27 seconds
    Last reboot reason             Router rebooted after a normal shutdown
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.01       0.00
```

show chassis routing-engine (M120 Router)

`user@host>` **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 46 degrees C / 114 degrees F
    CPU temperature             44 degrees C / 111 degrees F
    DRAM                      2048 MB
    Memory utilization          18 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     5 percent
      Interrupt                  0 percent
```

```
      Idle                       95 percent
    Model                           RE-A-1000
    Serial ID                       1000621154
    Start time                      2006-10-31 17:10:05 PST
    Uptime                          14 minutes, 31 seconds
    Last reboot reason              Router rebooted after a normal shutdown
    Load averages:                  1 minute   5 minute  15 minute
                                        0.02       0.07       0.07
Routing Engine status:
  Slot 1:
    Current state                   Backup
    Election priority               Backup (default)
    Temperature                  45 degrees C / 113 degrees F
    CPU temperature              42 degrees C / 107 degrees F
    DRAM                       2048 MB
    Memory utilization           15 percent
    CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      0 percent
      Interrupt                   0 percent
      Idle                      100 percent
    Model                           RE-A-1000
    Serial ID                       1000621151
    Start time                      2006-10-31 17:10:04 PST
    Uptime                          14 minutes, 30 seconds
    Last reboot reason              Router rebooted after a normal shutdown
```

show chassis routing-engine (M160 Router)

user@host> **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                   Master
    Election priority               Master (default)
    Temperature                  43 degrees C / 109 degrees F
    DRAM                       2048 MB
    Memory utilization           11 percent
    CPU utilization:
      User                        1 percent
      Background                  0 percent
      Kernel                      2 percent
      Interrupt                   0 percent
      Idle                       97 percent
    Model                           RE-3.0
    Serial ID                       210865700403
    Start time                      2003-12-23 12:25:55 PST
    Uptime                         6 days, 22 hours, 33 minutes, 24 seconds
    Last reboot reason              Router rebooted after a normal shutdown
    Load averages:                  1 minute   5 minute  15 minute
                                        0.24       0.13       0.04
Routing Engine status:
  Slot 1:
    Current state                   Backup
    Election priority               Backup (default)
    Temperature                  40 degrees C / 104 degrees F
    DRAM                       2048 MB
    Memory utilization            9 percent
    CPU utilization:
```

```
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
    Model                          RE-3.0
    Serial ID                      210865700332
    Start time                     2003-12-23 12:25:55 PST
    Uptime                        6 days, 22 hours, 33 minutes, 21 seconds
    Last reboot reason             Router rebooted after a normal shutdown
```

show chassis routing-engine (MX104 Router)

```
user@host> show chassis routing-engine
```

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 32 degrees C / 89 degrees F
    CPU temperature             42 degrees C / 107 degrees F
    DRAM                      3840 MB (3840 MB installed)
    Memory utilization          18 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     3 percent
      Interrupt                  2 percent
      Idle                      94 percent
    Model                          RE-MX-104
    Serial ID                      CAAR5925
    Start time                     2013-06-05 13:17:08 IST
    Uptime                         1 hour, 15 minutes, 8 seconds
    Last reboot reason             0x200:normal shutdown
    Load averages:                 1 minute   5 minute  15 minute
                                       0.87       0.90       0.41
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 32 degrees C / 89 degrees F
    CPU temperature             38 degrees C / 100 degrees F
    DRAM                      3840 MB (3840 MB installed)
    Memory utilization          13 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  2 percent
      Idle                      97 percent
    Model                          RE-MX-104
    Serial ID                      CAAM6369
    Start time                     2013-06-05 13:07:37 IST
    Uptime                         1 hour, 24 minutes, 34 seconds
    Last reboot reason             0x200:normal shutdown
    Load averages:                 1 minute   5 minute  15 minute
                                       0.19       0.15       0.06
```


show chassis routing-engine (MX240 Router)

user@host> **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 36 degrees C / 96 degrees F
    CPU temperature             35 degrees C / 95 degrees F
    DRAM                      3314 MB (8192 MB installed)
    Memory utilization          37 percent
    5 sec CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      99 percent
    1 min CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      99 percent
    5 min CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      99 percent
    15 min CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      99 percent
    Model                          RE-S-1800x4
    Serial ID                      9009074155
    Start time                     2014-10-13 00:35:41 PDT
    Uptime                         98 days, 2 hours, 6 minutes, 35 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
    Load averages:                 1 minute   5 minute  15 minute
                                       0.12       0.12       0.13
Routing Engine status:
  Slot 1:
    Current state                  Present
```

show chassis routing-engine (MX480 Router)

user@host> **show chassis routing-engine**

```

Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 33 degrees C / 91 degrees F
    CPU temperature             32 degrees C / 89 degrees F
    DRAM                     16323 MB (16384 MB installed)
    Memory utilization           7 percent
```

```
    5 sec CPU utilization:
      User                        1 percent
      Background                  0 percent
      Kernel                      1 percent
      Interrupt                   0 percent
      Idle                       98 percent
    1 min CPU utilization:
      User                        2 percent
      Background                  0 percent
      Kernel                      1 percent
      Interrupt                   0 percent
      Idle                       97 percent
    5 min CPU utilization:
      User                        1 percent
      Background                  0 percent
      Kernel                      1 percent
      Interrupt                   0 percent
      Idle                       97 percent
    15 min CPU utilization:
      User                        1 percent
      Background                  0 percent
      Kernel                      1 percent
      Interrupt                   0 percent
      Idle                       97 percent
    Model                          RE-S-1800x4
    Serial ID                      9009122628
    Start time                     2019-05-29 21:58:46 PDT
    Uptime                         11 days, 5 hours, 8 minutes, 55 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
    Load averages:                 1 minute   5 minute  15 minute
                                       0.28       0.22       0.22
```

show chassis routing-engine (MX960 Router)

`user@host>` **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 34 degrees C / 93 degrees F
    CPU temperature             33 degrees C / 91 degrees F
    DRAM                      16325 MB (16384 MB installed)
    Memory utilization           7 percent
    5 sec CPU utilization:
      User                        1 percent
      Background                  0 percent
      Kernel                      3 percent
      Interrupt                   1 percent
      Idle                       95 percent
    1 min CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      3 percent
      Interrupt                   0 percent
      Idle                       97 percent
    5 min CPU utilization:
      User                        0 percent
      Background                  0 percent
```

```
      Kernel                      3 percent
      Interrupt                   0 percent
      Idle                       97 percent
    15 min CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      2 percent
      Interrupt                   0 percent
      Idle                       97 percent
    Model                           RE-S-1800x4
    Serial ID                       9013043129
    Start time                      2019-04-29 13:07:15 CEST
    Uptime                          15 days, 22 hours, 42 minutes, 57 seconds
    Last reboot reason              Router rebooted after a normal shutdown.
    Load averages:                  1 minute   5 minute  15 minute
                                        0.17       0.20       0.22
Routing Engine status:
  Slot 1:
    Current state                   Backup
    Election priority               Backup (default)
    Temperature                  33 degrees C / 91 degrees F
    CPU temperature              32 degrees C / 89 degrees F
    DRAM                      16330 MB (16384 MB installed)
    Memory utilization            9 percent
    5 sec CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      0 percent
      Interrupt                   0 percent
      Idle                      100 percent
    Model                           RE-S-1800x4
    Serial ID                       9013043081
    Start time                      2019-04-29 13:05:17 CEST
    Uptime                          15 days, 22 hours, 44 minutes, 52 seconds
    Last reboot reason              0x1:power cycle/failure
    Load averages:                  1 minute   5 minute  15 minute
                                        0.17       0.17       0.12
```

show chassis routing-engine (MX2010 Router)

user@host> **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                   Master
    Election priority               Master (default)
    Temperature                  41 degrees C / 105 degrees F
    CPU temperature              38 degrees C / 100 degrees F
    DRAM                       3313 MB (16384 MB installed)
    Memory utilization           37 percent
    5 sec CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      2 percent
      Interrupt                   2 percent
      Idle                       96 percent
    1 min CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      2 percent
```



```
      Interrupt                   2 percent
      Idle                       97 percent
    5 min CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      2 percent
      Interrupt                   2 percent
      Idle                       97 percent
    15 min CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      2 percent
      Interrupt                   2 percent
      Idle                       97 percent
    Model                          RE-S-1800x4
    Serial ID                      9009146890
    Start time                     2015-01-18 21:35:12 PST
    Uptime                         4 hours, 21 minutes, 34 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
    Load averages:                 1 minute   5 minute  15 minute
                                       0.11       0.14       0.14
```

show chassis routing-engine (MX2020 Router)

user@host> **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 2 degrees C / 35 degrees F
    CPU temperature            32 degrees C / 89 degrees F
    DRAM                      32735 MB (32768 MB installed)
    Memory utilization         10 percent
    5 sec CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      1 percent
      Interrupt                   1 percent
      Idle                       98 percent
    1 min CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      1 percent
      Interrupt                   1 percent
      Idle                       99 percent
    5 min CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      1 percent
      Interrupt                   1 percent
      Idle                       99 percent
    15 min CPU utilization:
      User                        0 percent
      Background                  0 percent
      Kernel                      1 percent
      Interrupt                   1 percent
      Idle                       99 percent
    Model                          RE-S-2X00x8
    Serial ID                      CADN0309
```

```
    Start time                    2015-01-08 16:31:15 PST
    Uptime                        4 days, 22 hours, 59 minutes, 3 seconds
    Last reboot reason            Router rebooted after a normal shutdown.
    Load averages:                1 minute   5 minute  15 minute
                                      0.39       0.41       0.34
```

show chassis routing-engine (MX10003 Router)

```
user@host> show chassis routing-engine
```

```

Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 43 degrees C / 109 degrees F
    CPU temperature             40 degrees C / 104 degrees F
    DRAM                      49112 MB (49152 MB installed)
    Memory utilization           4 percent
    5 sec CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     2 percent
      Interrupt                  0 percent
      Idle                      98 percent
    1 min CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      98 percent
    5 min CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      98 percent
    15 min CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      96 percent
    Model                          RE-S-2X00x6
    Start time                     2017-08-08 23:13:16 PDT
    Uptime                         53 minutes, 38 seconds
    Last reboot reason             0x1:power cycle/failure
    Load averages:                 1 minute   5 minute  15 minute
                                       0.23       0.28       0.25
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 38 degrees C / 100 degrees F
    CPU temperature             39 degrees C / 102 degrees F
    DRAM                      49112 MB (49152 MB installed)
    Memory utilization           4 percent
    5 sec CPU utilization:
      User                       0 percent
      Background                 0 percent
```



```
      Kernel                      1 percent
      Interrupt                   0 percent
      Idle                       99 percent
    Model                          RE-S-2X00x6
    Start time                     2017-08-08 23:13:18 PDT
    Uptime                         53 minutes, 25 seconds
    Last reboot reason             0x1:power cycle/failure
    Load averages:                 1 minute   5 minute  15 minute
                                       0.21       0.19       0.17
```

show chassis routing-engine (MX204 Router)

```
user@host> show chassis routing-engine
```

```
Routing Engine status:
    Temperature                 52 degrees C / 125 degrees F
    CPU temperature             52 degrees C / 125 degrees F
    DRAM                      16341 MB (16384 MB installed)
    Memory utilization          11 percent
    5 sec CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
    1 min CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
    5 min CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
    15 min CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
    Model                          RE-S-2X00x6
    Start time                     2017-11-04 00:30:31 PDT
    Uptime                         4 days, 7 hours, 17 minutes, 3 seconds
    Last reboot reason             0x1:power cycle/failure
    Load averages:                 1 minute   5 minute  15 minute
                                       0.17       0.12       0.13
```

show chassis routing-engine (T320 Router)

user@host> **show chassis routing-engine**

```
Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 51 degrees C / 123 degrees F
```

```
    CPU temperature             55 degrees C / 131 degrees F
    DRAM                      3584 MB
    Memory utilization          11 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     2 percent
      Interrupt                  0 percent
      Idle                      97 percent
    Model                          RE-A-2000
    Serial ID                      9009010618
    Start time                     2012-10-10 01:24:05 PDT
    Uptime                         5 days, 10 hours, 49 minutes, 23 seconds
    Last reboot reason             0x1:power cycle/failure
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.05       0.04
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 45 degrees C / 113 degrees F
    CPU temperature             48 degrees C / 118 degrees F
    DRAM                      3584 MB
    Memory utilization           9 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
    Model                          RE-A-2000
    Serial ID                      9009003642
    Start time                     2012-10-10 01:24:04 PDT
    Uptime                         5 days, 10 hours, 49 minutes, 28 seconds
    Last reboot reason             0x1:power cycle/failure
```

show chassis routing-engine (T640 Router)

`user@host>` **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 50 degrees C / 122 degrees F
    CPU temperature             58 degrees C / 136 degrees F
    DRAM                      3584 MB
    Memory utilization          14 percent
    CPU utilization:
      User                       1 percent
      Background                 0 percent
      Kernel                     4 percent
      Interrupt                  1 percent
      Idle                      95 percent
    Model                          RE-A-2000
    Serial ID                      1000686556
    Start time                     2012-10-10 01:24:02 PDT
    Uptime                         5 days, 10 hours, 50 minutes, 27 seconds
    Last reboot reason             0x1:power cycle/failure
    Load averages:                 1 minute   5 minute  15 minute
```



```
                                       1.24       0.33       0.12
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 44 degrees C / 111 degrees F
    CPU temperature             49 degrees C / 120 degrees F
    DRAM                      3584 MB
    Memory utilization          12 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  1 percent
      Idle                      99 percent
    Model                          RE-A-2000
    Serial ID                      1000702739
    Start time                     2012-10-10 01:24:02 PDT
    Uptime                         5 days, 10 hours, 50 minutes, 26 seconds
    Last reboot reason             0x1:power cycle/failure
```

show chassis routing-engine (T1600 Router)

user@host> **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 48 degrees C / 118 degrees F
    CPU temperature             58 degrees C / 136 degrees F
    DRAM                      3584 MB
    Memory utilization          13 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     3 percent
      Interrupt                  1 percent
      Idle                      96 percent
    Model                          RE-A-2000
    Serial ID                      1000704521
    Start time                     2012-10-10 01:23:41 PDT
    Uptime                         5 days, 10 hours, 46 minutes, 56 seconds
    Last reboot reason             0x1:power cycle/failure
    Load averages:                 1 minute   5 minute  15 minute
                                       0.05       0.03       0.01
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 44 degrees C / 111 degrees F
    CPU temperature             48 degrees C / 118 degrees F
    DRAM                      3584 MB
    Memory utilization          12 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
```

```
    Model                          RE-A-2000
    Serial ID                      9009006579
    Start time                     2012-10-10 01:23:42 PDT
    Uptime                         5 days, 10 hours, 46 minutes, 54 seconds
    Last reboot reason             0x1:power cycle/failure
```

show chassis routing-engine (T4000 Router)

user@host> **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 33 degrees C / 91 degrees F
    CPU temperature             50 degrees C / 122 degrees F
    DRAM                      8960 MB
    Memory utilization          18 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     4 percent
      Interrupt                  1 percent
      Idle                      95 percent
    Model                          RE-DUO-1800
    Serial ID                      P737F-002248
    Start time                     2012-02-09 22:49:53 PST
    Uptime                         2 hours, 21 minutes, 35 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.04       0.00
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 32 degrees C / 89 degrees F
    CPU temperature             46 degrees C / 114 degrees F
    DRAM                      8960 MB
    Memory utilization          24 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                      99 percent
    Model                          RE-DUO-1800
    Serial ID                      P737F-002653
    Start time                     2012-02-08 20:12:51 PST
    Uptime                         1 day, 4 hours, 58 minutes, 28 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
```

show chassis routing-engine (TX Matrix Router)

user@host> **show chassis routing-engine**

```
scc-re0:
--------------------------------------------------------------------------
Routing Engine status:
  Slot 0:
```



```
    Current state                  Master
    Election priority              Master (default)
    Temperature                 34 degrees C / 93 degrees F
    CPU temperature             33 degrees C / 91 degrees F
    DRAM                      2048 MB
    Memory utilization          12 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     2 percent
      Interrupt                  0 percent
      Idle                      98 percent
    Model                          RE-4.0
    Serial ID                      P11123900153
    Start time                     2004-08-05 18:42:05 PDT
    Uptime                        9 days, 22 hours, 49 minutes, 50 seconds
    Last reboot reason             Router rebooted after a normal shutdown
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.08       0.07

lcc0-re0:
--------------------------------------------------------------------------
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 33 degrees C / 91 degrees F
    CPU temperature             30 degrees C / 86 degrees F
    DRAM                      2048 MB
    Memory utilization          12 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      98 percent
    Model                          RE-3.0
    Serial ID                      210865700363
    Start time                     2004-08-05 18:42:05 PDT
    Uptime                        9 days, 22 hours, 48 minutes, 20 seconds
    Last reboot reason             Router rebooted after a normal shutdown
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.02       0.00

lcc2-re0:
--------------------------------------------------------------------------
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 34 degrees C / 93 degrees F
    CPU temperature             35 degrees C / 95 degrees F
    DRAM                      2048 MB
    Memory utilization          12 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     2 percent
      Interrupt                  0 percent
      Idle                      98 percent
```

```
    Model                          RE-4.0
    Serial ID                      P11123900126
    Start time                     2004-08-05 18:42:05 PDT
    Uptime                        9 days, 22 hours, 49 minutes, 4 seconds
    Last reboot reason             Router rebooted after a normal shutdown
    Load averages:                 1 minute   5 minute  15 minute
                                       0.01       0.01       0.0
```

show chassis routing-engine lcc (TX Matrix Router)

user@host> **show chassis routing-engine 0 lcc 0**

```
lcc0-re0:
--------------------------------------------------------------------------------
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 33 degrees C / 91 degrees F
    CPU temperature             30 degrees C / 86 degrees F
    DRAM                      2048 MB
    Memory utilization          12 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      98 percent
    Model                          RE-3.0
    Serial ID                      210865700363
    Start time                     2004-08-05 18:42:05 PDT
    Uptime                        7 days, 22 hours, 49 minutes, 6 seconds
    Last reboot reason             Router rebooted after a normal shutdown
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.00       0.00
```

show chassis routing-engine bios (TX Matrix Router)

user@host> **show chassis routing-engine bios**

```
scc-re0:
--------------------------------------------------------------------------
Routing Engine BIOS Version: V1.0.0
lcc0-re0:
--------------------------------------------------------------------------
Routing Engine BIOS Version: V1.0.17
lcc2-re0:
--------------------------------------------------------------------------
Routing Engine BIOS Version: V1.0.0
```

show chassis routing-engine (TX Matrix Plus Router)

user@host> **show chassis routing-engine**

```
sfc0-re0:
--------------------------------------------------------------------------
Routing Engine status:
  Slot 0:
    Current state                  Master
```



```
    Election priority             Master (default)
    Temperature                27 degrees C / 80 degrees F
    CPU temperature            42 degrees C / 107 degrees F
    DRAM                     3327 MB
    Memory utilization         12 percent
    CPU utilization:
      User                      0 percent
      Background                0 percent
      Kernel                    2 percent
      Interrupt                 0 percent
      Idle                     98 percent
    Model                         RE-TXP-SFC
    Serial ID                     737A-1024
    Start time                    2009-05-11 17:39:49 PDT
    Uptime                        3 hours, 45 minutes, 25 seconds
    Last reboot reason            Router rebooted after a normal shutdown.
    Load averages:                1 minute   5 minute  15 minute
                                      0.00       0.00       0.00
Routing Engine status:
  Slot 1:
    Current state                 Backup
    Election priority             Backup (default)
    Temperature                29 degrees C / 84 degrees F
    CPU temperature            43 degrees C / 109 degrees F
    DRAM                     3327 MB
    Memory utilization         11 percent
    CPU utilization:
      User                      0 percent
      Background                0 percent
      Kernel                    0 percent
      Interrupt                 0 percent
      Idle                    100 percent
    Model                         RE-TXP-SFC
    Serial ID                     737A-1024
    Start time                    2009-05-11 17:08:54 PDT
    Uptime                        4 hours, 16 minutes, 52 seconds
    Last reboot reason            0x1:power cycle/failure

lcc0-re0:
--------------------------------------------------------------------------
Routing Engine status:
  Slot 0:
    Current state                 Master
    Election priority             Master (default)
    Temperature                30 degrees C / 86 degrees F
    CPU temperature            43 degrees C / 109 degrees F
    DRAM                     3327 MB
    Memory utilization          9 percent
    CPU utilization:
      User                      0 percent
      Background                0 percent
      Kernel                    2 percent
      Interrupt                 0 percent
      Idle                     98 percent
    Model                         RE-TXP-LCC
    Serial ID                     737F-1024
    Start time                    2009-05-11 17:40:32 PDT
    Uptime                        3 hours, 44 minutes, 51 seconds
    Last reboot reason            Router rebooted after a normal shutdown.
    Load averages:                1 minute   5 minute  15 minute
```

```
                                       0.00       0.00       0.00
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 30 degrees C / 86 degrees F
    CPU temperature             43 degrees C / 109 degrees F
    DRAM                      3327 MB
    Memory utilization           9 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                     100 percent
    Model                          RE-TXP-LCC
    Serial ID                      737F-1024
    Start time                     2009-05-06 17:31:32 PDT
    Uptime                         5 days, 3 hours, 54 minutes, 19 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
```

show chassis routing-engine lcc (TX Matrix Plus Router)

user@host> **show chassis routing-engine 0 lcc 0**

```
lcc0-re0:
--------------------------------------------------------------------------
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 30 degrees C / 86 degrees F
    CPU temperature             43 degrees C / 109 degrees F
    DRAM                      3327 MB
    Memory utilization           9 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     2 percent
      Interrupt                  0 percent
      Idle                      98 percent
    Model                          RE-TXP-LCC
    Serial ID                      737F-1024
    Start time                     2009-05-11 17:40:32 PDT
    Uptime                         3 hours, 45 minutes, 26 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.00       0.00
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 30 degrees C / 86 degrees F
    CPU temperature             43 degrees C / 109 degrees F
    DRAM                      3327 MB
    Memory utilization           9 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
```



```
      Interrupt                  0 percent
      Idle                     100 percent
    Model                          RE-TXP-LCC
    Serial ID                      737F-1024
    Start time                     2009-05-06 17:31:32 PDT
    Uptime                         5 days, 3 hours, 54 minutes, 59 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
```

show chassis routing-engine bios (TX Matrix Plus Router)

`user@host>` **show chassis routing-engine bios**

```
sfc0-re0:
--------------------------------------------------------------------------
    Routing Engine BIOS Version: V0.0.Z

lcc0-re0:
--------------------------------------------------------------------------
    Routing Engine BIOS Version: V0.0.N
```

show chassis routing-engine (QFX Series)

`user@switch>` **show chassis routing-engine**

```
Routing Engine status:
Slot 0:
Current state Master
Election priority Master (default)
DRAM 2820 MB
Memory utilization 49 percent
CPU utilization:
User 1 percent
Background 0 percent
Kernel 1 percent
Interrupt 0 percent
Idle 97 percent
Model QFX3500-48S4Q
Serial ID S/N ED3709
Uptime 3 days, 4 hours, 29 minutes, 42 seconds
Last reboot reason 0x200:chassis control reset
Load averages: 1 minute 5 minute 15 minute
0.37 0.26 0.19
```

show chassis routing-engine (OCX Series)

`user@switch>` **show chassis routing-engine**

```
Routing Engine status:
Slot 0:
Current state Master
Election priority Master (default)
DRAM 2820 MB
Memory utilization 49 percent
CPU utilization:
User 1 percent
Background 0 percent
Kernel 1 percent
Interrupt 0 percent
Idle 97 percent
```



```
Model OCX-1100-48SX-AFI
Serial ID S/N ED3709
Uptime 3 days, 4 hours, 29 minutes, 42 seconds
Last reboot reason 0x200:chassis control reset
Load averages: 1 minute 5 minute 15 minute
0.37 0.26 0.19
```

show chassis routing engine interconnect-device (QFabric Systems)

user@switch> **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
    Temperature                 48 degrees C / 118 degrees F
    DRAM                      3312 MB
    Memory utilization          63 percent
    CPU utilization:
      User                      14 percent
      Background                 0 percent
      Kernel                     5 percent
      Interrupt                  0 percent
      Idle                      81 percent
    Model                          RE-QFXC08-CB4S
    Serial ID                      BUILTIN
    Start time                     2011-07-06 13:26:15 UTC
    Uptime                         11 hours, 24 minutes, 57 seconds
    Last reboot reason             0x4:reset-button reset
    Load averages:                 1 minute   5 minute  15 minute
                                       2.62       2.31       2.28
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 39 degrees C / 102 degrees F
    DRAM                      3312 MB
    Memory utilization          59 percent
    CPU utilization:
      User                       9 percent
      Background                 0 percent
      Kernel                     1 percent
      Interrupt                  0 percent
      Idle                      91 percent
    Model                          RE-QFXC08-CB4S
    Serial ID                      BUILTIN
    Start time                     2011-07-06 13:24:58 UTC
    Uptime                         11 hours, 26 minutes, 18 seconds
    Last reboot reason             0x4:reset-button reset
```

show chassis routing-engine (PTX Series Packet Transport Router)

user@switch> **show chassis routing-engine**

```
Routing Engine status:
  Slot 0:
    Current state                  Master
    Election priority              Master (default)
```



```
    Temperature                 60 degrees C / 140 degrees F
    CPU temperature             76 degrees C / 168 degrees F
    DRAM                      17152 MB
    Memory utilization          11 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     4 percent
      Interrupt                  0 percent
      Idle                      95 percent
    Model                          RE-DUO-2600
    Serial ID                      P737A-002231
    Start time                     2011-12-21 16:54:37 PST
    Uptime                         25 minutes, 44 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
    Load averages:                 1 minute   5 minute  15 minute
                                       0.01       0.02       0.06
Routing Engine status:
  Slot 1:
    Current state                  Backup
    Election priority              Backup (default)
    Temperature                 50 degrees C / 122 degrees F
    CPU temperature             64 degrees C / 147 degrees F
    DRAM                      17152 MB
    Memory utilization          10 percent
    CPU utilization:
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  0 percent
      Idle                      99 percent
    Model                          RE-DUO-2600
    Serial ID                      P737A-002438
    Start time                     2011-12-21 16:52:26 PST
    Uptime                         27 minutes, 49 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
```

show chassis routing-engine (EX9200 Switch)

user@switch> **show chassis routing-engine**

```
Routing Engine status:
Slot 0:
  Current state                  Master
  Election priority              Master (default)
  Temperature                 35 degrees C / 95 degrees F
  CPU temperature             33 degrees C / 91 degrees F
  DRAM                      8157 MB
    Installed Memory        8192 MB
  Memory utilization          18 percent
CPU utilization:
  User                       1 percent
  Background                 0 percent
  Kernel                     4 percent
  Interrupt                  1 percent
  Idle                      94 percent
Model                          RE-S-EX9200-1800X4
Serial ID                      9009119555
Start time                     2014-03-12 14:58:05 UTC
Uptime                         1 hour, 41 minutes, 51 seconds
```

```
Last reboot reason              Router rebooted after a normal shutdown.
Load averages:                  1 minute   5 minute  15 minute
                                0.02       0.02       0.00
Routing Engine status:
Slot 1:
  Current state                   Backup
  Election priority               Backup (default)

[...Output truncasted...]
```

show chassis routing-engine (EX9251 Switch)

`user@switch>` **show chassis routing-engine**

```
Routing Engine status:
    Temperature                  50 degrees C / 122 degrees F
    CPU temperature              50 degrees C / 122 degrees F
    DRAM                       16340 MB (16384 MB installed)
    Memory utilization            6 percent
    5 sec CPU utilization:
      User                        2 percent
      Background                  0 percent
      Kernel                     19 percent
      Interrupt                   0 percent
      Idle                       79 percent
    1 min CPU utilization:
      User                        2 percent
      Background                  0 percent
      Kernel                     19 percent
      Interrupt                   0 percent
      Idle                       79 percent
    5 min CPU utilization:
      User                        2 percent
      Background                  0 percent
      Kernel                     19 percent
      Interrupt                   0 percent
      Idle                       79 percent
    15 min CPU utilization:
      User                        2 percent
      Background                  0 percent
      Kernel                     19 percent
      Interrupt                   0 percent
      Idle                       79 percent
    Model                           RE-S-2X00x6
    Start time                      2018-03-08 05:11:33 PST
    Uptime                          10 days, 18 hours, 59 minutes, 15 seconds
    Last reboot reason              0x4000:VJUNOS reboot
    Load averages:                  1 minute   5 minute  15 minute
                                        1.06       1.09       1.08
```

show chassis routing-engine (ACX2000 Universal Metro Router)

`user@host>` **show chassis routing-engine**

```
Routing Engine status:
    Temperature                  53 degrees C / 127 degrees F
    DRAM                       1536 MB
    Memory utilization           25 percent
    CPU utilization:
```

```
      User                       0 percent
      Background                 0 percent
      Kernel                     0 percent
      Interrupt                  1 percent
      Idle                      99 percent
    Model                          RE-ACX-2000
    Start time                     2012-05-09 00:57:07 PDT
    Uptime                         5 days, 3 hours, 16 minutes, 15 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.03       0.05
```

show chassis routing-engine (ACX1000 Universal Metro Router)

user@host> **show chassis routing-engine**

```
Routing Engine status:
    Temperature                 36 degrees C / 96 degrees F
    DRAM                       768 MB
    Memory utilization          50 percent
    CPU utilization:
      User                       3 percent
      Background                 0 percent
      Kernel                     6 percent
      Interrupt                  0 percent
      Idle                      91 percent
    Model                          RE-ACX-1000
    Start time                     2012-05-10 07:12:23 PDT
    Uptime                         4 days, 10 hours, 46 minutes, 53 seconds
    Last reboot reason             Router rebooted after a normal shutdown.
    Load averages:                 1 minute   5 minute  15 minute
                                       0.00       0.00       0.00
```

show chassis routing-engine (Displaying the guest reboot reason on PTX5000,MX240, MX480, MX960< MX2010, and MX2020)

user@host> **show chassis routing-engine re0 | match "Last reboot reason"**

```
Last reboot reason 0x4000:VJUNOS reboot
```

show chassis satellite

Syntax

```
show chassis satellite
[device-alias device-alias | fpc-slot fpc-slot | cluster cluster-name]
[brief | detail | extensive | terse]
<since time>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display the status of the satellite device connections in a Junos Fusion.

Options

none—(Same as **brief**) Display satellite device connection information

device-alias ***device-alias***—(Optional) Display satellite device connection information for the satellite device using the specified device alias only.

fpc-slot ***fpc-slot***—(Optional) Display satellite device connection information for the satellite device using the specified FPC slot number only.

cluster ***cluster-name***—(Optional) Display satellite device connection information for the satellite devices in the specified satellite device cluster only.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

since ***time***—(Optional) Display the satellite devices that have been added to the Junos Fusion on or after a certain date or time, in *YYYY-MM-DD.HH:MM:SS* format.

To display all satellite devices added since a specified date, enter the specific date. For instance, to display all satellite devices added on or after December 22nd, 2015, enter **2015-12-22** as the *time*.

To display all satellite devices added since a specified time, enter the specific date and time. For instance, to display all satellite devices added on or after 11:01AM on December 22nd, 2015, enter **2015-12-22.11:01:00** as the *time*.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

show chassis satellite on page 480
show chassis satellite device-alias on page 481
show chassis satellite fpc-slot 130 on page 481
show chassis satellite terse on page 481

show chassis satellite detail on page 482

Output Fields Table 26 on page 475 lists the output fields for the **show chassis satellite** command. Output fields are listed in the approximate order in which they appear.

Table 26: show chassis satellite Output Fields

Field Name	Field Description	Level of Output
Fields for Interface		
Alias	The satellite device's alias. The satellite device's alias is configured using the **set chassis satellite-management fpc** ***slot-id*** alias ***alias*** statement.	brief extensive none
Slot	The slot number of the satellite device. The slot number can be configured using the **set chassis satellite-management fpc** ***slot-id*** statement..	brief terse extensive none

Table 26: show chassis satellite Output Fields (continued)

Field Name	Field Description	Level of Output
Device State	The state of the satellite device within the Junos Fusion. The most common device states: • **Online**—the satellite device is online and active. This is the satellite device state during normal operating procedure. • **Offline**—the satellite device is offline and not detected. This state is typically seen when the satellite device has been disconnected from the aggregation device, or when all cascade or uplink ports connecting the satellite device to the aggregation device are down. • **Present**—the satellite device is recognized by the aggregation device, but is not online. This state is typically seen before a satellite device goes online, or while satellite device configuration is in progress or finalizing. • **Rebooting**—the satellite device is rebooting. • **Disable**—the satellite device has been disabled. • **Misconfig**—the satellite device is not properly configured. This state is typically seen when the system ID, cascade port, or FPC slot ID defined for the satellite device has a misconfiguration. • **Miswire**—the satellite device is miswired. This state is typically seen when a satellite device is wired to two aggregation devices but is not configured for multihoming. Use **show chassis satellite detail** to gather more information on the issue when the device state is **Miswire**. Other less common device states include: • **ModeChanging**—the device is converting from a standalone device to a satellite device, or from a satellite device to a standalone device. • **ModeChangeFail**—the mode change operation failed. • **MinorUpgradeOn**—A minor satellite software upgrade is in progress. • **MajorUpgradeOn**—A major satellite software upgrade is in progress. • **Upgrade-pending**—the satellite device is waiting for a satellite software upgrade. • **ProvSessionDn**—the provisioning session is down. • **ReconcileState**—the satellite provisioning daemon has restarted and is reconciling the satellite device state.	brief terse extensive none
Cascade Ports	The cascade port or ports. A cascade port is a port on the aggregation device that connects to a satellite device in a Junos Fusion.	brief extensive none

Table 26: show chassis satellite Output Fields (continued)

Field Name	Field Description	Level of Output
Port State	The state of the cascade port on the aggregation device. Port states include: • **online**—the cascade port is online and active. This is the port state during normal operating procedure. • **txUpRxDn**—Tx or Rx forwarding is disabled on the cascade port. This state is often seen when a second aggregation device is added to a Junos Fusion topology, and the devices in the Junos Fusion are synchronizing to the new topology. • **miswire**—the cascade port is miswired. This state is typically seen when a satellite device is interconnected to two aggregation devices but multihoming is not configured. Use **show chassis satellite detail** to gather more information on the issue when the device state is **Miswire**. • **present**—The cascade port recognized the satellite device and is up. • **misconfig**—the cascade port is assigned, but this interface is not working correctly due to a misconfiguration. • **down**—the cascade port is down. • **offline**—the satellite device was previously recognized from this interface, but is no longer present. • **absent**—the cascade port is configured but no satellite device is detected on the interface.	brief extensive none
Extended Ports Total	The total number of extended ports on the satellite device. An extended port is a network-facing port on the satellite device that sends and receives network traffic for the Junos Fusion.	brief none terse
Extended Ports Up	The number of active extended ports.	brief none terse
Model	The hardware model of the satellite device.	terse
Version	The version of satellite device software running on the satellite device.	terse
Satellite Alias	The satellite device's alias. The satellite device's alias is configured using the **set chassis satellite-management fpc *slot-id*** alias ***alias*** statement.	detail
FPC slot	The FPC slot number of the satellite device. The slot number can be configured using the **set chassis satellite-management fpc *slot-id*** statement.	detail

Table 26: show chassis satellite Output Fields (continued)

Field Name	Field Description	Level of Output
Operational State	The operational state of the satellite device. The state UFDDown indicates that uplink failure detection disabled the satellite device's extended ports due to an uplink port failure.	detail
Product Model	The hardware model of the satellite device.	detail
Product Family	The product family of the satellite device.	detail
Serial number	The serial number of the satellite device.	detail
System ID	The system ID of the satellite device. The system ID is also the satellite device's MAC address.	detail
Software package version	The satellite software version running on the satellite device.	detail
Host software version	The host operating system software version running on the satellite device.	detail
Management Address	The management IP address of the satellite device. This management IP address belongs to an internal routing instance. This management address is assigned by the control plane internally based on FPC slot ID and is used for the control plane traffic between the aggregation device and satellite device. All management in a Junos Fusion should be done through the aggregation device. The management IP address of the satellite device is useful for debugging purposes by expert users only.	detail
UFD config state	Uplink failure detection configuration state.	detail
Minimum link	Uplink failure detection minimum active uplink port setting.	detail
Holdddown timer (seconds)	Uplink failure detection holddown timer setting, in seconds.	detail
UFD operational state	Uplink failure detection operational state.	detail

Table 26: show chassis satellite Output Fields (continued)

Field Name	Field Description	Level of Output
Candidate uplink interfaces (pic/port)	Uplink failure detection candidate uplink interfaces.	detail
Extended Ports	The number of extended ports for the satellite device. The number on the left is the total number of extended ports, and the number on the right is the total number of extended ports currently in the up state.	extensive
When	The date and time of the event.	extensive
Event	The event.	extensive
Action	The actions that resulted from the event.	extensive
Fields for Cascade interfaces		
Interface Name	The name of the cascade interface on the aggregation device.	detail
State	The state of the cascade interface.	detail
Uplink Interface	The name of the uplink interface on the satellite device.	detail
Adjacency state	The adjacency state of the cascade to uplink interface link.	detail
Last transition	The amount of time that has passed since the last transition of the cascade to uplink interface link.	detail
Adjacency down count (Interface Name)	The number of times the cascade to uplink interface link has gone into the down state.	detail
RX Packet	The number of packets received on the cascade interface.	detail
Last received packet	The amount of time that has passed since the last packet was received on the cascade interface.	detail
Peer adjacency information	The amount of time that has passed since the last peer adjacency transition.	detail
Adjacency down count (Peer adjacency information)	The number of times the cascade to uplink interface link has gone into the down state.	detail

Table 26: show chassis satellite Output Fields (continued)

Field Name	Field Description	Level of Output
Last down cause	The cause of the last adjacency failure.	detail
SDPD restart detected	The number of times that the satellite device protocol process has restarted.	detail
Fields for Process information		
Process Name	The name of the process.	detail
PID	The process identification number of the process.	detail
State	The current state of the process.	detail
Number of restart detected	The number of times the process has restarted.	detail
Uptime	The amount of time that the process has been running.	detail

Sample Output

show chassis satellite

```
user@aggregation-device> show chassis satellite
                            Device            Cascade     Port      Extended Ports
Alias              Slot     State             Ports       State     Total/Up
qfx5100-24q-01     100      Online            xe-0/0/1    online    9/2
                                              xe-0/3/0    online
qfx5100-24q-02     101      Online            xe-0/0/2    online    20/12
                                              xe-0/3/1    online
qfx5100-24q-03     102      Online            xe-0/0/3    online    16/6
                                              xe-0/3/2    online
qfx5100-24q-04     103      Online            xe-0/0/4    online    16/4
                                              xe-0/3/3    online
qfx5100-24q-05     104      Online            xe-0/0/5    online    13/3
                                              xe-0/3/4    online
qfx5100-24q-06     105      Online            xe-0/0/6    online    24/15
                                              xe-0/3/5    online
qfx5100-24q-07     106      Online            xe-0/0/7    online    24/15
                                              xe-0/3/6    online
qfx5100-24q-08     107      Online            xe-0/0/8    online    21/12
                                              xe-0/3/7    online
ex4300-01          109      Online            xe-1/0/1    online    49/2
ex4300-02          110      Online            xe-1/0/2    online    49/2
ex4300-03          111      Online            xe-1/0/3    online    49/2
ex4300-04          112      Online            xe-1/0/4    online    49/11
ex4300-05          113      Online            xe-1/0/5    online    49/11
ex4300-06          114      Online            xe-1/0/6    online    49/11
ex4300-07          115      Online            xe-1/0/7    online    49/11
ex4300-08          116      Online            xe-1/1/0    online    49/11
ex4300-09          117      Online            xe-1/1/1    online    49/11
```



```
ex4300-10         118    Online         xe-1/1/2      online       49/11
ex4300-11         119    Online         xe-1/1/3      online       49/11
ex4300-12         120    Online         xe-1/1/4      online       49/11
ex4300-13         121    Online         xe-1/1/5      online       49/11
ex4300-14         122    Online         xe-1/1/6      online       49/11
ex4300-15         123    Online         xe-1/1/7      online       49/11
ex4300-16         124    Online         xe-1/2/1      online       49/11
ex4300-17         125    Online         xe-1/2/2      online       49/11
ex4300-18         126    Online         xe-1/2/3      online       49/2
ex4300-19         127    Online         xe-1/2/4      online       49/1
ex4300-20         128    Online         xe-1/2/5      online       49/1
ex4300-21         129    Online         xe-1/2/6      online       49/1
ex4300-22         130    Online         xe-1/2/7      online       49/1
```

Sample Output

show chassis satellite device-alias

user@aggregation-device> **show chassis satellite device-alias ex4300-22**

```
                         Device         Cascade       Port         Extended Ports
Alias             Slot   State          Ports         State        Total/Up
    ex4300-22     130    Online         xe-0/2/7      online       49/1
```

Sample Output

show chassis satellite fpc-slot 130

user@aggregation-device> **show chassis satellite fpc-slot 130**

```
                         Device         Cascade       Port         Extended Ports
Alias             Slot   State          Ports         State        Total/Up
ex4300-22         101    Online         xe-0/0/2      online       20/12
                                        xe-0/3/1      online
```

Sample Output

show chassis satellite terse

user@aggregation-device> **show chassis satellite terse**

```
       Device                          Extended Ports
Slot   State            Model          Total/Up     Version
101    Online           QFX5100-48S-6Q 7/7          3.0R1.1
102    Online           QFX5100-48S-6Q 7/7          3.0R1.1
103    Online           QFX5100-48S-6Q 6/5          3.0R1.1
104    Online           QFX5100-48S-6Q 14/14        3.0R1.1
105    Online           QFX5100-48S-6Q 18/18        3.0R1.1
106    Online           QFX5100-48S-6Q 17/16        3.0R1.1
107    Online           EX4300-48T     52/6         3.0R1.1
108    Online           EX4300-48T     52/15        3.0R1.1
109    Online           EX4300-48T     51/14        3.0R1.1
110    Online           EX4300-48T     51/14        3.0R1.1
111    Online           EX4300-48T     51/13        3.0R1.1
112    Online           EX4300-48T     51/12        3.0R1.1
113    Online           EX4300-48T     51/13        3.0R1.1
114    Online           QFX5100-24Q-2P 17/13        3.0R1.1
```

show chassis satellite detail

user@aggregation-device> **show chassis satellite detail**

```
Satellite Alias: qfx5100-48s-02
FPC Slot: 101
Operational State: Online
Product Model: QFX5100-48S-6Q
Product Family: i386
Serial number: ABC123DEF456
System id: 00:11:22:aa:bb:cc
Software package version: 3.0R1.1
Host software version: 1.0.0
Management Address: 172.16.0.101/32
Cascade interfaces:
    Interface Name: xe-0/0/2 State: online
        Uplink Interface: xe-001/0/48:0
        Adjacency state: Two-Way
        Last transition: 00:10:22
        Adjacency down count: 0
        Rx Packet: 65 Last received packet: 00:00:02
        Peer adjacency information: 00:10:22
            Adjacency down count: 3
            Last down cause: Interface Down
            SDPD restart detected: 3
    Interface Name: xe-0/2/1 State: online
        Uplink Interface: xe-001/0/48:1
        Adjacency state: Two-Way
        Last transition: 00:10:22
        Adjacency down count: 0
        Rx Packet: 64 Last received packet: 00:00:02
        Peer adjacency information: 00:10:22
            Adjacency down count: 3
            Last down cause: Interface Down
            SDPD restart detected: 3
    Interface Name: xe-2/0/0 State: online
        Uplink Interface: xe-001/0/48:2
        Adjacency state: Two-Way
        Last transition: 00:10:22
        Adjacency down count: 0
        Rx Packet: 65 Last received packet: 00:00:02
        Peer adjacency information: 00:10:22
            Adjacency down count: 3
            Last down cause: Interface Down
            SDPD restart detected: 3
    Interface Name: xe-2/1/6 State: online
        Uplink Interface: xe-001/0/48:3
        Adjacency state: Two-Way
        Last transition: 00:10:22
        Adjacency down count: 0
        Rx Packet: 65 Last received packet: 00:00:02
        Peer adjacency information: 00:10:22
            Adjacency down count: 3
            Last down cause: Hold timer expire
            SDPD restart detected: 3
Process information:
    Process Name: Provisioning PID: 6716 State: Running
        Number of restart detected: 0
        Uptime: 00:10:22
    Process Name: PFE PID: 3194 State: Running
```



```
        Number of restart detected: 0
        Uptime: 00:10:22
UFD config state: Enable (persist), Minimum link: 1,
Holdddown timer (seconds): 6
UFD operational state: Enable
Candidate uplink interfaces (pic/port):
        1/0
        1/1
        1/2
        1/3
        2/0
        2/1
        2/2
        2/3

Satellite Alias: qfx5100-48s-03
FPC Slot: 102
Operational State: Online
Product Model: QFX5100-48S-6Q
Product Family: i386
Serial number: ABCDEFG12345
System id: 00:11:22:aa:ba:cc
Software package version: 3.0R1.1
Host software version: 1.0.0
Management Address: 172.16.0.102/32
Cascade interfaces:
    Interface Name: xe-0/0/3 State: online
        Uplink Interface: xe-002/0/48:0
        Adjacency state: Two-Way
        Last transition: 00:10:22
        Adjacency down count: 0
        Rx Packet: 65 Last received packet: 00:00:02
        Peer adjacency information: 00:10:22
            Adjacency down count: 3
            Last down cause: Interface Down
            SDPD restart detected: 3
    Interface Name: xe-0/2/2 State: online
        Uplink Interface: xe-002/0/48:1
        Adjacency state: Two-Way
        Last transition: 00:10:22
        Adjacency down count: 0
        Rx Packet: 65 Last received packet: 00:00:02
        Peer adjacency information: 00:10:22
            Adjacency down count: 3
            Last down cause: Interface Down
            SDPD restart detected: 3
    Interface Name: xe-2/0/1 State: online
        Uplink Interface: xe-002/0/48:2
        Adjacency state: Two-Way
        Last transition: 00:10:22
        Adjacency down count: 0
        Rx Packet: 65 Last received packet: 00:00:02
        Peer adjacency information: 00:10:22
            Adjacency down count: 3
            Last down cause: Interface Down
            SDPD restart detected: 3
    Interface Name: xe-2/1/7 State: online
        Uplink Interface: xe-002/0/48:3
        Adjacency state: Two-Way
        Last transition: 00:10:22
```



```
        Adjacency down count: 0
        Rx Packet: 65 Last received packet: 00:00:02
        Peer adjacency information: 00:10:22
            Adjacency down count: 3
            Last down cause: Interface Down
            SDPD restart detected: 3
Process information:
    Process Name: Provisioning PID: 6667 State: Running
        Number of restart detected: 0
        Uptime: 00:10:22
    Process Name: PFE PID: 3155 State: Running
        Number of restart detected: 0
        Uptime: 00:10:22
<additional output removed for brevity>
```


show chassis satellite extended-port

Syntax

```
show chassis satellite extended-port interface-name
<fpc-slot fpc-slot>
<interface-name interface-name>
[brief | detail | extensive | terse]
<since time>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display the status of the extended ports on the satellite devices in a Junos Fusion.

The extended ports are the network-facing ports on satellite devices that send and receive network traffic for a Junos Fusion.

Options

none—(Same as **brief** and **terse**) Display extended port status information.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

fpc *fpc-slot*—Display extended port status information for the specified FPC slot only. In a Junos Fusion, one FPC slot ID is assigned to each satellite device, so you can use this option to display extended port status information for all extended ports on one satellite device.

interface-name *interface-name*—Display extended port status information for the extended port interface only.

history—Display extended port history.

statistics—Display extended port statistics.

since *time*—(Optional) Display extended port status information for the satellite devices that have been added to the Junos Fusion on or after a certain date or time, which is entered in the *YYYY-MM-DD.HH:MM:SS* format.

To display extended port status information for all satellite devices added since a specified date, enter the specific date as the time as the *time*. For instance, **2015-12-22**.

To display extended port status information for all satellite devices added since a specified time, enter the specific date and time as the *time*. For instance, **2015-12-22.11:01:00**.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output show chassis satellite extended-port on page 487

Output Fields Table 27 on page 486 lists the output fields for the **show chassis satellite extended-port** command. Output fields are listed in the approximate order in which they appear.

Table 27: show chassis satellite extended-port Output Fields

Field Name	Field Description	Level of Output
Fields for Interface		
Name	The interface name of the extended port.	brief terse detail extensive none
State	The state of the extended port.	brief terse detail extensive none
Rx Request State	The receive request state of the extended port.	brief terse detail extensive none
Tx Request State	The transmit request state of the extended port.	brief terse detail extensive none
Admin State	The administrative state of the extended port.	brief terse detail extensive none
Op State	The operational state of the extended port.	brief terse detail extensive none
IFD Idx	The internal interface index.	brief terse detail extensive none

Table 27: show chassis satellite extended-port Output Fields (continued)

Field Name	Field Description	Level of Output
PCID	The port's E-channel identifier (ECID), abbreviated as PCID.	brief terse detail extensive none
When	The date and time of the event.	detail extensive
Event	The event.	detail extensive
Action	The actions that resulted from the event.	detail extensive

Sample Output

show chassis satellite extended-port

```
user@aggregation-device> show chassis satellite extended-port
Legend for interface types:
   * -- Uplink interface
                              Rx            Tx            Admin/Op IFD
Name           State          Request State Request State State    Idx    PCID
et-100/0/2     AddComplete    None          Ready         Up/Dn    838    110
et-104/0/2     AddComplete    None          Ready         Up/Dn    813    110
et-107/0/23    AddComplete    None          Ready         Up/Up    544    194
ge-109/0/0     AddComplete    None          Ready         Up/Up    402    115
ge-109/0/1     AddComplete    None          Ready         Up/Dn    403    114
ge-109/0/10    AddComplete    None          Ready         Up/Dn    412    113
ge-109/0/11    AddComplete    None          Ready         Up/Dn    413    112
ge-109/0/12    AddComplete    None          Ready         Up/Dn    414    123
ge-109/0/13    AddComplete    None          Ready         Up/Dn    415    122
ge-109/0/14    AddComplete    None          Ready         Up/Dn    416    125
ge-109/0/15    AddComplete    None          Ready         Up/Dn    417    124
ge-109/0/16    AddComplete    None          Ready         Up/Dn    418    131
ge-109/0/17    AddComplete    None          Ready         Up/Dn    419    130
ge-109/0/18    AddComplete    None          Ready         Up/Dn    420    133
ge-109/0/19    AddComplete    None          Ready         Up/Dn    421    132
ge-109/0/2     AddComplete    None          Ready         Up/Dn    404    117
ge-109/0/20    AddComplete    None          Ready         Up/Dn    422    127
ge-109/0/21    AddComplete    None          Ready         Up/Dn    423    126
ge-109/0/22    AddComplete    None          Ready         Up/Dn    424    129
ge-109/0/23    AddComplete    None          Ready         Up/Dn    425    128
ge-109/0/24    AddComplete    None          Ready         Up/Dn    426    103
ge-109/0/25    AddComplete    None          Ready         Up/Dn    427    102
ge-109/0/26    AddComplete    None          Ready         Up/Dn    428    105
ge-109/0/27    AddComplete    None          Ready         Up/Dn    429    104
ge-109/0/28    AddComplete    None          Ready         Up/Dn    430    107
ge-109/0/29    AddComplete    None          Ready         Up/Dn    431    106
ge-109/0/3     AddComplete    None          Ready         Up/Dn    405    116
ge-109/0/30    AddComplete    None          Ready         Up/Dn    432    109
ge-109/0/31    AddComplete    None          Ready         Up/Dn    433    108
```



```
ge-109/0/32     AddComplete     None          Ready         Up/Dn     434    135
ge-109/0/33     AddComplete     None          Ready         Up/Dn     435    134
ge-109/0/34     AddComplete     None          Ready         Up/Dn     436    137
ge-109/0/35     AddComplete     None          Ready         Up/Dn     437    136
ge-109/0/36     AddComplete     None          Ready         Up/Dn     438    144
ge-109/0/37     AddComplete     None          Ready         Up/Dn     439    143
ge-109/0/38     AddComplete     None          Ready         Up/Dn     440    146
ge-109/0/39     AddComplete     None          Ready         Up/Dn     441    145
ge-109/0/4      AddComplete     None          Ready         Up/Dn     406    119
ge-109/0/40     AddComplete     None          Ready         Up/Dn     442    140
ge-109/0/41     AddComplete     None          Ready         Up/Dn     443    139
ge-109/0/42     AddComplete     None          Ready         Up/Dn     444    142
ge-109/0/43     AddComplete     None          Ready         Up/Dn     445    141
ge-109/0/44     AddComplete     None          Ready         Up/Dn     446    148
ge-109/0/45     AddComplete     None          Ready         Up/Dn     447    147
ge-109/0/46     AddComplete     None          Ready         Up/Dn     448    150
ge-109/0/47     AddComplete     None          Ready         Up/Dn     449    149
ge-109/0/5      AddComplete     None          Ready         Up/Dn     407    118
ge-109/0/6      AddComplete     None          Ready         Up/Dn     408    121
ge-109/0/7      AddComplete     None          Ready         Up/Dn     409    120
ge-109/0/8      AddComplete     None          Ready         Up/Dn     410    111
ge-109/0/9      AddComplete     None          Ready         Up/Dn     411    110
ge-110/0/0      AddComplete     None          Ready         Up/Up     728    115
ge-110/0/1      AddComplete     None          Ready         Up/Dn     729    114
```

show chassis satellite interface

Syntax

```
show chassis satellite interface
<interface-name>
[ brief | detail | extensive ]
<since time>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display the status of the cascade ports as well as the internal satellite interfaces in a Junos Fusion.

You might see **sd** interfaces in the output of this command. These are internal interfaces for the Junos Fusion.

Options

interface-name—Specify the name of the interface.

none—(Same as **brief**) Display aggregation device interface information.

brief | detail | extensive—(Optional) Display the specified level of output.

since *time*—(Optional) Display interface status information for the satellite devices that have been added to the Junos Fusion on or after a certain date or time, which is entered in the *YYYY-MM-DD.HH:MM:SS* format.

To display extended port status information for all satellite devices added since a specified date, enter the specific date as the time as the *time*. For instance, **2015-12-22**.

To display extended port status information for all satellite devices added since a specified time, enter the specific date and time as the *time*. For instance, **2015-12-22.11:01:00**.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

show chassis satellite interface on page 490
show chassis satellite interface (Junos Fusion Data Center with EVPN-VXLAN) on page 493

Output Fields

Table 28 on page 490 lists the output fields for the **show chassis satellite interface** command. Output fields are listed in the approximate order in which they appear.

Table 28: show chassis satellite interface Output Fields

Field Name	Field Description	Level of Output
Fields for Interface		
Interface	The interface name.	brief detail extensive none
State	The state of the interface.	brief detail extensive none
Type	The type of interface.	brief detail extensive none
DF-Role	(Junos Fusion Data Center with EVPN-VXLAN architecture) The designated forwarder (DF) role: • **NA**—Not applicable. • **NON-DF**—This aggregation device is not the designated forwarder for the satellite device • **DF**—This aggregation device is the designated forwarder for the satellite device.	brief detail extensive none
Provisioned Addresses	The provisioned IP addresses for the Junos Fusion. This information is primarily useful for debugging purposes by expert users.	detail extensive
Operational Addresses	The operational IP addresses for the Junos Fusion. This information is primarily useful for debugging purposes by expert users.	detail extensive
When	The date and time of the event.	detail extensive
Event	The event.	detail extensive
Action	The actions that resulted from the event.	detail extensive

Sample Output

show chassis satellite interface

`user@aggregation-device>` **show chassis satellite interface**

```
Interface          State        Type
lo0                Up           Loopback

sd-101/0/0         Up           Satellite

sd-102/0/0         Up           Satellite

sd-103/0/0         Up           Satellite

sd-104/0/0         Up           Satellite

sd-105/0/0         Up           Satellite

sd-106/0/0         Up           Satellite

sd-107/0/0         Up           Satellite

sd-108/0/0         Up           Satellite

sd-109/0/0         Up           Satellite

sd-110/0/0         Up           Satellite

sd-111/0/0         Up           Satellite

sd-112/0/0         Up           Satellite

sd-113/0/0         Up           Satellite

sd-114/0/0         Up           Satellite

xe-0/0/1           Up           Cascade

xe-0/0/2           Up           Cascade

xe-0/0/3           Up           Cascade

xe-0/0/4           Up           Cascade

xe-0/0/5           Up           Cascade

xe-0/0/6           Up           Cascade

xe-0/0/7           Up           Cascade

xe-0/0/8           Up           Cascade

xe-0/0/9           Up           Cascade

xe-0/2/0           Up           Cascade

xe-0/2/1           Up           Cascade

xe-0/2/2           Up           Cascade

xe-0/2/3           Up           Cascade

xe-0/2/4           Up           Cascade
```

```
xe-0/2/5            Up           Cascade
xe-0/2/6            Up           Cascade
xe-0/2/7            Up           Cascade
xe-1/0/1            Up           Cascade
xe-1/0/2            Up           Cascade
xe-1/0/3            Up           Cascade
xe-1/2/1            Up           Cascade
xe-1/2/2            Up           Cascade
xe-1/2/3            Up           Cascade
xe-2/0/0            Up           Cascade
xe-2/0/1            Up           Cascade
xe-2/0/2            Up           Cascade
xe-2/0/3            Up           Cascade
xe-2/0/4            Up           Cascade
xe-2/0/5            Up           Cascade
xe-2/0/6            Up           Cascade
xe-2/0/7            Up           Cascade
xe-2/1/0            Up           Cascade
xe-2/1/1            Up           Cascade
xe-2/1/2            Up           Cascade
xe-2/1/3            Up           Cascade
xe-2/1/4            Up           Cascade
xe-2/1/5            Up           Cascade
xe-2/1/6            Up           Cascade
xe-2/1/7            Up           Cascade
xe-2/2/0            Up           Cascade
xe-2/2/1            Up           Cascade
xe-2/2/2            Up           Cascade
xe-2/2/3            Up           Cascade
xe-2/2/4            Up           Cascade
```

```
xe-2/2/5          Up          Cascade

xe-2/2/6          Up          Cascade

xe-2/2/7          Up          Cascade

xe-2/3/0          Up          Cascade

xe-2/3/3          Dn          Cascade

xe-2/3/4          Up          Cascade

xe-2/3/5          Up          Cascade

xe-2/3/6          Up          Cascade

xe-2/3/7          Up          Cascade
```

Sample Output

show chassis satellite interface (Junos Fusion Data Center with EVPN-VXLAN)

`user@aggregation-device>` **show chassis satellite interface**

```
Interface         State       Type              DF-Role
lo0               Up          Loopback          NA

sd-101/0/0        Up          Satellite         Non-DF

sd-102/0/0        Up          Satellite         Non-DF

sd-103/0/0        Up          Satellite         DF

xe-0/0/1          Up          Cascade           NA

xe-0/0/2          Up          Cascade           NA

xe-0/0/3          Up          Cascade           NA

xe-0/0/4          Up          Cascade           NA

xe-0/0/5          Up          Cascade           NA
```


show chassis satellite neighbor

Syntax

```
show chassis satellite neighbor
[interface-name]
[ brief | detail | extensive | terse]
<since time>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display the status of the satellite device to aggregation device links in a Junos Fusion.

Options

interface-name—Specify the name of the cascade port on the aggregation device.

none—(Same as **terse**) Display satellite device connection information.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

since *time*—(Optional) Display satellite device connection information for the satellite devices that have been added to the Junos Fusion on or after a certain date or time, which is entered in the *YYYY-MM-DD.HH:MM:SS* format.

To display satellite device connection information for all satellite devices added since a specified date, enter the specific date as the time as the *time*. For instance, **2015-12-22**.

To display satellite device connection information for all satellite devices added since a specified time, enter the specific date and time as the *time*. For instance, **2015-12-22.11:01:00**.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

show chassis satellite neighbor on page 497

Output Fields

Table 29 on page 494 lists the output fields for the **show chassis satellite neighbor** command. Output fields are listed in the approximate order in which they appear.

Table 29: show chassis satellite neighbor Output Fields

Field Name	Field Description	Level of Output
Fields for Interface		

Table 29: show chassis satellite neighbor Output Fields (continued)

Field Name	Field Description	Level of Output
Interface	A cascade port interface on the aggregation device in the Junos Fusion. A cascade port interface on an aggregation device connects to a satellite device in a Junos Fusion.	brief terse detail extensive none
State	The state of the interface.	brief terse detail extensive none
Port Info	The uplink port interface on the satellite device. An uplink port interface on a satellite device connects the satellite device to an aggregation device in a Junos Fusion.	brief terse detail extensive none
System Name	The system name, or alias, of the satellite device. The satellite device's alias is configured using the **set chassis satellite-management fpc *slot-id* alias *alias*** statement.	brief terse detail extensive none
Model	The hardware model of the satellite device.	brief terse detail extensive none
SW Version	The version of satellite software running on the satellite device.	brief terse detail extensive none
Adjacency up-down transition count	The number of times that the adjacency has transitioned between up and down.	brief detail extensive
Last transition	The last transition of the adjacency state.	brief detail extensive
Device Serial Number	The serial number of the satellite device.	brief detail extensive
Chassis ID	The chassis ID of the satellite device. The chassis ID of the satellite device is the satellite's device's MAC address. The chassis ID is also specified as the system ID in some Junos Fusion configuration tasks.	brief detail extensive

Table 29: show chassis satellite neighbor Output Fields (continued)

Field Name	Field Description	Level of Output
Device Family Name	The device family name.	brief detail extensive
Version Sequence Number	The version sequence number.	brief detail extensive
System Description	A plain-text description of the hardware and software currently running on the satellite device.	brief detail extensive
Build date	The date and time that the satellite software was built.	brief detail extensive
Hello interval	The current hello interval configuration.	brief detail extensive
Satellite hello interval	The current satellite device hello interval configuration.	brief detail extensive
Local-end (Local assigned primary address)	The local-end cascade port IP address.	brief detail extensive
Remote-end (Local assigned primary address)	The remote-end uplink port IP address.	brief detail extensive
Cause (Adjacency Down History)	The cause of the last adjacency down event.	brief detail extensive
Timestamp (Adjacency Down History)	The date and time of the last adjacency down event.	brief detail extensive
Information (Adjacency Down History)	Information related to the last adjacency down event.	brief detail extensive
When	The date and time of the event.	detail extensive
Event	The event.	detail extensive

Table 29: show chassis satellite neighbor Output Fields (continued)

Field Name	Field Description	Level of Output
Action	The actions that resulted from the event.	detail extensive

Sample Output

show chassis satellite neighbor

user@aggregation-device> **show chassis satellite neighbor**

```
Interface    State      Port Info    System Name  Model          SW Version
xe-2/3/7     Init
xe-2/3/6     Init
xe-2/3/5     Init
xe-2/3/4     Init
xe-2/3/3     Dn
xe-2/3/0     Two-Way    xe-0/2/2        ex4300-29  EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/2/7     Two-Way    xe-0/2/2        ex4300-28  EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/2/6     Two-Way    xe-0/2/2        ex4300-27  EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/2/5     Two-Way    xe-0/2/2        ex4300-26  EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/2/4     Init
xe-2/2/3     Init
xe-2/2/2     Two-Way    xe-0/0/48:3 qfx5100-48s-06 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-2/2/1     Two-Way    xe-0/0/48:3 qfx5100-48s-05 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-2/2/0     Init
xe-2/1/7     Init
xe-2/1/6     Init
xe-2/1/5     Two-Way    xe-0/0/4:2  qfx5100-24q-09 QFX5100-24Q-2P 0.1I20150224_18
27_dc-builder
xe-2/1/4     Two-Way    xe-0/2/1        ex4300-31  EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/1/3     Two-Way    xe-0/2/1        ex4300-30  EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/1/2     Two-Way    xe-0/2/1        ex4300-29  EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/1/1     Two-Way    xe-0/2/1        ex4300-28  EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/1/0     Init
xe-2/0/7     Two-Way    xe-0/2/1        ex4300-26  EX4300-48T     0.1I20150224_182
7_dc-builder
xe-2/0/6     Init
xe-2/0/5     Init
xe-2/0/4     Init
xe-2/0/3     Init
xe-2/0/2     Two-Way    xe-0/0/48:2 qfx5100-48s-04 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-2/0/1     Two-Way    xe-0/0/48:2 qfx5100-48s-03 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-2/0/0     Init
xe-1/2/3     Two-Way    xe-0/0/0:0  qfx5100-24q-09 QFX5100-24Q-2P 0.1I20150224_18
```

```
27_dc-builder
xe-1/2/2    Two-Way    xe-0/2/0        ex4300-31 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-1/2/1    Two-Way    xe-0/2/0        ex4300-30 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-1/0/3    Two-Way    xe-0/2/0        ex4300-29 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-1/0/2    Two-Way    xe-0/2/0        ex4300-28 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-1/0/1    Two-Way    xe-0/2/0        ex4300-27 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-0/2/7    Two-Way    xe-0/0/0:1  qfx5100-24q-09 QFX5100-24Q-2P 0.1I20150224_18
27_dc-builder
xe-0/2/6    Init
xe-0/2/5    Init
xe-0/2/4    Two-Way    xe-0/0/48:1 qfx5100-48s-05 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/2/3    Two-Way    xe-0/0/48:1 qfx5100-48s-04 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/2/2    Two-Way    xe-0/0/48:1 qfx5100-48s-03 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/2/1    Init
xe-0/2/0    Init
xe-0/0/9    Two-Way    xe-0/2/0        ex4300-26 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-0/0/8    Two-Way    xe-0/2/0        ex4300-25 EX4300-48T     0.1I20150224_182
7_dc-builder
xe-0/0/7    Two-Way    xe-0/0/48:0 qfx5100-48s-07 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/6    Two-Way    xe-0/0/48:0 qfx5100-48s-06 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/5    Two-Way    xe-0/0/48:0 qfx5100-48s-05 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/4    Two-Way    xe-0/0/48:0 qfx5100-48s-04 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/3    Two-Way    xe-0/0/48:0 qfx5100-48s-03 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/2    Two-Way    xe-0/0/48:0 qfx5100-48s-02 QFX5100-48S-6Q 0.1I20150224_18
27_dc-builder
xe-0/0/1    Init
```


show chassis satellite redundancy-group

Syntax

```
show chassis satellite redundancy-group
[brief | detail | extensive | terse]
<since time>
```

Release Information

Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display the status of the redundancy group in a Junos Fusion.

Redundancy groups are used in a Junos Fusion to configure, monitor, and maintain a topology using two aggregation devices.

Options

none—(Same as **terse** and **brief**) Display redundancy group information for the Junos Fusion.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

since *time*—(Optional) Display redundancy group information on or after a certain date or time, in *YYYY-MM-DD.HH:MM:SS* format.

To display all output since a specified date, enter the specific date. For instance, enter **2015-12-22** as the *time*.

To display all output since a specified time, enter the specific date and time. For instance, to display all information on or after 11:01AM on December 22nd, 2015, enter **2015-12-22.11:01:00** as the *time*.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output

show chassis satellite redundancy-group on page 501

Output Fields

Table 30 on page 500 lists the output fields for the **show chassis satellite redundancy-groups** command. Output fields are listed in the approximate order in which they appear.

Table 30: show chassis satellite redundancy-groups Output Fields

Field Name	Field Description	Level of Output
Name	The name of the redundancy group. The redundancy group name is set using the **set chassis satellite-management redundancy-groups *redundancy-group-name*** statement.	none terse brief detail extensive
Cluster State	The cluster state.	none terse brief detail extensive
Peer Chassis ID	The chassis ID of the peer chassis. In a Junos Fusion using redundancy groups, the peer chassis ID is the chassis ID of the other aggregation device and is required to create an interchassis link (ICL). The chassis ID is set using the **set *redundancy-group-name* chassis-id *chassis-id-number*** statement.	none terse brief detail extensive
Peer Chassis SN	The serial number of the peer chassis. In a Junos Fusion using redundancy groups, the peer chassis serial number is the serial number of the other aggregation device.	none terse brief detail extensive
Device Count	The device count.	none terse brief detail extensive
When	The date and time of the event.	detail extensive

Table 30: show chassis satellite redundancy-groups Output Fields (continued)

Field Name	Field Description	Level of Output
Event	The event.	detail extensive
Action	The actions that resulted from the event.	detail extensive

Sample Output

show chassis satellite redundancy-group

`user@aggregation-device>` **show chassis satellite redundancy-group**

```
             Cluster                   Peer          Peer                 Device
Name         State                     Chassis ID    Chassis SN           Count
gr1          Online                    2             DC334                143/143/150
```

show chassis satellite redundancy-group devices

Syntax

```
show chassis satellite redundancy-group devices
[brief | detail | extensive | terse]
<history>
```

Release Information

Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display the status of the devices in a redundancy group in a Junos Fusion.

Redundancy groups are used in a Junos Fusion to configure, monitor, and maintain a topology using two aggregation devices.

Options

none—(Same as **terse** and **brief**) Display redundancy group device information for the Junos Fusion.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

history—(Optional) Display historical output.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output

show chassis satellite redundancy-group devices on page 503

Output Fields

Table 31 on page 502 lists the output fields for the **show chassis satellite redundancy-groups** command. Output fields are listed in the approximate order in which they appear.

Table 31: show chassis satellite redundancy-groups Output Fields

Field Name	Field Description	Level of Output
Cluster Name	The name of the redundancy group. The redundancy group name is set using the **set chassis satellite-management redundancy-groups** ***redundancy-group-name*** statement.	none terse brief detail extensive

Table 31: show chassis satellite redundancy-groups Output Fields (continued)

Field Name	Field Description	Level of Output
Slot ID	The FPC slot ID of the satellite device.	none terse brief detail extensive
Local State	The local state of the satellite device.	none terse brief detail extensive
Peer State	The peer state.	none terse brief detail extensive
When	The date and time of the event.	detail extensive
Event	The event.	detail extensive
Action	The actions that resulted from the event.	detail extensive

Sample Output

show chassis satellite redundancy-group devices

user@aggregation-device> **show chassis satellite redundancy-group devices**

```
Cluster                         Local           Peer
name          Slot-ID           State           State
gr1           100               online          online
gr1           101               online          online
gr1           102               online          online
```

```
gr1            103             not-provisioned online
gr1            104             not-provisioned online
gr1            105             not-provisioned online
gr1            106             not-provisioned online
gr1            107             not-provisioned online
gr1            108             not-provisioned online
gr1            109             not-provisioned online
```


show chassis satellite software

Syntax

```
show chassis satellite software
[ brief | detail ]
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display information related to the satellite software in the Junos Fusion.

Options

none—(Same as **brief**) Display satellite device software information.

brief | detail —(Optional) Display the specified level of output.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

show chassis satellite software on page 506
show chassis satellite software detail on page 506

Output Fields

Table 32 on page 505 lists the output fields for the **show chassis satellite neighbor** command. Output fields are listed in the approximate order in which they appear.

Table 32: show chassis satellite software Output Fields

Field Name	Field Description	Level of Output
Fields for Interface		
Version	The versions of satellite software that are installed and associated with a software upgrade group.	brief none
Platforms	The hardware platform information.	brief none
Group	The name of the assigned satellite software group or groups, if assigned.	brief none
Software Package Version	The satellite software package version.	detail
Platform	The platform type.	detail
Host Version	The host version of software for the platform.	detail

Table 32: show chassis satellite software Output Fields (continued)

Field Name	Field Description	Level of Output
Current Groups	The name or names of the satellite software upgrade groups that are using the software package. This output only appears if the software package is associated with a satellite software upgrade group.	detail
Former Groups	The name or names of satellite software upgrade groups that were previously using the software package. This output only appears if the software package was previously associated with a satellite software upgrade group.	detail

Sample Output

show chassis satellite software

```
user@aggregation-device> show chassis satellite software
Version                        Platforms          Group
3.0R1.1                        i386 ppc           group0
```

Sample Output

show chassis satellite software detail

```
user@aggregation-device> show chassis satellite software detail
Software package version: 3.0R1.6
Platforms supported by package: i386 ppc arm arm563xx
  Platform      Host Version  Models Supported
  i386          3.0.3         QFX5100-24Q-2P
                              QFX5100-48C-6Q
                              QFX5100-48S-6Q
                              QFX5100-48T-6Q
                              QFX5100-96S-8Q
                              QFX5100-48SH-6Q
                              QFX5100-48TH-6Q
  ppc           1.1.2         EX4300-24P
                              EX4300-24T
                              EX4300-48P
                              EX4300-48T
                              EX4300-48T-BF
                              EX4300-48T-DC
                              EX4300-48T-DC-BF
  arm           1.0.0         EX2300-24P
                              EX2300-24T-DC
                              EX2300-C-12T
                              EX4300-C-12P
  arm563xx      1.0.0         EX3400-24P
                              EX3400-24T
                              EX3400-48T
                              EX3400-48P
Current Groups: group1
```



```
          group2
          group3
          group4
          group5
```

show chassis satellite statistics

Syntax

```
show chassis satellite statistics
<device-alias device-alias>
<fpc-slot fpc-slot>
<cluster cluster-name>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display statistics for satellite devices in a Junos Fusion.

Options

device-alias—Display output for the specified satellite device, which is identified by the device alias, only.

fpc-slot —Display output for the specified satellite device, which is identified by the FPC slot ID, only.

cluster-name—Display output for the satellite devices in the specified satellite device cluster only.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

show chassis satellite statistics on page 509
show chassis satellite statistics device-alias qfx5100-48s-02 on page 512
show chassis satellite statistics fpc-slot 101 on page 512

Output Fields

Table 33 on page 508 lists the output fields for the **show chassis satellite statistics** command. Output fields are listed in the approximate order in which they appear.

Table 33: show chassis satellite statistics Output Fields

Field Name	Field Description
Fields for Interface	
Serial Number	The serial number of the satellite device.
Slot-ID	The FPC slot ID of the satellite device.
CSP down transition count	The number of times that the Control and Status Protocol (CSP) session has gone down.

Table 33: show chassis satellite statistics Output Fields (continued)

Field Name	Field Description
Last transition (CSP down transition count)	The last time that the Control and Status Protocol (CSP) session transitioned.
Reachability down transition count	The number of times the satellite device has been in the reachability down state.
Reachability change transition count (Reachability down transition count)	The number of times that the satellite device's reachability state has transitioned.
S/W image update count	The number of times that the satellite software has been updated on the satellite device.
Extended Port add/delete/up/down request/response	The number of times an extended port—a network-facing port on the satellite device—has been added, deleted, placed in the up position, received a down request, or received a response.
Extended Port Params change request	The number of times that an extended port—a network-facing port on the satellite device—has had a change request.
Extended Port up/down operational state transition	The number of times that an extended port—a network-facing port on the satellite device—has had an operational state transition to up or down.
Rx sync complete	The number of times the receive synchronization state has been completed.
Uplink ready rx count	The number of times the uplink port—the port on the satellite device that connects to the aggregation device—has been placed in the ready-to-receive state.
Uplink ready tx count	The number of times the uplink port—the port on the satellite device that connects to the aggregation device—has been placed in the ready-to-transmit state.

Sample Output

show chassis satellite statistics

```
user@aggregation-device> show chassis satellite statistics
```

```
Serial Number: TA3714160468 Slot-ID: 101
   CSP down transition count: 0 Last transition: 05:23:56
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:23:16
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 7/0/7/2 7/0/7/2
   Extended Port Params change request: 0
   Extended Port up/down operational state transition: 7/0
   Rx sync complete: 1
   Uplink ready rx count: 4
   Uplink ready tx count: 4
Serial Number: TA3714160046 Slot-ID: 102
   CSP down transition count: 0 Last transition: 05:23:55
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:23:19
   S/W image update count: 0
```

```
   Extended Port add/delete/up/down request/response: 7/0/7/2 7/0/7/2
   Extended Port Params change request: 0
   Extended Port up/down operational state transition: 7/0
   Rx sync complete: 1
   Uplink ready rx count: 4
   Uplink ready tx count: 4
Serial Number: TA3714140404 Slot-ID: 103
   CSP down transition count: 0 Last transition: 05:23:57
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:23:14
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 6/0/5/3 6/0/5/3
   Extended Port Params change request: 0
   Extended Port up/down operational state transition: 5/0
   Rx sync complete: 1
   Uplink ready rx count: 4
   Uplink ready tx count: 4
Serial Number: TA3714141327 Slot-ID: 104
   CSP down transition count: 0 Last transition: 05:23:57
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:23:15
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 14/0/14/2 14/0/14/2
   Extended Port Params change request: 0
   Extended Port up/down operational state transition: 14/0
   Rx sync complete: 1
   Uplink ready rx count: 4
   Uplink ready tx count: 4
Serial Number: TA3714140200 Slot-ID: 105
   CSP down transition count: 0 Last transition: 05:23:59
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:23:15
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 18/0/18/2 18/0/18/2
   Extended Port Params change request: 6
   Extended Port up/down operational state transition: 18/0
   Rx sync complete: 1
   Uplink ready rx count: 4
   Uplink ready tx count: 4
Serial Number: TA3714140904 Slot-ID: 106
   CSP down transition count: 0 Last transition: 05:23:57
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:23:16
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 17/0/16/3 17/0/16/3
   Extended Port Params change request: 2
   Extended Port up/down operational state transition: 16/0
   Rx sync complete: 1
   Uplink ready rx count: 4
   Uplink ready tx count: 4
Serial Number: PE3714040197 Slot-ID: 107
   CSP down transition count: 0 Last transition: 05:24:32
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:23:18
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 52/0/7/50 52/0/7/50
   Extended Port Params change request: 0
   Extended Port up/down operational state transition: 7/1
   Rx sync complete: 1
   Uplink ready rx count: 4
```

```
   Uplink ready tx count: 4
Serial Number: PE3714080398 Slot-ID: 108
   CSP down transition count: 0 Last transition: 05:24:32
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:23:18
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 52/0/15/40 52/0/15/40
   Extended Port Params change request: 0
   Extended Port up/down operational state transition: 15/0
   Rx sync complete: 1
   Uplink ready rx count: 4
   Uplink ready tx count: 4
Serial Number: PE3714080103 Slot-ID: 109
   CSP down transition count: 0 Last transition: 05:23:22
   Reachability down transition count: 0
   Reachability change transition count: 3 Last transition: 05:23:19
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 51/0/14/37 51/0/14/37
   Extended Port Params change request: 51
   Extended Port up/down operational state transition: 14/0
   Rx sync complete: 1
   Uplink ready rx count: 3
   Uplink ready tx count: 3
Serial Number: PE3714090246 Slot-ID: 110
   CSP down transition count: 0 Last transition: 05:23:22
   Reachability down transition count: 0
   Reachability change transition count: 3 Last transition: 05:23:19
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 51/0/14/37 51/0/14/37
   Extended Port Params change request: 42
   Extended Port up/down operational state transition: 14/0
   Rx sync complete: 1
   Uplink ready rx count: 3
   Uplink ready tx count: 3
Serial Number: PE3714080417 Slot-ID: 111
   CSP down transition count: 0 Last transition: 05:23:22
   Reachability down transition count: 0
   Reachability change transition count: 3 Last transition: 05:23:19
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 51/0/13/38 51/0/13/38
   Extended Port Params change request: 51
   Extended Port up/down operational state transition: 13/0
   Rx sync complete: 1
   Uplink ready rx count: 3
   Uplink ready tx count: 3
Serial Number: PE3714080018 Slot-ID: 112
   CSP down transition count: 0 Last transition: 05:23:22
   Reachability down transition count: 0
   Reachability change transition count: 2 Last transition: 05:23:18
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 51/0/12/39 51/0/12/39
   Extended Port Params change request: 51
   Extended Port up/down operational state transition: 12/0
   Rx sync complete: 1
   Uplink ready rx count: 2
   Uplink ready tx count: 2
Serial Number: PE3714080030 Slot-ID: 113
   CSP down transition count: 0 Last transition: 05:23:22
   Reachability down transition count: 0
   Reachability change transition count: 3 Last transition: 05:23:18
```

```
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 51/0/13/38 51/0/13/38
   Extended Port Params change request: 51
   Extended Port up/down operational state transition: 13/0
   Rx sync complete: 1
   Uplink ready rx count: 3
   Uplink ready tx count: 3
Serial Number: TB3714070145 Slot-ID: 114
   CSP down transition count: 0 Last transition: 05:23:58
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:23:15
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 17/0/13/7 17/0/13/7
   Extended Port Params change request: 0
   Extended Port up/down operational state transition: 13/0
   Rx sync complete: 1
   Uplink ready rx count: 4
   Uplink ready tx count: 4
```

Sample Output

show chassis satellite statistics device-alias qfx5100-48s-02

`user@aggregation-device>` **show chassis satellite statistics device-alias qfx5100-48s-02**

```
Serial Number: TA3714160468 Slot-ID: 101
   CSP down transition count: 0 Last transition: 05:52:44
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:52:04
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 7/0/7/2 7/0/7/2
   Extended Port Params change request: 0
   Extended Port up/down operational state transition: 7/0
   Rx sync complete: 1
   Uplink ready rx count: 4
   Uplink ready tx count: 4
```

Sample Output

show chassis satellite statistics fpc-slot 101

`user@aggregation-device>` **show chassis satellite statistics fpc-slot 101**

```
Serial Number: TA3714160468 Slot-ID: 101
   CSP down transition count: 0 Last transition: 05:52:44
   Reachability down transition count: 0
   Reachability change transition count: 4 Last transition: 05:52:04
   S/W image update count: 0
   Extended Port add/delete/up/down request/response: 7/0/7/2 7/0/7/2
   Extended Port Params change request: 0
   Extended Port up/down operational state transition: 7/0
   Rx sync complete: 1
   Uplink ready rx count: 4
   Uplink ready tx count: 4
```

show chassis satellite unprovision

Syntax

```
show chassis satellite unprovision
[brief | detail | extensive]
[cluster cluster-name]
<since time>
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display information about unprovisioned satellite devices in a Junos Fusion.

An unprovisioned satellite device in a Junos Fusion is a satellite device that is recognized by the aggregation device, but is not participating in a Junos Fusion.

No output appears when this command is entered when a Junos Fusion contains no unprovisioned satellite devices.

This command is helpful in identifying satellite devices that are not participating in a Junos Fusion due to configuration issues. Notably, a satellite device that has not been associated with an FPC ID in a Junos Fusion becomes an unprovisioned satellite device. See *Configuring Junos Fusion Provider Edge* or "Configuring or Expanding a Junos Fusion Enterprise" on page 45 for information on associating an FPC ID with a Junos Fusion.

Options

none—(Same as **brief**) Display unprovisioned satellite device information.

brief | detail | extensive—(Optional) Display the specified level of output.

cluster *cluster-name*—(Optional) Display unprovisioned satellite device information for the specified satellite device cluster only.

since *time*—(Optional) Display unprovisioned satellite device information for the satellite devices that have been unprovisioned from a Junos Fusion on or after a certain date or time, which is entered in the *YYYY-MM-DD.HH:MM:SS* format.

To display unprovisioned satellite device information for all satellite devices unprovisioned since a specified date, enter the specific date as the time as the *time*. For instance, **2015-12-22**.

To display unprovisioned satellite device information for all satellite devices added since a specified time, enter the specific date and time as the *time*. For instance, **2015-12-22.11:01:00**.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

show chassis satellite unprovision on page 515
show chassis satellite unprovision detail on page 516

Output Fields

Table 34 on page 514 lists the output fields for the **show chassis satellite unprovision** command. Output fields are listed in the approximate order in which they appear.

Table 34: show chassis satellite unprovision Output Fields

Field Name	Field Description	Level of Output
System-Id	The MAC address of the satellite device.	brief extensive none
Serial-Number	The serial number of the satellite device.	brief extensive none
Device State	The device state of the unprovisioned satellite device.	brief extensive none
Cascade Ports	The cascade ports on the aggregation device that are connected to the satellite device.	brief extensive none
Port State	The port state of the cascade port.	brief extensive none
Operational State	The operational state of the satellite device.	detail
Product Model	The product model of the satellite device.	detail
Product Family	The product family of the satellite device.	detail
Serial number	The serial number of the satellite device.	detail
System id	The MAC address of the satellite device.	detail
Software package version	The satellite software package version running on the satellite device.	detail
Host software version	The host software version.	detail
Fields for Cascade interfaces		
Interface Name	The interface name of the cascade port on the aggregation device.	detail

Table 34: show chassis satellite unprovision Output Fields (continued)

Field Name	Field Description	Level of Output
State	The state of the cascade port.	detail
Uplink Interface	The uplink interface name. The uplink interface is the interface on the satellite device that connects to the aggregation device.	detail
Adjacency State	The adjacency state of the uplink interface to cascade port link.	detail
Last transition	The amount of time that has passed since the last link transition.	detail
Adjacency down count	The number of times that the uplink interface to cascade port link has gone into the adjacency down count.	detail
Rx Packet	The number of received packets.	detail
Last received packet	The amount of time that has passed since the last received packet.	detail
Peer adjacency information	The amount of time that the adjacency has been active.	detail
Last down cause	The cause of the last time the adjacency went down.	detail
SDPD restart detected	The number of times that the SDPD has restarted.	detail
Fields for process information		
Process Name	The name of the process.	detail
PID	The PID of the process.	detail
State	The current state of the process.	detail
Number of restart detected	The number of times that the process has restarted.	detail
Uptime	The amount of time that the process has been active.	detail
When	The date and time of the event.	extensive
Event	The event.	extensive
Action	The actions that resulted from the event.	extensive

Sample Output

show chassis satellite unprovision

`user@aggregation-device>` **show chassis satellite unprovision**

```
                                         Device          Cascade     Port
System-Id            Serial-Number       State           Ports       State
AA:BB:CC:aa:bb:cc    TABCDE111111        Present         xe-0/0/1    present
                                                         xe-0/1/2    present
AA:BB:CC:aa:bb:zz    PABCDE111111        Present         xe-0/0/2    present
                                                         xe-0/3/2    present
```

Sample Output

show chassis satellite unprovision detail

user@aggregation-device> **show chassis satellite unprovision detail**

```
Operational State: Present
Product Model: QFX5100-48S-6Q
Product Family: i386
Serial number: TABCDE111111
System id: AA:BB:CC:aa:bb:cc
Software package version: 3.0R1
Host software version: 0.2.3
Cascade interfaces:
    Interface Name: xe-0/0/1 State: present
        Uplink Interface: xe-0/0/25
        Adjacency state: Two-Way
        Last transition: 3d 22:06:55
        Adjacency down count: 0
        Rx Packet: 33875 Last received packet: 00:00:09
        Peer adjacency information: 3d 22:06:55
            Adjacency down count: 3
            Last down cause: TTL is 0
            SDPD restart detected: 3
    Interface Name: xe-0/1/2 State: present
        Uplink Interface: xe-0/0/24
        Adjacency state: Two-Way
        Last transition: 3d 22:06:58
        Adjacency down count: 0
        Rx Packet: 33875 Last received packet: 00:00:09
        Peer adjacency information: 3d 22:06:58
            Adjacency down count: 5
            Last down cause: TTL is 0
            SDPD restart detected: 3
Process information:
    Process Name: Provisioning PID: 2488 State: Running
        Number of restart detected: 0
        Uptime: 3d 22:06:58
    Process Name: PFE PID: 2631 State: Running
        Number of restart detected: 0
        Uptime: 3d 22:06:58
Operational State: Present
Product Model: EX4300-48T
Product Family: ppc
Serial number: PABCDE111111
System id: AA:BB:CC:aa:bb:zz
Software package version: 3.0R1
Host software version: 0.2.4
Cascade interfaces:
    Interface Name: xe-0/0/2 State: present
        Uplink Interface: xe-0/2/1
        Adjacency state: Two-Way
        Last transition: 3d 22:06:56
```



```
        Adjacency down count: 0
        Rx Packet: 33876 Last received packet: 00:00:05
        Peer adjacency information: 3d 22:06:56
            Adjacency down count: 1
            Last down cause: TTL is 0
            SDPD restart detected: 2
    Interface Name: xe-0/3/2 State: present
        Uplink Interface: xe-0/2/0
        Adjacency state: Two-Way
        Last transition: 3d 22:06:57
        Adjacency down count: 0
        Rx Packet: 33876 Last received packet: 00:00:05
        Peer adjacency information: 3d 22:06:57
            Adjacency down count: 3
            Last down cause: TTL is 0
            SDPD restart detected: 2
Process information:
    Process Name: Provisioning PID: 1603 State: Running
        Number of restart detected: 0
        Uptime: 3d 22:06:57
    Process Name: PFE PID: 1615 State: Running
        Number of restart detected: 0
        Uptime: 3d 22:06:57
```

show chassis satellite upgrade-group

Syntax

```
show chassis satellite upgrade-group
<upgrade-group-name>
[ brief | detail | extensive | terse]
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display information about the satellite software upgrade groups for the Junos Fusion.

A satellite software upgrade group is a group of satellite devices that are updated at the same time to the same version of the satellite software. One Junos Fusion can contain multiple software upgrade groups, and multiple software upgrade groups should be configured in most Junos Fusions to avoid network downtimes during satellite software installations.

A satellite software upgrade group that contains all satellite devices in a satellite device cluster is automatically created when a satellite device cluster is configured. The software upgrade group name for these automatically created software upgrade groups is the cluster name.

Options

none—(Same as **brief** and **terse**) Display satellite software upgrade group information for all satellite software upgrade groups.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

upgrade-group-name—Display satellite software upgrade group information for the specified satellite software upgrade group only.

The satellite software upgrade group name is set using the **set chassis satellite-management upgrade-groups *upgrade-group-name*** statement for standalone satellite devices and is the cluster name for satellite device clusters.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45
- *Configuring Junos Fusion Provider Edge*

List of Sample Output

show chassis satellite upgrade-group on page 520
show chassis satellite upgrade-group detail on page 520

Output Fields

Table 35 on page 519 lists the output fields for the **show chassis satellite upgrade-group** command. Output fields are listed in the approximate order in which they appear.

Table 35: show chassis satellite upgrade-group Output Fields

Field Name	Field Description	Level of Output
Fields for Interface		
Group	The satellite software upgrade group name. The satellite software upgrade group name is the name of the satellite device cluster when used with a satellite device cluster. A satellite software upgrade group with the name of the satellite device cluster is created automatically when a satellite device cluster is configured. The satellite software upgrade group name is set using the **set chassis satellite-management upgrade-groups** ***upgrade-group-name*** statement for standalone satellite devices.	brief terse extensive none
Sw-Version	The version of satellite software associated with the satellite software upgrade group.	brief terse extensive none
Group State	The state of the satellite software upgrade group.	brief terse extensive none
Slot	The FPC slot identification number of the satellite device that is a member of the satellite software upgrade group.	brief terse detail extensive none
Device State	The state of the satellite software for the specified member of the satellite software upgrade group. The **version-in-sync** output appears when the satellite device is running the satellite software version that is associated with the satellite software upgrade group.	brief terse detail extensive none
Software upgrade group	The name of the satellite software upgrade group.	detail
Software package version	The satellite software package associated with the satellite software upgrade group.	detail
Previous software package version	The satellite software package that was previously associated with the satellite software upgrade group. This output only appears if the satellite software upgrade group was previously associated with another version of satellite software.	detail

Sample Output

show chassis satellite upgrade-group

user@aggregation-device> **show chassis satellite upgrade-group**

```
                                                Group                Device
Group          Sw-Version                       State       Slot     State
__ungrouped__
ex4300         3.0R1.0                          in-sync     107      version-in-sync

                                                            108      version-in-sync

                                                            109      version-in-sync

                                                            110      version-in-sync

                                                            111      version-in-sync

                                                            112      version-in-sync

                                                            113      version-in-sync
qfx            3.0R1.0                          in-sync     102      version-in-sync

                                                            103      version-in-sync

                                                            104      version-in-sync

                                                            105      version-in-sync

                                                            106      version-in-sync

                                                            114      version-in-sync
```

Sample Output

show chassis satellite upgrade-group detail

user@aggregation-device> **show chassis satellite upgrade-group detail**

```
Software upgrade group: ex4300
Software package version: 3.0R1.0
Previous software package version: 3.0R1.1
  Slot    Device State
  107     version-in-sync
  108     version-in-sync
  109     version-in-sync
  110     version-in-sync
  111     version-in-sync
  112     version-in-sync
  113     version-in-sync

Software upgrade group: qfx
Software package version: 3.0R1.0
  Slot    Device State
  102     version-in-sync
  103     version-in-sync
  104     version-in-sync
  105     version-in-sync
```

```
106     version-in-sync
114     version-in-sync
```

show chassis satellite-cluster

Syntax

```
show chassis satellite-cluster
[cluster cluster-name]
[brief | detail | extensive | terse]
```

Release Information Command introduced in Junos OS Release 16.1R1.

Description Display the status of the satellite device clusters in a Junos Fusion.

Options

none—(Same as **brief**) Display satellite device cluster information for satellite device clusters in the Junos Fusion.

brief | detail | extensive | terse—(Optional) Display the specified level of output.

cluster *cluster-name*—Display satellite device cluster information for the specified satellite device cluster only.

Required Privilege Level view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output

show chassis satellite-cluster terse on page 526
show chassis satellite-cluster on page 526

Output Fields Table 36 on page 522 lists the output fields for the **show chassis satellite-cluster** command. Output fields are listed in the approximate order in which they appear.

Table 36: show chassis satellite-cluster Output Fields

Field Name	Field Description	Level of Output
cluster	The name of the satellite device cluster. The name of the satellite device cluster is assigned using the **set chassis satellite-management cluster *cluster-name*** statement.	terse
Provision	The number of provisioned satellite devices in the specified satellite device cluster.	terse
Present	The number of present satellite devices in the specified satellite device cluster.	terse
Online	The number of online satellite devices in the specified satellite device cluster.	terse

Table 36: show chassis satellite-cluster Output Fields (continued)

Field Name	Field Description	Level of Output
Unprovision	The number of unprovisioned satellite devices in the specified satellite device cluster.	terse
Misconfig	The number of misconfigured satellite devices in the specified satellite device cluster.	terse
Cluster Name	The name of the satellite device cluster. The name of the satellite device cluster is assigned using the **set chassis satellite-management cluster *cluster-name*** statement.	none detail extensive
Number of devices provisioned	The number of provisioned satellite devices in the specified satellite device cluster.	none detail extensive
Number of devices present	The number of present satellite devices in the specified satellite device cluster.	none detail extensive
Number of devices unprovisioned	The number of unprovisioned satellite devices in the specified satellite device cluster.	none detail extensive
Number of devices misconfig/miswired	The number of misconfigured or miswired satellite devices in the specified satellite device cluster.	none detail extensive
Number of devices online	The number of online satellite devices in the specified satellite device cluster.	none detail extensive
Number of devices offline	The number of offline satellite devices in the specified satellite device cluster.	none detail extensive
Slot	The slot number of the satellite device. The slot number can be configured using the **set chassis satellite-management fpc *slot-id*** statement.	none detail extensive

Table 36: show chassis satellite-cluster Output Fields (continued)

Field Name	Field Description	Level of Output
Device State	The device state of the satellite device in the satellite device cluster. The most common device states: • **Online**—the satellite device is online and active. This is the satellite device state during normal operating procedure. • **Offline**—the satellite device is offline and not detected. This state is typically seen when the satellite device has been disconnected from the aggregation device, or when all cascade or uplink ports connecting the satellite device to the aggregation device are down. • **Present**—the satellite device is recognized by the aggregation device. In a satellite device cluster, this state is seen during normal operation for all satellite devices that are not directly cabled to the aggregation device. • **Rebooting**—the satellite device is rebooting. • **Disable**—the satellite device has been disabled. • **Misconfig**—the satellite device is not properly configured. This state is typically seen when the system ID, cascade port, or FPC slot ID defined for the satellite device has a misconfiguration. • **Miswire**—the satellite device is miswired. This state is typically seen when a satellite device is wired to two aggregation devices but is not configured for multihoming. Use **show chassis satellite detail** to gather more information on the issue when the device state is **Miswire**. Other less common device states include: • **ModeChanging**—the device is converting from a standalone device to a satellite device, or from a satellite device to a standalone device. • **ModeChangeFail**—the mode change operation failed. • **MinorUpgradeOn**—A minor satellite software upgrade is in progress. • **MajorUpgradeOn**—A major satellite software upgrade is in progress. • **Upgrade-pending**—the satellite device is waiting for a satellite software upgrade. • **ProvSessionDn**—the provisioning session is down. • **ReconcileState**—the satellite provisioning daemon has restarted and is reconciling the satellite device state.	none detail extensive
Distance	The distance the satellite device is away from the aggregation device. In this output, each hop to get from the satellite device to the aggregation device is counted as 4. The **via** output provides the slot number of the satellite device in the satellite device cluster that is directly connected to the aggregation device and passing traffic for the specified satellite device.	none detail extensive

Table 36: show chassis satellite-cluster Output Fields (continued)

Field Name	Field Description	Level of Output
Local Interface	A local interface on the specified satellite device.	none detail extensive
Remote Interface	A remote interface on the specified satellite device.	none detail extensive
Interface State	The state of the local and remote interface connection. Port states include: • **online**—the cascade port is online and active. This is the port state during normal operating procedure. • **txUpRxDn**—Tx or Rx forwarding is disabled on the cascade port. This state is often seen when a second aggregation device is added to a Junos Fusion topology, and the devices in the Junos Fusion are synchronizing to the new topology. • **miswire**—the cascade port is miswired. This state is typically seen when a satellite device is interconnected to two aggregation devices but multihoming is not configured. Use **show chassis satellite detail** to gather more information on the issue when the device state is **Miswire**. • **present**—The cascade port recognized the satellite device and is up. • **misconfig**—the cascade port is assigned, but this interface is not working correctly due to a misconfiguration. • **down**—the cascade port is down. • **offline**—the satellite device was previously recognized from this interface, but is no longer present. • **absent**—the cascade port is configured but no satellite device is detected on the interface.	none detail extensive
Adj Up/Dn Count	The number of times the satellite device in the satellite device cluster has transitioned to the up or down state.	detail extensive
Last Transition	The time of the last transition to the up or down state.	detail extensive
When	The date and time of the event.	extensive
Event	The event.	extensive
Action	The actions that resulted from the event.	extensive

Sample Output

show chassis satellite-cluster terse

user@aggregation-device> **show chassis satellite-cluster terse**

```
Cluster     Provision    Present    Online  Unprovision  Misconfig    Offline
cl1         4            4          4       0            0            0
```

Sample Output

show chassis satellite-cluster

user@aggregation-device> **show chassis satellite-cluster**

```

Cluster Name: cluster1
    Number of devices provisioned: 4
    Number of devices present: 4
    Number of devices unprovisioned: 0
    Number of devices misconfig/miwired: 0
    Number of devices online: 4
    Number of devices offline: 0

         Device                      Local         Remote        Interface
  Slot   State         Distance      Interface     Interface     State
  101    Online        0             xe-101/0/0    ge-0/0/0      online
                                     xe-101/0/1    ge-0/0/1      online
                                     xe-101/0/4    xe-102/0/0    present
                                     xe-101/0/5    xe-102/0/1    present
  102    Online        4    [via 101] xe-102/0/0    xe-101/0/4    present
                                     xe-102/0/1    xe-101/0/5    present
                                     xe-102/0/2    xe-103/0/0    present
                                     xe-102/0/3    xe-103/0/1    present
  103    Online        8    [via 101] xe-103/0/0    xe-102/0/2    present
                                     xe-103/0/1    xe-102/0/3    present
                                     xe-103/0/2    xe-104/0/4    present
                                     xe-103/0/3    xe-104/0/5    present
  104    Online        12   [via 101] xe-104/0/4    xe-103/0/2    present
                                     xe-104/0/5    xe-103/0/3    present
```


show chassis satellite-cluster route

Syntax

```
show chassis satellite-cluster route
[cluster cluster-name]
[fpc-slot slot-id]
```

Release Information Command introduced in Junos OS Release 16.1R1.

Description Display information about the route to the aggregation device for a satellite device in a satellite device cluster in a Junos Fusion.

Options

cluster *cluster-name*—Display route information for all satellite devices in the specified cluster.

fpc-slot *slot-id*—Display route information for the satellite device using the specified FPC slot ID.

Required Privilege Level view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output show chassis satellite-cluster route on page 528

Output Fields Table 37 on page 527 lists the output fields for the **show chassis satellite-cluster route** command. Output fields are listed in the approximate order in which they appear.

Table 37: show chassis satellite-cluster route Output Fields

Field Name	Field Description
Cluster Name	The name of the satellite device cluster. The name of the satellite device cluster is assigned using the **set chassis satellite-management cluster *cluster-name*** statement.
Slot	The slot number of the satellite device. The slot number and the FPC ID are the same number in this context.
Interface	Interface on the satellite device that is either interconnected to an aggregation device or another satellite device in the satellite device cluster.
Transit slot	The slot number of the satellite device in the satellite device cluster that is passing traffic to the aggregation device for the specified satellite device.

Table 37: show chassis satellite-cluster route Output Fields (continued)

Field Name	Field Description
Distance	The distance the satellite device is away from the aggregation device. A satellite device in a satellite device cluster that has an uplink port connection to an aggregation device has a distance of 0. The number given in this output counts each hop to a satellite device in the satellite device cluster as 4. For instance, a satellite device that is one aggregation device away from the satellite device with the uplink port has a distance of 4. The **via** output provides the slot number of the satellite device in the satellite device cluster that is directly connected to the aggregation device and passing traffic for the specified satellite device.

Sample Output

show chassis satellite-cluster route

user@aggregation-device> **show chassis satellite-cluster route**

```
Cluster Name: cluster1

                          Transit
Slot     Interface        Slot      Distance
101      ge-0/0/1         direct    0
         ge-0/0/0         direct    0
102      ge-0/0/1         101       4
         ge-0/0/0         101       4
103      ge-0/0/1         101       8
         ge-0/0/0         101       8
104      ge-0/0/1         101       12
         ge-0/0/0         101       12
```

show chassis satellite-cluster statistics

Syntax

```
show chassis satellite-cluster statistics
[cluster cluster-name]
[fpc-slot slot-id]
```

Release Information Command introduced in Junos OS Release 16.1R1.

Description Display satellite device cluster statistics for satellite devices in satellite device clusters in a Junos Fusion.

Options

cluster *cluster-name*—Display satellite device cluster statistics for all satellite devices in the specified cluster.

fpc-slot *slot-id*—Display satellite device cluster statistics for the satellite device using the specified FPC slot ID.

Required Privilege Level view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output show chassis satellite-cluster statistics cluster cluster1 on page 530

Output Fields Table 33 on page 508 lists the output fields for the **show chassis satellite-cluster statistics** command. Output fields are listed in the approximate order in which they appear.

Table 38: show chassis satellite-cluster statistics Output Fields

Field Name	Field Description
Cluster Name	The name of the satellite device cluster. The name of the satellite device cluster is assigned using the **set chassis satellite-management cluster *cluster-name*** statement.
FPC Slot	The FPC slot ID number of the satellite device.
Message Type	The message type.
Received	The number of times the specified message type has been received on the satellite device in the satellite device cluster.
Sent	The number of times the specified message type has been sent on the satellite device in the satellite device cluster.
Rx errors	The number of times the specified message type has experienced a receive error on the satellite device in the satellite device cluster.

Table 38: show chassis satellite-cluster statistics Output Fields (continued)

Field Name	Field Description
Adjacency Up	The total number of Adjacency Up events on the satellite device in the satellite device cluster.
Adjacency Down	The total number of Adjacency Down events on the satellite device in the satellite device cluster.
LLDP Adjacency Up	The total number of LLDP Adjacency Up events on the satellite device in the satellite device cluster.
LLDP Adjacency Down	The total number of LLDP Adjacency Down events on the satellite device in the satellite device cluster.
SD Adjacency Up	The total number of satellite device Adjacency Up events on the satellite device in the satellite device cluster.
SD Adjacency Down	The total number of satellite device Adjacency Down events on the satellite device in the satellite device cluster.
Route Add	The total number of Route Add events on the satellite device in the satellite device cluster.
Route Change	The total number of Route change events on the satellite device in the satellite device cluster.
Route Delete	The total number of Route Delete events on the satellite device in the satellite device cluster.
Provisioned event	The total number of Provisioned events on the satellite device in the satellite device cluster.
Unprovisioned event	The total number of Unprovisioned events on the satellite device in the satellite device cluster.
Delete event	The total number of delete events on the satellite device in the satellite device cluster.
Protocol Session Up	The total number of Protocol Session Up events on the satellite device in the satellite device cluster.
Protocol Session Down	The total number of Protocol Session Down events on the satellite device in the satellite device cluster.

Sample Output

show chassis satellite-cluster statistics cluster cluster1

user@aggregation-device> **show chassis satellite-cluster statistics cluster cluster1**

```
Cluster Name: cluster1

FPC Slot: 101

Message type                    Received      Sent   Rx errors
Open                            0             1      0
Adjacency UP                    4             0      0
Adjacency Down                  2             0      0
Sync Complete                   0             0      0
Provision                       0             1      0
```



```
Unprovision                        0              0      0
Remote SD Route                    7              0      0
Mode change Request                0              0      0
Mode change Cancel                 0              0      0
Set Policy                         0              0      0
Reset Policy                       0              0      0
Msg Ack                            0              7      0
Keepalive                          2568           2567   0

General Statistics:

Adjacency Up              1
Adjacency Down            0
LLDP Adjacency Up         2
LLDP Adjacency Down       0
SD Adjacency Up           2
SD Adjacency Down         0
Route Add                 1
Route Change              2
Route Delete              0
Provisioned event         1
Unprovisioned event       0
Delete event              0
Protocol Session Up       1
Protocol Session Down     0

FPC Slot: 102

Message type                       Received       Sent   Rx errors
Open                               0              2      0
Adjacency UP                       8              0      0
Adjacency Down                     0              0      0
Sync Complete                      0              0      0
Provision                          0              2      0
Unprovision                        0              0      0
Remote SD Route                    0              0      0
Mode change Request                0              0      0
Mode change Cancel                 0              0      0
Set Policy                         0              0      0
Reset Policy                       0              0      0
Msg Ack                            0              0      0
Keepalive                          2566           2568   0

General Statistics:

Adjacency Up              1
Adjacency Down            0
LLDP Adjacency Up         0
LLDP Adjacency Down       0
SD Adjacency Up           6
SD Adjacency Down         2
Route Add                 2
Route Change              6
Route Delete              1
Provisioned event         1
Unprovisioned event       0
Delete event              0
Protocol Session Up       2
Protocol Session Down     1
```

show chassis temperature-thresholds

List of Syntax

Syntax

```
show chassis temperature-thresholds
```

Syntax (TX Matrix Routers)

```
show chassis temperature-thresholds
<lcc number | scc>
```

Syntax (TX Matrix Plus Routers)

```
show chassis temperature-thresholds
<lcc number | sfc number>
```

Syntax (MX Series Routers)

```
show chassis temperature-thresholds
<all-members>
<local>
<member member-id>
<satellite [slot-id slot-ID |device-alias alias-name]>
```

Syntax (MX104, MX204, MX2010, MX2020, MX10003, MX10008, and MX2008 Universal Routing Platforms)

```
show chassis temperature-thresholds
```

Syntax (QFX Series)

```
show chassis temperature-thresholds
<interconnect-device name>
<node-device name>
```

Syntax (PTX Series)

```
show chassis temperature-thresholds
```

Syntax (EX9251, EX9253 Switches)

```
show chassis temperature-thresholds
```

Release Information

Command introduced in Junos OS Release 8.0.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc command introduced in Junos OS Release 9.6 for the TX Matrix Plus router.
Command introduced in Junos OS Release 11.1 for QFX Series.
Command introduced in Junos OS Release 12.1 for T4000 Core Routers.
Command introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers.
Command introduced in Junos OS Release 12.3 for MX2010 and MX2020 Universal Routing Platforms.
Command introduced in Junos OS Release 13.2 for MX104 Universal Routing Platforms.
satellite option introduced in Junos OS Release 14.2R3.
Command introduced in Junos OS Release 17.2 for MX2008 Universal Routing Platforms.
Command introduced in Junos OS Release 17.2 for PTX10008 Routers.
Command introduced in Junos OS Release 17.3 for MX10003 Universal Routing Platforms.
Command introduced in Junos OS Release 17.3 for MX150 Router Appliance.
Command introduced in Junos OS Release 17.4 for MX204 Universal Routing Platforms.
Command introduced in Junos OS Release 18.1R1 for EX9251 switches.
Command introduced in Junos OS Release 18.2 for EX9253 Switches.
Command introduced in Junos OS Release 18.2R1 for MX10008 Routers.

Description

Display chassis temperature threshold settings, in degrees Celsius.

Options

none—Display the temperature threshold details.

all-members—(MX Series routers only) (Optional) Display the chassis temperature threshold settings of all member routers in the Virtual Chassis configuration.

interconnect-device *name*—(QFabric systems only) (Optional) Display the chassis temperature threshold settings of the Interconnect device.

lcc *number*—(TX Matrix and TX Matrix Plus routers only) (Optional) On a TX Matrix router, display the temperature threshold details of a specified T640 router (line-card chassis) that is connected to a TX Matrix router. On a TX Matrix Plus router, display the temperature threshold details of a specified router (line-card chassis) that is connected to a 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—(MX Series routers only) (Optional) Display the chassis temperature threshold settings of the local Virtual Chassis member.

member ***member-id***—(MX Series routers only) (Optional) Display the chassis temperature threshold settings of the specified member of the Virtual Chassis configuration. Replace *member-id* with a value of 0 or 1.

node-device ***name***—(QFabric systems only) (Optional) Display the chassis temperature threshold settings of the Node device.

satellite [slot-id ***slot-ID*** **| device-alias** ***alias-name*****]**—(Junos Fusion only) (Optional) Display the chassis temperature threshold settings for the specified satellite device or devices in a Junos Fusion, or for all satellite devices if no satellite devices are specified.

scc—(TX Matrix routers only) (Optional) Display the temperature threshold details of the TX Matrix router (switch-card chassis).

sfc ***number***—(TX Matrix Plus routers only) (Optional) On TX Matrix Plus routers, display the temperature threshold details of the TX Matrix Plus router, which is the switch-fabric chassis. Replace *number* with 0.

Required Privilege Level

view

List of Sample Output

show chassis temperature-thresholds (PTX1000 Packet Transport Router) on page 572
show chassis temperature-thresholds (MX Routers with Media Services Blade [MSB]) on page 572
show chassis temperature-thresholds (EX9251 Switches) on page 573
show chassis temperature-thresholds (EX9253 witches) on page 574

Output Fields Table 39 on page 536 lists the output fields for the **show chassis temperature-thresholds** command. Output fields are listed in the approximate order in which they appear.

Table 39: show chassis temperature-thresholds Output Fields

Field name	Field Description
Item	Chassis component. If per FRU per slot thresholds are configured, the components about which information is displayed include the chassis, the Routing Engines, FPCs, and FEBs. If per FRU per slot thresholds are not configured, the components about which information is displayed include the chassis and the Routing Engines.
Fan speed	NOTE: On the QFX3500 switch and QFX3600 switch, there are four fan speeds: **low**, **medium-low**, **medium-high**, and **high**. The fan speed changes at the threshold when going from a low speed to a higher speed. When the fan speed changes from a higher speed to a lower speed, the temperature changes two degrees below the threshold. Temperature threshold settings, in degrees Celsius, for the fans to operate at normal and high speeds. • Normal—The fans operate at normal speed if the component is at or below this temperature and all the fans are present and functioning normally. NOTE: On a TX Matrix Plus router with 3D SIBs, the threshold temperature at the XF junction is set to 70ºC for **Normal** fan speed, which is less than or equal to 4800 RPM. • High—The fans operate at high speed if the component has exceeded this temperature or a fan has failed or is missing. NOTE: On a TX Matrix Plus router with 3D SIBs, the threshold temperature at the XF junction is set to 75ºC for **High** fan speed, which is greater than or equal to 5000 RPM. NOTE: For MX480 Routers, there are three fan speeds: Low, Medium, and High. An alarm is not triggered until the temperature exceeds the threshold settings for a yellow alarm or a red alarm.
Yellow alarm	Temperature threshold settings, in degrees Celsius, that trigger a yellow alarm. • Normal—The temperature that must be exceeded on the component to trigger a yellow alarm when the fans are running at full speed. • Bad fan—The temperature that must be exceeded on the component to trigger a yellow alarm when one or more fans have failed or are missing.
Red alarm	Temperature threshold settings, in degrees Celsius, that trigger a red alarm. • Normal—The temperature that must be exceeded on the component to trigger a red alarm when the fans are running at full speed. • Bad fan—The temperature that must be exceeded on the component to trigger a red alarm when one or more fans have failed or are missing.
Fire Shutdown	(T4000 routers, TX Matrix Plus router with 3D SIBs, and PTX Series Packet Transport Routers only)—Temperature threshold settings, in degrees Celsius, for the network device to shut down.

Sample Output

show chassis temperature-thresholds

user@host> **show chassis temperature-thresholds**

```
                          Fan speed        Yellow alarm        Red alarm
                         (degrees C)       (degrees C)       (degrees C)
Item                     Normal   High   Normal   Bad fan   Normal   Bad fan
Chassis default              48     54       65        55       75        65
Routing Engine 0             70     80       95        95      110       110
Routing Engine 1             70     80       95        95      110       110
FPC 0                        55     60       75        65       90        80
FPC 1                        55     60       75        65       90        80
FPC 2                        55     60       75        65       90        80
FPC 3                        55     60       75        65       90        80
FPC 4                        55     60       75        65       90        80
FPC 5                        55     60       75        65       90        80
FPC 6                        55     60       75        65       90        80
FPC 7                        55     60       75        65       90        80
FPC 8                        55     60       75        65       90        80
FPC 9                        55     60       75        65       90        80
FPC 10                       55     60       75        65       90        80
FPC 11                       55     60       75        65       90        80
```

show chassis temperature-thresholds (MX150)

user@host> **show chassis temperature-thresholds**

```
Fan speed      Yellow alarm      Red alarm      Fire Shutdown
                         (degrees C)      (degrees C)      (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
FPC 0 Sensor 1               43    65       68       68       70       70
72
FPC 0 Sensor 2               43    65       68       68       70       70
72
FPC 0 Coretemp               78    94      100      100      105      105
110
```

show chassis temperature-thresholds (MX104 Router)

user@host> **show chassis temperature-thresholds**

```
       Fan speed      Yellow alarm      Red alarm      Fire Shutdown
                         (degrees C)      (degrees C)      (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
Chassis default              48    54       65       55       75       65
100
Routing Engine 0             55    80       95       95      105      100
108
```

show chassis temperature-thresholds (MX240, MX480, MX960 Routers with Application Services Modular Line Card)

user@host> **show chassis temperature-thresholds**

```
Fan speed      Yellow alarm      Red alarm      Fire Shutdown
                          (degrees C)      (degrees C)      (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
Chassis default              48     54       65       55       75       65
100
Routing Engine 0             70     80       95       95      110      110
112
Routing Engine 1             70     80       95       95      110      110
112
FPC 0                        55     60       75       65       90       80
95
FPC 1                        55     60       75       65       90       80
95
FPC 2                        55     60       75       65       90       80
95
FPC 4                        55     60       75       65       90       80
95
FPC 5                        55     60       75       65       90       80
95
```

show chassis temperature-thresholds (MX480 Router with MPC4E)

user@ host> **show chassis temperature-thresholds**

```
       Fan speed      Yellow alarm      Red alarm      Fire Shutdown
                          (degrees C)      (degrees C)      (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
Chassis default              48     54       65       55       75       65
100
Routing Engine 0             70     80       95       95      110      110
112
Routing Engine 1             70     80       95       95      110      110
112
FPC 2                        55     60       75       65       95       80
100
FPC 3                        55     60       75       65       95       80
100
FPC 4                        55     60       75       65       90       80
95
```

show chassis temperature-thresholds (MX2010 Router with MPC7E, MPC8E, and MPC9E)

user@ host> **show chassis temperature-thresholds**

```
                                      Fan speed      Yellow alarm      Red alarm
      Fire Shutdown
                                       (degrees C)      (degrees C)      (degrees
 C)      (degrees C)
Item                                  Normal  High    Normal  Bad fan    Normal
Bad fan      Normal
```



```
FPC 3 Intake                                 53    59       72       67       80
    75         85
FPC 3 Exhaust A                              77    85       98       93      103
    98        108
FPC 3 Exhaust B                              54    62       80       75      103
    98        108
FPC 3 EA0 Chip                               64    72       90       90      100
   100        105
FPC 3 EA0_XR0 Chip                           79    87      102      102      106
   106        108
FPC 3 EA0_XR1 Chip                           79    87      102      102      106
   106        108
FPC 3 EA1 Chip                               64    72       90       90      100
   100        105
FPC 3 EA1_XR0 Chip                           79    87      102      102      106
   106        108
FPC 3 EA1_XR1 Chip                           79    87      102      102      106
   106        108
FPC 3 PEX Chip                               74    82      100      100      105
   105        110
FPC 3 EA2 Chip                               64    72       90       90      100
   100        105
FPC 3 EA2_XR0 Chip                           79    87      102      102      106
   106        108
FPC 3 EA2_XR1 Chip                           79    87      102      102      106
   106        108
FPC 3 EA3 Chip                               64    72       90       90      100
   100        105
FPC 3 EA3_XR0 Chip                           79    87      102      102      106
   106        108
FPC 3 EA3_XR1 Chip                           79    87      102      102      106
   106        108
FPC 3 EA0_HMC0 Logic die                     81    89      103      103      107
   107        111
FPC 3 EA0_HMC0 DRAM botm                     76    84       98       98      102
   102        106
FPC 3 EA0_HMC1 Logic die                     81    89      103      103      107
   107        111
FPC 3 EA0_HMC1 DRAM botm                     76    84       98       98      102
   102        106
FPC 3 EA0_HMC2 Logic die                     81    89      103      103      107
   107        111
FPC 3 EA0_HMC2 DRAM botm                     76    84       98       98      102
   102        106
FPC 3 EA1_HMC0 Logic die                     81    89      103      103      107
   107        111
FPC 3 EA1_HMC0 DRAM botm                     76    84       98       98      102
   102        106
FPC 3 EA1_HMC1 Logic die                     81    89      103      103      107
   107        111
FPC 3 EA1_HMC1 DRAM botm                     76    84       98       98      102
   102        106
FPC 3 EA1_HMC2 Logic die                     81    89      103      103      107
   107        111
FPC 3 EA1_HMC2 DRAM botm                     76    84       98       98      102
   102        106
FPC 3 EA2_HMC0 Logic die                     81    89      103      103      107
   107        111
FPC 3 EA2_HMC0 DRAM botm                     76    84       98       98      102
   102        106
```

```
FPC 3 EA2_HMC1 Logic die                   81    89      103      103      107
   107        111
FPC 3 EA2_HMC1 DRAM botm                   76    84       98       98      102
   102        106
FPC 3 EA2_HMC2 Logic die                   81    89      103      103      107
   107        111
FPC 3 EA2_HMC2 DRAM botm                   76    84       98       98      102
   102        106
FPC 3 EA3_HMC0 Logic die                   81    89      103      103      107
   107        111
FPC 3 EA3_HMC0 DRAM botm                   76    84       98       98      102
   102        106
FPC 3 EA3_HMC1 Logic die                   81    89      103      103      107
   107        111
FPC 3 EA3_HMC1 DRAM botm                   76    84       98       98      102
   102        106
FPC 3 EA3_HMC2 Logic die                   81    89      103      103      107
   107        111
FPC 3 EA3_HMC2 DRAM botm                   76    84       98       98      102
   102        106
FPC 4 Intake                               46    55       65       60       81
    76         90
FPC 4 Exhaust A                            61    70       80       75      100
    95        110
FPC 4 Exhaust B                            61    70       80       75       95
    90        105
FPC 4 EA0 Chip                             86    95      105      100      117
   112        123
FPC 4 EA0_XR0 Chip                         86    95      105      100      110
   105        116
FPC 4 EA0_XR1 Chip                         86    95      105      100      115
   110        121
FPC 4 EA1 Chip                             86    95      105      100      117
   112        123
FPC 4 EA1_XR0 Chip                         86    95      105      100      110
   105        116
FPC 4 EA1_XR1 Chip                         86    95      105      100      115
   110        121
FPC 4 PCIE_SW Chip                         81    90      105      100      115
   110        121
FPC 4 EA0_HMC0 DRAM botm                   86    95      105      100      115
   110        121
FPC 4 EA0_HMC1 DRAM botm                   86    95      105      100      115
   110        121
FPC 4 EA1_HMC0 DRAM botm                   86    95      105      100      115
   110        121
FPC 4 EA1_HMC1 DRAM botm                   86    95      105      100      115
   110        121
FPC 7 Intake                               53    59       72       67       80
    75         85
FPC 7 Exhaust A                            77    85       98       93      103
    98        108
FPC 7 Exhaust B                            54    62       80       75      103
    98        108
FPC 7 EA0 Chip                             64    72       90       90      100
   100        105
FPC 7 EA0_XR0 Chip                         79    87      102      102      106
   106        108
FPC 7 EA0_XR1 Chip                         79    87      102      102      106
   106        108
```



```
FPC 7 EA1 Chip                            64     72       90        90       100
   100        105
FPC 7 EA1_XR0 Chip                        79     87      102       102       106
   106        108
FPC 7 EA1_XR1 Chip                        79     87      102       102       106
   106        108
FPC 7 PEX Chip                            74     82      100       100       105
   105        110
FPC 7 EA2 Chip                            64     72       90        90       100
   100        105
FPC 7 EA2_XR0 Chip                        79     87      102       102       106
   106        108
FPC 7 EA2_XR1 Chip                        79     87      102       102       106
   106        108
FPC 7 EA3 Chip                            64     72       90        90       100
   100        105
FPC 7 EA3_XR0 Chip                        79     87      102       102       106
   106        108
FPC 7 EA3_XR1 Chip                        79     87      102       102       106
   106        108
FPC 7 EA0_HMC0 Logic die                  81     89      103       103       107
   107        111
FPC 7 EA0_HMC0 DRAM botm                  76     84       98        98       102
   102        106
FPC 7 EA0_HMC1 Logic die                  81     89      103       103       107
   107        111
FPC 7 EA0_HMC1 DRAM botm                  76     84       98        98       102
   102        106
FPC 7 EA0_HMC2 Logic die                  81     89      103       103       107
   107        111
FPC 7 EA0_HMC2 DRAM botm                  76     84       98        98       102
   102        106
FPC 7 EA1_HMC0 Logic die                  81     89      103       103       107
   107        111
FPC 7 EA1_HMC0 DRAM botm                  76     84       98        98       102
   102        106
FPC 7 EA1_HMC1 Logic die                  81     89      103       103       107
   107        111
FPC 7 EA1_HMC1 DRAM botm                  76     84       98        98       102
   102        106
FPC 7 EA1_HMC2 Logic die                  81     89      103       103       107
   107        111
FPC 7 EA1_HMC2 DRAM botm                  76     84       98        98       102
   102        106
FPC 7 EA2_HMC0 Logic die                  81     89      103       103       107
   107        111
FPC 7 EA2_HMC0 DRAM botm                  76     84       98        98       102
   102        106
FPC 7 EA2_HMC1 Logic die                  81     89      103       103       107
   107        111
FPC 7 EA2_HMC1 DRAM botm                  76     84       98        98       102
   102        106
FPC 7 EA2_HMC2 Logic die                  81     89      103       103       107
   107        111
FPC 7 EA2_HMC2 DRAM botm                  76     84       98        98       102
   102        106
FPC 7 EA3_HMC0 Logic die                  81     89      103       103       107
   107        111
FPC 7 EA3_HMC0 DRAM botm                  76     84       98        98       102
   102        106
```

```
FPC 7 EA3_HMC1 Logic die                   81     89       103        103        107
   107        111
FPC 7 EA3_HMC1 DRAM botm                   76     84        98         98        102
   102        106
FPC 7 EA3_HMC2 Logic die                   81     89       103        103        107
   107        111
FPC 7 EA3_HMC2 DRAM botm                   76     84        98         98        102
   102        106
```

As per the above output, the MPC7E, MPC8E, and MPC9E are installed in the FPC slots 4, 7, and 3, respectively.

show chassis temperature-thresholds (MX2010 Router)

`user@host>` **show chassis temperature-thresholds**

```
                  Fan speed       Yellow alarm      Red alarm     Fire Shutdown
                     (degrees C)     (degrees C)      (degrees C)     (degrees C)
Item                   Normal  High    Normal  Bad fan    Normal  Bad fan   Normal
Routing Engine 0       70      80      95      95       110      110       112
Routing Engine 1       70      80      95      95       110      110       112
CB 0 IntakeA-Zone0     60      65      78      75        85       80        95
CB 0 IntakeB-Zone1     60      65      78      75        85       80        95
CB 0 IntakeC-Zone0     60      65      78      75        85       80        95
CB 0 ExhaustA-Zone0    60      65      78      75        85       80        95
CB 0 ExhaustB-Zone1    60      65      78      75        85       80        95
CB 0 TCBC-Zone0        60      65      78      75        85       80        95
CB 1 IntakeA-Zone0     60      65      78      75        85       80        95
CB 1 IntakeB-Zone1     60      65      78      75        85       80        95
CB 1 IntakeC-Zone0     60      65      78      75        85       80        95
CB 1 ExhaustA-Zone0    60      65      78      75        85       80        95
CB 1 ExhaustB-Zone1    60      65      78      75        85       80        95
CB 1 TCBC-Zone0        60      65      78      75        85       80        95
SPMB 0 Intake          56      62      75      63        83       76        95
SPMB 1 Intake          56      62      75      63        83       76        95
SFB 0 Intake-Zone0     56      62      75      63        82       70        87
SFB 0 Exhaust-Zone1    56      62      75      63        82       70        87
SFB 0 IntakeA-Zone0    56      62      75      63        82       70        87
SFB 0 IntakeB-Zone1    56      62      75      63        82       70        87
SFB 0 Exhaust-Zone0    56      62      75      63        82       70        87
SFB 0 SFB-XF2-Zone1    70      80      90      90       107      107       115
SFB 0 SFB-XF1-Zone0    70      80      90      90       107      107       115
SFB 0 SFB-XF0-Zone0    70      80      90      90       107      107       115
SFB 1 Intake-Zone0     56      62      75      63        82       70        87
SFB 1 Exhaust-Zone1    56      62      75      63        82       70        87
SFB 1 IntakeA-Zone0    56      62      75      63        82       70        87
SFB 1 IntakeB-Zone1    56      62      75      63        82       70        87
SFB 1 Exhaust-Zone0    56      62      75      63        82       70        87
SFB 1 SFB-XF2-Zone1    70      80      90      90       107      107       115
SFB 1 SFB-XF1-Zone0    70      80      90      90       107      107       115
SFB 1 SFB-XF0-Zone0    70      80      90      90       107      107       115
SFB 2 Intake-Zone0     56      62      75      63        82       70        87
SFB 2 Exhaust-Zone1    56      62      75      63        82       70        87
SFB 2 IntakeA-Zone0    56      62      75      63        82       70        87
SFB 2 IntakeB-Zone1    56      62      75      63        82       70        87
SFB 2 Exhaust-Zone0    56      62      75      63        82       70        87
SFB 2 SFB-XF2-Zone1    70      80      90      90       107      107       115
SFB 2 SFB-XF1-Zone0    70      80      90      90       107      107       115
SFB 2 SFB-XF0-Zone0    70      80      90      90       107      107       115
```

```
SFB 3 Intake-Zone0      56    62       75       63       82       70       87
SFB 3 Exhaust-Zone1     56    62       75       63       82       70       87
SFB 3 IntakeA-Zone0     56    62       75       63       82       70       87
SFB 3 IntakeB-Zone1     56    62       75       63       82       70       87
SFB 3 Exhaust-Zone0     56    62       75       63       82       70       87
SFB 3 SFB-XF2-Zone1     70    80       90       90      107      107      115
SFB 3 SFB-XF1-Zone0     70    80       90       90      107      107      115
SFB 3 SFB-XF0-Zone0     70    80       90       90      107      107      115
SFB 4 Intake-Zone0      56    62       75       63       82       70       87
SFB 4 Exhaust-Zone1     56    62       75       63       82       70       87
SFB 4 IntakeA-Zone0     56    62       75       63       82       70       87
SFB 4 IntakeB-Zone1     56    62       75       63       82       70       87
SFB 4 Exhaust-Zone0     56    62       75       63       82       70       87
SFB 4 SFB-XF2-Zone1     70    80       90       90      107      107      115
SFB 4 SFB-XF1-Zone0     70    80       90       90      107      107      115
SFB 4 SFB-XF0-Zone0     70    80       90       90      107      107      115
SFB 5 Intake-Zone0      56    62       75       63       82       70       87
SFB 5 Exhaust-Zone1     56    62       75       63       82       70       87
SFB 5 IntakeA-Zone0     56    62       75       63       82       70       87
SFB 5 IntakeB-Zone1     56    62       75       63       82       70       87
SFB 5 Exhaust-Zone0     56    62       75       63       82       70       87
SFB 5 SFB-XF2-Zone1     70    80       90       90      107      107      115
SFB 5 SFB-XF1-Zone0     70    80       90       90      107      107      115
SFB 5 SFB-XF0-Zone0     70    80       90       90      107      107      115
SFB 6 Intake-Zone0      56    62       75       63       82       70       87
SFB 6 Exhaust-Zone1     56    62       75       63       82       70       87
SFB 6 IntakeA-Zone0     56    62       75       63       82       70       87
SFB 6 IntakeB-Zone1     56    62       75       63       82       70       87
SFB 6 Exhaust-Zone0     56    62       75       63       82       70       87
SFB 6 SFB-XF2-Zone1     70    80       90       90      107      107      115
SFB 6 SFB-XF1-Zone0     70    80       90       90      107      107      115
SFB 6 SFB-XF0-Zone0     70    80       90       90      107      107      115
SFB 7 Intake-Zone0      56    62       75       63       82       70       87
SFB 7 Exhaust-Zone1     56    62       75       63       82       70       87
SFB 7 IntakeA-Zone0     56    62       75       63       82       70       87
SFB 7 IntakeB-Zone1     56    62       75       63       82       70       87
SFB 7 Exhaust-Zone0     56    62       75       63       82       70       87
SFB 7 SFB-XF2-Zone1     70    80       90       90      107      107      115
SFB 7 SFB-XF1-Zone0     70    80       90       90      107      107      115
SFB 7 SFB-XF0-Zone0     70    80       90       90      107      107      115
FPC 0                   55    60       75       65       95       80      100
FPC 1                   55    60       75       65       90       80       95
FPC 2                   55    60       75       65       95       80      100
FPC 3                   55    60       75       65       90       80       95
FPC 4                   55    60       75       65       90       80       95
FPC 5                   55    60       75       65       95       80      100
FPC 6                   55    60       75       65       90       80       95
FPC 7                   55    60       75       65       95       80      100
FPC 8                   55    60       75       65       90       80       95
FPC 9                   55    60       75       65       95       80      100
ADC 0 Intake            56    62       75       63       83       76       95
ADC 0 Exhaust           56    62       75       63       83       76       95
ADC 0 ADC-XF1           70    80       90       90      107      107      115
ADC 0 ADC-XF0           70    80       90       90      107      107      115
ADC 1 Intake            56    62       75       63       83       76       95
ADC 1 Exhaust           56    62       75       63       83       76       95
ADC 1 ADC-XF1           70    80       90       90      107      107      115
ADC 1 ADC-XF0           70    80       90       90      107      107      115
ADC 2 Intake            56    62       75       63       83       76       95
ADC 2 Exhaust           56    62       75       63       83       76       95
```

```
ADC 2 ADC-XF1          70     80        90        90       107       107       115
ADC 2 ADC-XF0          70     80        90        90       107       107       115
ADC 3 Intake           56     62        75        63        83        76        95
ADC 3 Exhaust          56     62        75        63        83        76        95
ADC 3 ADC-XF1          70     80        90        90       107       107       115
ADC 3 ADC-XF0          70     80        90        90       107       107       115
ADC 4 Intake           56     62        75        63        83        76        95
ADC 4 Exhaust          56     62        75        63        83        76        95
ADC 4 ADC-XF1          70     80        90        90       107       107       115
ADC 4 ADC-XF0          70     80        90        90       107       107       115
ADC 5 Intake           56     62        75        63        83        76        95
ADC 5 Exhaust          56     62        75        63        83        76        95
ADC 5 ADC-XF1          70     80        90        90       107       107       115
ADC 5 ADC-XF0          70     80        90        90       107       107       115
ADC 6 Intake           56     62        75        63        83        76        95
ADC 6 Exhaust          56     62        75        63        83        76        95
ADC 6 ADC-XF1          70     80        90        90       107       107       115
ADC 6 ADC-XF0          70     80        90        90       107       107       115
ADC 7 Intake           56     62        75        63        83        76        95
ADC 7 Exhaust          56     62        75        63        83        76        95
ADC 7 ADC-XF1          70     80        90        90       107       107       115
ADC 7 ADC-XF0          70     80        90        90       107       107       115
ADC 8 Intake           56     62        75        63        83        76        95
ADC 8 Exhaust          56     62        75        63        83        76        95
ADC 8 ADC-XF1          70     80        90        90       107       107       115
ADC 8 ADC-XF0          70     80        90        90       107       107       115
ADC 9 Intake           56     62        75        63        83        76        95
ADC 9 Exhaust          56     62        75        63        83        76        95
ADC 9 ADC-XF1          70     80        90        90       107       107       115
ADC 9 ADC-XF0          70     80        90        90       107       107       115
```

show chassis temperature-thresholds (MX2020 Router)

user@host> **show chassis temperature-thresholds**

```
                   Fan speed        Yellow alarm      Red alarm     Fire Shutdown

                    (degrees C)     (degrees C)       (degrees C)      (degrees C)
Item                 Normal  High    Normal  Bad fan   Normal  Bad fan  Normal
Routing Engine 0       70     80        95        95       110       110       112
Routing Engine 1       70     80        95        95       110       110       112
CB 0 IntakeA-Zone0     60     65        78        75        85        80        95
CB 0 IntakeB-Zone1     60     65        78        75        85        80        95
CB 0 IntakeC-Zone0     60     65        78        75        85        80        95
CB 0 ExhaustA-Zone0    60     65        78        75        85        80        95
CB 0 ExhaustB-Zone1    60     65        78        75        85        80        95
CB 0 TCBC-Zone0        60     65        78        75        85        80        95
CB 1 IntakeA-Zone0     60     65        78        75        85        80        95
CB 1 IntakeB-Zone1     60     65        78        75        85        80        95
CB 1 IntakeC-Zone0     60     65        78        75        85        80        95
CB 1 ExhaustA-Zone0    60     65        78        75        85        80        95
CB 1 ExhaustB-Zone1    60     65        78        75        85        80        95
CB 1 TCBC-Zone0        60     65        78        75        85        80        95
SPMB 0 Intake          56     62        75        63        83        76        95
SPMB 1 Intake          56     62        75        63        83        76        95
SFB 0 Intake-Zone0     56     62        75        63        82        70        87
SFB 0 Exhaust-Zone1    56     62        75        63        82        70        87
SFB 0 IntakeA-Zone0    56     62        75        63        82        70        87
SFB 0 IntakeB-Zone1    56     62        75        63        82        70        87
SFB 0 Exhaust-Zone0    56     62        75        63        82        70        87
```



```
SFB 0 SFB-XF2-Zone1     70     80        90        90       107       107       115
SFB 0 SFB-XF1-Zone0     70     80        90        90       107       107       115
SFB 0 SFB-XF0-Zone0     70     80        90        90       107       107       115
SFB 1 Intake-Zone0      56     62        75        63        82        70        87
SFB 1 Exhaust-Zone1     56     62        75        63        82        70        87
SFB 1 IntakeA-Zone0     56     62        75        63        82        70        87
SFB 1 IntakeB-Zone1     56     62        75        63        82        70        87
SFB 1 Exhaust-Zone0     56     62        75        63        82        70        87
SFB 1 SFB-XF2-Zone1     70     80        90        90       107       107       115
SFB 1 SFB-XF1-Zone0     70     80        90        90       107       107       115
SFB 1 SFB-XF0-Zone0     70     80        90        90       107       107       115
SFB 2 Intake-Zone0      56     62        75        63        82        70        87
SFB 2 Exhaust-Zone1     56     62        75        63        82        70        87
SFB 2 IntakeA-Zone0     56     62        75        63        82        70        87
SFB 2 IntakeB-Zone1     56     62        75        63        82        70        87
SFB 2 Exhaust-Zone0     56     62        75        63        82        70        87
SFB 2 SFB-XF2-Zone1     70     80        90        90       107       107       115
SFB 2 SFB-XF1-Zone0     70     80        90        90       107       107       115
SFB 2 SFB-XF0-Zone0     70     80        90        90       107       107       115
SFB 3 Intake-Zone0      56     62        75        63        82        70        87
SFB 3 Exhaust-Zone1     56     62        75        63        82        70        87
SFB 3 IntakeA-Zone0     56     62        75        63        82        70        87
SFB 3 IntakeB-Zone1     56     62        75        63        82        70        87
SFB 3 Exhaust-Zone0     56     62        75        63        82        70        87
SFB 3 SFB-XF2-Zone1     70     80        90        90       107       107       115
SFB 3 SFB-XF1-Zone0     70     80        90        90       107       107       115
SFB 3 SFB-XF0-Zone0     70     80        90        90       107       107       115
SFB 4 Intake-Zone0      56     62        75        63        82        70        87
SFB 4 Exhaust-Zone1     56     62        75        63        82        70        87
SFB 4 IntakeA-Zone0     56     62        75        63        82        70        87
SFB 4 IntakeB-Zone1     56     62        75        63        82        70        87
SFB 4 Exhaust-Zone0     56     62        75        63        82        70        87
SFB 4 SFB-XF2-Zone1     70     80        90        90       107       107       115
SFB 4 SFB-XF1-Zone0     70     80        90        90       107       107       115
SFB 4 SFB-XF0-Zone0     70     80        90        90       107       107       115
SFB 5 Intake-Zone0      56     62        75        63        82        70        87
SFB 5 Exhaust-Zone1     56     62        75        63        82        70        87
SFB 5 IntakeA-Zone0     56     62        75        63        82        70        87
SFB 5 IntakeB-Zone1     56     62        75        63        82        70        87
SFB 5 Exhaust-Zone0     56     62        75        63        82        70        87
SFB 5 SFB-XF2-Zone1     70     80        90        90       107       107       115
SFB 5 SFB-XF1-Zone0     70     80        90        90       107       107       115
SFB 5 SFB-XF0-Zone0     70     80        90        90       107       107       115
SFB 6 Intake-Zone0      56     62        75        63        82        70        87
SFB 6 Exhaust-Zone1     56     62        75        63        82        70        87
SFB 6 IntakeA-Zone0     56     62        75        63        82        70        87
SFB 6 IntakeB-Zone1     56     62        75        63        82        70        87
SFB 6 Exhaust-Zone0     56     62        75        63        82        70        87
SFB 6 SFB-XF2-Zone1     70     80        90        90       107       107       115
SFB 6 SFB-XF1-Zone0     70     80        90        90       107       107       115
SFB 6 SFB-XF0-Zone0     70     80        90        90       107       107       115
SFB 7 Intake-Zone0      56     62        75        63        82        70        87
SFB 7 Exhaust-Zone1     56     62        75        63        82        70        87
SFB 7 IntakeA-Zone0     56     62        75        63        82        70        87
SFB 7 IntakeB-Zone1     56     62        75        63        82        70        87
SFB 7 Exhaust-Zone0     56     62        75        63        82        70        87
SFB 7 SFB-XF2-Zone1     70     80        90        90       107       107       115
SFB 7 SFB-XF1-Zone0     70     80        90        90       107       107       115
SFB 7 SFB-XF0-Zone0     70     80        90        90       107       107       115
FPC 0                   55     60        75        65        90        80        95
```

```
FPC 1                   55    60        75        65        90        80        95
FPC 2                   55    60        75        65        90        80        95
FPC 3                   55    60        75        65        90        80        95
FPC 4                   55    60        75        65        90        80        95
FPC 5                   55    60        75        65        90        80        95
FPC 6                   55    60        75        65        90        80        95
FPC 7                   55    60        75        65        90        80        95
FPC 8                   55    60        75        65        90        80        95
FPC 9                   55    60        75        65        90        80        95
FPC 10                  55    60        75        65        90        80        95
FPC 11                  55    60        75        65        90        80        95
FPC 12                  55    60        75        65        90        80        95
FPC 13                  55    60        75        65        90        80        95
FPC 14                  55    60        75        65        90        80        95
FPC 15                  55    60        75        65        90        80        95
FPC 16                  55    60        75        65        90        80        95
FPC 17                  55    60        75        65        90        80        95
FPC 18                  55    60        75        65        90        80        95
FPC 19                  55    60        75        65        90        80        95
ADC 0 Intake            56    62        75        63        83        76        95
ADC 0 Exhaust           56    62        75        63        83        76        95
ADC 0 ADC-XF1           70    80        90        90       107       107       115
ADC 0 ADC-XF0           70    80        90        90       107       107       115
ADC 1 Intake            56    62        75        63        83        76        95
ADC 1 Exhaust           56    62        75        63        83        76        95
ADC 1 ADC-XF1           70    80        90        90       107       107       115
ADC 1 ADC-XF0           70    80        90        90       107       107       115
ADC 2 Intake            56    62        75        63        83        76        95
ADC 2 Exhaust           56    62        75        63        83        76        95
ADC 2 ADC-XF1           70    80        90        90       107       107       115
ADC 2 ADC-XF0           70    80        90        90       107       107       115
ADC 3 Intake            56    62        75        63        83        76        95
ADC 3 Exhaust           56    62        75        63        83        76        95
ADC 3 ADC-XF1           70    80        90        90       107       107       115
ADC 3 ADC-XF0           70    80        90        90       107       107       115
ADC 4 Intake            56    62        75        63        83        76        95
ADC 4 Exhaust           56    62        75        63        83        76        95
ADC 4 ADC-XF1           70    80        90        90       107       107       115
ADC 4 ADC-XF0           70    80        90        90       107       107       115
ADC 5 Intake            56    62        75        63        83        76        95
ADC 5 Exhaust           56    62        75        63        83        76        95
ADC 5 ADC-XF1           70    80        90        90       107       107       115
ADC 5 ADC-XF0           70    80        90        90       107       107       115
ADC 6 Intake            56    62        75        63        83        76        95
ADC 6 Exhaust           56    62        75        63        83        76        95
ADC 6 ADC-XF1           70    80        90        90       107       107       115
ADC 6 ADC-XF0           70    80        90        90       107       107       115
ADC 7 Intake            56    62        75        63        83        76        95
ADC 7 Exhaust           56    62        75        63        83        76        95
ADC 7 ADC-XF1           70    80        90        90       107       107       115
ADC 7 ADC-XF0           70    80        90        90       107       107       115
ADC 8 Intake            56    62        75        63        83        76        95
ADC 8 Exhaust           56    62        75        63        83        76        95
ADC 8 ADC-XF1           70    80        90        90       107       107       115
ADC 8 ADC-XF0           70    80        90        90       107       107       115
ADC 9 Intake            56    62        75        63        83        76        95
ADC 9 Exhaust           56    62        75        63        83        76        95
ADC 9 ADC-XF1           70    80        90        90       107       107       115
ADC 9 ADC-XF0           70    80        90        90       107       107       115
ADC 10 Intake           56    62        75        63        83        76        95
```

```
ADC 10 Exhaust           56    62       75       63       83       76       95
ADC 10 ADC-XF1           70    80       90       90      107      107      115
ADC 10 ADC-XF0           70    80       90       90      107      107      115
ADC 11 Intake            56    62       75       63       83       76       95
ADC 11 Exhaust           56    62       75       63       83       76       95
ADC 11 ADC-XF1           70    80       90       90      107      107      115
ADC 11 ADC-XF0           70    80       90       90      107      107      115
ADC 12 Intake            56    62       75       63       83       76       95
ADC 12 Exhaust           56    62       75       63       83       76       95
ADC 12 ADC-XF1           70    80       90       90      107      107      115
ADC 12 ADC-XF0           70    80       90       90      107      107      115
ADC 13 Intake            56    62       75       63       83       76       95
ADC 13 Exhaust           56    62       75       63       83       76       95
ADC 13 ADC-XF1           70    80       90       90      107      107      115
ADC 13 ADC-XF0           70    80       90       90      107      107      115
ADC 14 Intake            56    62       75       63       83       76       95
ADC 14 Exhaust           56    62       75       63       83       76       95
ADC 14 ADC-XF1           70    80       90       90      107      107      115
ADC 14 ADC-XF0           70    80       90       90      107      107      115
ADC 15 Intake            56    62       75       63       83       76       95
ADC 15 Exhaust           56    62       75       63       83       76       95
ADC 15 ADC-XF1           70    80       90       90      107      107      115
ADC 15 ADC-XF0           70    80       90       90      107      107      115
ADC 16 Intake            56    62       75       63       83       76       95
ADC 16 Exhaust           56    62       75       63       83       76       95
ADC 16 ADC-XF1           70    80       90       90      107      107      115
ADC 16 ADC-XF0           70    80       90       90      107      107      115
ADC 17 Intake            56    62       75       63       83       76       95
ADC 17 Exhaust           56    62       75       63       83       76       95
ADC 17 ADC-XF1           70    80       90       90      107      107      115
ADC 17 ADC-XF0           70    80       90       90      107      107      115
ADC 18 Intake            56    62       75       63       83       76       95
ADC 18 Exhaust           56    62       75       63       83       76       95
ADC 18 ADC-XF1           70    80       90       90      107      107      115
ADC 18 ADC-XF0           70    80       90       90      107      107      115
ADC 19 Intake            56    62       75       63       83       76       95
ADC 19 Exhaust           56    62       75       63       83       76       95
ADC 19 ADC-XF1           70    80       90       90      107      107      115
ADC 19 ADC-XF0           70    80       90       90      107      107      115
```

show chassis temperature-thresholds (MX2020 Router with MPC4E)

`user@host>` **show chassis temperature-thresholds**

```
     Fan speed      Yellow alarm      Red alarm      Fire Shutdown
                     (degrees C)      (degrees C)     (degrees C)      (degrees
C)
Item                    Normal  High   Normal  Bad fan   Normal  Bad fan    Normal
Routing Engine 0          70    80       95       95      110      110      112
Routing Engine 1          70    80       95       95      110      110      112
CB 0 IntakeA-Zone0        60    65       78       75       85       80       95
CB 0 IntakeB-Zone1        60    65       78       75       85       80       95
CB 0 IntakeC-Zone0        60    65       78       75       85       80       95
CB 0 ExhaustA-Zone0       60    65       78       75       85       80       95
CB 0 ExhaustB-Zone1       60    65       78       75       85       80       95
CB 0 TCBC-Zone0           60    65       78       75       85       80       95
CB 1 IntakeA-Zone0        60    65       78       75       85       80       95
CB 1 IntakeB-Zone1        60    65       78       75       85       80       95
CB 1 IntakeC-Zone0        60    65       78       75       85       80       95
CB 1 ExhaustA-Zone0       60    65       78       75       85       80       95
```

```
CB 1 ExhaustB-Zone1      60     65        78        75        85        80        95
CB 1 TCBC-Zone0          60     65        78        75        85        80        95
SPMB 0 Intake            56     62        75        63        83        76        95
SPMB 1 Intake            56     62        75        63        83        76        95
SFB 0 Intake-Zone0       56     62        70        70        85        85        89
SFB 0 Exhaust-Zone1      56     62        70        70        85        85        89
SFB 0 IntakeA-Zone0      56     62        70        70        85        85        89
SFB 0 IntakeB-Zone1      56     62        70        70        85        85        89
SFB 0 Exhaust-Zone0      56     62        70        70        85        85        89
SFB 0 SFB-XF2-Zone1      70     75        90        85        95        90       100
SFB 0 SFB-XF1-Zone0      70     75        90        85        95        90       100
SFB 0 SFB-XF0-Zone0      70     75        90        85        95        90       100
SFB 1 Intake-Zone0       56     62        70        70        85        85        89
SFB 1 Exhaust-Zone1      56     62        70        70        85        85        89
SFB 1 IntakeA-Zone0      56     62        70        70        85        85        89
SFB 1 IntakeB-Zone1      56     62        70        70        85        85        89
SFB 1 Exhaust-Zone0      56     62        70        70        85        85        89
SFB 1 SFB-XF2-Zone1      70     75        90        85        95        90       100
SFB 1 SFB-XF1-Zone0      70     75        90        85        95        90       100
SFB 1 SFB-XF0-Zone0      70     75        90        85        95        90       100
SFB 2 Intake-Zone0       56     62        70        70        85        85        89
SFB 2 Exhaust-Zone1      56     62        70        70        85        85        89
SFB 2 IntakeA-Zone0      56     62        70        70        85        85        89
SFB 2 IntakeB-Zone1      56     62        70        70        85        85        89
SFB 2 Exhaust-Zone0      56     62        70        70        85        85        89
SFB 2 SFB-XF2-Zone1      70     75        90        85        95        90       100
SFB 2 SFB-XF1-Zone0      70     75        90        85        95        90       100
SFB 2 SFB-XF0-Zone0      70     75        90        85        95        90       100
SFB 3 Intake-Zone0       56     62        70        70        85        85        89
SFB 3 Exhaust-Zone1      56     62        70        70        85        85        89
SFB 3 IntakeA-Zone0      56     62        70        70        85        85        89
SFB 3 IntakeB-Zone1      56     62        70        70        85        85        89
SFB 3 Exhaust-Zone0      56     62        70        70        85        85        89
SFB 3 SFB-XF2-Zone1      70     75        90        85        95        90       100
SFB 3 SFB-XF1-Zone0      70     75        90        85        95        90       100
SFB 3 SFB-XF0-Zone0      70     75        90        85        95        90       100
SFB 4 Intake-Zone0       56     62        70        70        85        85        89
SFB 4 Exhaust-Zone1      56     62        70        70        85        85        89
SFB 4 IntakeA-Zone0      56     62        70        70        85        85        89
SFB 4 IntakeB-Zone1      56     62        70        70        85        85        89
SFB 4 Exhaust-Zone0      56     62        70        70        85        85        89
SFB 4 SFB-XF2-Zone1      70     75        90        85        95        90       100
SFB 4 SFB-XF1-Zone0      70     75        90        85        95        90       100
SFB 4 SFB-XF0-Zone0      70     75        90        85        95        90       100
SFB 5 Intake-Zone0       56     62        70        70        85        85        89
SFB 5 Exhaust-Zone1      56     62        70        70        85        85        89
SFB 5 IntakeA-Zone0      56     62        70        70        85        85        89
SFB 5 IntakeB-Zone1      56     62        70        70        85        85        89
SFB 5 Exhaust-Zone0      56     62        70        70        85        85        89
SFB 5 SFB-XF2-Zone1      70     75        90        85        95        90       100
SFB 5 SFB-XF1-Zone0      70     75        90        85        95        90       100
SFB 5 SFB-XF0-Zone0      70     75        90        85        95        90       100
SFB 6 Intake-Zone0       56     62        70        70        85        85        89
SFB 6 Exhaust-Zone1      56     62        70        70        85        85        89
SFB 6 IntakeA-Zone0      56     62        70        70        85        85        89
SFB 6 IntakeB-Zone1      56     62        70        70        85        85        89
SFB 6 Exhaust-Zone0      56     62        70        70        85        85        89
SFB 6 SFB-XF2-Zone1      70     75        90        85        95        90       100
SFB 6 SFB-XF1-Zone0      70     75        90        85        95        90       100
SFB 6 SFB-XF0-Zone0      70     75        90        85        95        90       100
```



```
SFB 7 Intake-Zone0       56     62         70         70         85         85         89
SFB 7 Exhaust-Zone1      56     62         70         70         85         85         89
SFB 7 IntakeA-Zone0      56     62         70         70         85         85         89
SFB 7 IntakeB-Zone1      56     62         70         70         85         85         89
SFB 7 Exhaust-Zone0      56     62         70         70         85         85         89
SFB 7 SFB-XF2-Zone1      70     75         90         85         95         90        100
SFB 7 SFB-XF1-Zone0      70     75         90         85         95         90        100
SFB 7 SFB-XF0-Zone0      70     75         90         85         95         90        100
FPC 0                    55     60         75         65         90         80         95
FPC 9                    55     60         75         65         90         80         95
FPC 10                   55     60         75         65         90         80         95
FPC 14                   55     60         75         65         95         80        100
FPC 19                   55     60         75         65         90         80         95
ADC 0 Intake             50     55         60         60         65         65         80
ADC 0 Exhaust            50     55         60         60         65         65         80
ADC 0 ADC-XF1            70     75         90         85         95         90        100
ADC 0 ADC-XF0            70     75         90         85         95         90        100
ADC 9 Intake             50     55         60         60         65         65         80
ADC 9 Exhaust            50     55         60         60         65         65         80
ADC 9 ADC-XF1            70     75         90         85         95         90        100
ADC 9 ADC-XF0            70     75         90         85         95         90        100
ADC 10 Intake            50     55         60         60         65         65         80
ADC 10 Exhaust           50     55         60         60         65         65         80
ADC 10 ADC-XF1           70     75         90         85         95         90        100
ADC 10 ADC-XF0           70     75         90         85         95         90        100
ADC 14 Intake            50     55         60         60         65         65         80
ADC 14 Exhaust           50     55         60         60         65         65         80
ADC 14 ADC-XF1           70     75         90         85         95         90        100
ADC 14 ADC-XF0           70     75         90         85         95         90        100
ADC 19 Intake            50     55         60         60         65         65         80
ADC 19 Exhaust           50     55         60         60         65         65         80
ADC 19 ADC-XF1           70     75         90         85         95         90        100
ADC 19 ADC-XF0           70     75         90         85         95         90        100
```

show chassis temperature-thresholds (MX2008 Routers)

user@host> **show chassis temperature-thresholds**

```
                          Fan speed      Yellow alarm      Red alarm      Fire
Shutdown
                         (degrees C)      (degrees C)     (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
Routing Engine 0 CPU         58    63       78       75       93       90
98
Routing Engine 1 CPU         58    63       78       75       93       90
98
CB 0 Inlet1                  55    60       65       62       75       72
85
CB 0 Inlet2                  45    50       61       58       80       77
90
CB 0 Inlet3                  57    62       68       65       80       77
90
CB 0 Inlet4                  55    60       80       77       90       87
95
CB 0 Exhaust1                55    60       65       62       75       72
85
CB 0 Exhaust2                50    55       60       57       80       77
90
```



```
CB 0 Exhaust3                70     75       81       78       91       88
96
CB 0 Exhaust4                75     80       90       87      100       97
105
CB 1 Inlet1                  55     60       65       62       75       72
85
CB 1 Inlet2                  45     50       61       58       80       77
90
CB 1 Inlet3                  57     62       68       65       80       77
90
CB 1 Inlet4                  55     60       80       77       90       87
95
CB 1 Exhaust1                55     60       65       62       75       72
85
CB 1 Exhaust2                50     55       60       57       80       77
90
CB 1 Exhaust3                70     75       81       78       91       88
96
CB 1 Exhaust4                75     80       90       87      100       97
105
SFB 0 Inlet1                 49     54       62       59       76       73
81
SFB 0 Inlet2                 65     70       71       68       83       80
88
SFB 0 Exhaust1               45     50       61       58       75       72
80
SFB 0 Exhaust2               60     65       69       66       80       77
85
SFB 0 SFB2-PF-local          65     70       75       72       95       92
100
SFB 0 SFB2-PF-die            88     93       98       95      118      115
120
SFB 1 Inlet1                 49     54       62       59       76       73
81
SFB 1 Inlet2                 65     70       71       68       83       80
88
SFB 1 Exhaust1               45     50       61       58       75       72
80
SFB 1 Exhaust2               60     65       69       66       80       77
85
SFB 1 SFB2-PF-local          65     70       75       72       95       92
100
SFB 1 SFB2-PF-die            88     93       98       95      118      115
120
SFB 2 Inlet1                 49     54       62       59       76       73
81
SFB 2 Inlet2                 65     70       71       68       83       80
88
SFB 2 Exhaust1               45     50       61       58       75       72
80
SFB 2 Exhaust2               60     65       69       66       80       77
85
SFB 2 SFB2-PF-local          65     70       75       72       95       92
100
SFB 2 SFB2-PF-die            88     93       98       95      118      115
120
SFB 3 Inlet1                 49     54       62       59       76       73
81
SFB 3 Inlet2                 65     70       71       68       83       80
88
```



```
SFB 3 Exhaust1                 45    50       61       58       75       72
80
SFB 3 Exhaust2                 60    65       69       66       80       77
85
SFB 3 SFB2-PF-local            65    70       75       72       95       92
100
SFB 3 SFB2-PF-die              88    93       98       95      118      115
120
SFB 4 Inlet1                   49    54       62       59       76       73
81
SFB 4 Inlet2                   65    70       71       68       83       80
88
SFB 4 Exhaust1                 45    50       61       58       75       72
80
SFB 4 Exhaust2                 60    65       69       66       80       77
85
SFB 4 SFB2-PF-local            65    70       75       72       95       92
100
SFB 4 SFB2-PF-die              88    93       98       95      118      115
120
SFB 5 Inlet1                   49    54       62       59       76       73
81
SFB 5 Inlet2                   65    70       71       68       83       80
88
SFB 5 Exhaust1                 45    50       61       58       75       72
80
SFB 5 Exhaust2                 60    65       69       66       80       77
85
SFB 5 SFB2-PF-local            65    70       75       72       95       92
100
SFB 5 SFB2-PF-die              88    93       98       95      118      115
120
SFB 6 Inlet1                   49    54       62       59       76       73
81
SFB 6 Inlet2                   65    70       71       68       83       80
88
SFB 6 Exhaust1                 45    50       61       58       75       72
80
SFB 6 Exhaust2                 60    65       69       66       80       77
85
SFB 6 SFB2-PF-local            65    70       75       72       95       92
100
SFB 6 SFB2-PF-die              88    93       98       95      118      115
120
SFB 7 Inlet1                   49    54       62       59       76       73
81
SFB 7 Inlet2                   65    70       71       68       83       80
88
SFB 7 Exhaust1                 45    50       61       58       75       72
80
SFB 7 Exhaust2                 60    65       69       66       80       77
85
SFB 7 SFB2-PF-local            65    70       75       72       95       92
100
SFB 7 SFB2-PF-die              88    93       98       95      118      115
120
FPC 0                          55    60       75       65       90       80
95
FPC 3                          55    60       75       65      105       80
110
```

```
FPC 5                         55    60        75        65       105        80
110
FPC 7                         55    60        75        65        90        80
95
FPC 9 Intake                  60    65        75        75        85        85
95
FPC 9 Exhaust A               60    65        75        75        85        85
95
FPC 9 Exhaust B               60    65        75        75        85        85
95
FPC 9 XL 0 Chip               70    75        85        85       102       102
110
FPC 9 XL 0 XR2 0 Chip         75    80        90        90       105       105
115
FPC 9 XL 0 XR2 1 Chip         75    80        90        90       105       105
115
FPC 9 XL 1 Chip               70    75        85        85       102       102
110
FPC 9 XL 1 XR2 0 Chip         75    80        90        90       105       105
115
FPC 9 XL 1 XR2 1 Chip         75    80        90        90       105       105
115
FPC 9 XM 0 Chip               70    75        85        85       100       100
110
FPC 9 XM 1 Chip               70    75        85        85       100       100
110
FPC 9 XM 2 Chip               70    75        85        85       100       100
110
FPC 9 XM 3 Chip               70    75        85        85       100       100
110
FPC 9 PCIe Switch Chip        80    85        95        95       105       105
120
ADC 0 Intake                  50    55        65        65        75        75
80
ADC 0 Exhaust                 50    55        65        65        75        75
80
ADC 0 ADC-XF1                 70    75        90        85        95        90
100
ADC 0 ADC-XF0                 70    75        90        85        95        90
100
ADC 3 Intake                  50    55        65        65        75        75
80
ADC 3 Exhaust                 50    55        65        65        75        75
80
ADC 3 ADC-XF1                 70    75        90        85        95        90
100
ADC 3 ADC-XF0                 70    75        90        85        95        90
100
ADC 5 Intake                  50    55        65        65        75        75
80
ADC 5 Exhaust                 50    55        65        65        75        75
80
ADC 5 ADC-XF1                 70    75        90        85        95        90
100
ADC 5 ADC-XF0                 70    75        90        85        95        90
100
ADC 7 Intake                  50    55        65        65        75        75
80
ADC 7 Exhaust                 50    55        65        65        75        75
80
```



```
ADC 7 ADC-XF1                  70     75       90        85        95        90
100
ADC 7 ADC-XF0                  70     75       90        85        95        90
100
```

show chassis temperature-thresholds (MX10003 Router)

`user@host>` **show chassis temperature-thresholds**

```
                          Fan speed      Yellow alarm      Red alarm      Fire
Shutdown
                         (degrees C)      (degrees C)     (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
Routing Engine 0           48     54       85        85       100       100
102
Routing Engine 1           48     54       85        85       100       100
102
CB 0 Exhaust Temp Sensor   60     65       75        75        85        85
95
CB 0 Inlet Temp Sensor     60     65       75        75        85        85
95
CB 0 CPU DIE Temp Sensor   83     90       98        98       105       105
110
CB 1 Exhaust Temp Sensor   60     65       75        75        85        85
95
CB 1 Inlet Temp Sensor     60     65       75        75        85        85
95
CB 1 CPU DIE Temp Sensor   83     90       98        98       105       105
110
FPC 0 Intake Temp Sensor   40     45       75        70        85        80
95
FPC 0 Exhaust-A Temp Sensor  55   60       85        80        90        90
100
FPC 0 Exhaust-B Temp Sensor  55   60       85        80        90        90
100
FPC 0 EA0 Chip             87     92       97        97       105       105
110
FPC 0 EA0-XR0 Chip         88     93       98        98       120       120
125
FPC 0 EA0-XR1 Chip         88     93       98        98       120       120
125
FPC 0 EA1 Chip             87     92       97        97       105       105
110
FPC 0 EA1-XR0 Chip         88     93       98        98       120       120
125
FPC 0 EA1-XR1 Chip         88     93       98        98       120       120
125
FPC 0 EA2 Chip             87     92       97        97       105       105
110
FPC 0 EA2-XR0 Chip         88     93       98        98       120       120
125
FPC 0 EA2-XR1 Chip         88     93       98        98       120       120
125
FPC 0 PF Chip              89     94      104       104       120       120
120
FPC 0 EA0_HMC0 Logic die   88     93      103       103       120       120
125
```

```
FPC 0 EA0_HMC0 DRAM botm     83    88       98       98       120       120
125
FPC 0 EA0_HMC1 Logic die     88    93      103      103       120       120
125
FPC 0 EA0_HMC1 DRAM botm     83    88       98       98       120       120
125
FPC 0 EA0_HMC2 Logic die     88    93      103      103       120       120
125
FPC 0 EA0_HMC2 DRAM botm     83    88       98       98       120       120
125
FPC 0 EA1_HMC0 Logic die     88    93      103      103       120       120
125
FPC 0 EA1_HMC0 DRAM botm     83    88       98       98       120       120
125
FPC 0 EA1_HMC1 Logic die     88    93      103      103       120       120
125
FPC 0 EA1_HMC1 DRAM botm     83    88       98       98       120       120
125
FPC 0 EA1_HMC2 Logic die     88    93      103      103       120       120
125
FPC 0 EA1_HMC2 DRAM botm     83    88       98       98       120       120
125
FPC 0 EA2_HMC0 Logic die     88    93      103      103       120       120
125
FPC 0 EA2_HMC0 DRAM botm     83    88       98       98       120       120
125
FPC 0 EA2_HMC1 Logic die     88    93      103      103       120       120
125
FPC 0 EA2_HMC1 DRAM botm     83    88       98       98       120       120
125
FPC 0 EA2_HMC2 Logic die     88    93      103      103       120       120
125
FPC 0 EA2_HMC2 DRAM botm     83    88       98       98       120       120
125
FPC 1 Intake Temp Sensor     40    45       75       70        85        80
95
FPC 1 Exhaust-A Temp Sensor   55    60       85       80        90        90
100
FPC 1 Exhaust-B Temp Sensor   55    60       85       80        90        90
100
FPC 1 EA0 Chip               87    92       97       97       105       105
110
FPC 1 EA0-XR0 Chip           88    93       98       98       120       120
125
FPC 1 EA0-XR1 Chip           88    93       98       98       120       120
125
FPC 1 EA1 Chip               87    92       97       97       105       105
110
FPC 1 EA1-XR0 Chip           88    93       98       98       120       120
125
FPC 1 EA1-XR1 Chip           88    93       98       98       120       120
125
FPC 1 EA2 Chip               87    92       97       97       105       105
110
FPC 1 EA2-XR0 Chip           88    93       98       98       120       120
125
FPC 1 EA2-XR1 Chip           88    93       98       98       120       120
125
FPC 1 PF Chip                89    94      104      104       120       120
120
```



```
FPC 1 EA0_HMC0 Logic die     88     93      103       103       120       120
125
FPC 1 EA0_HMC0 DRAM botm     83     88       98        98       120       120
125
FPC 1 EA0_HMC1 Logic die     88     93      103       103       120       120
125
FPC 1 EA0_HMC1 DRAM botm     83     88       98        98       120       120
125
FPC 1 EA0_HMC2 Logic die     88     93      103       103       120       120
125
FPC 1 EA0_HMC2 DRAM botm     83     88       98        98       120       120
125
FPC 1 EA1_HMC0 Logic die     88     93      103       103       120       120
125
FPC 1 EA1_HMC0 DRAM botm     83     88       98        98       120       120
125
FPC 1 EA1_HMC1 Logic die     88     93      103       103       120       120
125
FPC 1 EA1_HMC1 DRAM botm     83     88       98        98       120       120
125
FPC 1 EA1_HMC2 Logic die     88     93      103       103       120       120
125
FPC 1 EA1_HMC2 DRAM botm     83     88       98        98       120       120
125
FPC 1 EA2_HMC0 Logic die     88     93      103       103       120       120
125
FPC 1 EA2_HMC0 DRAM botm     83     88       98        98       120       120
125
FPC 1 EA2_HMC1 Logic die     88     93      103       103       120       120
125
FPC 1 EA2_HMC1 DRAM botm     83     88       98        98       120       120
125
FPC 1 EA2_HMC2 Logic die     88     93      103       103       120       120
125
FPC 1 EA2_HMC2 DRAM botm     83     88       98        98       120       120
125
```

show chassis temperature-thresholds (MX10008 Router)

`user@host>` **show chassis temperature-thresholds**

```
                                      Fan speed      Yellow alarm      Red alarm
      Fire Shutdown
                                       (degrees C)      (degrees C)     (degrees
 C)      (degrees C)
Item                                  Normal  High    Normal  Bad fan    Normal
Bad fan      Normal
Routing Engine 0                          65     70        95        95       100
   100          110
Routing Engine 1                          65     70        95        95       100
   100          110
CB 0 Intake A Temp Sensor                 30     35        80        80        85
    85          95
CB 0 Intake B Temp Sensor                 30     35        80        80        85
    85          95
CB 0 Exhaust A Temp Sensor                40     45        80        80        85
    85          95
CB 0 Exhaust B Temp Sensor                40     45        80        80        85
    85          95
CB 0 Middle Temp Sensor                   40     45        80        80        85
```

```
    85         95
CB 1 Intake A Temp Sensor                   30     35       80       80       85
    85         95
CB 1 Intake B Temp Sensor                   30     35       80       80       85
    85         95
CB 1 Exhaust A Temp Sensor                  40     45       80       80       85
    85         95
CB 1 Exhaust B Temp Sensor                  40     45       80       80       85
    85         95
CB 1 Middle Temp Sensor                     40     45       80       80       85
    85         95
FPC 0 Intake-A Temp Sensor                  52     62       72       72       85
    85         90
FPC 0 Exhaust-A Temp Sensor                 75     85       98       98      103
   103        108
FPC 0 Exhaust-B Temp Sensor                 75     85       98       98      103
   103        108
FPC 0 EA0 Temp Sensor                       62     72       90       90      100
   100        105
FPC 0 EA0_XR0 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA0_XR1 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA1 Temp Sensor                       62     72       90       90      100
   100        105
FPC 0 EA1_XR0 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA1_XR1 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA2 Temp Sensor                       62     72       90       90      100
   100        105
FPC 0 EA2_XR0 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA2_XR1 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA3 Temp Sensor                       62     72       90       90      100
   100        105
FPC 0 EA3_XR0 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA3_XR1 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA4 Temp Sensor                       62     72       90       90      100
   100        105
FPC 0 EA4_XR0 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA4_XR1 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA5 Temp Sensor                       62     72       90       90      100
   100        105
FPC 0 EA5_XR0 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA5_XR1 Temp Sensor                   77     87      100      100      105
   105        108
FPC 0 EA0_HMC0 Logic die                    79     89      103      103      110
   110        115
FPC 0 EA0_HMC0 DRAM botm                    74     84       98       98      105
   105        110
FPC 0 EA0_HMC1 Logic die                    79     89      103      103      110
   110        115
FPC 0 EA0_HMC1 DRAM botm                    74     84       98       98      105
```

```
   105        110
FPC 0 EA0_HMC2 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA0_HMC2 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA1_HMC0 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA1_HMC0 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA1_HMC1 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA1_HMC1 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA1_HMC2 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA1_HMC2 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA2_HMC0 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA2_HMC0 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA2_HMC1 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA2_HMC1 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA2_HMC2 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA2_HMC2 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA3_HMC0 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA3_HMC0 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA3_HMC1 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA3_HMC1 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA3_HMC2 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA3_HMC2 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA4_HMC0 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA4_HMC0 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA4_HMC1 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA4_HMC1 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA4_HMC2 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA4_HMC2 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA5_HMC0 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA5_HMC0 DRAM botm                         74    84       98       98      105
   105        110
FPC 0 EA5_HMC1 Logic die                         79    89      103      103      110
   110        115
FPC 0 EA5_HMC1 DRAM botm                         74    84       98       98      105
```



```
  105        110
FPC 0 EA5_HMC2 Logic die                         79    89      103       103       110
  110        115
FPC 0 EA5_HMC2 DRAM botm                         74    84       98        98       105
  105        110
FPC 2 Intake-A Temp Sensor                       52    62       72        72        85
   85         90
FPC 2 Exhaust-A Temp Sensor                      75    85       98        98       103
  103        108
FPC 2 Exhaust-B Temp Sensor                      75    85       98        98       103
  103        108
FPC 2 EA0 Temp Sensor                            62    72       90        90       100
  100        105
FPC 2 EA0_XR0 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA0_XR1 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA1 Temp Sensor                            62    72       90        90       100
  100        105
FPC 2 EA1_XR0 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA1_XR1 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA2 Temp Sensor                            62    72       90        90       100
  100        105
FPC 2 EA2_XR0 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA2_XR1 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA3 Temp Sensor                            62    72       90        90       100
  100        105
FPC 2 EA3_XR0 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA3_XR1 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA4 Temp Sensor                            62    72       90        90       100
  100        105
FPC 2 EA4_XR0 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA4_XR1 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA5 Temp Sensor                            62    72       90        90       100
  100        105
FPC 2 EA5_XR0 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA5_XR1 Temp Sensor                        77    87      100       100       105
  105        108
FPC 2 EA0_HMC0 Logic die                         79    89      103       103       110
  110        115
FPC 2 EA0_HMC0 DRAM botm                         74    84       98        98       105
  105        110
FPC 2 EA0_HMC1 Logic die                         79    89      103       103       110
  110        115
FPC 2 EA0_HMC1 DRAM botm                         74    84       98        98       105
  105        110
FPC 2 EA0_HMC2 Logic die                         79    89      103       103       110
  110        115
FPC 2 EA0_HMC2 DRAM botm                         74    84       98        98       105
  105        110
FPC 2 EA1_HMC0 Logic die                         79    89      103       103       110
```



```
   110        115
FPC 2 EA1_HMC0 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA1_HMC1 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA1_HMC1 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA1_HMC2 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA1_HMC2 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA2_HMC0 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA2_HMC0 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA2_HMC1 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA2_HMC1 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA2_HMC2 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA2_HMC2 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA3_HMC0 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA3_HMC0 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA3_HMC1 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA3_HMC1 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA3_HMC2 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA3_HMC2 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA4_HMC0 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA4_HMC0 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA4_HMC1 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA4_HMC1 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA4_HMC2 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA4_HMC2 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA5_HMC0 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA5_HMC0 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA5_HMC1 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA5_HMC1 DRAM botm                    74    84      98       98      105
   105        110
FPC 2 EA5_HMC2 Logic die                    79    89     103      103      110
   110        115
FPC 2 EA5_HMC2 DRAM botm                    74    84      98       98      105
   105        110
FPC 3 Intake-A Temp Sensor                  52    62      72       72       85
```

```
    85         90
FPC 3 Exhaust-A Temp Sensor               75    85       98        98       103
   103        108
FPC 3 Exhaust-B Temp Sensor               75    85       98        98       103
   103        108
FPC 3 EA0 Temp Sensor                     62    72       90        90       100
   100        105
FPC 3 EA0_XR0 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA0_XR1 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA1 Temp Sensor                     62    72       90        90       100
   100        105
FPC 3 EA1_XR0 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA1_XR1 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA2 Temp Sensor                     62    72       90        90       100
   100        105
FPC 3 EA2_XR0 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA2_XR1 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA3 Temp Sensor                     62    72       90        90       100
   100        105
FPC 3 EA3_XR0 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA3_XR1 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA4 Temp Sensor                     62    72       90        90       100
   100        105
FPC 3 EA4_XR0 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA4_XR1 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA5 Temp Sensor                     62    72       90        90       100
   100        105
FPC 3 EA5_XR0 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA5_XR1 Temp Sensor                 77    87      100       100       105
   105        108
FPC 3 EA0_HMC0 Logic die                  79    89      103       103       110
   110        115
FPC 3 EA0_HMC0 DRAM botm                  74    84       98        98       105
   105        110
FPC 3 EA0_HMC1 Logic die                  79    89      103       103       110
   110        115
FPC 3 EA0_HMC1 DRAM botm                  74    84       98        98       105
   105        110
FPC 3 EA0_HMC2 Logic die                  79    89      103       103       110
   110        115
FPC 3 EA0_HMC2 DRAM botm                  74    84       98        98       105
   105        110
FPC 3 EA1_HMC0 Logic die                  79    89      103       103       110
   110        115
FPC 3 EA1_HMC0 DRAM botm                  74    84       98        98       105
   105        110
FPC 3 EA1_HMC1 Logic die                  79    89      103       103       110
   110        115
FPC 3 EA1_HMC1 DRAM botm                  74    84       98        98       105
```



```
   105        110
FPC 3 EA1_HMC2 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA1_HMC2 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA2_HMC0 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA2_HMC0 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA2_HMC1 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA2_HMC1 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA2_HMC2 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA2_HMC2 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA3_HMC0 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA3_HMC0 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA3_HMC1 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA3_HMC1 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA3_HMC2 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA3_HMC2 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA4_HMC0 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA4_HMC0 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA4_HMC1 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA4_HMC1 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA4_HMC2 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA4_HMC2 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA5_HMC0 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA5_HMC0 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA5_HMC1 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA5_HMC1 DRAM botm                         74    84       98       98      105
   105        110
FPC 3 EA5_HMC2 Logic die                         79    89      103      103      110
   110        115
FPC 3 EA5_HMC2 DRAM botm                         74    84       98       98      105
   105        110
SFB 0 Intake-A                                   65    75       85       85       95
    95        105
SFB 0 Intake-B                                   65    75       85       85       95
    95        105
SFB 0 Exhaust-A                                  75    85       95       95       95
    95        105
SFB 0 Exhaust-B                                  75    85       95       95       95
```

```
     95        105
SFB 0 PF0                                       65     75      100       100       105
    105        115
SFB 0 PF1                                       65     75      100       100       105
    105        115
SFB 1 Intake-A                                  65     75       85        85        95
     95        105
SFB 1 Intake-B                                  65     75       85        85        95
     95        105
SFB 1 Exhaust-A                                 75     85       95        95        95
     95        105
SFB 1 Exhaust-B                                 75     85       95        95        95
     95        105
SFB 1 PF0                                       65     75      100       100       105
    105        115
SFB 1 PF1                                       65     75      100       100       105
    105        115
SFB 2 Intake-A                                  65     75       85        85        95
     95        105
SFB 2 Intake-B                                  65     75       85        85        95
     95        105
SFB 2 Exhaust-A                                 75     85       95        95        95
     95        105
SFB 2 Exhaust-B                                 75     85       95        95        95
     95        105
SFB 2 PF0                                       65     75      100       100       105
    105        115
SFB 2 PF1                                       65     75      100       100       105
    105        115
SFB 3 Intake-A                                  65     75       85        85        95
     95        105
SFB 3 Intake-B                                  65     75       85        85        95
     95        105
SFB 3 Exhaust-A                                 75     85       95        95        95
     95        105
SFB 3 Exhaust-B                                 75     85       95        95        95
     95        105
SFB 3 PF0                                       65     75      100       100       105
    105        115
SFB 3 PF1                                       65     75      100       100       105
    105        115
SFB 4 Intake-A                                  65     75       85        85        95
     95        105
SFB 4 Intake-B                                  65     75       85        85        95
     95        105
SFB 4 Exhaust-A                                 75     85       95        95        95
     95        105
SFB 4 Exhaust-B                                 75     85       95        95        95
     95        105
SFB 4 PF0                                       65     75      100       100       105
    105        115
SFB 4 PF1                                       65     75      100       100       105
    105        115
SFB 5 Intake-A                                  65     75       85        85        95
     95        105
SFB 5 Intake-B                                  65     75       85        85        95
     95        105
SFB 5 Exhaust-A                                 75     85       95        95        95
     95        105
SFB 5 Exhaust-B                                 75     85       95        95        95
```



```
    95         105
SFB 5 PF0                                       65     75       100       100       105
   105         115
SFB 5 PF1                                       65     75       100       100       105
   105         115
```

show chassis temperature-thresholds (MX204 Router)

user@host> **show chassis temperature-thresholds**

```

                                      Fan speed      Yellow alarm      Red alarm
      Fire Shutdown
                                      (degrees C)     (degrees C)      (degrees
 C)      (degrees C)
Item                                  Normal  High   Normal  Bad fan   Normal
Bad fan     Normal
Routing Engine                          48     54        85        85       100
   100         102
CB Top Right Inlet Sensor               35     40        63        63        85
    85          95
CB Top Left Inlet Sensor                40     45        65        65        85
    85          95
CB Top Right Exhaust Sensor             45     50        68        68        85
    85          95
CB Top Left Exhaust Sensor              65     70        78        78        85
    85          95
CB CPU Core-0 Temp                      65     70        80        80        90
    90         100
CB CPU Core-1 Temp                      65     70        80        80        90
    90         100
CB CPU Core-2 Temp                      65     70        80        80        90
    90         100
CB CPU Core-3 Temp                      65     70        80        80        90
    90         100
CB CPU Core-4 Temp                      65     70        80        80        90
    90         100
CB CPU Core-5 Temp                      65     70        80        80        90
    90         100
CB CPU Core-6 Temp                      65     70        80        80        90
    90         100
CB CPU Core-7 Temp                      65     70        80        80        90
    90         100
FPC EA0_HMC0 Logic die                  85     90        95        95       105
   105         110
FPC EA0_HMC0 DRAM botm                  80     85        90        90       105
   105         110
FPC EA0_HMC1 Logic die                  85     90        95        95       105
   105         110
FPC EA0_HMC1 DRAM botm                  80     85        90        90       105
   105         110
FPC EA0 Chip                            92     97       103       103       109
   109         115
FPC EA0-XR0 Chip                        85     90        98        98       103
   103         110
FPC EA0-XR1 Chip                        85     90        98        98       103
   103         110
```

show chassis temperature-thresholds (PTX10008 Routers)

```
user@host> show chassis temperature-thresholds
                            Fan speed      Yellow alarm      Red alarm      Fire
Shutdown
                           (degrees C)      (degrees C)     (degrees C)
(degrees C)
Item                      Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
Routing Engine 0              48    54       85       85      100      100
102
Routing Engine 1              48    54       85       85      100      100
102
CB 0 Intake Temp Sensor       30    35       80       80       85       85
95
CB 0 Exhaust Temp Sensor      30    35       80       80       85       85
95
CB 0 CPU Die Temp Sensor      40    45       95       95      100      100
110
CB 1 Intake Temp Sensor       30    35       80       80       85       85
95
CB 1 Exhaust Temp Sensor      30    35       80       80       85       85
95
CB 1 CPU Die Temp Sensor      40    45       95       95      100      100
110
FPC 0 Intake-A Temp Sensor    30    35       80       80       85       85
95
FPC 0 Intake-B Temp Sensor    30    35       80       80       85       85
95
FPC 0 Exhaust-A Temp Sensor    30    35       80       80       85       85
95
FPC 0 Exhaust-B Temp Sensor    30    35       80       80       85       85
95
FPC 0 Exhaust-C Temp Sensor    30    35       80       80       85       85
95
FPC 0 PE0 Temp Sensor         40    45      100      100      105      105
115
FPC 0 PE1 Temp Sensor         40    45      100      100      105      105
115
FPC 0 PE2 Temp Sensor         40    45      100      100      105      105
115
FPC 0 LCPU Temp Sensor        40    45       95       95      100      100
110
FPC 5 Intake-A Temp Sensor    30    35       80       80       85       85
95
FPC 5 Intake-B Temp Sensor    30    35       80       80       85       85
95
FPC 5 Exhaust-A Temp Sensor    30    35       80       80       85       85
95
FPC 5 Exhaust-B Temp Sensor    30    35       80       80       85       85
95
FPC 5 Exhaust-C Temp Sensor    30    35       80       80       85       85
95
FPC 5 PE0 Temp Sensor         40    45      100      100      105      105
115
FPC 5 PE1 Temp Sensor         40    45      100      100      105      105
115
FPC 5 PE2 Temp Sensor         40    45      100      100      105      105
115
FPC 5 PE3 Temp Sensor         40    45      100      100      105      105
```



```
115
FPC 5 PE4 Temp Sensor        40     45      100       100       105       105
115
FPC 5 PE5 Temp Sensor        40     45      100       100       105       105
115
FPC 5 LCPU Temp Sensor       40     45       95        95       100       100
110
FPC 6 Intake-A Temp Sensor   30     35       80        80        85        85
95
FPC 6 Intake-B Temp Sensor   30     35       80        80        85        85
95
FPC 6 Exhaust-A Temp Sensor   30    35       80        80        85        85
95
FPC 6 Exhaust-B Temp Sensor   30    35       80        80        85        85
95
FPC 6 Exhaust-C Temp Sensor   30    35       80        80        85        85
95
FPC 6 PE0 Temp Sensor        40     45      100       100       105       105
115
FPC 6 PE1 Temp Sensor        40     45      100       100       105       105
115
FPC 6 PE2 Temp Sensor        40     45      100       100       105       105
115
FPC 6 PE3 Temp Sensor        40     45      100       100       105       105
115
FPC 6 PE4 Temp Sensor        40     45      100       100       105       105
115
FPC 6 PE5 Temp Sensor        40     45      100       100       105       105
115
FPC 6 LCPU Temp Sensor       40     45       95        95       100       100
110
SIB 0 Intake-A Temp Sensor   40     45       90        90        95        95
105
SIB 0 Intake-B Temp Sensor   40     45       90        90        95        95
105
SIB 0 Exhaust-A Temp Sensor   40    45       90        90        95        95
105
SIB 0 Exhaust-B Temp Sensor   40    45       90        90        95        95
105
SIB 0 PF0 Temp Sensor        50     55      100       100       105       105
115
SIB 0 PF1 Temp Sensor        50     55      100       100       105       105
115
SIB 1 Intake-A Temp Sensor   40     45       90        90        95        95
105
SIB 1 Intake-B Temp Sensor   40     45       90        90        95        95
105
SIB 1 Exhaust-A Temp Sensor   40    45       90        90        95        95
105
SIB 1 Exhaust-B Temp Sensor   40    45       90        90        95        95
105
SIB 1 PF0 Temp Sensor        50     55      100       100       105       105
115
SIB 1 PF1 Temp Sensor        50     55      100       100       105       105
115
```

show chassis temperature-thresholds (T4000 Core Routers)

`user@host>` **show chassis temperature-thresholds**

```
                         Fan speed        Yellow alarm        Red alarm    Fire Shutdown

                        (degrees C)      (degrees C)       (degrees C)     (degrees C)
Item                    Normal  High   Normal  Bad fan   Normal  Bad fan     Normal
Chassis default           48     54      65      55        75      65         100
Routing Engine 0          55     65      85      85       100     100         102
Routing Engine 1          55     65      85      85       100     100         102
FPC 0                     63     68      75      70        90      83          95
FPC 3                     63     68      75      70        90      83          95
FPC 5                     56     62      75      63        83      76          95
FPC 6                     63     68      75      70        90      83          95
SIB 0                     64     70      76      72        87      84          95
SIB 1                     64     70      76      72        87      84          95
SIB 2                     64     70      76      72        87      84          95
SIB 3                     64     70      76      72        87      84          95
SIB 4                     64     70      76      72        87      84          95
```

show chassis temperature-thresholds (TX Matrix Plus Router)

user@host> **show chassis temperature-thresholds**

```
sfc0-re0:
--------------------------------------------------------------------------
                                Fan speed         Yellow alarm          Red alarm
                               (degrees C)        (degrees C)         (degrees C)
Item                          Normal    High    Normal    Bad fan    Normal    Bad fan
Chassis default                   48      54        65        55        75         65
Routing Engine 0                  55      65        85        85       100        100
Routing Engine 1                  55      65        85        85       100        100
SIB F13 0                         64      70        76        72        90         84
SIB F13 3                         64      70        76        72        90         84
SIB F13 6                         64      70        76        72        90         84
SIB F13 8                         64      70        76        72        90         84
SIB F13 11                        64      70        76        72        90         84
SIB F13 12                        64      70        76        72        90         84
SIB F2S 16                        64      70        76        72        90         84
SIB F2S 17                        64      70        76        72        90         84
SIB F2S 18                        64      70        76        72        90         84
SIB F2S 19                        64      70        76        72        90         84
SIB F2S 20                        64      70        76        72        90         84
SIB F2S 21                        64      70        76        72        90         84
SIB F2S 22                        64      70        76        72        90         84
SIB F2S 23                        64      70        76        72        90         84
SIB F2S 24                        64      70        76        72        90         84
SIB F2S 25                        64      70        76        72        90         84
SIB F2S 26                        64      70        76        72        90         84
SIB F2S 27                        64      70        76        72        90         84
SIB F2S 28                        64      70        76        72        90         84
SIB F2S 29                        64      70        76        72        90         84
SIB F2S 30                        64      70        76        72        90         84
SIB F2S 31                        64      70        76        72        90         84
SIB F2S 32                        64      70        76        72        90         84
SIB F2S 33                        64      70        76        72        90         84
SIB F2S 34                        64      70        76        72        90         84
SIB F2S 35                        64      70        76        72        90         84

lcc0-re0:
--------------------------------------------------------------------------
                                Fan speed         Yellow alarm          Red alarm
```



```
                         (degrees C)        (degrees C)        (degrees C)
Item                     Normal   High     Normal   Bad fan   Normal   Bad fan
Chassis default              48     54         65        55       75        65
Routing Engine 0             55     65         85        85      100       100
Routing Engine 1             55     65         85        85      100       100
FPC 1                        56     62         75        63       83        76
FPC 3                        56     62         75        63       83        76
FPC 4                        56     62         75        63       83        76
FPC 6                        56     62         75        63       83        76
FPC 7                        56     62         75        63       83        76
SIB 0                        48     54         65        60       80        75
SIB 1                        48     54         65        60       80        75
SIB 2                        48     54         65        60       80        75
SIB 3                        48     54         65        60       80        75
SIB 4                        48     54         65        60       80        75

lcc1-re0:
--------------------------------------------------------------------------
                          Fan speed        Yellow alarm         Red alarm
                         (degrees C)        (degrees C)        (degrees C)
Item                     Normal   High     Normal   Bad fan   Normal   Bad fan
Chassis default              48     54         65        55       75        65
Routing Engine 0             55     65         85        85      100       100
Routing Engine 1             55     65         85        85      100       100
FPC 1                        56     62         75        63       83        76
FPC 3                        56     62         75        63       83        76
FPC 4                        56     62         75        63       83        76
FPC 6                        56     62         75        63       83        76
...
```

show chassis temperature-thresholds lcc (TX Matrix Plus Router)

user@host> **show chassis temperature-thresholds lcc 1**

```
lcc1-re0:
--------------------------------------------------------------------------
                          Fan speed        Yellow alarm         Red alarm
                         (degrees C)        (degrees C)        (degrees C)
Item                     Normal   High     Normal   Bad fan   Normal   Bad fan
Chassis default              48     54         65        55       75        65
Routing Engine 0             55     65         85        85      100       100
Routing Engine 1             55     65         85        85      100       100
FPC 1                        56     62         75        63       83        76
FPC 3                        56     62         75        63       83        76
FPC 4                        56     62         75        63       83        76
FPC 6                        56     62         75        63       83        76
SIB 0                        48     54         65        60       80        75
SIB 1                        48     54         65        60       80        75
SIB 2                        48     54         65        60       80        75
SIB 3                        48     54         65        60       80        75
SIB 4                        48     54         65        60       80        75
```

show chassis temperature-thresholds sfc (TX Matrix Plus Router)

user@host> **show chassis temperature-thresholds sfc 0**

```
sfc0-re0:
--------------------------------------------------------------------------
                          Fan speed        Yellow alarm         Red alarm
```

```
                          (degrees C)        (degrees C)        (degrees C)
Item                     Normal   High     Normal   Bad fan   Normal   Bad fan
Chassis default              48     54         65        55       75        65
Routing Engine 0             55     65         85        85      100       100
Routing Engine 1             55     65         85        85      100       100
SIB F13 0                    64     70         76        72       90        84
SIB F13 3                    64     70         76        72       90        84
SIB F13 6                    64     70         76        72       90        84
SIB F13 8                    64     70         76        72       90        84
SIB F13 11                   64     70         76        72       90        84
SIB F13 12                   64     70         76        72       90        84
SIB F2S 16                   64     70         76        72       90        84
SIB F2S 17                   64     70         76        72       90        84
SIB F2S 18                   64     70         76        72       90        84
SIB F2S 19                   64     70         76        72       90        84
SIB F2S 20                   64     70         76        72       90        84
SIB F2S 21                   64     70         76        72       90        84
SIB F2S 22                   64     70         76        72       90        84
SIB F2S 23                   64     70         76        72       90        84
SIB F2S 24                   64     70         76        72       90        84
SIB F2S 25                   64     70         76        72       90        84
SIB F2S 26                   64     70         76        72       90        84
SIB F2S 27                   64     70         76        72       90        84
SIB F2S 28                   64     70         76        72       90        84
SIB F2S 29                   64     70         76        72       90        84
SIB F2S 30                   64     70         76        72       90        84
SIB F2S 31                   64     70         76        72       90        84
SIB F2S 32                   64     70         76        72       90        84
SIB F2S 33                   64     70         76        72       90        84
SIB F2S 34                   64     70         76        72       90        84
SIB F2S 35                   64     70         76        72       90        84
```

show chassis temperature-thresholds (TX Matrix Plus routers with 3D SIBs)

user@host> **show chassis temperature-thresholds**

```
sfc0-re0:
--------------------------------------------------------------------------
                          Fan speed      Yellow alarm      Red alarm      Fire
Shutdown
                         (degrees C)     (degrees C)     (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
Chassis default              48    54       65       55       75       65
100
Routing Engine 0             70    75       90       87      102       97
115
Routing Engine 1             70    75       90       87      102       97
115
SIB F13 0 Board              60    65       78       75       85       80
95
SIB F13 0 XF Junction        70    75       82       74      105      100
107
SIB F13 4 Board              60    65       78       75       85       80
95
SIB F13 4 XF Junction        70    75       82       74      105      100
107
SIB F13 6 Board              60    65       78       75       85       80
95
```

```
SIB F13 6 XF Junction        70    75       82       74      105      100
107
SIB F2S 16 Board             60    65       78       75       85       80
95
SIB F2S 16 XF Junction       70    75       82       74      105      100
107
SIB F2S 17 Board             60    65       78       75       85       80
95
SIB F2S 17 XF Junction       70    75       82       74      105      100
107
SIB F2S 18 Board             60    65       78       75       85       80
95
SIB F2S 18 XF Junction       70    75       82       74      105      100
107
SIB F2S 19 Board             60    65       78       75       85       80
95
SIB F2S 19 XF Junction       70    75       82       74      105      100
107
SIB F2S 24 Board             60    65       78       75       85       80
95
SIB F2S 24 XF Junction       70    75       82       74      105      100
107
SIB F2S 25 Board             60    65       78       75       85       80
95
SIB F2S 25 XF Junction       70    75       82       74      105      100
107
SIB F2S 26 Board             60    65       78       75       85       80
95
SIB F2S 26 XF Junction       70    75       82       74      105      100
107
SIB F2S 27 Board             60    65       78       75       85       80
95
SIB F2S 27 XF Junction       70    75       82       74      105      100
107

lcc0-re0:
--------------------------------------------------------------------------
                          Fan speed      Yellow alarm      Red alarm      Fire
Shutdown
                         (degrees C)      (degrees C)     (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
Chassis default              48    54       65       55       75       65
100
Routing Engine 0             55    65       85       85      100      100
102
FPC 0                        63    68       75       70       90       83
95
FPC 1                        56    62       75       63       83       76
95
FPC 7                        56    62       75       63       83       76
95
SIB 0                        64    70       76       72       87       84
95
SIB 0 ASIC Junction          63    68       75       70      105      100
107
SIB 2                        64    70       76       72       87       84
95
SIB 2 ASIC Junction          63    68       75       70      105      100
```

```
107
SIB 3                            64     70        76        72        87        84
95
SIB 3 ASIC Junction              63     68        75        70       105       100
107
```

show chassis temperature-thresholds (QFX3500 Switch and QFX3600)

user@switch> **show chassis temperature-thresholds**

```
                           Fan speed      Yellow alarm      Red alarm
                          (degrees C)      (degrees C)     (degrees C)
Item                     Normal  High    Normal  Bad fan   Normal  Bad fan
rmal
FPC Sensor TopLeft I         48     56        53        43        56        46
FPC Sensor TopRight I        46     54        51        41        54        44
FPC Sensor TopLeft E         58     65        62        52        65        55
FPC Sensor TopRight E        56     64        61        51        64        54
FPC Sensor TopMiddle I       58     64        61        51        64        54
FPC Sensor TopMiddle E       67     74        71        61        74        64
FPC Sensor Bottom I          59     67        64        54        67        57
FPC Sensor Bottom E          66     73        70        60        73        63
FPC Sensor Die Temp          69     75        72        62        75        65
FPC Sensor Mgmnt Brd I       46     54        51        41        54        44
FPC Sensor Switch I          56     63        60        50        63        53
```

show chassis temperature-thresholds interconnect-device (QFabric System)

user@switch> **show chassis temperature-thresholds interconnect-device interconnect1**

```
temperature-thresholds interconnect-device interconnect1
                           Fan speed        Yellow alarm        Red alarm
Item                     Normal   High     Normal    Bad fan    Normal    Bad fan
Chassis default              48     54         65         55        75         65
```

show chassis temperature-thresholds (PTX5000 Packet Transport Router)

user@switch> **show chassis temperature-thresholds**

```
user@switch> show chassis temperature-thresholds

                           Fan speed      Yellow alarm      Red alarm      Fire
Shutdown
                          (degrees C)      (degrees C)     (degrees C)
(degrees C)
Item                     Normal  High    Normal  Bad fan   Normal  Bad fan
Normal
Routing Engine 0             80     90        95        85       105        95
115
CB 0 Exhaust A               60     65        78        75        85        80
95
CB 0 Exhaust B               60     65        78        75        85        80
95
CB 1 Exhaust A               60     65        78        75        85        80
95
CB 1 Exhaust B               60     65        78        75        85        80
95
FPC 3 Exhaust A              80     90        95        85       105        95
115
```



```
FPC 3 Exhaust B              80     90       95       85       105       95
115
FPC 3 TL5                    80     90       95       85       105       95
115
FPC 3 TQ5                    80     90       95       85       105       95
115
FPC 3 TL6                    80     90       95       85       105       95
115
FPC 3 TQ6                    80     90       95       85       105       95
115
FPC 3 TL1                    80     90       95       85       105       95
115
FPC 3 TQ1                    80     90       95       85       105       95
115
FPC 3 TL2                    80     90       95       85       105       95
115
FPC 3 TQ2                    80     90       95       85       105       95
115
FPC 3 TL4                    80     90       95       85       105       95
115
FPC 3 TQ4                    80     90       95       85       105       95
115
FPC 3 TL7                    80     90       95       85       105       95
115
FPC 3 TQ7                    80     90       95       85       105       95
115
FPC 3 TL0                    80     90       95       85       105       95
115
FPC 3 TQ0                    80     90       95       85       105       95
115
FPC 3 TL3                    80     90       95       85       105       95
115
FPC 3 TQ3                    80     90       95       85       105       95
115
SIB 0 Exhaust                60     65       78       75        85       80
95
SIB 0 Junction               75     80       90       85       105       95
115
SIB 1 Exhaust                60     65       78       75        85       80
95
SIB 1 Junction               75     80       90       85       105       95
115
SIB 2 Exhaust                60     65       78       75        85       80
95
SIB 2 Junction               75     80       90       85       105       95
115
SIB 3 Exhaust                60     65       78       75        85       80
95
SIB 3 Junction               75     80       90       85       105       95
115
SIB 4 Exhaust                60     65       78       75        85       80
95
SIB 4 Junction               75     80       90       85       105       95
115
SIB 5 Exhaust                60     65       78       75        85       80
95
SIB 5 Junction               75     80       90       85       105       95
115
SIB 6 Exhaust                60     65       78       75        85       80
95
```

```
SIB 6 Junction              75     80        90        85       105        95
115
SIB 7 Exhaust               60     65        78        75        85        80
95
SIB 7 Junction              75     80        90        85       105        95
115
SIB 8 Exhaust               60     65        78        75        85        80
95
SIB 8 Junction              75     80        90        85       105        95
115
```

show chassis temperature-thresholds (PTX1000 Packet Transport Router)

`user@host>` **show chassis temperature-thresholds**

```
                           Fan speed      Yellow alarm      Red alarm      Fire
Shutdown
                          (degrees C)      (degrees C)     (degrees C)
(degrees C)
Item                      Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
FPC 0 Intake Temp Sensor     30     65        65        65        70        70
75
FPC 0 Exhaust Temp Sensor    30     65        65        65        70        70
75
FPC 0 Mezz Temp Sensor 0     30     65        65        65        70        70
75
FPC 0 Mezz Temp Sensor 1     30     65        65        65        70        70
75
FPC 0 PE2 Temp Sensor        50     90        90        90       100       100
103
FPC 0 PE1 Temp Sensor        50     90        90        90       100       100
103
FPC 0 PF0 Temp Sensor        50     90        90        90       100       100
103
FPC 0 PE0 Temp Sensor        50     90        90        90       100       100
103
FPC 0 PE5 Temp Sensor        50     90        90        90       100       100
103
FPC 0 PE4 Temp Sensor        50     90        90        90       100       100
103
FPC 0 PF1 Temp Sensor        50     90        90        90       100       100
103
FPC 0 PE3 Temp Sensor        50     90        90        90       100       100
103
FPC 0 CPU Die Temp Sensor    50     90        90        90       100       100
103
FPC 0 OCXO Temp Sensor       50     90        90        90       100       100
103
```

show chassis temperature-thresholds (MX Routers with Media Services Blade [MSB])

`user@switch>` **show chassis temperature-thresholds**


```
  Fan speed       Yellow alarm       Red alarm      Fire Shutdown
                          (degrees C)      (degrees C)     (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
Chassis default              48    54       65       55       75       65
100
Routing Engine 0             70    80       95       95      110      110
112
Routing Engine 1             70    80       95       95      110      110
112
FPC 0                        55    60       75       65       90       80
95
FPC 1                        55    60       75       65       90       80
95
FPC 2                        55    60       75       65       90       80
95
FPC 4                        55    60       75       65       90       80
95
FPC 5                        55    60       75       65       90       80
95
```

show chassis temperature-thresholds (EX9251 Switches)

user@switch> **show chassis temperature-thresholds**

```
                          Fan speed      Yellow alarm      Red alarm      Fire
Shutdown
                          (degrees C)      (degrees C)     (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan   Normal  Bad fan
Normal
Routing Engine                     48     54       85       85      100
   100        102
CB Top Right Inlet Sensor          35     40       63       63       85
    85         95
CB Top Left Inlet Sensor           40     45       65       65       85
    85         95
CB Top Right Exhaust Sensor        45     50       68       68       85
    85         95
CB Top Left Exhaust Sensor         65     70       78       78       85
    85         95
CB CPU Core-0 Temp                 65     70       80       80       90
    90        100
CB CPU Core-1 Temp                 65     70       80       80       90
    90        100
CB CPU Core-2 Temp                 65     70       80       80       90
    90        100
CB CPU Core-3 Temp                 65     70       80       80       90
    90        100
CB CPU Core-4 Temp                 65     70       80       80       90
    90        100
CB CPU Core-5 Temp                 65     70       80       80       90
    90        100
CB CPU Core-6 Temp                 65     70       80       80       90
    90        100
CB CPU Core-7 Temp                 65     70       80       80       90
    90        100
```

```
FPC EA0_HMC0 Logic die                  85     90       95       95       105
   105        110
FPC EA0_HMC0 DRAM botm                  80     85       90       90       105
   105        110
FPC EA0_HMC1 Logic die                  85     90       95       95       105
   105        110
FPC EA0_HMC1 DRAM botm                  80     85       90       90       105
   105        110
FPC EA0 Chip                            92     97      103      103       109
   109        115
FPC EA0-XR0 Chip                        85     90       98       98       103
   103        110
FPC EA0-XR1 Chip                        85     90       98       98       103
   103        110
```

show chassis temperature-thresholds (EX9253 witches)

user@switch> **show chassis temperature-thresholds**

```
                          Fan speed      Yellow alarm      Red alarm      Fire
Shutdown
                          (degrees C)      (degrees C)     (degrees C)
(degrees C)
Item                     Normal  High   Normal  Bad fan  Normal  Bad fan
Normal
Routing Engine 0                        48     54       85       85       100
   100        102
CB 0 Exhaust Temp Sensor                60     65       75       75        85
    85         95
CB 0 Inlet Temp Sensor                  60     65       75       75        85
    85         95
CB 0 CPU DIE Temp Sensor                83     90       98       98       105
   105        110
CB 1 Exhaust Temp Sensor                60     65       75       75        85
    85         95
CB 1 Inlet Temp Sensor                  60     65       75       75        85
    85         95
CB 1 CPU DIE Temp Sensor                83     90       98       98       105
   105        110
FPC 0 Intake Temp Sensor                40     45       75       70        85
    80         95
FPC 0 Exhaust-A Temp Sensor             55     60       85       80        90
    90        100
FPC 0 Exhaust-B Temp Sensor             55     60       85       80        90
    90        100
FPC 0 EA0 Chip                          87     92       97       97       105
   105        110
FPC 0 EA0-XR0 Chip                      88     93       98       98       120
   120        125
FPC 0 EA0-XR1 Chip                      88     93       98       98       120
   120        125
FPC 0 EA1 Chip                          87     92       97       97       105
   105        110
FPC 0 EA1-XR0 Chip                      88     93       98       98       120
   120        125
FPC 0 EA1-XR1 Chip                      88     93       98       98       120
   120        125
FPC 0 EA2 Chip                          87     92       97       97       105
   105        110
```

```
FPC 0 EA2-XR0 Chip                          88     93        98         98        120
   120        125
FPC 0 EA2-XR1 Chip                          88     93        98         98        120
   120        125
FPC 0 PF Chip                               89     94       104        104        120
   120        120
FPC 0 EA0_HMC0 Logic die                    88     93       103        103        120
   120        125
FPC 0 EA0_HMC0 DRAM botm                    83     88        98         98        120
   120        125
FPC 0 EA0_HMC1 Logic die                    88     93       103        103        120
   120        125
FPC 0 EA0_HMC1 DRAM botm                    83     88        98         98        120
   120        125
FPC 0 EA0_HMC2 Logic die                    88     93       103        103        120
   120        125
FPC 0 EA0_HMC2 DRAM botm                    83     88        98         98        120
   120        125
FPC 0 EA1_HMC0 Logic die                    88     93       103        103        120
   120        125
FPC 0 EA1_HMC0 DRAM botm                    83     88        98         98        120
   120        125
FPC 0 EA1_HMC1 Logic die                    88     93       103        103        120
   120        125
FPC 0 EA1_HMC1 DRAM botm                    83     88        98         98        120
   120        125
FPC 0 EA1_HMC2 Logic die                    88     93       103        103        120
   120        125
FPC 0 EA1_HMC2 DRAM botm                    83     88        98         98        120
   120        125
FPC 0 EA2_HMC0 Logic die                    88     93       103        103        120
   120        125
FPC 0 EA2_HMC0 DRAM botm                    83     88        98         98        120
   120        125
FPC 0 EA2_HMC1 Logic die                    88     93       103        103        120
   120        125
FPC 0 EA2_HMC1 DRAM botm                    83     88        98         98        120
   120        125
FPC 0 EA2_HMC2 Logic die                    88     93       103        103        120
   120        125
FPC 0 EA2_HMC2 DRAM botm                    83     88        98         98        120
   120        125
FPC 1 Intake Temp Sensor                    40     45        75         70         85
    80         95
FPC 1 Exhaust-A Temp Sensor                 55     60        85         80         90
    90        100
FPC 1 Exhaust-B Temp Sensor                 55     60        85         80         90
    90        100
FPC 1 EA0 Chip                              87     92        97         97        105
   105        110
FPC 1 EA0-XR0 Chip                          88     93        98         98        120
   120        125
FPC 1 EA0-XR1 Chip                          88     93        98         98        120
   120        125
FPC 1 EA1 Chip                              87     92        97         97        105
   105        110
FPC 1 EA1-XR0 Chip                          88     93        98         98        120
   120        125
FPC 1 EA1-XR1 Chip                          88     93        98         98        120
   120        125
```

```
FPC 1 EA2 Chip                            87     92        97        97       105
   105        110
FPC 1 EA2-XR0 Chip                        88     93        98        98       120
   120        125
FPC 1 EA2-XR1 Chip                        88     93        98        98       120
   120        125
FPC 1 PF Chip                             89     94       104       104       120
   120        120
FPC 1 EA0_HMC0 Logic die                  88     93       103       103       120
   120        125
FPC 1 EA0_HMC0 DRAM botm                  83     88        98        98       120
   120        125
FPC 1 EA0_HMC1 Logic die                  88     93       103       103       120
   120        125
FPC 1 EA0_HMC1 DRAM botm                  83     88        98        98       120
   120        125
FPC 1 EA0_HMC2 Logic die                  88     93       103       103       120
   120        125
FPC 1 EA0_HMC2 DRAM botm                  83     88        98        98       120
   120        125
FPC 1 EA1_HMC0 Logic die                  88     93       103       103       120
   120        125
FPC 1 EA1_HMC0 DRAM botm                  83     88        98        98       120
   120        125
FPC 1 EA1_HMC1 Logic die                  88     93       103       103       120
   120        125
FPC 1 EA1_HMC1 DRAM botm                  83     88        98        98       120
   120        125
FPC 1 EA1_HMC2 Logic die                  88     93       103       103       120
   120        125
FPC 1 EA1_HMC2 DRAM botm                  83     88        98        98       120
   120        125
FPC 1 EA2_HMC0 Logic die                  88     93       103       103       120
   120        125
FPC 1 EA2_HMC0 DRAM botm                  83     88        98        98       120
   120        125
FPC 1 EA2_HMC1 Logic die                  88     93       103       103       120
   120        125
FPC 1 EA2_HMC1 DRAM botm                  83     88        98        98       120
   120        125
FPC 1 EA2_HMC2 Logic die                  88     93       103       103       120
   120        125
FPC 1 EA2_HMC2 DRAM botm                  83     88        98        98       120
   120        125
```


show interfaces extensive satellite-device

Syntax

```
show interfaces extensive satellite-device (device-alias | all)
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Enterprise.

Description

Display the satellite device extended ports in a Junos Fusion.

Options

device-alias ***device-alias***—Display extended port information for the satellite device using the specified device alias only.

all—Display information for all extended ports and aggregated Ethernet interfaces with extended ports as members configured on all of the satellite devices.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output

show interfaces extensive satellite-device all on page 583

Output Fields

Table 40 on page 577 lists the output fields for the **show interfaces extensive satellite-device** command. Output fields are listed in the approximate order in which they appear.

Table 40: show interfaces extensive satellite-device Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Interface index	Index number of the physical interface, which reflects its initialization sequence.	**detail extensive** none
Device flags	Information about the physical device.	All levels
Flow control	Flow control status: **Enabled** or **Disabled**. NOTE: This field is only displayed if asymmetric flow control is not configured.	All levels
Pad to minimum frame size	Pad Tx VLAN-tagged frame to minimum of 68 bytes.	
Device flags	Information about the physical device.	All levels
Interface flags	Information about the interface.	All levels

Table 40: show interfaces extensive satellite-device Output Fields (continued)

Field Name	Field Description	Level of Output
Current address	Configured MAC address.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour::minute:second:timezone*** **(*hour:minute:second* ago)**. For example, **Last flapped: 2008–01–16 10:52:40 UTC (3d 22:58 ago).**	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Extended port information	Satellite device port ID	
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface. NOTE: The bandwidth bps counter is not enabled.	**detail extensive**
IPv6 transit statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface. NOTE: The bandwidth bps counter is not enabled.	**detail extensive**
Input errors	Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Giants**—Number of frames received that are greater than the giant threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that Junos OS does not handle. • **Resource errors**—Sum of transmit drops.	**extensive**

Table 40: show interfaces extensive satellite-device Output Fields (continued)

Field Name	Field Description	Level of Output
Output errors	Output errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious: • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**
Egress queues	Total number of egress queues supported on the specified interface.	**detail extensive**
Queue counters	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
Queue Number	The CoS queue number and the forwarding classes mapped to the queue number. The **Mapped forwarding class** column lists the forwarding classes mapped to each CoS queue.	**detail extensive**
Active alarms and Active defects	Ethernet-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the switch configuration, an alarm can ring the red or yellow alarm bell on the switch, or turn on the red or yellow alarm LED on the craft interface. These fields can contain the value **None** or **Link**. • **None**—There are no active defects or alarms. • **Link**—Interface has lost its link state, which usually means that the cable is unplugged, the far-end system has been turned off, or the PIC is malfunctioning.	**detail extensive** none

Table 40: show interfaces extensive satellite-device Output Fields (continued)

Field Name	Field Description	Level of Output
MAC statistics	**Receive** and **Transmit** statistics reported by the PIC's MAC subsystem. • **Total octets** and **total packets**—Total number of octets and packets. For Gigabit Ethernet IQ PICs, the received octets count varies by interface type. • **Unicast packets, Broadcast packets,** and **Multicast packets**—Number of unicast, broadcast, and multicast packets. • **CRC/Align errors**—Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error). • **FIFO error**—Number of FIFO errors that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning. • **MAC control frames**—Number of MAC control frames. • **MAC pause frames**—Number of MAC control frames with **pause** operational code. • **Oversized frames**—Number of packets that exceeds the configured MTU. • **Jabber frames**—Number of frames that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. This definition of jabber is different from the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition in which any packet exceeds 20 ms. The allowed range to detect jabber is from 20 ms to 150 ms. • **Fragment frames**—Total number of packets that were less than 64 octets in length (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. Fragment frames normally increment because both runts (which are normal occurrences caused by collisions) and noise hits are counted. • **VLAN tagged frames**—Number of frames that are VLAN tagged. The system uses the TPID of 0x8100 in the frame to determine whether a frame is tagged or not. This counter is not supported on EX Series switches and is always displayed as 0. • **Code violations**—Number of times an event caused the PHY to indicate “Data reception error” or “invalid data symbol error.”	**extensive**
Filter statistics	**Receive** and **Transmit** statistics reported by the PIC's MAC address filter subsystem.	**extensive**

Table 40: show interfaces extensive satellite-device Output Fields (continued)

Field Name	Field Description	Level of Output
Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Index number of the logical interface, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP interface index number for the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface.	All levels
Statistics	• **Packets** • **pps** • **Bytes** • **bps**	All levels

Bundle	Provide information for each active bundle link.
	• **Input**
	  ◦ **Packets**—
	  ◦ **pps**
	  ◦ **Bytes**
	  ◦ **bps**
	  ◦ **Output**
	    ▪ **Packets**—
	    ▪ **pps**
	    ▪ **Bytes**
	    ▪ **bps**
		All levels

Table 40: show interfaces extensive satellite-device Output Fields (continued)

Field Name	Field Description	Level of Output
Adaptive Statistics	• **Adaptive Adjusts** • **Adaptive Scans** • **Adaptive Updates**	All levels
Link	Link state: up or down.	All levels

LACP info	LACP state information for each aggregated interface:
	• **Role priority**—Role played by the interface. It can be one of the following:
	  ◦ **Actor**—Local device participating in LACP negotiation.
	  ◦ **Partner**—Remote device participating in LACP negotiation.
	  ◦ **System identifier**—48-bit (6-byte) globally unique field.
	  ◦ **System priority**—LACP system priority at the aggregated Ethernet interface level. This system priority value takes precedence over a system priority value configured at the global [edit chassis] hierarchy level.
	  ◦ **Port number**
	  ◦ **Port key**
	  ◦ **Port**
		All levels

LACP Statistics	LACP statistics are returned when the **extensive** option is used and provides the following information: • **LACP Rx**—LACP received counter that increments for each normal hello. • **LACP Tx**—Number of LACP transmit packet errors logged. • **Unknown Rx**—Number of unrecognized packet errors logged. • **Illegal Rx**—Number of invalid packets received.	All levels
Marker statistics	Marker statistics are returned when the **extensive** option is used and provides the following information: • **Marker Rx**—Marker received counter that increments for each normal hello. • **Resp Tx**—Number of RESP transmit packet errors logged. • **Unknown Rx**—Number of unrecognized packet errors logged. • **Illegal Rx**—Number of invalid packets received.	All levels
Protocol	Protocol family configured on the logical interface.	All levels
MTU	MTU size on the logical interface. If the MTU value is negotiated down to meet the MRRU requirement on the remote side, this value is marked Adjusted.	All levels
Generation	Unique number for use by Juniper Networks technical support only.	All levels
Route table	Routing table in which this address exists. For example, Route table:0 refers to inet.0.	All levels
Mesh table	Information regarding mesh topology.	All levels

Sample Output

show interfaces extensive satellite-device all

```
user@aggregation-device> show interfaces extensive satellite-device all
```

```
Physical interface: ae0 (Extended Port, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 574, Generation: 131
  Link-level type: Ethernet, MTU: 1514, Speed: 2Gbps, BPDU Error: None, MAC-REWRITE
 Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled
  Pad to minimum frame size: Disabled
  Minimum links needed: 1, Minimum bandwidth needed: 1bps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: f4:b5:2f:f7:3f:c0, Hardware address: f4:b5:2f:f7:3f:c0
  Last flapped   : 2015-03-31 18:36:43 PDT (07:05:56 ago)
  Statistics last cleared: Never
  Extended port information:
    Satellite device port id  : 415
  Traffic statistics:
   Input  bytes  :             13515908                 2032 bps
   Output bytes  :             12289920                 2032 bps
   Input  packets:                99514                    2 pps
   Output packets:                96015                    2 pps
   IPv6 transit statistics:
    Input  bytes  :                    0
    Output bytes  :                    0
    Input  packets:                    0
    Output packets:                    0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
 0
  Egress queues: 8 supported, 7 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0                                0                95867                    0

    1                                0                    0                    0

    2                                0                    0                    0

    3                                0                    0                    0

    4                                0                    0                    0

    5                                0                    0                    0

    7                                0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   FC0
    1                   FC1
    2                   FC2
    3                   FC3
    4                   FC4
    5                   FC5, be-3
```

```
  7                 be-2

 Logical interface ae0.0 (Index 337) (SNMP ifIndex 575) (Generation 1194)
   Flags: Up SNMP-Traps 0x24024000 Encapsulation: Ethernet-Bridge
   Statistics        Packets        pps         Bytes          bps
   Bundle:
       Input :          1729          0        601692            0
       Output:             0          0             0            0
   Adaptive Statistics:
       Adaptive Adjusts:          0
       Adaptive Scans  :          0
       Adaptive Updates:          0
   Link:
     ge-104/0/24.0
       Input :             0          0             0            0
       Output:             0          0             0            0
     ge-103/0/0.0
       Input :          1729          0        601692            0
       Output:             0          0             0            0
   LACP info:        Role     System             System      Port    Port  Port

                          priority         identifier  priority  number   key

     ge-104/0/24.0    Actor      127  f4:b5:2f:f7:3f:c0       127      31     1

     ge-104/0/24.0  Partner      127  f4:b5:2f:41:0a:40       127      24     1

     ge-103/0/0.0    Actor       127  f4:b5:2f:f7:3f:c0       127       7     1

     ge-103/0/0.0  Partner       127  f4:b5:2f:41:0a:40       127       1     1

   LACP Statistics:       LACP Rx     LACP Tx   Unknown Rx   Illegal Rx
     ge-104/0/24.0         25470       25495            0            0
     ge-103/0/0.0          25469       25512            0            0
   Marker Statistics:   Marker Rx     Resp Tx   Unknown Rx   Illegal Rx
     ge-104/0/24.0             0           0            0            0
     ge-103/0/0.0              0           0            0            0
   Protocol bridge, MTU: 1514, Generation: 1229, Route table: 3, Mesh Group:
__all_ces__
Physical interface: ae1 (Extended Port, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 790, Generation: 132
  Link-level type: Ethernet, MTU: 1514, Speed: 200mbps, BPDU Error: None,
MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled
  Pad to minimum frame size: Disabled
  Minimum links needed: 1, Minimum bandwidth needed: 1bps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: f4:b5:2f:f7:3f:c1, Hardware address: f4:b5:2f:f7:3f:c1
  Last flapped   : 2015-03-31 18:36:44 PDT (07:05:55 ago)
  Statistics last cleared: Never
  Extended port information:
    Satellite device port id  : 431
  Traffic statistics:
   Input  bytes  :             13285288                 2032 bps
   Output bytes  :             12166400                 2032 bps
   Input  packets:                98447                    2 pps
   Output packets:                95050                    2 pps
   IPv6 transit statistics:
    Input  bytes  :                   0
```



```
    Output bytes  :                  0
    Input  packets:                  0
    Output packets:                  0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
 0
  Egress queues: 8 supported, 7 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0                                0                94909                    0

    1                                0                    0                    0

    2                                0                    0                    0

    3                                0                    0                    0

    4                                0                    0                    0

    5                                0                    0                    0

    7                                0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   FC0
    1                   FC1
    2                   FC2
    3                   FC3
    4                   FC4
    5                   FC5, be-3
    7                   be-2

  Logical interface ae1.0 (Index 338) (SNMP ifIndex 1216) (Generation 1195)
    Flags: Up SNMP-Traps 0x24024000 Encapsulation: Ethernet-Bridge
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :          2785          0        688380            0
        Output:             0          0             0            0
    Adaptive Statistics:
        Adaptive Adjusts:          0
        Adaptive Scans  :          0
        Adaptive Updates:          0
    Link:
      ge-104/0/25.0
        Input :            10          0           600            0
        Output:             0          0             0            0
      ge-103/0/1.0
        Input :          2775          0        687780            0
        Output:             0          0             0            0
    LACP info:        Role     System             System      Port    Port  Port

                             priority          identifier  priority  number   key

      ge-104/0/25.0    Actor      127  f4:b5:2f:f7:3f:c0       127      32     2

      ge-104/0/25.0  Partner      127  f4:b5:2f:41:0a:40       127      25     2
```

```
      ge-103/0/1.0    Actor       127  f4:b5:2f:f7:3f:c0       127       8     2

      ge-103/0/1.0  Partner       127  f4:b5:2f:41:0a:40       127       2     2

    LACP Statistics:       LACP Rx     LACP Tx   Unknown Rx   Illegal Rx
      ge-104/0/25.0          25470       25494            0            0
      ge-103/0/1.0           25469       25513            0            0
    Marker Statistics:   Marker Rx     Resp Tx   Unknown Rx   Illegal Rx
      ge-104/0/25.0              0           0            0            0
      ge-103/0/1.0               0           0            0            0
    Protocol bridge, MTU: 1514, Generation: 1230, Route table: 3, Mesh Group:
__all_ces__
Physical interface: ae0 (Extended Port, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 574, Generation: 131
  Link-level type: Ethernet, MTU: 1514, Speed: 2Gbps, BPDU Error: None, MAC-REWRITE
 Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled
  Pad to minimum frame size: Disabled
  Minimum links needed: 1, Minimum bandwidth needed: 1bps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: f4:b5:2f:f7:3f:c0, Hardware address: f4:b5:2f:f7:3f:c0
  Last flapped   : 2015-03-31 18:36:43 PDT (07:05:56 ago)
  Statistics last cleared: Never
  Extended port information:
    Satellite device port id  : 415
  Traffic statistics:
   Input  bytes  :            13515908                2032 bps
   Output bytes  :            12289920                2032 bps
   Input  packets:               99514                   2 pps
   Output packets:               96015                   2 pps
   IPv6 transit statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
 0
  Egress queues: 8 supported, 7 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0                                0                95867                    0

    1                                0                    0                    0

    2                                0                    0                    0

    3                                0                    0                    0

    4                                0                    0                    0

    5                                0                    0                    0

    7                                0                    0                    0

  Queue number:         Mapped forwarding classes
```



```
    0                   FC0
    1                   FC1
    2                   FC2
    3                   FC3
    4                   FC4
    5                   FC5, be-3
    7                   be-2

  Logical interface ae0.0 (Index 337) (SNMP ifIndex 575) (Generation 1194)
    Flags: Up SNMP-Traps 0x24024000 Encapsulation: Ethernet-Bridge
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :          1729          0        601692            0
        Output:             0          0             0            0
    Adaptive Statistics:
        Adaptive Adjusts:          0
        Adaptive Scans  :          0
        Adaptive Updates:          0
    Link:
      ge-104/0/24.0
        Input :             0          0             0            0
        Output:             0          0             0            0
      ge-103/0/0.0
        Input :          1729          0        601692            0
        Output:             0          0             0            0
    LACP info:        Role     System             System      Port    Port  Port

                            priority          identifier  priority  number   key

      ge-104/0/24.0    Actor      127  f4:b5:2f:f7:3f:c0       127      31     1

      ge-104/0/24.0  Partner      127  f4:b5:2f:41:0a:40       127      24     1

      ge-103/0/0.0    Actor       127  f4:b5:2f:f7:3f:c0       127       7     1

      ge-103/0/0.0  Partner       127  f4:b5:2f:41:0a:40       127       1     1

    LACP Statistics:       LACP Rx     LACP Tx   Unknown Rx   Illegal Rx
      ge-104/0/24.0          25470       25495            0            0
      ge-103/0/0.0           25469       25512            0            0
    Marker Statistics:   Marker Rx     Resp Tx   Unknown Rx   Illegal Rx
      ge-104/0/24.0              0           0            0            0
      ge-103/0/0.0               0           0            0            0
    Protocol bridge, MTU: 1514, Generation: 1229, Route table: 3, Mesh Group:
__all_ces__
Physical interface: ae1 (Extended Port, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 790, Generation: 132
  Link-level type: Ethernet, MTU: 1514, Speed: 200mbps, BPDU Error: None,
MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled
  Pad to minimum frame size: Disabled
  Minimum links needed: 1, Minimum bandwidth needed: 1bps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: f4:b5:2f:f7:3f:c1, Hardware address: f4:b5:2f:f7:3f:c1
  Last flapped   : 2015-03-31 18:36:44 PDT (07:05:55 ago)
  Statistics last cleared: Never
  Extended port information:
    Satellite device port id  : 431
  Traffic statistics:
```

```
  Input  bytes  :            13285288                2032 bps
  Output bytes  :            12166400                2032 bps
  Input  packets:               98447                   2 pps
  Output packets:               95050                   2 pps
  IPv6 transit statistics:
   Input  bytes  :                 0
   Output bytes  :                 0
   Input  packets:                 0
   Output packets:                 0
 Input errors:
   Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
0, Resource errors: 0
 Output errors:
   Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
0
 Egress queues: 8 supported, 7 in use
 Queue counters:       Queued packets  Transmitted packets      Dropped packets

   0                              0                94909                    0

   1                              0                    0                    0

   2                              0                    0                    0

   3                              0                    0                    0

   4                              0                    0                    0

   5                              0                    0                    0

   7                              0                    0                    0

 Queue number:         Mapped forwarding classes
   0                   FC0
   1                   FC1
   2                   FC2
   3                   FC3
   4                   FC4
   5                   FC5, be-3
   7                   be-2

 Logical interface ae1.0 (Index 338) (SNMP ifIndex 1216) (Generation 1195)
   Flags: Up SNMP-Traps 0x24024000 Encapsulation: Ethernet-Bridge
   Statistics        Packets        pps         Bytes          bps
   Bundle:
       Input :          2785          0        688380            0
       Output:             0          0             0            0
   Adaptive Statistics:
       Adaptive Adjusts:          0
       Adaptive Scans  :          0
       Adaptive Updates:          0
   Link:
     ge-104/0/25.0
       Input :            10          0           600            0
       Output:             0          0             0            0
     ge-103/0/1.0
       Input :          2775          0        687780            0
       Output:             0          0             0            0
   LACP info:        Role     System             System      Port    Port  Port
```



```
                           priority         identifier  priority  number   key

      ge-104/0/25.0    Actor      127  f4:b5:2f:f7:3f:c0       127      32     2

      ge-104/0/25.0  Partner      127  f4:b5:2f:41:0a:40       127      25     2

      ge-103/0/1.0    Actor       127  f4:b5:2f:f7:3f:c0       127       8     2

      ge-103/0/1.0  Partner       127  f4:b5:2f:41:0a:40       127       2     2

    LACP Statistics:       LACP Rx     LACP Tx   Unknown Rx   Illegal Rx
      ge-104/0/25.0          25470       25494            0            0
      ge-103/0/1.0           25469       25513            0            0
    Marker Statistics:   Marker Rx     Resp Tx   Unknown Rx   Illegal Rx
      ge-104/0/25.0              0           0            0            0
      ge-103/0/1.0               0           0            0            0
    Protocol bridge, MTU: 1514, Generation: 1230, Route table: 3, Mesh Group:
__all_ces__

Physical interface: ae0 (Extended Port, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 574, Generation: 131
  Link-level type: Ethernet, MTU: 1514, Speed: 2Gbps, BPDU Error: None, MAC-REWRITE
 Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled
  Pad to minimum frame size: Disabled
  Minimum links needed: 1, Minimum bandwidth needed: 1bps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: f4:b5:2f:f7:3f:c0, Hardware address: f4:b5:2f:f7:3f:c0
  Last flapped   : 2015-03-31 18:36:43 PDT (07:05:56 ago)
  Statistics last cleared: Never
  Extended port information:
    Satellite device port id  : 415
  Traffic statistics:
   Input  bytes  :             13515908                 2032 bps
   Output bytes  :             12289920                 2032 bps
   Input  packets:                99514                    2 pps
   Output packets:                96015                    2 pps
   IPv6 transit statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
 0
  Egress queues: 8 supported, 7 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0                                0                95867                    0

    1                                0                    0                    0

    2                                0                    0                    0

    3                                0                    0                    0
```

```
    4                                0                    0                    0

    5                                0                    0                    0

    7                                0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   FC0
    1                   FC1
    2                   FC2
    3                   FC3
    4                   FC4
    5                   FC5, be-3
    7                   be-2

  Logical interface ae0.0 (Index 337) (SNMP ifIndex 575) (Generation 1194)
    Flags: Up SNMP-Traps 0x24024000 Encapsulation: Ethernet-Bridge
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :          1729          0       601692            0
        Output:             0          0            0            0
    Adaptive Statistics:
        Adaptive Adjusts:          0
        Adaptive Scans  :          0
        Adaptive Updates:          0
    Link:
      ge-104/0/24.0
        Input :             0          0            0            0
        Output:             0          0            0            0
      ge-103/0/0.0
        Input :          1729          0       601692            0
        Output:             0          0            0            0
    LACP info:        Role     System             System      Port    Port  Port

                            priority         identifier  priority  number   key

      ge-104/0/24.0    Actor      127  f4:b5:2f:f7:3f:c0       127      31     1

      ge-104/0/24.0  Partner      127  f4:b5:2f:41:0a:40       127      24     1

      ge-103/0/0.0    Actor       127  f4:b5:2f:f7:3f:c0       127       7     1

      ge-103/0/0.0  Partner       127  f4:b5:2f:41:0a:40       127       1     1

    LACP Statistics:       LACP Rx     LACP Tx   Unknown Rx   Illegal Rx
      ge-104/0/24.0          25470       25495            0            0
      ge-103/0/0.0           25469       25512            0            0
    Marker Statistics:   Marker Rx     Resp Tx   Unknown Rx   Illegal Rx
      ge-104/0/24.0              0           0            0            0
      ge-103/0/0.0               0           0            0            0
    Protocol bridge, MTU: 1514, Generation: 1229, Route table: 3, Mesh Group:
__all_ces__
Physical interface: ae1 (Extended Port, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 790, Generation: 132
  Link-level type: Ethernet, MTU: 1514, Speed: 200mbps, BPDU Error: None,
MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled
  Pad to minimum frame size: Disabled
  Minimum links needed: 1, Minimum bandwidth needed: 1bps
  Device flags   : Present Running
```



```
 Interface flags: SNMP-Traps Internal: 0x4000
 Current address: f4:b5:2f:f7:3f:c1, Hardware address: f4:b5:2f:f7:3f:c1
 Last flapped   : 2015-03-31 18:36:44 PDT (07:05:55 ago)
 Statistics last cleared: Never
 Extended port information:
   Satellite device port id  : 431
 Traffic statistics:
  Input  bytes  :             13285288                 2032 bps
  Output bytes  :             12166400                 2032 bps
  Input  packets:                98447                    2 pps
  Output packets:                95050                    2 pps
  IPv6 transit statistics:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
 Input errors:
   Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
0, Resource errors: 0
 Output errors:
   Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
0
 Egress queues: 8 supported, 7 in use
 Queue counters:       Queued packets  Transmitted packets      Dropped packets

   0                                0                94909                    0

   1                                0                    0                    0

   2                                0                    0                    0

   3                                0                    0                    0

   4                                0                    0                    0

   5                                0                    0                    0

   7                                0                    0                    0

 Queue number:         Mapped forwarding classes
   0                   FC0
   1                   FC1
   2                   FC2
   3                   FC3
   4                   FC4
   5                   FC5, be-3
   7                   be-2

 Logical interface ae1.0 (Index 338) (SNMP ifIndex 1216) (Generation 1195)
   Flags: Up SNMP-Traps 0x24024000 Encapsulation: Ethernet-Bridge
   Statistics        Packets        pps         Bytes          bps
   Bundle:
       Input :          2785          0        688380            0
       Output:             0          0             0            0
   Adaptive Statistics:
       Adaptive Adjusts:          0
       Adaptive Scans  :          0
       Adaptive Updates:          0
   Link:
     ge-104/0/25.0
```

```
      Input :           10         0          600           0
      Output:            0         0            0           0
    ge-103/0/1.0
      Input :         2775         0       687780           0
      Output:            0         0            0           0
   LACP info:        Role     System             System      Port    Port  Port

                           priority         identifier  priority  number   key

    ge-104/0/25.0    Actor      127  f4:b5:2f:f7:3f:c0       127      32     2

    ge-104/0/25.0  Partner      127  f4:b5:2f:41:0a:40       127      25     2

    ge-103/0/1.0    Actor       127  f4:b5:2f:f7:3f:c0       127       8     2

    ge-103/0/1.0  Partner       127  f4:b5:2f:41:0a:40       127       2     2

   LACP Statistics:       LACP Rx     LACP Tx   Unknown Rx   Illegal Rx
    ge-104/0/25.0          25470       25494            0            0
    ge-103/0/1.0           25469       25513            0            0
   Marker Statistics:   Marker Rx     Resp Tx   Unknown Rx   Illegal Rx
    ge-104/0/25.0              0           0            0            0
    ge-103/0/1.0               0           0            0            0
   Protocol bridge, MTU: 1514, Generation: 1230, Route table: 3, Mesh Group:
__all_ces__
Physical interface: ge-101/0/7 (Extended Port, Enabled, Physical link is Down
  Interface index: 328, SNMP ifIndex: 1587, Generation: 331
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 1000mbps
  Device flags   : Present Running
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Damping        : half-life: 0 sec, max-suppress: 0 sec, reuse: 0, suppress: 0,
 state: unsuppressed
  Current address: 10:0e:7e:bf:2d:0c, Hardware address: 10:0e:7e:bf:2d:0c
  Last flapped   : Never
  Statistics last cleared: Never
  Extended port information:
    Satellite device port id  : 143
  Traffic statistics:
   Input  bytes  :                   0                   0 bps
   Output bytes  :                   0                   0 bps
   Input  packets:                   0                   0 pps
   Output packets:                   0                   0 pps
   IPv6 transit statistics:
    Input  bytes  :                  0
    Output bytes  :                  0
    Input  packets:                  0
    Output packets:                  0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3
incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, FIFO errors: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
 FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
  Egress queues: 8 supported, 7 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets
```

```
    0                                0                    0                    0

    1                                0                    0                    0

    2                                0                    0                    0

    3                                0                    0                    0

    4                                0                    0                    0

    5                                0                    0                    0

    7                                0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   FC0
    1                   FC1
    2                   FC2
    3                   FC3
    4                   FC4
    5                   FC5, be-3
    7                   be-2
  Active alarms  : None
  Active defects : None
  MAC statistics:                      Receive         Transmit
    Total octets                             0                0
    Total packets                            0                0
    Unicast packets                          0                0
    Broadcast packets                        0                0
    Multicast packets                        0                0
    CRC/Align errors                         0                0
    FIFO errors                              0                0
    MAC control frames                       0                0
    MAC pause frames                         0                0
    Oversized frames                         0
    Jabber frames                            0
    Fragment frames                          0
    VLAN tagged frames                       0
    Code violations                          0
    Total errors                             0                0
  Filter statistics:
    Input packet count                       0
    Input packet rejects                     0
    Input DA rejects                         0
    Input SA rejects                         0
    Output packet count                                       0
    Output packet pad count                                   0
    Output packet error count                                 0
    CAM destination filters: 0, CAM source filters: 0
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                              %            bps     %           usec
    0 FC0                    95      950000000    95              0      low
none
    3 FC3                     5       50000000     5              0      low
none
```

```
  Interface transmit statistics: Disabled

Physical interface: ge-101/0/8 (Extended Port, Enabled, Physical link is Down
  Interface index: 329, SNMP ifIndex: 1586, Generation: 332
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 1000mbps
  Device flags   : Present Running
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Damping        : half-life: 0 sec, max-suppress: 0 sec, reuse: 0, suppress: 0,
 state: unsuppressed
  Current address: 10:0e:7e:bf:2d:0d, Hardware address: 10:0e:7e:bf:2d:0d
  Last flapped   : Never
  Statistics last cleared: Never
  Extended port information:
    Satellite device port id  : 159
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
   IPv6 transit statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3
incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, FIFO errors: 0,
    Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
 FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
  Egress queues: 8 supported, 7 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0                             0                    0                    0

    1                             0                    0                    0

    2                             0                    0                    0

    3                             0                    0                    0

    4                             0                    0                    0

    5                             0                    0                    0

    7                             0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   FC0
    1                   FC1
    2                   FC2
    3                   FC3
    4                   FC4
    5                   FC5, be-3
    7                   be-2
  Active alarms  : None
```



```
  Active defects : None
  MAC statistics:                      Receive        Transmit
    Total octets                             0               0
    Total packets                            0               0
    Unicast packets                          0               0
    Broadcast packets                        0               0
    Multicast packets                        0               0
    CRC/Align errors                         0               0
    FIFO errors                              0               0
    MAC control frames                       0               0
    MAC pause frames                         0               0
    Oversized frames                         0
    Jabber frames                            0
    Fragment frames                          0
    VLAN tagged frames                       0
    Code violations                          0
    Total errors                             0               0
  Filter statistics:
    Input packet count                       0
    Input packet rejects                     0
    Input DA rejects                         0
    Input SA rejects                         0
    Output packet count                                      0
    Output packet pad count                                  0
    Output packet error count                                0
    CAM destination filters: 0, CAM source filters: 0
  Packet Forwarding Engine configuration:
    Destination slot: 0 (0x00)
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                              %            bps     %            usec
    0 FC0                    95      950000000    95               0      low
none
    3 FC3                     5       50000000     5               0      low
none
  Interface transmit statistics: Disabled
```

show interfaces satellite-device

Syntax

```
show interfaces satellite-device (device-alias | all)
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display the satellite device extended ports in a Junos Fusion.

Options

device-alias *device-alias*—Display extended port information for the satellite device using the specified device alias only.

all—Display information for all extended ports and aggregated Ethernet interfaces with extended ports as members configured on all of the satellite devices.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output

show interfaces satellite-device all on page 598

Output Fields

Table 41 on page 596 lists the output fields for the **show interfaces satellite-device** command. Output fields are listed in the approximate order in which they appear.

Table 41: show interfaces satellite-device Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Interface index	Index number of the physical interface, which reflects its initialization sequence.	**detail extensive** none
Link-level type	Encapsulation being used on the physical interface.	All levels
Device flags	Information about the physical device.	All levels
Flow control	Flow control status: **Enabled** or **Disabled**. NOTE: This field is only displayed if asymmetric flow control is not configured.	All levels
Pad to minimum frame size	Pad Tx VLAN-tagged frame to minimum of 68 bytes.	All levels

Table 41: show interfaces satellite-device Output Fields (continued)

Field Name	Field Description	Level of Output
Minimum links needed	Minimum number of aggregated links.	All levels
Minimum bandwidth needed	Minimum bandwidth configured for aggregated bundle.	All levels
Device flags	Information about the physical device.	All levels
Interface flags	Information about the interface.	All levels
Current address	Configured MAC address.	**detail extensive** none
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour:*** **:*minute*:*second*:*timezone* (*hour*:*minute*:*second* ago)**. For example, **Last flapped: 2008–01–16 10:52:40 UTC (3d 22:58 ago).**	**detail extensive** none
Input rate	Input rate in bits per second (bps) and packets per second (pps). The value in this field also includes the Layer 2 overhead bytes for ingress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level.	All levels
Output rate	Output rate in bps and pps. The value in this field also includes the Layer 2 overhead bytes for egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level.	All levels
Extended port information	Satellite device port ID	All levels
Active alarms and Active defects	Ethernet-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. Based on the switch configuration, an alarm can ring the red or yellow alarm bell on the switch, or turn on the red or yellow alarm LED on the craft interface. These fields can contain the value **None** or **Link**. • **None**—There are no active defects or alarms. • **Link**—Interface has lost its link state, which usually means that the cable is unplugged, the far-end system has been turned off, or the PIC is malfunctioning.	**detail extensive** none
Interface transmit statistics	All levels	All levels
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Index number of the logical interface, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP interface index number for the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

Table 41: show interfaces satellite-device Output Fields (continued)

Field Name	Field Description	Level of Output
Flags	Information about the logical interface.	All levels
Statistics	• **Packets** • **pps** • **Bytes** • **bps**	All levels

Bundle	Provides information for each active bundle link.
	• **Input**
	  ◦ **Packets**
	  ◦ **pps**
	  ◦ **Bytes**
	  ◦ **bps**
	  ◦ **Output**
	    ◦ **Packets—**
	    ◦ **pps**
	    ◦ **Bytes**
	    ◦ **bps**
		All levels

Adaptive Statistics	• **Adaptive Adjusts** • **Adaptive Scans** • **Adaptive Updates**	All levels
Protocol	Protocol family configured on the logical interface.	All levels

Sample Output

Sample Output

show interfaces satellite-device all

user@aggregation-device> **show interfaces satellite-device all**

```
Physical interface: ae0 (Extended Port, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 574
 Link-level type: Ethernet, MTU: 1514, Speed: 2Gbps, BPDU Error: None, MAC-REWRITE
 Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled
  Pad to minimum frame size: Disabled
  Minimum links needed: 1, Minimum bandwidth needed: 1bps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: f4:b5:2f:f7:3f:c0, Hardware address: f4:b5:2f:f7:3f:c0
  Last flapped   : 2015-03-31 18:36:43 PDT (06:54:08 ago)
  Input rate     : 2032 bps (2 pps)
  Output rate    : 3048 bps (2 pps)

  Logical interface ae0.0 (Index 337) (SNMP ifIndex 575)
```



```
    Flags: Up SNMP-Traps 0x24024000 Encapsulation: Ethernet-Bridge
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :          1704          0       592992            0
        Output:             0          0            0            0
    Adaptive Statistics:
        Adaptive Adjusts:         0
        Adaptive Scans  :         0
        Adaptive Updates:         0
    Protocol bridge, MTU: 1514

Physical interface: ae1 (Extended Port, Enabled, Physical link is Up
  Interface index: 129, SNMP ifIndex: 790
  Link-level type: Ethernet, MTU: 1514, Speed: 200mbps, BPDU Error: None,
MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
  Flow control: Disabled
  Pad to minimum frame size: Disabled
  Minimum links needed: 1, Minimum bandwidth needed: 1bps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: f4:b5:2f:f7:3f:c1, Hardware address: f4:b5:2f:f7:3f:c1
  Last flapped   : 2015-03-31 18:36:44 PDT (06:54:07 ago)
  Input rate     : 2032 bps (2 pps)
  Output rate    : 2032 bps (2 pps)

  Logical interface ae1.0 (Index 338) (SNMP ifIndex 1216)
    Flags: Up SNMP-Traps 0x24024000 Encapsulation: Ethernet-Bridge
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :          2759          0       679982            0
        Output:             0          0            0            0
    Adaptive Statistics:
        Adaptive Adjusts:         0
        Adaptive Scans  :         0
        Adaptive Updates:         0
    Protocol bridge, MTU: 1514
Physical interface: xe-101/0/31 (Extended Port, Enabled, Physical link is Up
  Interface index: 336, SNMP ifIndex: 829
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Current address: 10:0e:7e:bf:2d:24, Hardware address: 10:0e:7e:bf:2d:24
  Last flapped   : 2015-03-31 08:28:23 PDT (17:02:29 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : None
  Active defects : None
  Interface transmit statistics: Disabled

  Logical interface xe-101/0/31.0 (Index 491) (SNMP ifIndex 926)
    Flags: Up SNMP-Traps 0x24024000 Encapsulation: Ethernet-Bridge
    Input packets : 0
    Output packets: 0
    Protocol bridge, MTU: 1514

Physical interface: xe-101/0/32 (Extended Port, Enabled, Physical link is Up
  Interface index: 337, SNMP ifIndex: 836
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps
```

```
Device flags   : Present Running
Interface flags: SNMP-Traps Internal: 0x4000
Link flags     : None
CoS queues     : 8 supported, 8 maximum usable queues
Current address: 10:0e:7e:bf:2d:25, Hardware address: 10:0e:7e:bf:2d:25
Last flapped   : 2015-03-31 08:28:23 PDT (17:02:29 ago)
Input rate     : 0 bps (0 pps)
Output rate    : 0 bps (0 pps)
Active alarms  : None
Active defects : None
Interface transmit statistics: Disabled

Logical interface xe-101/0/32.0 (Index 492) (SNMP ifIndex 935)
  Flags: Up SNMP-Traps 0x24024000 Encapsulation: Ethernet-Bridge
  Input packets : 0
  Output packets: 0
  Protocol bridge, MTU: 1514
```


show interfaces statistics

Syntax

```
show interfaces statistics interface-name
<satellite-device [device-alias-name |all ]>
<detail>
```

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers.
Command introduced in Junos OS Release 12.2 for ACX Series Routers.
satellite-device option introduced in Junos OS Release 14.2R3.

Description

Display static interface statistics, such as errors.

NOTE: When the **show interfaces statistics** command is executed on an interface that is configured on T4000 Type 5 FPC, the *IPv6 transit statistics* field displays:

- Total statistics (sum of transit and local statistics) at the physical interface level
- Transit statistics at the logical interface level

Options

interface-name—Name of an interface.

satellite-device [*device-alias-name* | all]—(Junos Fusion only) (Optional) Display interface statistics for interfaces on the specified satellite device in the Junos Fusion, or on all satellite devices in the Junos Fusion.

NOTE: In a Junos Fusion Enterprise, logical interface statistics are not synced across aggregation devices in a dual-aggregation device topology.

detail—(Optional) Display detailed output.

Required Privilege Level

view

Related Documentation

- *clear interfaces statistics*

List of Sample Output

show interfaces statistics (Fast Ethernet) on page 602
show interfaces statistics (Gigabit Ethernet PIC—Egress) on page 603

Output Fields

Output from both the **show interfaces** ***interface-name*** **detail** and the **show interfaces** ***interface-name*** **extensive** commands include all the information displayed in the output from the **show interfaces statistics** command. For more information, see the particular interface type in which you are interested. For information about destination class and source class statistics, see the “Destination Class Field” section and the “Source Class Field” section under *Common Output Fields Description*. For information about the input errors and output errors, see *Fast Ethernet and Gigabit Ethernet Counters*.

Sample Output

show interfaces statistics (Fast Ethernet)

user@host> **show interfaces fe-1/3/1 statistics**

```
Physical interface: fe-1/3/1, Enabled, Physical link is Up
  Interface index: 144, SNMP ifIndex: 1042
  Description: ford fe-1/3/1
  Link-level type: Ethernet, MTU: 1514, Speed: 100mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  CoS queues     : 4 supported, 4 maximum usable queues
  Current address: 00:00:5E:00:53:dc, Hardware address: 00:00:5E:00:53:dc
  Last flapped   : 2006-04-18 03:08:59 PDT (00:01:24 ago)
  Statistics last cleared: Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Input errors: 0, Output errors: 0
  Active alarms  : None
  Active defects : None
  Logical interface fe-1/3/1.0 (Index 69) (SNMP ifIndex 50)
    Flags: SNMP-Traps Encapsulation: ENET2
    Protocol inet, MTU: 1500
      Flags: Is-Primary, DCU, SCU-in
                                               Packets                Bytes
      Destination class             (packet-per-second)    (bits-per-second)
                          silver1                    0                    0
                                 (                   0) (                 0)
                          silver2                    0                    0
                                 (                   0) (                 0)
                          silver3                    0                    0
                                 (                   0) (                 0)
      Addresses, Flags: Is-Default Is-Preferred Is-Primary
        Destination: 10.27.245/24, Local: 10.27.245.2,
```



```
        Broadcast: 10.27.245.255
    Protocol iso, MTU: 1497
      Flags: Is-Primary
```

show interfaces statistics (Gigabit Ethernet PIC—Egress)

`user@host>` **show interfaces ge-5/2/0 statistics detail**

```
Physical interface: ge-5/2/0, Enabled, Physical link is Up
  Interface index: 146, SNMP ifIndex: 519, Generation: 149
  Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, BPDU Error: None,
MAC-REWRITE Error: None, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:00:5E:00:53:74, Hardware address: 00:00:5E:00:53:74
  Last flapped   : 2009-11-11 11:24:00 PST (09:23:08 ago)
  Statistics last cleared: 2009-11-11 17:50:58 PST (02:56:10 ago)
  Traffic statistics:
   Input  bytes  :               271524                    0 bps
   Output bytes  :             37769598                  352 bps
   Input  packets:                 3664                    0 pps
   Output packets:               885790                    0 pps
   IPv6 transit statistics:
    Input  bytes  :                   0
    Output bytes  :            16681118
    Input  packets:                   0
    Output packets:              362633
   Multicast statistics:
    IPV4 multicast statistics:
     Input  bytes  :               112048                    0 bps
     Output bytes  :             20779920                    0 bps
     Input  packets:                 1801                    0 pps
     Output packets:               519498                    0 pps
    IPV6 multicast statistics:
     Input  bytes  :               156500                    0 bps
     Output bytes  :             16681118                    0 bps
     Input  packets:                 1818                    0 pps
     Output packets:               362633                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3
incompletes: 0, L2 channel errors: 0,
    L2 mismatch timeouts: 0, FIFO errors: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
 FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0,
    Resource errors: 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort               882558               882558                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0
```

```
    3 network-cont               3232                3232                  0

  Active alarms  : None
  Active defects : None

  Logical interface ge-5/2/0.0 (Index 71) (SNMP ifIndex 573) (Generation 135)
    Flags: SNMP-Traps 0x4000 Encapsulation: ENET2
    Egress account overhead: 100
    Ingress account overhead: 90
    Traffic statistics:
     Input  bytes  :              271524
     Output bytes  :            37769598
     Input  packets:                3664
     Output packets:              885790
     IPv6 transit statistics:
      Input  bytes  :                  0
      Output bytes  :           16681118
      Input  packets:                  0
      Output packets:             362633
    Local statistics:
     Input  bytes  :              271524
     Output bytes  :              308560
     Input  packets:                3664
     Output packets:                3659
    Transit statistics:
     Input  bytes  :                   0                    0 bps
     Output bytes  :            37461038                    0 bps
     Input  packets:                   0                    0 pps
     Output packets:              882131                    0 pps
     IPv6 transit statistics:
      Input  bytes  :                  0
      Output bytes  :           16681118
      Input  packets:                  0
      Output packets:             362633
    Multicast statistics:
     IPV4 multicast statistics:
      Input  bytes  :             112048                    0 bps
      Output bytes  :           20779920                    0 bps
      Input  packets:               1801                    0 pps
      Output packets:             519498                    0 pps
     IPV6 multicast statistics:
      Input  bytes  :             156500                    0 bps
      Output bytes  :           16681118                    0 bps
      Input  packets:               1818                    0 pps
      Output packets:             362633                    0 pps
    Protocol inet, MTU: 1500, Generation: 151, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.40.40.0/30, Local: 10.40.40.2, Broadcast: 10.40.40.3,
Generation: 167
    Protocol inet6, MTU: 1500, Generation: 152, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: ::10.40.40.0/126, Local: ::10.40.40.2
    Generation: 169
      Addresses, Flags: Is-Preferred
        Destination: fe80::/64, Local: fe80::21d:b5ff:fe61:d974
    Protocol multiservice, MTU: Unlimited, Generation: 171
    Generation: 153, Route table: 0
      Policer: Input: __default_arp_policer__
```


show interfaces statistics detail (Aggregated Ethernet)

user@host> **show interfaces ae0 detail**

```
Physical interface: ae0, Enabled, Physical link is Up
  Interface index: 186, SNMP ifIndex: 111, Generation: 187
  Link-level type: Ethernet, MTU: 1514, Speed: 2000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1,
  Minimum bandwidth needed: 0
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: 00:00:5E:0053:f0, Hardware address: 00:00:5E:00:53:f0
  Last flapped   : Never
  Statistics last cleared: 2006-12-23 03:04:16 PST (01:16:24 ago)
  Traffic statistics:
   Input  bytes  :               28544                    0 bps
   Output bytes  :               39770                    0 bps
   Input  packets:                 508                    0 pps
   Output packets:                 509                    0 pps
   Input  bytes  :          IPv6 28544
   Output bytes  :              IPv6 0
   Input  packets:            IPv6 508
   Output packets:              IPv6 0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
    Policed discards: 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0,
    Resource errors: 0

  Logical interface ae0.0 (Index 67) (SNMP ifIndex 139) (Generation 145)
    Flags: SNMP-Traps Encapsulation: ENET2
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :           508          0         28544            0
        Output:           509          0         35698            0
    Link:
      ge-3/3/8.0
        Input :           508          0         28544            0
        Output:             0          0             0            0
      ge-3/3/9.0
        Input :             0          0             0            0
        Output:             0          0             0            0
    Marker Statistics:   Marker Rx     Resp Tx   Unknown Rx   Illegal Rx
      ge-3/3/8.0                 0           0            0            0
      ge-3/3/9.0                 0           0            0            0
  Egress queues: 8 supported, 8 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0

    Protocol inet, MTU: 1500, Generation: 166, Route table: 0
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
```

```
        Destination: 10.1.1/24, Local: 10.1.1.1, Broadcast: 10.1.1.255,
        Generation: 159
    Protocol inet6, MTU: 1500, Generation: 163, Route table: 0
      Flags: Is-Primary
      Addresses, Flags: Is-Preferred
        Destination: fe80::/64, Local: fe80::206:5bff:fe05:c321,
        Broadcast: Unspecified, Generation: 161
```

show interfaces statistics detail (Aggregated Ethernet—Ingress)

user@host> **show interfaces statistics detail ae0 | no-more**

```
Physical interface: ae0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 504, Generation: 278
  Link-level type: Ethernet, MTU: 1514, Speed: 1Gbps, BPDU Error: None, MAC-REWRITE
 Error: None, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1,
Minimum bandwidth needed: 0
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: 00:00:5E:00:53:f0, Hardware address: 00:00:5E:00:53:f0
  Last flapped   : 2009-11-09 03:30:23 PST (00:01:28 ago)
  Statistics last cleared: 2009-11-09 03:26:18 PST (00:05:33 ago)
  Traffic statistics:
   Input  bytes  :            544009602             54761856 bps
   Output bytes  :                 3396                    0 bps
   Input  packets:             11826292               148809 pps
   Output packets:                   42                    0 pps
   IPv6 transit statistics:
    Input  bytes  :           350818604
    Output bytes  :                   0
    Input  packets:             7626488
    Output packets:                   0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
 0
  Ingress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0

  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                   21                   21                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                 451                  451                    0
```

```
  Logical interface ae0.0 (Index 70) (SNMP ifIndex 574) (Generation 177)
    Flags: SNMP-Traps 0x4000 Encapsulation: ENET2
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :      11826292     148809     544009602     54761856
        Output:            42          0          3396            0
    Link:
      ge-5/2/0.0
        Input :      11826292     148809     544009602     54761856
        Output:            42          0          3396            0
    Marker Statistics:   Marker Rx     Resp Tx   Unknown Rx   Illegal Rx
      ge-5/2/0.0                 0           0            0            0
    Protocol inet, MTU: 1500, Generation: 236, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.30.30.0/30, Local: 10.30.30.2, Broadcast: 10.30.30.3,
Generation: 310
    Protocol inet6, MTU: 1500, Generation: 237, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: ::10.30.30.0/126, Local: ::10.30.30.2
    Generation: 312
      Addresses, Flags: Is-Preferred
        Destination: fe80::/64, Local: fe80::21d:b5ff:fe61:dbf0
    Protocol multiservice, MTU: Unlimited, Generation: 314
    Generation: 238, Route table: 0
      Policer: Input: __default_arp_policer__
```

show interfaces statistics detail (Aggregated Ethernet—Egress)

`user@host>` **show interfaces statistics detail ae0 | no-more**

```
Physical interface: ae0, Enabled, Physical link is Up
  Interface index: 128, SNMP ifIndex: 501, Generation: 319
  Link-level type: Ethernet, MTU: 1514, Speed: 1Gbps, BPDU Error: None, MAC-REWRITE
 Error: None, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Disabled, Minimum links needed: 1,
Minimum bandwidth needed: 0
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Current address: 00:00:5E:00:53:f0, Hardware address: 00:00:5E:00:53:f0
  Last flapped   : 2009-11-09 03:30:24 PST (00:02:42 ago)
  Statistics last cleared: 2009-11-09 03:26:42 PST (00:06:24 ago)
  Traffic statistics:
   Input  bytes  :                  440                    0 bps
   Output bytes  :           1047338120             54635848 bps
   Input  packets:                    7                    0 pps
   Output packets:             22768200               148466 pps
   IPv6 transit statistics:
    Input  bytes  :                 288
    Output bytes  :           723202616
    Input  packets:                   4
    Output packets:            15721796
  Input errors:
   Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
 0
  Ingress queues: 8 supported, 4 in use
```

```
 Queue counters:       Queued packets  Transmitted packets      Dropped packets

   0 best-effort                    0                    0                    0

   1 expedited-fo                   0                    0                    0

   2 assured-forw                   0                    0                    0

   3 network-cont                   0                    0                    0

 Egress queues: 8 supported, 4 in use
 Queue counters:       Queued packets  Transmitted packets      Dropped packets

   0 best-effort            201985796            201985796                    0

   1 expedited-fo                   0                    0                    0

   2 assured-forw                   0                    0                    0

   3 network-cont                  65                   65                    0


 Logical interface ae0.0 (Index 72) (SNMP ifIndex 505) (Generation 204)
   Flags: SNMP-Traps 0x4000 Encapsulation: ENET2
   Statistics        Packets        pps         Bytes          bps
   Bundle:
       Input :             7          0           440            0
       Output:      22768200     148466    1047338120     54635848
   Link:
     ge-2/1/6.0
       Input :             7          0           440            0
       Output:      22768200     148466    1047338120     54635848
   Marker Statistics:   Marker Rx     Resp Tx   Unknown Rx   Illegal Rx
     ge-2/1/6.0                 0           0            0            0
   Protocol inet, MTU: 1500, Generation: 291, Route table: 0
     Addresses, Flags: Is-Preferred Is-Primary
       Destination: 10.30.30.0/30, Local: 10.30.30.1, Broadcast: 10.30.30.3,
Generation: 420
   Protocol inet6, MTU: 1500, Generation: 292, Route table: 0
     Addresses, Flags: Is-Preferred Is-Primary
       Destination: ::/26, Local: ::10.30.30.1
   Generation: 422
     Addresses, Flags: Is-Preferred
       Destination: fe80::/64, Local: fe80::21f:12ff:fec2:37f0
   Protocol multiservice, MTU: Unlimited, Generation: 424
   Generation: 293, Route table: 0
     Policer: Input: __default_arp_policer__
```

show interfaces statistics (SONET/SDH)

user@host> **show interfaces statistics detail so-3/0/0 | no-more**

```
Physical interface: so-3/0/0, Enabled, Physical link is Up
  Interface index: 133, SNMP ifIndex: 538, Generation: 283
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC192,
 Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Hold-times     : Up 0 ms, Down 0 ms
```



```
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive statistics:
    Input : 13 (last seen 00:00:04 ago)
    Output: 14 (last sent 00:00:02 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Opened, iso: Not-configured, mpls: Not-configured

  CHAP state: Closed
  PAP state: Closed
  CoS queues     : 8 supported, 8 maximum usable queues
  Last flapped   : 2009-11-09 02:52:34 PST (01:12:39 ago)
  Statistics last cleared: 2009-11-09 03:58:54 PST (00:06:19 ago)
  Traffic statistics:
   Input  bytes  :           2559160294            54761720 bps
   Output bytes  :                10640                  48 bps
   Input  packets:             55633975              148809 pps
   Output packets:                  216                   0 pps
   IPv6 transit statistics:
    Input  bytes  :           647922328
    Output bytes  :                   0
    Input  packets:            14085269
    Output packets:                   0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Bucket drops:
0, Policed discards: 0, L3 incompletes: 0,
    L2 channel errors: 0, L2 mismatch timeouts: 0, HS link CRC errors: 0, HS link
 FIFO overflows: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Aged packets: 0, HS link FIFO
underflows: 0, MTU errors: 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    4                    4                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                 213                  213                    0

  SONET alarms   : None
  SONET defects  : None

  Logical interface so-3/0/0.0 (Index 72) (SNMP ifIndex 578) (Generation 182)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Protocol inet, MTU: 4470, Generation: 244, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.30.30.0/30, Local: 10.30.30.2, Broadcast: 10.30.30.3,
Generation: 322
    Protocol inet6, MTU: 4470, Generation: 245, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: ::10.30.30.0/126, Local: ::10.30.30.2
    Generation: 324
      Addresses, Flags: Is-Preferred
        Destination: fe80::/64, Local: fe80::2a0:a5ff:fe61:9264
    Generation: 326
```


show interfaces statistics (Aggregated SONET/SDH—Ingress)

user@host> **show interfaces statistics detail as0 | no-more**

```
Physical interface: as0, Enabled, Physical link is Up
  Interface index: 132, SNMP ifIndex: 534, Generation: 282
  Link-level type: PPP, MTU: 4474, Speed: OC192, Minimum links needed: 1, Minimum
 bandwidth needed: 0
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Last flapped   : 2009-11-09 03:45:53 PST (00:09:38 ago)
  Statistics last cleared: 2009-11-09 03:48:17 PST (00:07:14 ago)
  Traffic statistics:
   Input  bytes  :          2969786332            54761688 bps
   Output bytes  :               11601                   0 bps
   Input  packets:            64560636              148808 pps
   Output packets:                 225                   0 pps
    IPv6 transit statistics:
    Input  bytes  :         2086013152
    Output bytes  :                  0
    Input  packets:           45348114
    Output packets:                  0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    3                    3                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                 222                  222                    0


  Logical interface as0.0 (Index 71) (SNMP ifIndex 576) (Generation 179)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :      64560550     148808    2969785300     54761688
        Output:           139          0         10344            0
    Link:
      so-3/0/0.0
        Input :      64560550     148808    2969785300     54761688
        Output:           139          0         10344            0
    Protocol inet, MTU: 4470, Generation: 240, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.30.30.0/30, Local: 10.30.30.2, Broadcast: 10.30.30.3,
Generation: 316
    Protocol inet6, MTU: 4470, Generation: 241, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: ::10.30.30.0/126, Local: ::10.30.30.2
    Generation: 318
      Addresses, Flags: Is-Preferred
```

```
      Destination: fe80::/64, Local: fe80::2a0:a5ff:fe61:9264
    Generation: 320
```

show interfaces statistics (Aggregated SONET/SDH—Egress)

user@host> **show interfaces statistics detail as0 | no-more**

```
Physical interface: as0, Enabled, Physical link is Up
  Interface index: 132, SNMP ifIndex: 565, Generation: 323
  Link-level type: PPP, MTU: 4474, Speed: OC192, Minimum links needed: 1, Minimum
 bandwidth needed: 0
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Last flapped   : 2009-11-09 03:43:37 PST (00:12:48 ago)
  Statistics last cleared: 2009-11-09 03:48:54 PST (00:07:31 ago)
  Traffic statistics:
   Input  bytes  :                11198                  392 bps
   Output bytes  :           3101452132             54783448 bps
   Input  packets:                  234                    0 pps
   Output packets:             67422937               148868 pps
   IPv6 transit statistics:
    Input  bytes  :                5780
    Output bytes  :          2171015678
    Input  packets:                  72
    Output packets:            47195993
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0, Policed discards:
 0, Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, MTU errors: 0, Resource errors:
 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort             67422830             67422830                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                  90                   90                    0


  Logical interface as0.0 (Index 71) (SNMP ifIndex 548) (Generation 206)
    Flags: Point-To-Point SNMP-Traps 0x4000 Encapsulation: PPP
    Statistics        Packets        pps         Bytes          bps
    Bundle:
        Input :           144          0         10118          392
        Output:      67422847     148868    3101450962     54783448
    Link:
      so-0/1/0.0
        Input :           144          0         10118          392
        Output:      67422847     148868    3101450962     54783448
    Protocol inet, MTU: 4470, Generation: 295, Route table: 0
      Addresses, Flags: Is-Preferred Is-Primary
        Destination: 10.30.30.0/30, Local: 10.30.30.1, Broadcast: 10.30.30.3,
Generation: 426
    Protocol inet6, MTU: 4470, Generation: 296, Route table: 0
```

```
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: ::/26, Local: ::10.30.30.1
  Generation: 428
    Addresses, Flags: Is-Preferred
      Destination: fe80::/64, Local: fe80::2a0:a5ff:fe63:1d0a
  Generation: 429
```

show interfaces statistics (MX Series Routers)

user@host> **show interfaces xe-0/0/0 statistics**

```
Physical interface: xe-0/0/0, Enabled, Physical link is Up
  Interface index: 145, SNMP ifIndex: 592
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps, BPDU Error:
 None, Loopback: None, Source filtering: Disabled, Flow control: Enabled
  Pad to minimum frame size: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x0
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Current address: 00:00:5E:00:53:f0, Hardware address: 00:00:5E:00:53:f0
  Last flapped   : 2013-10-26 03:20:40 test (2w3d 03:29 ago)
  Statistics last cleared: Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Input errors: 0, Output errors: 0
  Active alarms  : LINK
  Active defects : LINK
  PCS statistics                      Seconds
    Bit errors                           109
    Errored blocks                       109
  Interface transmit statistics: Disabled
```

show interfaces statistics (MX Series Routers: Dynamic Interfaces with RPF Check Detail)

user@host> **show interfaces statistics pp0.3221225475 detail**

```
  Logical interface pp0.3221225475(Index 536870921)(SNMP ifIndex 200000009)
(Generation 6)
    Flags: Up Point-To-Point Encapsulation: PPPoE
    PPPoE:
      State: SessionUp, Session ID: 1,
      Session AC name: B, Remote MAC address:00:00:5E:00:53:01,
      Underlying interface: xe-1/0/0.3221225474 (Index 536870919)
      Ignore End-Of-List tag: Disable
    Bandwidth: 0
    Traffic statistics:
     Input  bytes  :                  34
     Output bytes  :                   0
     Input  packets:                   1
     Output packets:                   1
    Local statistics:
     Input  bytes  :                   0
     Output bytes  :                   0
     Input  packets:                   0
     Output packets:                   0
    Transit statistics:
     Input  bytes  :                  34                    0 bps
     Output bytes  :                   0                    0 bps
```



```
     Input  packets:                    1                    0 pps
     Output packets:                    1                    0 pps
  Keepalive settings: Interval 30 seconds, Up-count 3, Down-count 3
  LCP state: Opened
  NCP state: inet: Opened, inet6: Not-configured, iso: Not-configured, mpls:
Not-configured
  CHAP state: Success
  PAP state: Closed
    Protocol inet, MTU: 1492
    Max nh cache: 0, New hold nh limit: 0, Curr nh cnt: 0, Curr new hold cnt: 0,
 NH drop cnt: 0
    Generation: 0, Route table: 0
      Flags: uRPF, Unnumbered
      RPF Failures: Packets: 0, Bytes: 0
      Donor interface: lo0.0 (Index 320)
      Input Filters: upstrm1-inet-pp0.3221225475-in
      Output Filters: dwnstrm1-inet-pp0.3221225475-out
      Addresses, Flags: Is-Primary
        Destination: Unspecified, Local: 10.255.96.19, Broadcast: Unspecified,
Generation: 0
```

show interfaces statistics (PTX Series Packet Transport Routers)

`user@host>` **show interfaces statistics em0**

```
 Physical interface: em0, Enabled, Physical link is Up
      Interface index: 8, SNMP ifIndex: 0
      Type: Ethernet, Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps
      Device flags   : Present Running
      Interface flags: SNMP-Traps
      Link type      : Full-Duplex
      Current address: 00:00:5E:00:53:1b, Hardware address: 00:00:5E:00:53:1b
      Last flapped   : Never
      Statistics last cleared: Never
 Input packets : 212620
 Output packets: 71
      Input errors: 0, Output errors: 0

      Logical interface em0.0 (Index 3) (SNMP ifIndex 0)
 Flags: SNMP-Traps Encapsulation: ENET2
 Input packets : 212590
 Output packets: 71
 Protocol inet, MTU: 1500
   Flags: Is-Primary
   Addresses, Flags: Is-Default Is-Preferred Is-Primary
     Destination: 192.168.3/24, Local: 192.168.3.30,
     Broadcast: 192.168.3.255
```

show interfaces statistics (ACX Series routers)

`user@host>` **show interfaces statistics ge-0/1/7**

```
Physical interface: ge-0/1/7, Enabled, Physical link is Down
  Interface index: 151, SNMP ifIndex: 524
  Link-level type: Ethernet, Media type: Copper, MTU: 1514, Link-mode: Full-duplex,
 Speed: 1000mbps, BPDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled,

  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
Remote fault: Online
```

```
Device flags   : Present Running Down
Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
Link flags     : None
CoS queues     : 8 supported, 8 maximum usable queues
Current address: 00:00:5E:00:53:a3, Hardware address: 00:00:5E:00:53:a3
Last flapped   : 2012-05-11 04:25:28 PDT (2d 20:23 ago)
Statistics last cleared: 2012-05-13 23:07:23 PDT (01:41:25 ago)
Input rate     : 0 bps (0 pps)
Output rate    : 0 bps (0 pps)
Input errors: 0, Output errors: 0
Active alarms  : LINK
Active defects : LINK
Interface transmit statistics: Disabled
```


show interfaces terse satellite-device

Syntax

```
show interfaces terse satellite-device (device-alias | all)
```

Release Information

Command introduced in Junos OS Release 14.2R3 for Junos Fusion Provider Edge.
Command introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Command introduced in Junos OS Release 17.2R1 for Junos Fusion Data Center.

Description

Display the satellite device extended ports in a Junos Fusion.

Options

device-alias *device-alias*—Display extended port information for the satellite device using the specified device alias only.

all—Display information for all extended ports and aggregated Ethernet interfaces with extended ports as members configured on all of the satellite devices.

Required Privilege Level

view

Related Documentation

- Configuring or Expanding a Junos Fusion Enterprise on page 45

List of Sample Output

show interfaces terse satellite-device device-alias on page 616
show interfaces terse satellite-device all on page 616

Output Fields

Table 42 on page 615 lists the output fields for the **show interfaces terse satellite-device** command. Output fields are listed in the approximate order in which they appear.

Table 42: show interfaces terse satellite-device Output Fields

Field Name	Field Description
Interface	Interface name.
Admin	Whether the interface is turned on (up) or off (down).
Link	Link state: **up** or **down**.
Proto	Protocol family configured on the logical interface.
Local	Local IP address of the logical interface.
Remote	Remote IP address of the logical interface.

Sample Output

show interfaces terse satellite-device device-alias

user@aggregation-device> **show interfaces terse satellite-device TOR1**

```
Interface               Admin Link Proto    Local                 Remote
sd-101/0/0              up    up
sd-101/0/0.32770        up    up   bridge
xe-101/0/14             up    up
xe-101/0/15             up    up
xe-101/0/16             up    up
xe-101/0/17             up    up
xe-101/0/24             up    up
xe-101/0/25             up    up
xe-101/0/31             up    up
xe-101/0/31.0           up    up   bridge
xe-101/0/32             up    down
xe-101/0/32.0           up    down bridge
xe-101/0/33             up    down
xe-101/0/33.0           up    down bridge
ge-101/0/36             up    down
et-101/0/48             up    down
xe-101/0/50:0           up    up
xe-101/0/50:0.0         up    up   bridge
xe-101/0/50:1           up    up
xe-101/0/50:2           up    up
xe-101/0/50:2.0         up    up   bridge
xe-101/0/50:3           up    up
```

Sample Output

show interfaces terse satellite-device all

user@aggregation-device> **show interfaces terse satellite-device all**

```
Interface               Admin Link Proto    Local                 Remote
ae0                     up    up
ae0.0                   up    up   bridge
ae1                     up    up
ae1.0                   up    up   bridge
ae2                     up    up
ae2.0                   up    up   bridge
ae3                     up    up
ae3.0                   up    up   bridge
ae4                     up    up
ae4.0                   up    up   bridge
ae5                     up    up
ae5.0                   up    up   bridge
ae6                     up    up
ae6.0                   up    up   bridge
ae7                     up    up
ae7.0                   up    up   bridge
ae8                     up    up
ae8.0                   up    up   bridge
ae9                     up    up
ae9.0                   up    up   bridge
ae10                    up    down
ae10.0                  up    down bridge
xe-101/0/14             up    up
```



```
xe-101/0/15             up    up
xe-101/0/16             up    up
xe-101/0/17             up    up
xe-101/0/24             up    up
xe-101/0/25             up    up
xe-101/0/31             up    up
xe-101/0/31.0           up    up   bridge
xe-101/0/32             up    down
xe-101/0/32.0           up    down bridge
xe-101/0/33             up    down
xe-101/0/33.0           up    down bridge
ge-101/0/36             up    down
et-101/0/48             up    down
xe-101/0/50:0           up    up
xe-101/0/50:0.0         up    up   bridge
xe-101/0/50:1           up    up
xe-101/0/50:2           up    up
xe-101/0/50:2.0         up    up   bridge
xe-101/0/50:3           up    up
xe-102/0/10             up    up
xe-102/0/11             up    up
xe-102/0/12             up    down
xe-102/0/13             up    up
xe-102/0/14             up    up
xe-102/0/15             up    up
xe-102/0/16             up    up
xe-102/0/17             up    up
xe-102/0/24             up    up
xe-102/0/25             up    up
xe-102/0/31             up    up
xe-102/0/31.0           up    up   bridge
xe-102/0/32             up    up
xe-102/0/32.0           up    up   bridge
xe-102/0/33             up    up
xe-102/0/45             up    down
ge-102/0/46             up    down
xe-102/0/47             up    down
et-102/0/48             up    down
et-102/0/49             up    down
et-102/0/50             up    down
et-102/0/51             up    down
et-102/0/52             up    down
et-102/0/53             up    down
ge-103/0/0              up    up
ge-103/0/0.0            up    up   aenet    --> ae0.0
ge-103/0/1              up    down
ge-103/0/1.0            up    down aenet    --> ae1.0
ge-103/0/2              up    up
ge-103/0/2.0            up    up   aenet    --> ae2.0
ge-103/0/3              up    up
```

show system core-dumps

List of Syntax

Syntax

```
show system core-dumps
<re0>
<re1>
<routing-engine>
<satellite [fpc-slot-id |device-alias alias-name]>
```

Syntax (SRX Series)

```
show system core-dumps
```

Syntax (Junos OS Evolved)

```
show system core-dumps
```

Syntax (EX Series Switches)

```
show system core-dumps
<all-members>
<local>
<member member-id>
```

Syntax (TX Matrix Router)

```
show system core-dumps
<all-chassis | all-lcc | lcc number | scc>
```

Syntax (TX Matrix Plus Router)

```
show system core-dumps
<all-chassis | all-lcc | lcc number | sfc number>
```

Syntax (QFX Series and OCX Series)

```
show system core-dumps
<component (UUID | serial number | all)>
<display-period (hours | minutes | seconds)>
<display-order>
<kernel-crashinfo component (UUID | serial number)>
<repository (core | log)>
```

Release Information

Command introduced before Junos OS Release 8.5.
Command introduced in Junos OS Release 9.0 for EX Series switches.
sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.
Command introduced in Junos OS Release 11.1 for the QFX Series.

re0, **re1**, and **routing-engine** options introduced for dual Routing Engines in Junos OS Release 13.1.
Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.
satellite option introduced in Junos OS Release 14.2R3.
core-file-info option is deprecated in Junos OS Release 16.1R3.

Description Show core files on all routers or switches running Junos OS. You can use the **show system core-dumps** command to show a list of system core files created when the router or switch has failed. This command can be useful for diagnostic purposes. Each list item includes the file permissions, number of links, owner, group, size, modification date, and path and filename. If dual Routing Engines are present, you can view core-dump files for either routing engine or both routing engines together. On a QFabric system, you can view core-dump files on individual QFabric system devices as well as on the entire QFabric system.

The core files are placed in the **/var/tmp/corefiles** on the SPC3 cards. Each PIC of the SPC3 card has five core files quota on the RE. When no more than five core files from one SPC3 PIC are on the RE, and the RE hard drive has more than 5 GB capacity, core file from the specific PIC is saved at the time it arrives. When there are already five core files from one SPC3 PIC on the RE, the newly arrived core file from the specific PIC replaces the last core file created by that PIC on the RE. When 5 GB capacity limit is reached, core file is not copied onto the RE. Only a zero sized shadow file with the same file name suffixed by ".shadow" is created. The core file is reached on the specific SPC3 PIC.

Options **none**—Display a list of all existing core-dump files.

NOTE: If dual Routing Engines are present, then only the core-dump files for the active Routing Engine are listed. For Junos OS Evolved, core-dump files for all Routing Engines are listed.

all-chassis—(TX Matrix and TX Matrix Plus routers only) (Optional) On a routing matrix based on a TX Matrix router, display system core files for the TX Matrix router switch-card chassis [SCC] and all the T640 routers [LCCs] connected to the TX Matrix router.

On a routing matrix based on a TX Matrix Plus router, display system core files for the TX Matrix Plus router (switch-fabric chassis [SFC]) and all the T1600 routers [LCCs] connected to the TX Matrix Plus router.

<all-lcc | lcc *number*>—(TX Matrix and TX Matrix Plus routers only) (Optional) On a routing matrix based on the TX Matrix router, display core dump files for all T640 routers (line-card chassis [LCCs]) or a specific T640 router [LCC] connected to the TX Matrix router.

On a routing matrix based on the TX Matrix Plus router, display logging information for all T1600 routers (line-card chassis [LCCs]) or a specific T1600 router (LCC) connected to the TX Matrix Plus router. When using the **lcc *number*** option, replace ***number*** with a value from **0** through **3**.

NOTE: The **all-chassis** option displays system core files for the SCC or SFC and the LCCs connected to the SCC or SFC in the routing matrix while the **all-lcc** option only displays system core files for the LCCs in the routing matrix.

all-members—(EX4200 switches) (Optional) Display system core files on all members of the Virtual Chassis configuration.

component (*UUID* | *serial number* | *all*)—(QFabric systems only) (Optional) Display a list of core-dump files located on individual QFabric system device or on the entire QFabric system.

display-order (timestamp-sort | alphanumeric-sort)—(QFabric systems only) (Optional) Display list of debug artifacts generated within the specified period—for example, within the last hour, within the last 20 minutes, or within the last 32 seconds—or according to their filename.

display-period (*hours* | *minutes* | *seconds*)—(QFabric systems only) (Optional) Display core-dump files generated within the specified period—for example, within the last hour, within the last 20 minutes, or within the last 32 seconds.

kernel-crashinfo component (*UUID* | *serial number*)—(QFabric systems only) (Optional) Display kernel crash information from the EEPROM on a QFabric system device.

local—(EX4200 switches only) (Optional) Display system core files on the local Virtual Chassis member.

member *member-id*—(EX4200 switches only) (Optional) Display system core files on the specified member of the Virtual Chassis configuration. Replace ***member-id*** with a value from 0 through 9.

node *node-name*—(Optional) (Junos OS Evolved only) Display system core files generated on the specified node.

re0—(Dual Routing Engines only) Display the core-dump files on re0.

re1—(Dual Routing Engines only) Display the coredump files on re1.

repository (core | log)—(QFabric systems only) (Optional) Specify either the core or log repository in which to view core-dump files.

routing-engine (backup | both | local | master | other)—(Dual routing engines only) Display a list of core-dump files for either the backup, local, master, or other routing engine or both routing engines.

satellite [*fpc-slot-id* | device-alias *alias-name*]—(Junos Fusion only)(Optional) Display system core files for the specified satellite device in a Junos Fusion, or for all satellite devices in the Junos Fusion if no satellite devices are specified.

scc—(TX Matrix routers only) (Optional) Display system core files on the TX Matrix router (or switch-card chassis).

sfc—(TX Matrix Plus routers only) (Optional) Display system core files on the TX Matrix Plus router (or switch-fabric chassis).

Required Privilege Level

view

List of Sample Output

show system core-dumps on page 623
show system core-dumps on page 623
show system core-dumps routing-engine both on page 623
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show system core-dumps (TX Matrix Plus Router) on page 624
show system core-dumps (QFX3500 Switch) on page 626
show system core-dumps (QFabric Systems) on page 626
show system core-dumps component serial number display-order alphanumeric-sort repository core (QFabric Systems) on page 627
show system core-dumps display-period (QFabric Systems) on page 627
show system core-dumps kernel-crashinfo component serial number (QFabric Systems) on page 629
show system core-dumps repository core (QFabric Systems) on page 631
show system core-dumps repository log (QFabric Systems) on page 631

Output Fields

Table 43 on page 621 describes the output fields for the **show system core-dumps** command. Output fields are listed in the approximate order in which they appear.

Table 43: show system core-dumps Output Fields

Field Name	Field Description
Permissions	Read/write permissions for the file named.
Links	Number of links to the file.
Owner	Name of the file owner.
Group	Name of the group with file access.
File size	File size in bytes.
Modified	Last file modification date and time.

Table 43: show system core-dumps Output Fields (continued)

Field Name	Field Description
Path/filename	File path where the file resides and the filename. (MX Series routers only) When you display the core files for an MX Series Virtual Chassis, the **show system core-dumps** command does not display information about files pertaining to the relayd process.
Repository scope:	Repository where core-dump files and log files are stored. The core-dump files are located in the **core** repository, and the log files are located in the **log** repository. The default **Repository scope** is shared since both the **core** and **log** repositories are shared by all of the QFabric system devices.
Repository head:	Path to the top-level repository location.
Repository name:	Name of the repository: **core** or **log**.
List of nodes for core repository:	List of core-dump files associated with a particular QFabric system device located in the core repository.
Node Group	Name of the QFabric system device.
Node Identifier	UUID or serial number of the QFabric system device.
Num	Number of core-dump and log files.
Model	Model number of the QFabric system device.
Usage	Usage of the repository in megabytes.
Total usage of core repository:	Total usage of core-dump files associated with a particular QFabric system device located in the core repository. Usage is specified in megabytes and as a percentage.
Total usage of log repository:	Total usage of log files associated with a particular QFabric system device located in the log repository. Usage is specified in megabytes and as a percentage.
List of nodes for core repository:	List of core-dump files associated with a particular QFabric system device located in the core repository.
List of nodes for log repository:	List of log files associated with a particular QFabric system device located in the log repository.
Filename	Name of the core-dump file.
Date	Last core-dump file modification date and time.
Size	Size of the core-dump file.

Table 43: show system core-dumps Output Fields (continued)

Field Name	Field Description
Core filename	Filename of the core-dump file.
Process name	Name of the process that is generating a core-dump file or log file.
Release	Junos OS release.
Build server	Junos OS build server.
Build date	Junos OS build date.
Stack trace	Stack trace of the core-dump file.

Sample Output

show system core-dumps

This example shows the command output if core files exist.

user@host> **show system core-dumps**

```
-rw------- 1 root wheel 268369920 Jun 18 17:59 /var/crash/vmcore.0
-rw-rw---- 1 root field 3371008 Jun 18 17:53 /var/tmp/rpd.core.0
-rw-r--r-- 1 root wheel 27775914 Jun 18 17:59 /var/crash/kernel.0
```

show system core-dumps

This example shows the command output if core files do not exist.

user@host> **show system core-dumps**

```
/var/crash/*core*: No such file or directory
/var/tmp/*core*: No such file or directory
/var/tmp/pics/*core*: No such file or directory
/var/crash/kernel.*: No such file or directory
```

show system core-dumps routing-engine both

This example shows the command output if dual Routing Engines are present.

user@host> **show system core-dumps routing-engine both**

```
re0:
--------------------------------------------------------------------------
/var/crash/*core*: No such file or directory
/var/tmp/pics/*core*: No such file or directory
/var/crash/kernel.*: No such file or directory

/var/tmp/cores:
total blocks: 496776
-rw-rw----  1 root  field   11910589 Nov 8  13:20 chassisd.core.0.201311081320
...
```

```
-rw-rw----  1 root  field   11737227 Oct 28 14:21
rpd.core-tarball.4.tgz.201310281421.3458162
total files: 10

re1:
--------------------------------------------------------------------------
/var/crash/*core*: No such file or directory
/var/tmp/pics/*core*: No such file or directory
/var/crash/kernel.*: No such file or directory

/var/tmp/cores:
total blocks: 3178420
-rw-rw----  1 root  field   19039721 Nov 8  14:29
chassisd.core.0.201311081429.3485600.gz
-rw-rw----  1 root  field   19039793 Nov 8  14:37
chassisd.core.1.201311081437.3485599.gz
..

-rw-rw----  1 root  field   11710113 Oct 17 15:26
rpd.core-tarball.1.tgz.201310171526.3430028
```

show system core-dumps (SRX Series)

user@host> **show system core-dumps**

```

/var/crash/*core*: No such file or directory
-rw-r--r--  1 nobody wheel   1439949 Apr 24 10:38
/var/tmp/FPC0_PIC0.localhost.J-UKERN.23421.1556127502.core.tgz
-rw-r--r--  1 nobody wheel   1435531 Apr 24 10:44
/var/tmp/FPC0_PIC0.localhost.J-UKERN.24702.1556127821.core.tgz
-rw-r--r--  1 nobody wheel 288761042 Apr 24 10:32
/var/tmp/FPC0_PIC0.localhost.flowd_spc3.elf.31620.1556126342.core.tgz
-rw-r--r--  1 nobody wheel     35082 Apr 24 10:47
/var/tmp/FPC0_PIC0.localhost.tnp_hello.20972.1556128038.core.tgz
-rw-r--r--  1 nobody wheel     35367 Apr 24 10:49
/var/tmp/FPC0_PIC0.localhost.tnp_hello.27233.1556128140.core.tgz
-rw-r--r--  1 nobody wheel     35372 Apr 24 11:32
/var/tmp/FPC0_PIC1.localhost.tnp_hello.22289.1556130737.core.tgz
-rw-r--r--  1 nobody wheel     35357 Apr 24 10:51
/var/tmp/FPC0_PIC1.localhost.tnp_hello.22492.1556128268.core.tgz
-rw-r--r--  1 nobody wheel     34812 Apr 24 11:33
/var/tmp/FPC0_PIC1.localhost.tnp_hello.24235.1556130795.core.tgz
-rw-r--r--  1 nobody wheel     35383 Apr 24 11:18
/var/tmp/FPC0_PIC1.localhost.tnp_hello.27070.1556129899.core.tgz
-rw-r--r--  1 nobody wheel     34675 Apr 24 11:18
/var/tmp/FPC0_PIC1.localhost.tnp_hello.31621.1556129928.core.tgz
/var/tmp/pics/*core*: No such file or directory
/var/crash/kernel.*: No such file or directory
/var/jails/rest-api/tmp/*core*: No such file or directory
/tftpboot/corefiles/*core*: No such file or directory
total files: 10
```

show system core-dumps (TX Matrix Plus Router)

user@host> **show system core-dumps**

```
sfc0-re0:
--------------------------------------------------------------------------
```

```
/var/crash/kernel.*: No such file or directory
/tftpboot/corefiles/*core*: No such file or directory

/var/crash/cores:
total 8

/var/tmp/cores:
total 1627592
-rw-r--r--  1 root  field  535346090 May 15 07:36
rpd.core-tarball.0.090515.0736.tgz
-rw-r--r--  1 root  field  105632057 May 15 07:37
rpd.core-tarball.1.090515.0737.tgz
-rw-r--r--  1 root  field  101981681 May 15 07:38
rpd.core-tarball.2.090515.0738.tgz
-rw-r--r--  1 root  field   85854573 May 15 07:40
rpd.core-tarball.3.090515.0740.tgz
-rw-r--r--  1 root  field    4157845 May 15 08:18
rpd.core-tarball.4.090515.0818.tgz

lcc0-re0:
--------------------------------------------------------------------------
/var/crash/kernel.*: No such file or directory
/tftpboot/corefiles/*core*: No such file or directory

/var/crash/cores:
total 8

/var/tmp/cores:
total 12

lcc1-re0:
--------------------------------------------------------------------------
/var/crash/kernel.*: No such file or directory
/tftpboot/corefiles/*core*: No such file or directory

/var/crash/cores:
total 8

/var/tmp/cores:
total 10024
-rw-r--r--  1 root  field    1875794 Apr 22 15:47
chassisd.core-tarball.0.090422.1547.tgz
-rw-r--r--  1 root  field    1894183 Apr 22 19:02
chassisd.core-tarball.0.090422.1902.tgz
-rw-r--r--  1 root  field    1290240 Apr 26 16:01 ksyncd_1558.core.0.090426.1601

lcc2-re0:
--------------------------------------------------------------------------
/var/crash/kernel.*: No such file or directory
/tftpboot/corefiles/*core*: No such file or directory

/var/crash/cores:
total 21124008
-rw-r--r--  1 root  wheel  1022376528 May 2  06:43
core-LCC2-EGFPC7.core.0.090502.0643
-rw-r--r--  1 root  wheel  1022376528 May 2  08:13
core-LCC2-EGFPC7.core.0.090502.0813
-rw-r--r--  1 root  wheel  1022376544 May 5  06:15
core-LCC2-EGFPC7.core.0.090505.0615
-rw-r--r--  1 root  wheel  1022376544 May 6  10:59
```

```
core-LCC2-EGFPC7.core.0.090506.1059
-rw-r--r--  1 root  wheel  1022376528 May 2  06:58
core-LCC2-EGFPC7.core.1.090502.0658
-rw-r--r--  1 root  wheel  754271232 May 5  06:33
core-LCC2-EGFPC7.core.1.090505.0633
-rw-r--r--  1 root  wheel  264897536 May 6  11:12
core-LCC2-EGFPC7.core.1.090506.1112
-rw-r--r--  1 root  wheel  1022376528 May 2  07:22
core-LCC2-EGFPC7.core.2.090502.0722
-rw-r--r--  1 root  wheel  163633152 May 5  06:52
core-LCC2-EGFPC7.core.2.090505.0652
-rw-r--r--  1 root  wheel  171312128 May 6  12:13
core-LCC2-EGFPC7.core.2.090506.1213
-rw-r--r--  1 root  wheel  1022376528 May 2  07:39
core-LCC2-EGFPC7.core.3.090502.0739
-rw-r--r--  1 root  wheel  1022376528 May 2  07:55
core-LCC2-EGFPC7.core.4.090502.0755
-rw-r--r--  1 root  wheel  427277312 May 7  04:47
core-LCC2-STFPC4.core.0.090507.0447
-rw-r--r--  1 root  wheel  419609600 May 7  04:47
core-LCC2-STFPC5.core.0.090507.0447
-rw-r--r--  1 root  wheel  432356352 May 7  04:47
core-LCC2-STFPC6.core.0.090507.0447

/var/tmp/cores:
total 2568
-rw-r--r--  1 root  field    1290240 May 14 14:26 ksyncd_1540.core.0.090514.1426
...
```

show system core-dumps (QFX3500 Switch)

user@switch> **show system core-dumps**

```
/var/crash/*core*: No such file or directory
-rw-rw----  1 root  field    1545143 Jun 4   2012 /var/tmp/pafxpc.core.0.gz
-rw-rw----  1 root  field    1545146 Jun 4   2012 /var/tmp/pafxpc.core.1.gz
-rw-rw----  1 root  field    1545141 Jun 4   2012 /var/tmp/pafxpc.core.2.gz
-rw-rw----  1 root  field    1545146 Jun 4   2012 /var/tmp/pafxpc.core.3.gz
-rw-rw----  1 root  field    1545142 Jun 5   2012 /var/tmp/pafxpc.core.4.gz
/var/tmp/pics/*core*: No such file or directory
/var/crash/kernel.*: No such file or directory
/tftpboot/corefiles/*core*: No such file or directory
total 5
```

show system core-dumps (QFabric Systems)

user@switch> **show system core-dumps**

```
Repository scope: shared
Repository head: /pbdata/export
List of nodes for core repository: /pbdata/export/rdumps/
Node Group      Node Identifier                         Num   Model        Usage

DG-0            BCF7208D-E44F-E011-802F-4171BAAC781D     0     qfx3100      0M
FM-0            73747cd8-0710-11e1-b6a4-00e081c5297e     0     fx-jvre      0M
DRE-0           77116f18-0710-11e1-a2a0-00e081c5297e     0     fx-jvre      0M
NW-NG-0         BBAK0394                                 0     qfx3500      0M
NW-NG-0         cd78871a-0710-11e1-878e-00e081c5297e     0     fx-jvre      0M
NW-NG-0         d0afda1e-0710-11e1-a1d0-00e081c5297e     0     fx-jvre      0M
```



```
FC-0            d31ab7a6-0710-11e1-ad1b-00e081c5297e    0    fx-jvre      0M
FC-1            d4d0f254-0710-11e1-90c3-00e081c5297e    0    fx-jvre      0M
IC-WS001        WS001                                   0    -            -
IC-WS001        WS001/YW3803                            0    qfxc08-3008  0M
IC-WS001        WS001/YN5999                            0    qfxc08-3008  0M
node-device1    BBAK0372                                0    qfx3500      0M
node-device1    EE3093                                  0    qfx3500      0M
Total usage of core repository:0M of 70000M (0.0%)

List of nodes for log repository: /pbdata/export/rlogs/
Node Group      Node Identifier                         Num  Model        Usage

DG-0            BCF7208D-E44F-E011-802F-4171BAAC781D    0    qfx3100      0M
FM-0            73747cd8-0710-11e1-b6a4-00e081c5297e    1    fx-jvre      0M
DRE-0           77116f18-0710-11e1-a2a0-00e081c5297e    1    fx-jvre      0M
NW-NG-0         BBAK0394                                1    qfx3500      0M
NW-NG-0         cd78871a-0710-11e1-878e-00e081c5297e    1    fx-jvre      0M
NW-NG-0         d0afda1e-0710-11e1-a1d0-00e081c5297e    3    fx-jvre      0M
FC-0            d31ab7a6-0710-11e1-ad1b-00e081c5297e    1    fx-jvre      0M
FC-1            d4d0f254-0710-11e1-90c3-00e081c5297e    1    fx-jvre      0M
IC-WS001        WS001                                   0    -            -
IC-WS001        WS001/YN5999                            1    qfxc08-3008  0M
IC-WS001        WS001/YW3803                            1    qfxc08-3008  0M
node-device1    BBAK0372                                1    qfx3500      0M
node-device1    EE3093                                  1    qfx3500      0M
Total usage of log repository:0M of 70000M (0.0%)
```

show system core-dumps component serial number display-order alphanumeric-sort repository core (QFabric Systems)

user@switch> **show system core-dumps component BBAK8891 display-order alphanumeric-sort repository core**

```
Repository scope: shared
Repository head: /pbdata/export
Repository name: core
List of core dumps for component BBAK8891
Repository location: /pbdata/export/rdumps/BBAK8891
Filename                                   Date                      Size

eswd.core.0.1361.11172011214257.gz         Nov 17 21:43:10 2011      4779553
eswd.core.1.80267.11172011214514.gz        Nov 17 21:45:19 2011      3541648
eswd.core.2.80682.11172011214535.gz        Nov 17 21:45:43 2011      2156683
vccpd.core.0.1195.11182011151131.gz        Nov 18 15:11:35 2011      375617
Number of core dumps in repository:4
```

show system core-dumps display-period (QFabric Systems)

user@switch> **show system core-dumps display-period 24h**

```
 show system core-dumps display-period 24h
Repository scope: shared
Repository head: /pbdata/export
List of core dumps at repository: /pbdata/export/rdumps
Delta timespec: Last 24h
Component: BBAK8273
Filename                                   Size                      Date

vccpd.core.0.1195.11182011151131.gz        Nov 18 15:11:35 2011      375794
```



```
Component: cedb7b0e-0025-11e1-9a5f-00e081c52990
Filename                                   Size                      Date

vccpd.core.0.1461.11182011151131.gz        Nov 18 15:11:31 2011      120951
Component: ee19c4f8-0025-11e1-aef6-00e081c52990
Filename                                   Size                      Date

vccpd.core.0.1462.11182011151131.gz        Nov 18 15:11:31 2011      109420
Component: BBAK8281
Filename                                   Size                      Date

vccpd.core.0.1196.11182011151131.gz        Nov 18 15:11:36 2011      375373
Component: BBAK8891
Filename                                   Size                      Date

vccpd.core.0.1195.11182011151131.gz        Nov 18 15:11:35 2011      375617
Component: BBAK8276
Filename                                   Size                      Date

vccpd.core.0.1196.11182011151131.gz        Nov 18 15:11:35 2011      375350
Component: BBAK8868
Filename                                   Size                      Date

vccpd.core.0.1196.11182011151130.gz        Nov 18 15:11:34 2011      376211
Component: BBAK8835
Filename                                   Size                      Date

vccpd.core.0.1195.11182011151130.gz        Nov 18 15:11:35 2011      375700
Component: BBAK8283
Filename                                   Size                      Date

vccpd.core.0.1195.11182011151131.gz        Nov 18 15:11:36 2011      368298
Component: YW3781/YW3781
Filename                                   Size                      Date

vccpd.core.0.1220.11182011151131.gz        Nov 18 15:11:38 2011      380002
Component: 09726be2-0026-11e1-82d9-00e081c52990
Filename                                   Size                      Date

vccpd.core.0.1461.11182011151130.gz        Nov 18 15:11:31 2011      119965
Component: BBAK8309
Filename                                   Size                      Date

vccpd.core.0.1196.11182011151131.gz        Nov 18 15:11:36 2011      378930
Component: 303d476a-0026-11e1-abf4-00e081c52990
Filename                                   Size                      Date

vccpd.core.0.1460.11182011151131.gz        Nov 18 15:11:31 2011      118385
Component: YW3798/YW3798
Filename                                   Size                      Date

vccpd.core.0.1219.11182011151131.gz        Nov 18 15:11:36 2011      380455
List of log dumps at repository: /pbdata/export/rlogs
Delta timespec: Last 24h
Component: BBAK8273
Filename                                   Size                      Date

vccpd.tarball.0.1195.11182011151138.tgz    Nov 18 15:11:39 2011      20415
Component: cedb7b0e-0025-11e1-9a5f-00e081c52990
Filename                                   Size                      Date
```



```
vccpd.tarball.0.1461.11182011151131.tgz    Nov 18 15:11:33 2011      19651
Component: ee19c4f8-0025-11e1-aef6-00e081c52990
Filename                                   Size                      Date

vccpd.tarball.0.1462.11182011151133.tgz    Nov 18 15:11:36 2011      24650
Component: BBAK8281
Filename                                   Size                      Date

vccpd.tarball.0.1196.11182011151137.tgz    Nov 18 15:11:41 2011      19445
Component: BBAK8891
Filename                                   Size                      Date

vccpd.tarball.0.1195.11182011151138.tgz    Nov 18 15:11:41 2011      21916
Component: BBAK8276
Filename                                   Size                      Date

vccpd.tarball.0.1196.11182011151137.tgz    Nov 18 15:11:39 2011      20461
Component: BBAK8868
Filename                                   Size                      Date

vccpd.tarball.0.1196.11182011151137.tgz    Nov 18 15:11:41 2011      21924
Component: BBAK8835
Filename                                   Size                      Date

vccpd.tarball.0.1195.11182011151137.tgz    Nov 18 15:11:39 2011      19424
Component: BBAK8283
Filename                                   Size                      Date

vccpd.tarball.0.1195.11182011151138.tgz    Nov 18 15:11:42 2011      31186
Component: YW3781/YW3781
Filename                                   Size                      Date

vccpd.tarball.0.1220.11182011151141.tgz    Nov 18 15:11:45 2011      27565
Component: 09726be2-0026-11e1-82d9-00e081c52990
Filename                                   Size                      Date

vccpd.tarball.0.1461.11182011151130.tgz    Nov 18 15:11:34 2011      19613
Component: BBAK8309
Filename                                   Size                      Date

vccpd.tarball.0.1196.11182011151138.tgz    Nov 18 15:11:46 2011      50362
Component: 303d476a-0026-11e1-abf4-00e081c52990
Filename                                   Size                      Date

vccpd.tarball.0.1460.11182011151133.tgz    Nov 18 15:11:33 2011      19360
Component: YW3798/YW3798
Filename                                   Size                      Date

vccpd.tarball.0.1219.11182011151140.tgz    Nov 18 15:11:49 2011      24473
```

show system core-dumps kernel-crashinfo component serial number (QFabric Systems)

`user@switch>` **show system core-dumps kernel-crashinfo component A0001/YA0197**

```
Node: A0001/YA0197

Information about previous kernel crash:

-- Kernel panic data --
```

```
Panic string: kdb_sysctl_panic
System uptime: 3 day 20 hr 59 min 40 sec Kernel crash time: 2011-11-15 Wed 15:25:17
 Kernel build linkstamp: JUNOS 11.3I #0: 2011-11-10 20:42:27 UTC

-- Stacktrace of panicing context --
Processor 1 (crash monarch):
savectx+0x0 (c9552800,80214efc,802a7fbc,c88ad05c) ra 801b93a8 sz 0
kdm_kcore_save_crashinfo+0x254 (c9552800,0,802a7fbc,c88ad05c) ra 801b9f44 sz 784
 kdm_kcore_kern_panic_event_handler+0x4b0 (c9552800,0,802a7fbc,c88ad05c) ra
8022a9b8 sz 88
panic+0x1d0 (c9552800,0,4,77fed534) ra 802540c0 sz 56
kdb_sysctl_panic+0x70 (c9552800,0,4,77fed534) ra 80237e58 sz 40 sysctl_root+0x12c
 (c9552800,0,4,e8bc5cf8) ra 80238e50 sz 48
userland_sysctl+0x164 (c9552800,0,4,e8bc5cf8) ra 8023956c sz 104
__sysctl+0xe4 (c9552800,0,4,e8bc5cf8) ra 806d62e8 sz 160
trap+0xe1c (c9552800,0,4,e8bc5cf8) ra 80896e68 sz 128
MipsUserGenException+0x1a4 (c9552800,0,4,405cd12c) ra 0 sz 0
pid 82340, process: sysctl

Processor 0:
restoreintr+0x14 (1,81bca820,3,0) ra 806cdc3c sz 0
spinlock_exit+0x30 (1,81bca820,3,0) ra 8025d354 sz 24
sleepq_release+0x64 (1,81bca820,3,0) ra 8025e670 sz 24
sleepq_timeout+0x224 (1,81bca820,3,0) ra 80240294 sz 48
softclock+0x434 (1,81bca820,3,0) ra 802067f8 sz 80
ithread_loop+0x244 (1,81bca820,3,0) ra 80200e28 sz 64 fork_exit+0xc0
(1,81bca820,3,0) ra 80897c28 sz 48
MipsNMIException+0x34 (1,81bca820,3,0) ra 0 sz 0
pid 82340, process: sysctl

Processor 2:
cpu_idle+0x20 (80960000,51bbc,2031df,81bca1b8) ra 80204948 sz 24 idle_proc+0x130
 (80960000,51bbc,2031df,81bca1b8) ra 80200e28 sz 56 fork_exit+0xc0
(80960000,51bbc,2031df,81bca1b8) ra 80897c28 sz 48
MipsNMIException+0x34 (80960000,51bbc,2031df,81bca1b8) ra 0 sz 0
pid 82340, process: sysctl

Processor 3:
cpu_idle+0x20 (80960000,51bbc,2038df,81bca300) ra 80204948 sz 24 idle_proc+0x130
 (80960000,51bbc,2038df,81bca300) ra 80200e28 sz 56 fork_exit+0xc0
(80960000,51bbc,2038df,81bca300) ra 80897c28 sz 48
MipsNMIException+0x34 (80960000,51bbc,2038df,81bca300) ra 0 sz 0
pid 82340, process: sysctl

Processor 4:
cpu_idle+0x20 (80960000,51bbc,2037df,81bca448) ra 80204948 sz 24 idle_proc+0x130
 (80960000,51bbc,2037df,81bca448) ra 80200e28 sz 56 fork_exit+0xc0
(80960000,51bbc,2037df,81bca448) ra 80897c28 sz 48
MipsNMIException+0x34 (80960000,51bbc,2037df,81bca448) ra 0 sz 0
pid 82340, process: sysctl

Processor 5:
restoreintr+0x14 (1,51bbc,203edf,81bca590) ra 806cdc3c sz 0
spinlock_exit+0x30 (1,51bbc,203edf,81bca590) ra 80204a34 sz 24 idle_proc+0x21c
(1,51bbc,203edf,81bca590) ra 80200e28 sz 56 fork_exit+0xc0
(1,51bbc,203edf,81bca590) ra 80897c28 sz 48
MipsNMIException+0x34 (1,51bbc,203edf,81bca590) ra 0 sz 0
pid 82340, process: sysctl
```

```
Processor 6:
cpu_idle+0x20 (80960000,51bbc,205cdf,81bca6d8) ra 80204948 sz 24 idle_proc+0x130
 (80960000,51bbc,205cdf,81bca6d8) ra 80200e28 sz 56 fork_exit+0xc0
(80960000,51bbc,205cdf,81bca6d8) ra 80897c28 sz 48
MipsNMIException+0x34 (80960000,51bbc,205cdf,81bca6d8) ra 0 sz 0
pid 82340, process: sysctl

Processor 7:
lockmgr+0x5ac (c97e8484,c8dd9800,0,c8dd9800) ra 8c11c81c sz 48
sal_sem_take+0x134 (c97e8484,c8dd9800,0,c8dd9800) ra 8c351108 sz 56
_bcm_esw_linkscan_thread+0x45c (c97e8484,c8dd9800,0,c8dd9800) ra 8c11cdb4 sz 104
sal_thread_start_wrap+0x74 (c97e8484,c8dd9800,0,c8dd9800) ra 80200e28 sz 32
fork_exit+0xc0 (c97e8484,c8dd9800,0,c8dd9800) ra 80897c28 sz 48
MipsNMIException+0x34 (c97e8484,c8dd9800,0,c8dd9800) ra 0 sz 0
pid 82340, process: sysctl
-- End of stacktrace --
```

show system core-dumps repository core (QFabric Systems)

`user@switch>` **show system core-dumps repository core**

```
Repository scope: shared
Repository head: /pbdata/export
Repository name: core
List of nodes for core repository: /pbdata/export/rdumps/
Node Group       Node Identifier                        Num   Model        Usage

DG-0             BCF7208D-E44F-E011-802F-4171BAAC781D    0    qfx3100      0M
FM-0             73747cd8-0710-11e1-b6a4-00e081c5297e    0    fx-jvre      0M
DRE-0            77116f18-0710-11e1-a2a0-00e081c5297e    0    fx-jvre      0M
NW-NG-0          BBAK0394                                0    qfx3500      0M
NW-NG-0          cd78871a-0710-11e1-878e-00e081c5297e    0    fx-jvre      0M
NW-NG-0          d0afda1e-0710-11e1-a1d0-00e081c5297e    0    fx-jvre      0M
FC-0             d31ab7a6-0710-11e1-ad1b-00e081c5297e    0    fx-jvre      0M
FC-1             d4d0f254-0710-11e1-90c3-00e081c5297e    0    fx-jvre      0M
IC-WS001         WS001                                   0    -            -
IC-WS001         WS001/YW3803                            0    qfxc08-3008  0M
IC-WS001         WS001/YN5999                            0    qfxc08-3008  0M
node-device1     BBAK0372                                0    qfx3500      0M
node-device1     EE3093                                  0    qfx3500      0M
Total usage of core repository:0M of 70000M (0.0%)
```

show system core-dumps repository log (QFabric Systems)

`user@switch>` **show system core-dumps repository log**

```
Repository scope: shared
Repository head: /pbdata/export
Repository name: log
List of nodes for log repository: /pbdata/export/rlogs/
Node Group       Node Identifier                        Num   Model        Usage

DG-0             BCF7208D-E44F-E011-802F-4171BAAC781D    0    qfx3100      0M
FM-0             73747cd8-0710-11e1-b6a4-00e081c5297e    1    fx-jvre      0M
DRE-0            77116f18-0710-11e1-a2a0-00e081c5297e    1    fx-jvre      0M
NW-NG-0          BBAK0394                                1    qfx3500      0M
NW-NG-0          cd78871a-0710-11e1-878e-00e081c5297e    1    fx-jvre      0M
NW-NG-0          d0afda1e-0710-11e1-a1d0-00e081c5297e    3    fx-jvre      0M
FC-0             d31ab7a6-0710-11e1-ad1b-00e081c5297e    1    fx-jvre      0M
```

```
FC-1           d4d0f254-0710-11e1-90c3-00e081c5297e    1    fx-jvre      0M
IC-WS001       WS001                                   0    -            -
IC-WS001       WS001/YN5999                            1    qfxc08-3008  0M
IC-WS001       WS001/YW3803                            1    qfxc08-3008  0M
node-device1   BBAK0372                                1    qfx3500      0M
node-device1   EE3093                                  1    qfx3500      0M
Total usage of log repository:0M of 70000M (0.0%)
```

CHAPTER 6

Enabling Layer 3 Support in a Junos Fusion Enterprise

Understanding Integrated Routing and Bridging (IRB) Interfaces in a Junos Fusion Enterprise

In most campus networking environments, endpoint devices must have a path to send and receive Layer 3 traffic.

In a typical Junos Fusion Enterprise deployment, the EX9200 switch assumes the responsibilities of an aggregation layer switch and is typically the gateway to layer 3. Integrated routing and bridging (IRB) interfaces are, therefore, configured on the EX9200 switches acting as aggregation devices to move traffic between Layer 2 and Layer 3.

See *Understanding Integrated Routing and Bridging* for information on configuring IRB interfaces.

See the Adding Layer 3 Support to a Junos Fusion Enterprise section of the Enabling Junos Fusion Enterprise on an Enterprise Campus Network for a sample IRB interface configuration in a Junos Fusion Enterprise.

Related Documentation

- *Understanding Integrated Routing and Bridging*

CHAPTER 7

802.1X in a Junos Fusion Enterprise

Understanding 802.1X on a Junos Fusion Enterprise

This topic describes 802.1X in a Junos Fusion Enterprise.

802.1X is an IEEE standard for port-based network access control (PNAC). It provides an authentication mechanism for devices seeking to access a LAN. The 802.1X authentication feature is based upon the IEEE 802.1X standard Port-Based Network Access Control.

The range of 802.1X configuration options are beyond the scope of this document. For additional information on 802.1X, see 802.1X for Switches Overview and the Access Control Feature Guide for EX9200 Switches.

The following requirements should be understood when configuring 802.1X for a Junos Fusion Enterprise:

- The authentication server cannot connect to the Junos Fusion Enterprise through an extended port.
- 802.1X configuration must match on both aggregation devices in a Junos Fusion Enterprise. 802.1X , therefore, should typically be configured using configuration groups that are applied to both aggregation devices using commit synchronization. See "Understanding Configuration Synchronization in a Junos Fusion" on page 25 and "Enabling Configuration Synchronization Between Aggregation Devices in a Junos Fusion" on page 77.
- 802.1X control is handled by either aggregation device on a per-session basis. Either aggregation device can act as the primary device for 802.1X control for any 802.1X session. If traffic flow through one aggregation device is disrupted during an 802.1X session, the 802.1X session may be interrupted and control could be transferred to the other aggregation device.
- A captive portal cannot be configured on an extended port.

See Enabling 802.1X in the Enabling Junos Fusion Enterprise on an Enterprise Campus Network document for an example of 802.1X configuration on a Junos Fusion Enterprise.

CHAPTER 8

Junos Fusion Enterprise Half-Duplex Links on Satellite Devices

Understanding Half-Duplex Links on Satellite Devices in a Junos Fusion Enterprise

This topic describes half-duplex links on satellite devices in a Junos Fusion Enterprise.

This topic covers:

Half-Duplex Links on Satellite Devices Overview

Half-duplex communication is supported on all built-in network copper ports on EX2300, EX3400, and EX4300 satellite devices in a Junos Fusion Enterprise (JFE). *Half-duplex* is bidirectional communication, but signals can flow in only one direction at a time. *Full-duplex* communication means that both ends of the communication can send and receive signals at the same time.

The built-in network copper ports are configured by default as full-duplex 1-gigabit links with autonegotiation. If the link partner is set to autonegotiate the link, then the link is autonegotiated to full duplex or half-duplex. If the link is not set to autonegotiation, then the satellite-device link defaults to half-duplex unless the interface is explicitly configured for full duplex.

On EX2300, EX3400, and EX4300 satellite devices, the link mode is handled as follows:

- If the link partner is operating in half-duplex, the satellite device interface goes to half-duplex.
- If the link partner is not capable of autonegotiation, the satellite device interface goes to half duplex.

- If the link partner is capable of autonegotiation and is operating in full duplex, the satellite device interface also works in full duplex.

Understanding Configuration of Full-Duplex Link Mode on a Satellite Device and Verification of Half-Duplex Mode

Like all features in a Junos Fusion Enterprise, link modes are configured and verified from the aggregation devices.

To explicitly configure full duplex:

```
[edit]
user@aggregation-device# set interfaces interface-name link-mode full-duplex
```

To verify a half-duplex setting:

```
user@aggregation-device> show interfaces interface-name extensive
```

Related Documentation

- *Configuring Gigabit Ethernet Interfaces for EX Series Switches with ELS support*

link-mode

Syntax

```
link-mode mode (automatic | full-duplex | half-duplex);
```

Hierarchy Level

```
[edit interfaces interface-name],
[edit interfaces interface-name ether-options],
[edit interfaces ge-pim/0/0 switch-options switch-port port-number]
```

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 12.2 for ACX Series Universal Metro Routers.

Description

Set the device's link connection characteristic.

Options

mode—Link characteristics:

- **automatic**—Link mode is negotiated. This is the default for EX Series switches.
- **full-duplex**—Connection is full duplex.
- **half-duplex**—Connection is half duplex.

Default: Fast Ethernet interfaces can operate in either full-duplex or half-duplex mode. The router's or switch's management Ethernet interface, **fxp0** or **em0**, and the built-in Fast Ethernet interfaces on the FIC (M7i router) autonegotiate whether to operate in full-duplex or half-duplex mode. Unless otherwise noted here, all other interfaces operate only in full-duplex mode.

NOTE: On EX Series switches, if **no-auto-negotiation** is specified in **[edit interfaces *interface-name* ether-options]**, you can select only **full-duplex** or **half-duplex**. If **auto-negotiation** is specified, you can select any mode.

NOTE:

- Member links of an aggregated Ethernet bundle must not be explicitly configured with a link mode. You must remove any such link-mode configuration before committing the aggregated Ethernet configuration.
- Starting with Junos OS release 17.4R1 and later, the **link-mode** configuration is not supported for 10-Gigabit Ethernet interfaces.
- Starting in Junos OS release 18.4R1, half-duplex mode is supported on SRX340 and SRX345 devices.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring the Link Characteristics on Ethernet Interfaces*
- *Understanding Management Ethernet Interfaces*
- *Configuring Gigabit Ethernet Interfaces (CLI Procedure)*
- *Configuring Gigabit Ethernet Interfaces for EX Series Switches with ELS support*

CHAPTER 9

Junos Fusion Enterprise Network Monitoring and Analyzers

Understanding sFlow Technology on a Junos Fusion Enterprise

This topic describes sFlow technology in a Junos Fusion Enterprise.

This topic covers:

sFlow Technology on a Junos Fusion Enterprise Overview

sFlow technology is a monitoring technology for high-speed switched or routed networks. sFlow technology randomly samples network packets and sends the samples to a monitoring system. In a Junos Fusion Enterprise, you can configure sFlow technology on the aggregation device to continuously monitor traffic on all extended interfaces simultaneously.

Many sFlow technology concepts for standalone switches also apply to sFlow technology on a Junos Fusion Enterprise. See Understanding How to Use sFlow Technology for Network Monitoring on an EX Series Switch for a detailed overview of sFlow on standalone EX Series switches.

Understanding the sFlow Sampling Mechanism on a Junos Fusion Enterprise

sFlow technology uses the following two sampling mechanisms:

- Packet-based sampling: Samples one packet out of a specified number of packets from an interface enabled for sFlow technology.
- Time-based sampling: Samples interface statistics at a specified interval from an interface enabled for sFlow technology.

The sampling information is used to create a network traffic visibility picture. The Juniper Networks Junos operating system (Junos OS) fully supports the sFlow standard described in RFC 3176, *InMon Corporation's sFlow: A Method for Monitoring Traffic in Switched and Routed Networks*.

NOTE: sFlow technology on the switches samples only raw packet headers. A raw Ethernet packet is the complete Layer 2 network frame.

An sFlow monitoring system consists of an sFlow agent (embedded in the switch), and a centralized collector. The sFlow agent's two main activities are random sampling and statistics gathering. The sFlow agent combines interface counters and flow samples and sends them across the network to the sFlow collector in UDP datagrams, directing those datagrams to the IP address and UDP destination port of the collector. Each datagram contains the following information:

- The IP address of the sFlow agent
- The number of samples
- The interface through which the packets entered the agent
- The interface through which the packets exited the agent
- The source and destination interface for the packets
- The source and destination VLAN for the packets

Like all features in a Junos Fusion Enterprise, sFlow technology is configured from the aggregation devices.

BEST PRACTICE:

We recommend the following consideration guidelines for sFlow technology in a Junos Fusion Enterprise:

- Configure sFlow technology on both aggregation devices.
- Configure the same sampling rates on all the extended ports. If you configure different sampling rates, then the lowest value is used for all ports. Note that counter samples are sent from both aggregation devices for an extended port.
- Use the configuration sync feature to synchronize the configuration across the aggregation devices.
- After synchronization is finished, make sure that the collector is reachable from both aggregation devices.

Limitations for sFlow on a Junos Fusion Enterprise

Consider the following limitations when you configure sFlow technology on a Junos Fusion Enterprise:

- You cannot configure sFlow technology on a link aggregation group (LAG), but you can configure it individually on a LAG member interface.
- You cannot configure sFlow technology on a cascade port.
- When using the configuration sync feature, sFlow collector statistics are not synced between the aggregation devices.
- Adaptive sampling is not supported for extended ports. Given this limitation, make sure that you configure the appropriate sampling rate for your configuration so that there is no congestion for CPU traffic.

Understanding Port Mirroring Analyzers on a Junos Fusion Enterprise

This topic describes port mirroring analyzers in a Junos Fusion Enterprise.

This topic covers:

Port Mirroring Analyzers on a Junos Fusion Enterprise Overview

Port mirroring can be used for traffic analysis on routers and switches that, unlike hubs, do not broadcast packets to every port on the destination device. Port mirroring sends copies of all packets or policy-based sample packets to local or remote analyzers where you can monitor and analyze the data.

In a Junos Fusion Enterprise, analyzers are used to mirror traffic from an extended port on a satellite device to an output interface or VLAN. The output interface or VLAN can be connected to the aggregation device or to an extended port on a satellite device.

You can configure an analyzer to mirror:

- Bridged packets (Layer 2 packets)
- Routed packets (Layer 3 packets)

Many port mirroring analyzer concepts for standalone switches also apply to port mirroring analyzers on Junos Fusion Enterprise. See *Understanding Port Mirroring Analyzers* for a detailed overview of port mirroring analyzers on standalone switches.

Understanding the Configuration of Analyzers in a Junos Fusion Enterprise

Like all features in a Junos Fusion Enterprise, port mirroring analyzers are configured from the aggregation devices.

The mirroring options in a Junos Fusion Enterprise are:

- Mirror traffic from a native interface to an extended port.

- Mirror traffic from an extended port on one satellite device to an extended port on another satellite device.
- Mirror traffic from an extended port to a native interface. Configure remote mirroring for this scenario—that is, configure an analyzer output VLAN with an ICL and a native interface as remote-mirroring VLAN members in one aggregation device and an ICL as a remote-mirroring VLAN member in the peer aggregation device, so that both aggregation devices can mirror to the native interface.

NOTE: Even if the mirroring source and destination are on the same satellite device, the mirrored traffic always goes back to the aggregation device.

BEST PRACTICE:

We recommend the following configuration guidelines for analyzers in a Junos Fusion Enterprise:

- Configure remote mirroring.
- Configure an analyzer output VLAN with both an ICL (interchassis link) and the mirror destination as VLAN members, so that mirrored traffic can travel through the ICL to the peer aggregation device if the mirror destination is not directly reachable on the local aggregation device. This is applicable in scenarios where the mirror destination is single-homed or a dual-homed satellite device and the cascade port is down on the local aggregation device.
- Use the configuration sync feature to synchronize the configuration across aggregation devices.

Limitations for Port Mirroring Analyzers on a Junos Fusion Enterprise

Consider the following limitations when you configure port mirroring analyzers on a Junos Fusion Enterprise:

- You cannot mirror a cascade port or an ICL. (See the configuration guidelines in *Understanding Port Mirroring Analyzers* for other port types that cannot be mirrored.)
- An analyzer input VLAN mirrors all interfaces in the VLAN *except* the ICL in the VLAN. This limitation keeps mirrored traffic from causing congestion in the ICL.

Related Documentation

- *Understanding Port Mirroring Analyzers*

CHAPTER 10

Junos Fusion Enterprise Private VLANs

Understanding Private VLANs on a Junos Fusion Enterprise

This topic describes private VLANs (PVLANs) in a Junos Fusion Enterprise.

This topic covers:

PVLANs on a Junos Fusion Enterprise Overview

Junos Fusion Enterprise (JFE) supports private VLANs (PVLANs). PVLANs on a Junos Fusion Enterprise are an extension of PVLANs on standalone switches that enables PVLANs on extended ports on satellite devices.

PVLANs are useful for restricting the flow of broadcast and unknown unicast traffic and for limiting the known communication between known hosts. PVLAN is a standard introduced by RFC 5517 to achieve port or device isolation in a Layer 2 VLAN by partitioning a VLAN broadcast domain (also called a *primary VLAN*) into smaller subdomains (also called *secondary VLANs*).

PVLANs can be used for such purposes as:

- To help ensure the security of service providers sharing a server farm
- To provide security to subscribers of various service providers sharing a common metropolitan area network
- To achieve isolation within the same subnet in a very large enterprise network

In a Junos Fusion Enterprise, PVLANs can be configured on ports belonging to the aggregation device or to an extended port on a satellite device.

PVLAN concepts for standalone switches apply to PVLANs on a Junos Fusion Enterprise. See *Understanding Private VLANs*.

NOTE: Some "Guidelines and Restrictions for PVLANs" in *Understanding Private VLANs*, however, do not apply to PVLANs on a Junos Fusion Enterprise for the following reasons:

- Restrictions on use of MSTP and VSTP—Spanning-tree protocols are not supported on Junos Fusion Enterprise.
- Restrictions on use of *mac-table-size*, *no-mac-learning*, *mac-statistics*, and *interface-mac-limit*—These statements are not supported on Junos Fusion Enterprise.

Understanding the Configuration of PVLANs in a Junos Fusion Enterprise

Like all features in a Junos Fusion Enterprise, PVLANs are configured from the aggregation devices.

Junos Fusion Enterprise PVLAN topologies support the following:

- Multiple satellite devices can be clustered into a group and cabled into the JFE as a group instead of as individual satellite devices.
- Aggregation device *native ports* (that is, ports on the aggregation device that are not acting as cascade ports) or satellite device extended ports can act as promiscuous ports, isolated ports, or community VLAN ports. See *Understanding Private VLANs* for definitions of PVLAN port types. These port types are also described in RFC 5517.
- The promiscuous port can be attached to a core switch or router through physical interfaces or aggregated links.
- PVLANs are supported in dual aggregation device JFEs.

BEST PRACTICE:
We recommend the following configuration guidelines for PVLANs in a Junos Fusion Enterprise:

- In a dual-aggregation device JFE, we recommend that you use the interchassis link (ICL) as the inter-switch link for PVLAN inter-switching. Although any port link in the JFE *could* serve as the inter-switch link, the high-bandwidth requirements on the inter-switch link make the ICL the best choice.
- PVLAN ports can span across the switches in the JFE. We recommend that you interconnect 10-gigabit or 40-gigabit ports as they provide the high bandwidth needed for PVLAN trunk traffic.

Limitations for PVLANs on a Junos Fusion Enterprise

Consider the following limitations when you configure PVLANs on a Junos Fusion Enterprise:

- PVLANs on a JFE do not work if local switching is enabled on satellite devices.
- You cannot change the role of a PVLAN bridge domain from primary VLAN to secondary VLAN or the reverse in a single commit cycle.
- Protocols configured per VLAN cannot be configured on secondary VLANs. Secondary VLANs inherit protocol configurations from the primary VLAN.

Related Documentation

- *Understanding Private VLANs*

CHAPTER 11

Power over Ethernet, LLDP, and LLDP-MED on Junos Fusion Enterprise

Understanding Power over Ethernet in a Junos Fusion

This topic describes Power over Ethernet (PoE) in a Junos Fusion.

This topic covers:

Power over Ethernet in a Junos Fusion Overview

Power over Ethernet (PoE) enables electric power, along with data, to be passed over a copper Ethernet LAN cable. Powered devices—such as VoIP telephones, wireless access points, video cameras, and point-of-sale devices—that support PoE can receive power safely from the same access ports that are used to connect personal computers to the network. This reduces the amount of wiring in a network, and it also eliminates the need to position a powered device near an AC power outlet, making network design more flexible and efficient.

In a Junos Fusion, PoE is used to carry electric power from an extended port on a satellite device to a connected device. An extended port is any network-facing port on a satellite device in a Junos Fusion.

Many PoE concepts for standalone switches also apply to PoE on Junos Fusion. See *Understanding PoE on EX Series Switches* for a detailed overview of PoE on standalone EX Series switches.

Understanding the Role of the Aggregation Devices for PoE Support in a Junos Fusion

An aggregation device is responsible for configuring, monitoring, and maintaining all configurations for all extended ports in a Junos Fusion, including PoE. Therefore, all commands used to configure, monitor, and maintain PoE in a Junos Fusion are entered from the aggregation device.

An extended port on the satellite device must support PoE to enable PoE in a Junos Fusion. No hardware limitations for PoE support are introduced by the aggregation device in a Junos Fusion.

NOTE: PoE is supported in a Junos Fusion Provide Edge and a Junos Fusion Enterprise despite not being supported in MX series routers or standalone EX9200 switches. All MX series routers and EX9200 switch models, when configured into the aggregation device role in a Junos Fusion , can enable PoE Junos Fusion because the PoE hardware support is supported on the satellite devices.

Understanding the Role of the Satellite Devices for PoE Support in a Junos Fusion

A satellite device in a Junos Fusion provides PoE hardware support in a Junos Fusion. Each satellite device in a Junos Fusion that supports PoE has its own PoE controller. The PoE controller keeps track of the PoE power consumption on the satellite device and allocates power to PoE extended ports. The maximum PoE power consumption for a satellite device—the total amount of power available for the satellite device's PoE controller to allocate to all of the satellite device's PoE interfaces—is determined individually by the switch model of the satellite devices and by the power supply or supplies installed in that satellite device.

In allocating power, the satellite device's PoE controller cannot exceed the satellite device's maximum PoE power availability.

The maximum PoE power consumption varies by satellite device in a Junos Fusion , because the hardware specifications of the satellite devices determine the maximum PoE power availability.

See *Understanding PoE on EX Series Switches* for a listing of the PoE power consumption limit for each EX Series switch model and power supply configuration.

Understanding PoE Configuration in a Junos Fusion

Like all features in a Junos Fusion, PoE is configured from the aggregation devices.

In dual aggregation device topologies, the PoE configurations should match identically on both aggregation devices.

PoE in a Junos Fusion works by periodically checking the PoE configuration on each aggregation device, and updating the configuration when a PoE change is identified. If the aggregation devices have different PoE configurations, the PoE configurations for the Junos Fusion will continually change because the Junos Fusion always uses the PoE configuration of the last aggregation device that was checked.

Understanding PoE Support Standards for Extended Ports in a Junos Fusion

The extended port hardware—specifically, the extended port hardware interface on the satellite device in the Junos Fusion —must support PoE to enable PoE in a Junos Fusion.

All extended ports that support PoE on satellite devices in a Junos Fusion support the IEEE 802.3at PoE+ standard. The IEEE 802.3at PoE+ standard allows an extended port that supports PoE to provide up to 30 W of power to a connected device.

Understanding Maximum PoE Power Budgets in a Junos Fusion

The maximum PoE power budgets are determined for each individual satellite device in a Junos Fusion.

Maximum PoE power budgets for a satellite device vary by the switch model and power supply configuration of the satellite device.

To learn the maximum PoE power supply budget for a satellite device:

- See *Understanding PoE on EX Series Switches* for a table of maximum power supply budgets by switch device model.
- Enter the **show poe controller** command from your aggregation device and view the Maximum Power output.

Understanding PoE Controller Software in a Junos Fusion

All switches that support PoE have a PoE controller that runs PoE controller software, including switches acting as satellite devices in a Junos Fusion.

PoE controller software is bundled with Junos OS. PoE controller software should be updated before installing a switch as a satellite device in a Junos Fusion.

For information on PoE controller software requirements in a Junos Fusion Enterprise, see "Understanding Junos Fusion Enterprise Software and Hardware Requirements" on page 26.

For information on PoE controller software requirements in a Junos Fusion Provider Edge, see *Understanding Junos Fusion Provider Edge Software and Hardware Requirements*

For information on checking or upgrading the PoE controller software version, see *Upgrading the PoE Controller Software*.

Understanding PoE Power Allocation Configuration Options in a Junos Fusion

Junos Fusion supports several optional features that help manage PoE power allocation on the satellite devices.

The PoE power allocation options are discussed in greater detail in *Understanding PoE on EX Series Switches*.

Related Documentation

- Configuring Power over Ethernet in a Junos Fusion on page 653
- Verifying PoE Configuration and Status for a Junos Fusion (CLI Procedure) on page 657

Understanding LLDP and LLDP-MED on a Junos Fusion

This topic describes Link Layer Discovery Protocol (LLDP) and Link Layer Discovery Protocol–Media Endpoint Discovery (LLDP-MED) in a Junos Fusion.

This topic covers:

LLDP and LLDP-MED in a Junos Fusion Overview

LLDP and LLDP-MED are used to learn and distribute device information on network links. The information enables the switch to quickly identify a variety of devices, resulting in a LAN that interoperates smoothly and efficiently.

LLDP-capable devices transmit information in type, length, and value (TLV) messages to neighbor devices. Device information can include information such as chassis and port identification and system name and system capabilities. The TLVs leverage this information from parameters that have already been configured in the Junos operating system (Junos OS).

Many LLDP and LLDP-MED concepts for standalone EX Series switches that support the features also apply to LLDP and LLDP-MED on Junos Fusion . See *Understanding LLDP and LLDP-MED on EX Series Switches* for a detailed overview of LLDP and LLDP-MED on standalone EX Series switches.

NOTE: LLDP-MED goes one step further than LLDP, exchanging IP-telephony messages between the switch and the IP telephone. LLDP-MED is an important access layer switch feature that is supported in a Junos Fusion despite not being supported on a standalone EX9200 switch.

Understanding LLDP and LLDP-MED Configuration and Traffic Handling in a Junos Fusion

LLDP and LLDP-MED traffic is generally handled the same in a Junos Fusion or a standalone series switch. LLDP and LLDP-MED configuration on an extended port in a Junos Fusion is identical for a standalone EX Series switch. See *Configuring LLDP (CLI Procedure)* or *Configuring LLDP-MED (CLI Procedure)*.

The following specifications apply to the device information transmitted by LLDP and LLDP-MED in a Junos Fusion topology with two or more aggregation devices:

- Management address TLVs are merged into a single packet in such a way that the packet contains two or more management address TLVs.
- The SNMP index used as the port ID TLV is derived so that all aggregation devices receive the same index value for port IDs of extended ports.
- The system name for extended ports is the configured redundancy group name. A redundancy group has to be configured in order to enable a topology with two or more aggregation devices.
- The chassis ID is the same for all aggregation devices. If a system MAC address is defined for the redundancy group, is it used as the chassis ID. The system MAC address is configured using the **set chassis satellite-management redundancy-groups *redundancy-group-name* system-mac-address *system-mac-address*** command. If the system MAC is not configured, the chassis ID is the default MAC address, which is 00:00:00:00:00:01.

BEST PRACTICE: **We recommend specifying a system MAC address if you are running LLDP or LLCP-MED traffic in your Junos Fusion topology.**

Related Documentation

- *Configuring LLDP (CLI Procedure)*
- *Configuring LLDP-MED (CLI Procedure)*

Configuring Power over Ethernet in a Junos Fusion

PoE Configurable Options

Table 44 on page 654 shows the configurable PoE options and their default settings in a Junos Fusion.

Some PoE options can be configured globally and per interface. In cases where a PoE interface setting is different from a global PoE setting, the PoE interface setting is configured on the interface.

Table 44: Configurable PoE Options and Default Settings

Option	Default	Description
disable (Power over Ethernet)	Not included in default configuration. NOTE: PoE ports are disabled by default in a Junos Fusion.	Disables PoE on the interface if PoE was enabled. The interface maintains network connectivity but no longer supplies power to a connected powered device. Power is not allocated to the interface.
guard-band	**0** W	Reserves a specified amount of power from the PoE power budget for possible spikes in PoE power consumption. In a Junos Fusion, the guard band can be 0 to 19 W.
management	**class**	Sets the PoE power management mode for the extended port. The power management mode determines how power to a PoE extended port is allocated: • **class**—In this mode, the power allocated to a PoE extended port is determined by the class of the connected powered device. If there is no powered device connected, standard 15.4W power is allocated on the interface. • **static**—The maximum power delivered by an interface is statically configured and is independent of the class of the connected powered device. The maximum power is allocated to the interface even if a powered device is not connected.
maximum-power (Interface)	**30.0** W (PoE+, IEEE 802.3at)	Sets the maximum power that can be delivered by a PoE interface when the power management mode is **static**. In a Junos Fusion, all extended ports support PoE+ so the maximum power is up to 30 W. This setting is ignored if the power management mode is **class**.
priority (Power over Ethernet)	**low**	Sets an interface's power priority to either **low** or **high**. If power is insufficient for all PoE interfaces, the PoE power to low-priority interfaces is shut down before power to high-priority interfaces is shut down. Among interfaces that have the same assigned priority, the power priority is determined by port number, with lower-numbered ports having higher priority.

Enabling PoE

PoE is disabled by default for all extended ports in a Junos Fusion.

To enable PoE on all PoE-supported interfaces:

```
[edit]
user@aggregation-device# set poe interface all-extended
```

To enable PoE on a specific PoE-supported interface:

```
[edit]
user@aggregation-device# set poe interface interface-name
```

For instance, to enable PoE on extended port interface ge-100/0/24:

```
[edit]
user@aggregation-device# set poe interface ge-100/0/24
```

Disabling PoE

PoE is disabled by default in a Junos Fusion. Use this procedure to disable PoE in a Junos Fusion that has PoE previously enabled.

If PoE is enabled globally but disabled on a specific interface, PoE is disabled on the specified interface. This procedure can, therefore, be used to individually disable ports in cases where PoE is globally enabled.

If you want to disable PoE on all extended port interfaces in a Junos Fusion:

```
[edit]
user@aggregation-device# set poe interface all-extended disable
```

If you want to disable PoE on one extended port interface:

```
[edit]
user@aggregation-device# set poe interface interface-name disable
```

For instance, to disable PoE on extended port 101/0/1 in a Junos Fusion:

```
[edit]
user@aggregation-device# set poe interface 101/0/1 disable
```

If you want to enable PoE on all PoE-supported extended ports in a Junos Fusion except 101/0/10, enter the following commands:

```
[edit]
user@aggregation-device# set poe interface all-extendeduser@aggregation-device# set poe interface 101/0/10 disable
```

Setting the Power Management Mode

The power management mode in a Junos Fusion is set for all extended ports in a Junos Fusion .

The default power management mode is class.

To set the power management mode to static for all PoE extended ports:

```
[edit]
user@aggregation-device# set poe management static
```

To set the power management mode back to class for all PoE extended ports:

```
[edit]
user@aggregation-device# set poe management class
```

Setting the Maximum Power That Can Be Delivered from a PoE Interface

To set the maximum power that can be delivered to a connected device using PoE when the power management mode is set to static:

```
[edit]
user@aggregation-device# set poe interface interface-name maximum-power watts
```

To configure all extended port interfaces to the same maximum power, enter **all-extended** as the *interface-name*.

For instance, to change the maximum power for all PoE extended ports configured in static power management mode to 25 watts:

```
[edit]
user@aggregation-device# set poe interface all-extended maximum-power 25
```

To change the maximum power for interface 101/0/1 to 25 watts:

```
[edit]
user@aggregation-device# set poe interface 101/0/1 maximum-power 25
```

Setting the Guard Band

One guard band is configured for all extended ports in a Junos Fusion.

To set the guard band for all extended ports in a Junos Fusion:

```
[edit]
user@aggregation-device# set poe guard-band watts
```

For instance, to set the guard-band to 19 watts for all PoE extended ports:

```
[edit]
user@aggregation-device# set poe guard-band 19
```

Setting the PoE Interface Priority

To set a PoE interface priority to high:

```
[edit]
user@aggregation-device# set poe interface interface-name priority high
```

For instance, to assign a high priority to interface 101/0/1:

```
[edit]
```



```
user@aggregation-device# set poe interface 101/0/1 priority high
```

To set a PoE interface priority to low:

```
[edit]
user@aggregation-device# set poe interface interface-name priority low
```

For instance, to assign a low priority to interface 102/0/1:

```
[edit]
user@aggregation-device# set poe interface 102/0/1 priority low
```

Related Documentation

- Verifying PoE Configuration and Status for a Junos Fusion (CLI Procedure) on page 657
- Understanding Power over Ethernet in a Junos Fusion on page 649

Verifying PoE Configuration and Status for a Junos Fusion (CLI Procedure)

You can verify the Power over Ethernet (PoE) configuration and status on Junos Fusion.

This topic describes how to verify:

- PoE Power Budgets, Consumption, and Mode on Satellite Devices on page 657
- PoE Interface Configuration and Status on page 658

PoE Power Budgets, Consumption, and Mode on Satellite Devices

Purpose Verify the PoE configuration and status, such as the PoE power budget, total PoE power consumption, power management mode, and the supported PoE standard.

Action Enter the following command:

```
user@aggregation-device> show poe controller
```

```
Controller  Maximum   Power        Guard   Management   Status      Lldp
index       power     consumption  band                             Priority

 100        925.00W   0.00W         19W    Class        AT_MODE     Disabled

 120        125.00W   6.08W         19W    Class        AT_MODE     Disabled
```

Meaning

- Satellite device 100 has a PoE power budget of 925 W, of which 0 W were being used by the PoE extended ports at the time the command was executed. The Guard band field shows that 19 W of power is reserved out of the PoE power budget to protect against spikes in power demand. The power management mode is class. The PoE ports on the switch support PoE+ (IEEE 802.3at).
- Satellite device 120 has a PoE power budget of 125 W, of which 6.08 W were being used by the PoE extended ports at the time the command was executed. The Guard band field shows that 19 W of power is reserved out of the PoE power budget to protect

against spikes in power demand. The power management mode is class. The PoE ports on the switch support PoE+ (IEEE 802.3at).

PoE Interface Configuration and Status

Purpose Verify that PoE interfaces are enabled and set to the correct maximum power and priority settings. Also verify current operational status and power consumption.

Action To view configuration and status for all PoE interfaces, enter:

user@switch> **show poe interface**

```
Interface     Admin      Oper    Max        Priority       Power          Class
              status     status  power                     consumption
ge-100/0/0    Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/1    Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/2    Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/3    Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/4    Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/5    Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/6    Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/7    Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/8    Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/9    Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/10   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/11   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/12   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/13   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/14   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/15   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/16   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/17   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/18   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/19   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/20   Enabled    OFF     16.0W      Low            0.0W
not-applicable
ge-100/0/21   Enabled    OFF     16.0W      Low            0.0W
not-applicable
```



```
ge-100/0/22  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/23  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/24  Enabled      ON     16.0W      Low           3.7W          2
ge-100/0/25  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/26  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/27  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/28  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/29  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/30  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/31  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/32  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/33  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/34  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/35  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/36  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/37  Enabled      ON     16.0W      Low           2.0W          0
ge-100/0/38  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/39  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/40  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/41  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/42  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/43  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/44  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/45  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/46  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-100/0/47  Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-120/0/0   Enabled      ON     16.0W      Low           3.9W          2
ge-120/0/1   Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-120/0/2   Enabled     OFF     16.0W      Low           2.0W
not-applicable
ge-120/0/3   Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-120/0/4   Enabled     OFF     16.0W      Low           0.0W
not-applicable
ge-120/0/5   Enabled     OFF     16.0W      Low           0.0W
```

```
not-applicable
ge-120/0/6   Enabled     ON     16.0W      Low            0.0W             4
ge-120/0/7   Enabled    OFF     0.0W       Low            0.0W
not-applicable
ge-120/0/8   Enabled    OFF     0.0W       Low            0.0W
not-applicable
ge-120/0/9   Enabled    OFF     0.0W       Low            0.0W
not-applicable
ge-120/0/10  Enabled    OFF     0.0W       Low            0.0W
not-applicable
ge-120/0/11  Enabled    OFF     0.0W       Low            0.0W
not-applicable
<additional output removed for brevity>
```

To view configuration and status for a single PoE interface, enter:

`user@switch>` **show poe interface ge-120/0/0**

```
PoE interface status:
PoE interface                : ge-120/0/0
Administrative status        : Enabled
Operational status           :   ON
Power limit on the interface : 7.0W
Priority                     : Low
Power consumed               : 3.9W
Class of power device        :        2
PoE Mode                     :   802.3at
```

Meaning

The command output shows the status and configuration of interfaces. For example, the interface 120/0/0 is administratively enabled. Its operational status is **ON**; that is, the interface is currently delivering power to a connected powered device. The maximum power allocated to the interface is 7.0 W. The interface has a low PoE power priority. At the time the command was executed, the powered device was consuming 3.9 W. The class of the powered device is class 2. If the PoE power management mode is class, the class of the powered device determines the maximum power allocated to the interface, which is 7 W in the case of class 2 devices.

The PoE Mode field indicates that the interface supports IEEE 802.3at (PoE+).

Related Documentation

- Configuring Power over Ethernet in a Junos Fusion on page 653
- Understanding Power over Ethernet in a Junos Fusion on page 649

CHAPTER 12

Configuration Statements for Power over Ethernet and Power Supply Management on Junos Fusion Enterprise

disable (Power over Ethernet)

Syntax

```
disable;
```

Hierarchy Level

[edit poe interface (all | all-extended | *interface-name*)],
[edit poe interface (all | all-extended | *interface-name*) telemetries],
[edit poe notification-control fpc *slot-number*]

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX2000 Universal Metro Routers.
all-extended option introduced in Junos OS Release 16.1R1.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Disable a PoE interface, disable the collection of power consumption data for a PoE interface, or disable the generation of the PoE SNMP traps. The action of the **disable** statement depends on which statement it is used with:

- When used with **interface**—Disable the PoE capability of this interface. The interface operates as a standard network access interface, and power is no longer allocated to it from the PoE power budget. Although the PoE capability is disabled, the PoE configuration for the interface is retained. To reenable the PoE capability of this interface, delete the **disable** statement from the **interface** entry in the configuration.
- When used with **telemetries**—Disable the collection of PoE power consumption records for this interface. Any previously collected records are deleted. However, the **telemetries** configuration is retained, including the values for ***interval*** and ***duration***. To reenable record collection, delete the **disable** statement from the **telemetries** entry in the configuration.
- When used with **notification-control**—Disable the generation of PoE SNMP traps. To reenable PoE traps, delete the **disable** statement from the **notification-control** entry in the configuration.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- *Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch*
- *Configuring PoE on EX Series Switches (CLI Procedure)*
- Configuring Power over Ethernet in a Junos Fusion on page 653

guard-band

Syntax

```
guard-band watts;
```

Hierarchy Level

```
[edit poe],
[edit poe (all | fpc slot-number)]
```

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX2000 Universal Metro Routers.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Reserve a specified amount of power from the PoE power budget for the switch, line card, or satellite device in case of a spike in PoE consumption.

Options

watts—Amount of power to be reserved in case of a spike in PoE consumption.

Range: 0 through 19 for all switches except EX6200 and EX8200 switches.0 through 19 for ACX2000 routers.0 through 15 for EX6200 and EX8200 switches.0 through 19 for satellite devices in a Junos Fusion.

Default: 0

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- *Configuring PoE on EX Series Switches (CLI Procedure)*
- Configuring Power over Ethernet in a Junos Fusion on page 653

interface (Power over Ethernet)

Syntax

```
interface (all | all-extended | interface-name) {
  af-mode;
  disable;
  maximum-power watts;
  priority (high | low);
  telemetries {
    disable;
    duration hours;
    interval minutes;
  }
}
```

Hierarchy Level

```
[edit poe]
```

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Specify a PoE interface to be configured.

Options

all—All PoE interfaces on the switch that have not been individually configured for PoE. If a PoE interface has been individually configured, that configuration overrides any settings specified with **all**.

all-extended—(Junos Fusion only) All PoE extended port interfaces in a Junos Fusion that have not been individually configured for PoE. If a PoE interface has been individually configured, that configuration overrides any settings specified with **all-extended**.

interface-name—Name of the specific interface being configured.

If you use the **interface** statement without any substatements, default values are used for the remaining statements.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- *Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch*
- *Configuring PoE on EX Series Switches (CLI Procedure)*
- Configuring Power over Ethernet in a Junos Fusion on page 653

management

Syntax

```
management (class | static | high-power);
```

Hierarchy Level

```
[edit poe],
[edit poe (all | fpc slot-number)]
```

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX2000 Universal Metro Routers.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Designate how the PoE controller allocates power to the PoE interfaces.

Default

class

Options

- **class**—The amount of power allocated to the interface is determined by the class of the connected powered device. If no powered device is connected, standard 15.4 W power is allocated to the interface. See *Understanding PoE on EX Series Switches* for more information about classes of powered devices.
- **static**—The amount of power allocated to the interface is determined by the value of the maximum-power statement, not the class of the connected powered device. This amount is allocated even when a powered device is not connected to the interface, ensuring that power is available when needed.
- **high-power**—(ACX2000 routers only) ACX2000 PoE interfaces support power delivery of up to 65 W per port using all four pairs of Ethernet RJ45 cables. Traditional PoE ports use only two pairs of Ethernet cable for power delivery. According to the IEEE 802.3af standard, each port can deliver a maximum power of up to 32 W. With **high-power** mode of power delivery over all four pairs, the power sourcing equipment (PSE) has an option to deliver up to 65 W per port, provided the powered devices request this high power over all four pairs of the Ethernet cable. By default, **high-power** mode is not enabled and has to be explicitly enabled. When the PoE controller is configured for **high-power** mode, the PoE controller does not deliver power to normal powered devices that request power over two pairs.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- *Configuring PoE on EX Series Switches (CLI Procedure)*
- Configuring Power over Ethernet in a Junos Fusion on page 653
- *Understanding PoE on EX Series Switches*

maximum-power (Interface)

Syntax

```
maximum-power watts;
```

Hierarchy Level

[edit poe interface (all | all-extended | *interface-name*)]

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 12.2 for ACX2000 routers.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Set the maximum amount of power that the switch can supply to the PoE port.

NOTE: Although you can set this value when PoE power management is in class mode, it does not establish the maximum power for the port. Instead, the IEEE 802.3af (PoE) or IEEE 802.3at (PoE+) class of the connected device determines the maximum power for the port.

A standalone switch's default setting and range for maximum power does not change if the switch is configured as a satellite device in a Junos Fusion. For instance, an EX4300 switch has a 30W default and a range of 0.0 through 30.0 W when configured as a standalone switch and when it is configured into a satellite device in a Junos Fusion.

Options

watts—The maximum power in watts that can be supplied to the ports..

For EX2200, EX3300, EX4200, EX4300, EX4600, EX6200, and EX8200 switches:

Range: 0.0 through 30.0

Default: 15.4 W for ports that support IEEE 802.3af and 30 W for ports that support IEEE 802.3at

For EX3200 switches:

Range: 0.0 through 18.6

Default: 15.4 W

NOTE: EX4600 switches support PoE only when operating in a mixed Virtual Chassis with EX4300 switches.

For ACX2000 routers:

Range: 1 through 65 W

Default: 32 W

NOTE: The **maximum-power** setting permitted by the CLI might be greater than the maximum power a given PoE port can deliver. For example, the CLI permits you to set any PoE port on an EX8200 line card to 30 W; however, only ports 0 through 11 support 30 W. Similarly, the CLI permits you to set any PoE port on an EX4200 switch to 30 W, but some models of EX4200 switch support only 18.6 W per port. If you configure a **maximum-power** value that is greater than the maximum power supported by a port, the power allocated to the port will be the maximum supported.

If you use the **all** option to set **maximum-power** to a value greater than 15.4 W on all interfaces on an EX8200 line card, the maximum power allocated to all ports is 15.4 W.

NOTE: Support for a maximum of 18.6 W per port instead of 15.4 W per port on EX3200 switches and P and T models of EX4200 switch requires Junos OS Release 11.1 or later. In addition to requiring an upgrade of Junos OS to Release 11.1 or later, switches that are running an earlier release of Junos OS release require the PoE controller software be upgraded as described in *Upgrading the PoE Controller Software*. If the controller software is not upgraded and you set **maximum-power** to a value greater than 15.4 W, the configuration is accepted when you commit it, but the actual power allocated to the port will be 15.4 W.

NOTE: On ACX2000 routers, the power sourcing equipment (PSE) delivers up to 65 W per port, provided the management mode is set to high-power mode, by using the **high-power** option at the **[edit poe management]** hierarchy level. By default, the management mode is set to **static**. In the static mode, the PSE can deliver power up to 32 W.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- *Configuring PoE on EX Series Switches (CLI Procedure)*
- Configuring Power over Ethernet in a Junos Fusion on page 653
- **management on page 665**

n-plus-n (satellite-management)

Syntax

```
n-plus-n
```

Hierarchy Level

```
[edit chassis satellite-management psu redundancy]
```

Release Information

Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Configure *N+N* power supply redundancy for the satellite devices in a Junos Fusion.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Understanding Power over Ethernet in a Junos Fusion on page 649

poe

Syntax For switches other than EX6200 and EX8200 switches:

```
poe {
  guard-band watts;
  interface (all | interface-name) {
    disable;
    maximum-power watts;
    priority (high | low);
    telemetries {
      disable;
      duration hours;
      interval minutes;
    }
  }
  lldp-priority;
  management (class | static);
  notification-control {
    fpc slot-number {
      disable;
    }
  }
}
```

For a Junos Fusion:

```
poe {
  guard-band watts;
  interface (all-extended | interface-name) {
    disable;
    maximum-power watts;
    priority (high | low);
  }
  management (class | static);
}
```

For EX6200 and EX8200 switches:

```
poe {
  fpc ( all | slot-number) {
    guard-band watts;
    lldp-priority;
    management (class | static);
    maximum-power watts;
  }
  interface (all | interface-name) {
    af-mode;
    disable;
    maximum-power watts;
    priority (high | low);
    telemetries {
      disable;
```

```
        duration hours;
        interval minutes;
      }
    }
    notification-control {
      fpc slot-number {
        disable;
      }
    }
}
```

Hierarchy Level

```
[edit]
```

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Configure PoE options. PoE ports on Juniper network switches provide power to PoE-enabled devices only when straight-through cables are used. Power is not provided when crossover cables are used.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- *Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch*
- *Example: Configuring PoE on an EX6200 or EX8200 Switch*
- *Configuring PoE on EX Series Switches (CLI Procedure)*
- Configuring Power over Ethernet in a Junos Fusion on page 653

priority (Power over Ethernet)

Syntax

```
priority (low | high);
```

Hierarchy Level

[edit poe interface (*interface-name* | all | all-extended)]

Release Information

Statement introduced in Junos OS Release 9.0 for EX Series switches.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Set the power priority for individual interfaces when there is insufficient power for all PoE interfaces. If the switch needs to shut down powered devices because PoE demand exceeds the PoE budget, low-priority devices are shut down before high-priority devices. Among interfaces that have the same assigned priority, priority is determined by port number, with lower-numbered ports having higher priority.

Default

low

Options

high—Specifies that this interface is to be treated as high-priority in terms of power allocation. If the switch needs to shut down powered devices because PoE demand exceeds the PoE budget, power is not shut down on this interface until it has been shut down on all the low-priority interfaces.

low—Specifies that this interface is to be treated as low-priority in terms of power allocation. If the switch needs to shut down powered devices because PoE demand exceeds the PoE budget, power is shut down on this interface before it is shut down on high-priority interfaces.

Required Privilege Level

system—To view this statement in the configuration.
system-control—To add this statement to the configuration.

Related Documentation

- *Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch*
- *Configuring PoE on EX Series Switches (CLI Procedure)*
- Configuring Power over Ethernet in a Junos Fusion on page 653

psu (satellite-management)

Syntax

```
psu {
  redundancy {
    n-plus-n;
  }
}
```

Hierarchy Level

[edit chassis satellite-management]

Release Information

Statement introduced in Junos OS Release 16.1R1 for a Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Configure *N*+*N* power supply redundancy for the satellite devices in a Junos Fusion.

The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Understanding Power over Ethernet in a Junos Fusion on page 649

redundancy (satellite-management)

Syntax

```
redundancy {
  n-plus-n;
}
```

Hierarchy Level

[edit chassis satellite-management psu]

Release Information

Statement introduced in Junos OS Release 16.1R1 for a Junos Fusion Enterprise.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Configure *N*+*N* power supply redundancy for the satellite devices in a Junos Fusion.

The remaining statement is explained separately. See CLI Explorer.

Default

N+1 power supply redundancy is configured on each satellite device by default.

Required Privilege Level

interface—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- Understanding Power over Ethernet in a Junos Fusion on page 649

CHAPTER 13

Operational Commands for Power over Ethernet and Power Supply Management on Junos Fusion Enterprise

show chassis satellite power-budget-statistics

Syntax

```
show chassis satellite power-budget-statistics
<slot-id slot-id-number>
```

Release Information Command introduced in Junos OS Release 16.1R1 for a Junos Fusion Enterprise. Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description Display the power budget statistics of a satellite device or devices in a Junos Fusion.

Options **none**—Display power budget statistics for all satellite devices in the Junos Fusion.

slot-id *slot-id-number*—Display power budget statistics for the specified satellite device only. The *slot-id-number* and the FPC ID are the same number in a Junos Fusion.

Required Privilege Level view

Related Documentation

- Understanding Power over Ethernet in a Junos Fusion on page 649

List of Sample Output show chassis satellite power-budget-statistics on page 677

Output Fields Table 45 on page 676 lists the output fields for the **show chassis satellite-management power-budget-statistics** command. Output fields are listed in the approximate order in which they appear.

Table 45: show chassis satellite-management power-budget-statistics Output Fields

Field Name	Field Description
FPC *n*	The FPC slot ID number in the Junos Fusion, where *n* Is the FPC slot ID. The FPC slot ID and the satellite device number are the same thing in a Junos Fusion.
PSU *n* (*supply type*)	Capacity rating of the power supply and whether the power supply is currently operating (**Online**) or not (**Offline**). If a power supply is offline, the capacity is shown as 0 W.
Total Power supplied by all Online PSUs	Total number of watts supplied by all currently operating power supplies for the satellite device.
Power Redundancy Configuration	Configured power redundancy setting, either *N*+1 or *N*+*N*.
Base power reserved	Total number of watts reserved for the satellite device.
Non-PoE power being consumed	The amount of power, in W, currently being consumed for functions other than PoE by the satellite device.

Table 45: show chassis satellite-management power-budget-statistics Output Fields (continued)

Field Name	Field Description
Total Power allocated for PoE	The total of the PoE power budgets allocated to the satellite device.
Total PoE power consumed	The amount of power that has been consumed by PoE by the satellite device.
Total PoE power remaining	The amount of available power remaining that can be used for PoE on the satellite device.

Sample Output

show chassis satellite power-budget-statistics

```
user@aggregation-device> show chassis satellite power-budget-statistics
fpc 100:
--------------------------------------------------------------------------
            PSU 0    (JPSU-550-DC-AFI    )           :     550 W   Online
            PSU 1    (JPSU-550-DC-AFO    )           :     550 W   Online
            Power redundancy configuration           :     N+N
            Total power supplied by all online PSUs  :     522 W
            Base power reserved                      :     175 W
            Non-PoE power being consumed             :      82 W
            Total power allocated for PoE            :     347 W
            Total PoE power consumed                 :       0 W
            Total PoE power remaining                :     347 W
fpc 120:
--------------------------------------------------------------------------
            Power redundancy configuration           :     N+N
            Total power supplied by all online PSUs  :     170 W
            Base power reserved                      :       0 W
            Non-PoE power being consumed             :       0 W
fpc 128:
--------------------------------------------------------------------------
            Power redundancy configuration           :     N+N
            Total power supplied by all online PSUs  :       0 W
            Base power reserved                      :       0 W
            Non-PoE power being consumed             :       0 W
fpc 133:
--------------------------------------------------------------------------
            PSU 0                        )           :       0 W  Offline
            PSU 1    (JPSU-1100-AC-AFO   )           :    1100 W   Online
            Power redundancy configuration           :     N+N
            Total power supplied by all online PSUs  :    1100 W
            Base power reserved                      :     175 W
            Non-PoE power being consumed             :      74 W
            Total power allocated for PoE            :     925 W
            Total PoE power consumed                 :       0 W
            Total PoE power remaining                :     925 W
fpc 240:
--------------------------------------------------------------------------
            Power redundancy configuration           :     N+N
            Total power supplied by all online PSUs  :       0 W
```

```
          Base power reserved                      :       0 W
          Non-PoE power being consumed             :       0 W
```

show poe controller

Syntax

```
show poe controller
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 12.2 for ACX2000 routers.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Display configuration and status of the PoE controllers.

Required Privilege Level

view

Related Documentation

- show poe interface on page 682
- *request system firmware upgrade poe*
- *Verifying PoE Configuration and Status (CLI Procedure)*
- Verifying PoE Configuration and Status for a Junos Fusion (CLI Procedure) on page 657
- *Monitoring PoE Power Consumption (CLI Procedure)*
- *Upgrading the PoE Controller Software*

List of Sample Output

show poe controller (EX3200 Switch) on page 680
show poe controller (EX8200 Switch) on page 680
show poe controller (Controller Software Upgrade in Progress) on page 681
show poe controller (ACX2000 Router) on page 681

Output Fields

Table 46 on page 679 lists the output fields for the **show poe controller** command. Output fields are listed in the approximate order in which they appear.

Table 46: show poe controller Output Fields

Field Name	Field Description
Controller index	PoE controller number: • 0 for EX2200, EX3200, standalone EX3300, standalone EX4200 switches, standalone EX4300 switches, and ACX2000 routers. • Member ID for switches in an EX3300 Virtual Chassis, EX4200 Virtual Chassis, EX4300 Virtual Chassis, a mixed EX4200 and EX4500 Virtual Chassis. • Slot number for line cards with a PoE controller in an EX6200 or EX8200 switch.
Maximum power	The maximum PoE power consumption for the switch or line card. This is the total amount of power available to the PoE controller to allocate to the PoE ports.

Table 46: show poe controller Output Fields (continued)

Field Name	Field Description
Power consumption	Total amount of power being consumed by the PoE ports at the time the command is executed. This value, which represents actual power consumption, cannot exceed the value for **Maximum power**.
Guard Band	Amount of power that has been placed in reserve for power demand spikes and that cannot be allocated to a PoE interface.
Management	Power management mode: **class** or **static** or **high-power**. NOTE: The mode **high-power** is available on only ACX2000 routers.
Status	Status of the PoE controller: • **AF_ENHANCE**—Controller supports enhanced PoE. The maximum power per PoE port is 18.6 W in static mode (15.4 W in class mode). • **DEVICE FAIL**—Software download to the controller has failed or the PoE controller is not initialized because of a hardware failure. • **DOWNLOAD_INIT**—Software download to the controller is in the initial phase. • **AF_MODE**—Controller supports standard IEEE 802.3af. The maximum power per PoE port is 15.4 W. • **AT/AF COMBO**—Controller supports a mix of standard IEEE 802.3af and IEEE 802.3at (PoE+) ports. The maximum power per port is 30 W for IEEE 802.3at (PoE+) ports and 15.4 W for the IEEE 802.3af ports. • **AT_MODE**—Controller supports IEEE 802.3at (PoE+). The maximum power per PoE port is 30 W. • **SW_DOWNLOAD (*n*%)**—Software download to the controller is in progress.
Lldp Priority	Link Layer Discovery Protocol (LLDP) priority operating state. The state can be **Enabled** or **Disabled**. LLDP priority enables the PoE controller to assign interfaces the power priority provided by the connected powered device by using LLDP power negotiation rather than the power priority configured on the switch interface.

Sample Output

show poe controller (EX3200 Switch)

`user@switch>` **show poe controller**

```
Controller  Maximum   Power         Guard    Management  Status      Lldp
index       power     consumption   band                             Priority
   0        130.00W   81.20W         10W     Static      AF_ENHANCE  Disabled
```

show poe controller (EX8200 Switch)

`user@switch>` **show poe controller**

```
Controller  Maximum   Power         Guard    Management  Status       Lldp
index       power     consumption   band                              Priority
   0        792.00W   603.50W        0W      Class       AT/AF COMBO  Disabled
```

```
   4        915.00W   781.00W        0W     Class       AT/AF COMBO  Disabled
   7        915.00W   0.00W          0W     Class       AT/AF COMBO  Disabled
```

show poe controller (Controller Software Upgrade in Progress)

`user@switch>` **show poe controller**

```
Controller  Maximum   Power         Guard    Management  Status          Lldp
index      power     consumption   band                                 Priority

   0       130.00W   0.00W          0W     Static      AF_ENHANCE       Disabled

   8**     130.00W   0.00W          0W     Static      SW_DOWNLOAD(10%)  Disabled

  **New PoE software upgrade available.
Use 'request system firmware upgrade poe fpc-slot <slot>'
 This procedure will take around 10 minutes (recommended to be performed during
maintenance)
```

show poe controller (ACX2000 Router)

`user@host>` **show poe controller**

```

Controller  Maximum   Power         Guard    Management  Status         Lldp
index       power     consumption   band                                Priority

   0        130.0 W   14.2 W         0 W      high-power   UP
```

show poe interface

Syntax

```
show poe interface
<fpc-slot number>
<interface-name>
```

Release Information

Command introduced in Junos OS Release 9.0 for EX Series switches.
Command introduced in Junos OS Release 12.2 for ACX2000 routers.
Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

Description

Display the status of PoE interfaces.

Options

none—Display status of all PoE interfaces on the switch or router.

fpc-slot ***number***—(Optional) (EX6200 or EX8200 switches only) Display the status of the PoE interfaces on the specified line card.

interface-name—(Optional) Display the status of a specific PoE interface on the switch.

Required Privilege Level

view

Related Documentation

- show poe controller on page 679
- *Verifying PoE Configuration and Status (CLI Procedure)*
- *Monitoring PoE Power Consumption (CLI Procedure)*
- *Troubleshooting PoE Interfaces*

List of Sample Output

show poe interface on page 684
show poe interface (EX2300 and EX3400) on page 684
show poe interface (with LLDP Negotiation) on page 684
show poe interface (Specific Interface) on page 684
show poe interface (Specific FPC Slot) on page 685
show poe interface (Specific Interface on ACX2000 Universal Metro Routers) on page 685

Output Fields

Table 47 on page 682 lists the output fields for the **show poe interface** command. Output fields are listed in the approximate order in which they appear.

Table 47: show poe interface Output Fields

Field Name (All Interfaces Output)	Field Name (Single Interface Output)	Field Description
Interface	**PoE Interface**	Interface name.

Table 47: show poe interface Output Fields (continued)

Field Name (All Interfaces Output)	Field Name (Single Interface Output)	Field Description
Admin status	**Administrative status**	Administrative state of the PoE interface: **Enabled** or **Disabled**. If the PoE interface is disabled, it can provide network connectivity, but it cannot provide power to connected devices.
Oper status	**Operational status**	Operational state of the PoE interface: • **ON**—The interface is currently supplying power to a powered device. • **OFF**—PoE is enabled on the interface, but the interface is not currently supplying power to a powered device. • **FAULT**—PoE interface is in the **OFF** state due to a fault condition. • **Disabled**—PoE is disabled on the interface.
	Operational status detail	Additional information for troubleshooting the operational state of the PoE interface: • **Admin up but disabled on hardware**—The interface is disabled due to power budget unavailability. • **Overload**—Interface is in the fault condition. • **IEEE PD Detected**—The interface is providing power to the powered device. • **Detection In Progress**—Detection of the powered device is ongoing.
	FourPair status	Status of high-power mode of power delivery over all four pairs of the Ethernet cable: • **Enabled**—High power mode is enabled. • **Disabled**—High power mode is disabled.
Pair/Mode status		Shows the mode of power delivery configured on the interface. • **4P/AT**—Interface is configured for high power mode. • **4P/POH**—Interface is configured for ultra-high power mode.
Max power	**Power limit on the interface**	Maximum power that can be provided by the interface. An **(L)** next to the value indicates that the value on the port was negotiated by LLDP.
Priority	**Priority**	Interface power priority: either **High** or **Low**. An **(L)** next to the value indicates that the value on the port was negotiated by LLDP.
Power consumption	**Power consumed**	Amount of power being used by the interface at the time the command is executed.
Class	**Class of power device**	IEEE 802.3af (PoE) or IEEE 802.3at (PoE+) class of the powered device. **Class 0** is the default class and is used when the class of the powered device is unknown. If no powered device is connected, this field contains **not applicable**.
	PoE Mode	IEEE PoE standard supported by the interface—either **802.3af**, or **802.3at**, or **ultra-poe**.

Sample Output

show poe interface

user@switch> **show poe interface**

```
Interface Admin        Oper        Max       Priority Power            Class
          status       status      power              consumption
 ge-0/0/0 Enabled      ON          15.4W     Low      7.9W               0
 ge-0/0/1 Enabled      ON          15.4W     Low      3.2W               2
 ge-0/0/2 Enabled      ON          15.4W     Low      3.2W               2
 ge-0/0/3 Enabled      ON          15.4W     Low      3.2W               2
 ge-0/0/4 Enabled      ON          15.4W     Low      3.2W               2
 ge-0/0/5 Enabled      ON          15.4W     Low      3.2W               2
 ge-0/0/6 Enabled      ON          15.4W     Low      3.2W               2
 ge-0/0/7 Enabled      ON          15.4W     Low      3.2W               2
```

show poe interface (EX2300 and EX3400)

user@switch> **show poe interface**

```
Interface  Admin      Oper     Pair/Mode  Max     Priority  Power        Class
           status     status   status     power            consumption
 ge-0/0/0  Enabled    OFF      4P/AT      60.0W   Low       4.5W           2
 ge-0/0/1  Enabled    OFF      4P/AT      60.0W   Low       4.5W           2
 ge-0/0/2  Enabled    OFF      4P/AT      60.0W   Low       4.5W           2
 ge-0/0/3  Enabled    OFF      4P/AT      60.0W   Low       4.5W           2
 ge-0/0/4  Enabled    OFF      4P/AT      60.0W   Low       4.5W           2
```

show poe interface (with LLDP Negotiation)

user@switch> **show poe interface**

```
Interface     Admin       Oper    Max        Priority        Power          Class
              status      status  power                      consumption
 ge-0/0/0     Enabled      ON     17.5W(L)   Low(L)          16.2W            4
 ge-0/0/1     Enabled      ON     17.5W(L)   Low(L)          16.0W            4
 ge-0/0/2     Enabled      ON     17.5W(L)   High(L)         16.0W            4
 ge-0/0/3     Enabled      ON     17.5W(L)   Low(L)          16.0W            4
 ge-0/0/4     Enabled      ON     10.1W(L)   Low(L)          10.0W            3
 ge-0/0/5     Enabled      ON     3.5W(L)    High(L)         3.0W             2
(L) LLDP-negotiated value on the port.
```

show poe interface (Specific Interface)

user@switch> **show poe interface ge-0/0/3**

```
PoE interface status:
PoE interface                 :  ge-0/0/3
Administrative status         : Enabled
Operational status            :  ON
Operational status detail     :  IEEE PD Detected
Power limit on the interface : 7.0W
Priority                      : Low
Power consumed                : 5.3W
Class of power device         :   2
PoE Mode                      : 802.3af
```

show poe interface (Specific FPC Slot)

`user@switch>` **show poe interface fpc-slot 3**

```
Interface Admin        Oper        Max       Priority Power            Class
          status       status      power              consumption
 ge-3/0/0 Enabled       ON         30.0W     Low      20.3W                4
 ge-3/0/1 Enabled       ON         30.0W     Low      17.8W                4
 ge-3/0/2 Enabled       ON         30.0W     High     16.3W                4
 ge-3/0/3 Enabled       ON         30.0W     High     16.2W                4
 ge-3/0/4 Enabled       ON         30.0W     Low      25.9W                4
 ge-3/0/5 Enabled       ON         30.0W     Low      10.1W                4
 ge-3/0/6 Enabled       ON         30.0W     Low      16.2W                4
 ge-3/0/7 Enabled       ON         30.0W     Low      6.4W                 4
 ge-3/0/8 Enabled       ON         30.0W     Low      5.2W                 4
 ge-3/0/9 Enabled       ON         30.0W     Low      5.2W                 4
ge-3/0/10 Enabled       ON         30.0W     Low      21.5W                4
ge-3/0/11 Enabled       ON         30.0W     Low      21.7W                4
ge-3/0/12 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/13 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/14 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/15 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/16 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/17 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/18 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/19 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/20 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/21 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/22 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/23 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/24 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/25 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/26 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/27 Enabled       ON         15.4W     Low      9.4W                 0
ge-3/0/28 Enabled       ON         15.4W     Low      7.0W                 0
ge-3/0/29 Enabled       ON         15.4W     Low      2.2W                 1
ge-3/0/30 Enabled       ON         15.4W     Low      2.2W                 1
ge-3/0/31 Enabled       ON         15.4W     Low      2.2W                 1
ge-3/0/32 Enabled       ON         15.4W     Low      2.0W                 1
ge-3/0/33 Enabled       ON         15.4W     Low      2.0W                 1
ge-3/0/34 Enabled       ON         15.4W     Low      2.2W                 1
ge-3/0/35 Enabled       ON         15.4W     Low      2.2W                 1
ge-3/0/36 Enabled       ON         15.4W     Low      2.2W                 1
ge-3/0/37 Enabled       ON         15.4W     Low      2.2W                 1
ge-3/0/38 Enabled       ON         15.4W     Low      2.2W                 1
ge-3/0/39 Enabled       ON         15.4W     Low      2.2W                 1
```

show poe interface (Specific Interface on ACX2000 Universal Metro Routers)

`user@host>` **show poe interface ge-0/1/7**

```
PoE interface status:
PoE interface                : ge-0/1/7
Administrative status        : Enabled
Operational status           : Powered-up
Power limit on the interface : 9.0 W
Priority                     : Low
Power consumed               : 14.2 W
Class of power device        :  4
```

CHAPTER 14

Link Aggregation and LACP on Junos Fusion Enterprise

Configuring Link Aggregation on Satellite Devices in a Junos Fusion Enterprise

Link aggregation, as defined by IEEE 802.3ad, allows users to bundle multiple Ethernet interfaces into a single logical interface. An aggregated Ethernet interface, also known as a link aggregation group (LAG), balances traffic across its member links within the aggregated Ethernet bundle and effectively increases the uplink bandwidth. Aggregated Ethernet interfaces also increase high availability, because an aggregated Ethernet interface is composed of multiple member links that can continue to carry traffic when one member link fails.

In a Junos Fusion Enterprise, you can configure aggregated Ethernet interfaces using extended port member links to increase uplink bandwidth and high availability for endpoint devices connected to a satellite device. These aggregated Ethernet interfaces can be configured to use Link Aggregation Control Protocol (LACP).

LACP is a subcomponent of the IEEE 802.3ad standard that simplifies management of LAGs. LACP automates the addition and deletion of individual links to the LAG without user intervention, and can also prevent communication failures by detecting misconfigurations within a LAG. LACP-enabled devices exchange LACP protocol data units (PDUs) to monitor links between LAG peers. You can configure Ethernet links to actively transmit LACP PDUs, or you can configure the links to passively transmit them, sending out LACP PDUs only when they receive them from another link.

LAG and LACP configuration on extended ports in a Junos Fusion Enterprise is identical for a standalone EX Series switch. The following guidelines apply to link aggregation in a Junos Fusion Enterprise:

- The member links must be located on the same satellite device.
- Up to 1000 LAGs are supported, with up to 16 members per LAG.
- LAGs are numbered from ae0 through ae4091.

- The LAG must be configured on both sides of the link.
- The interfaces on either side of the link must be set to the same speed and be in full-duplex mode.

To configure link aggregation in a Junos Fusion Enterprise:

1. Configure the maximum number of aggregated Ethernet interfaces:

```
[edit]
user@aggregation-device# set chassis aggregated-devices ethernet device-count number
```

2. Create and name the aggregated Ethernet interface:

```
[edit]
user@aggregation-device# set interfaces aex
```

NOTE: Specify the aggregated Ethernet interface name as ae*x*, where *x* is the interface instance number. The instance number can be from 0 through 4091.

3. Assign interfaces to the aggregated Ethernet interface:

```
[edit]
user@aggregation-device# set interfaces interface-name ether-options 802.3ad aex
```

For example:

```
[edit]
user@aggregation-device# set interfaces xe-100/0/12 ether-options 802.3ad ae0
user@aggregation-device# set interfaces xe-100/0/13 ether-options 802.3ad ae0
user@aggregation-device# set interfaces xe-100/0/46 ether-options 802.3ad ae1
```

4. Enable LACP for the aggregated Ethernet interface:

```
[edit]
user@aggregation-device# set interfaces aex aggregated-ether-options lacp
```

For information on configuring LACP parameters, see "Configuring Aggregated Ethernet LACP" on page 689.

Related Documentation

- Configuring an Aggregated Ethernet Interface on page 688
- Configuring Aggregated Ethernet LACP on page 689

Configuring an Aggregated Ethernet Interface

You can associate a physical interface with an aggregated Ethernet interface.

To configure an aggregated Ethernet interface:

1. Specify that you want to configure the link aggregation group interface.

   ```
   user@host# edit interfaces interface-name
   ```

2. Configure the aggregated Ethernet interface.

   ```
   [edit interfaces interface-name]
   user@host# set ether-options 802.3ad aex
   ```

You specify the interface instance number ***x*** to complete the link association; ***x*** can be from 0 through 480, for a total of 480 aggregated interfaces on MX Series routers or EX9200 switches. You must also include a statement defining **ae*x*** at the **[edit interfaces]** hierarchy level. You can optionally specify other physical properties that apply specifically to the aggregated Ethernet interfaces; for details, see *Ethernet Interfaces Overview*.

NOTE: In general, aggregated Ethernet bundles support the features available on all supported interfaces that can become a member link within the bundle. As an exception, Gigabit Ethernet IQ features and some newer Gigabit Ethernet features are not supported in aggregated Ethernet bundles.

Gigabit Ethernet IQ and SFP interfaces can be member links, but IQ- and SFP-specific features are not supported on the aggregated Ethernet bundle even if all the member links individually support those features.

You need to configure the correct link speed for the aggregated Ethernet interface to eliminate any warning message.

NOTE: Before you commit an aggregated Ethernet configuration, ensure that link mode is not configured on any member interface of the aggregated Ethernet bundle; otherwise, the configuration commit check fails.

Related Documentation

- *Aggregated Ethernet Interfaces Overview*
- *Ethernet Interfaces Feature Guide for Routing Devices*

Configuring Aggregated Ethernet LACP

For aggregated Ethernet interfaces, you can configure the Link Aggregation Control Protocol (LACP). LACP is one method of bundling several physical interfaces to form one logical interface. You can configure both VLAN-tagged and untagged aggregated Ethernet with or without LACP enabled.

For Multichassis Link Aggregation (MC-LAG), you must specify the **system-id** and **admin key**. MC-LAG peers use the same **system-id** while sending the LACP messages. The **system-id** can be configured on the MC-LAG network device and synchronized between peers for validation.

LACP exchanges are made between actors and partners. An actor is the local interface in an LACP exchange. A partner is the remote interface in an LACP exchange.

LACP is defined in IEEE 802.3ad, *Aggregation of Multiple Link Segments*.

LACP was designed to achieve the following:

- Automatic addition and deletion of individual links to the aggregate bundle without user intervention
- Link monitoring to check whether both ends of the bundle are connected to the correct group

The Junos OS implementation of LACP provides link monitoring but not automatic addition and deletion of links.

The LACP mode can be active or passive. If the actor and partner are both in passive mode, they do not exchange LACP packets, which results in the aggregated Ethernet links not coming up. If either the actor or partner is active, they do exchange LACP packets. By default, LACP is turned off on aggregated Ethernet interfaces. If LACP is configured, it is in passive mode by default. To initiate transmission of LACP packets and response to LACP packets, you must configure LACP in active mode.

To enable LACP active mode, include the **lacp** statement at the **[edit interfaces *interface-name* aggregated-ether-options]** hierarchy level, and specify the **active** option:

```
[edit interfaces interface-name aggregated-ether-options]
lacp {
   active;
}
```

NOTE: The LACP process exists in the system only if you configure the system in either active or passive LACP mode.

To restore the default behavior, include the **lacp** statement at the **[edit interfaces *interface-name* aggregated-ether-options]** hierarchy level, and specify the **passive** option:

```
[edit interfaces interface-name aggregated-ether-options]
lacp {
   passive;
}
```

Starting with Junos OS release 12.2, you can also configure LACP to override the IEEE 802.3ad standard and to allow the standby link always to receive traffic. Overriding the default behavior facilitates subsecond failover.

To override the IEEE 802.3ad standard and facilitate subsecond failover, include the **fast-failover** statement at the **[edit interfaces *interface-name* aggregated-ether-options lacp]** hierarchy level.

For more information, see the following sections:

Configuring the LACP Interval

By default, the actor and partner send LACP packets every second. You can configure the interval at which the interfaces send LACP packets by including the **periodic** statement at the **[edit interfaces *interface-name* aggregated-ether-options lacp]** hierarchy level:

```
[edit interfaces interface-name aggregated-ether-options lacp]
periodic interval;
```

The interval can be fast (every second) or slow (every 30 seconds). You can configure different periodic rates on active and passive interfaces. When you configure the active and passive interfaces at different rates, the transmitter honors the receiver's rate.

NOTE: Source address filtering does not work when LACP is enabled.

Percentage policers are not supported on aggregated Ethernet interfaces with the CCC protocol family configured. For more information about percentage policers, see the *Routing Policies, Firewall Filters, and Traffic Policers Feature Guide*.

Generally, LACP is supported on all untagged aggregated Ethernet interfaces. For more information, see *Configuring Untagged Aggregated Ethernet Interfaces*.

Configuring LACP Link Protection

NOTE: When using LACP link protection, you can configure only two member links to an aggregated Ethernet interface: one active and one standby.

To force active and standby links within an aggregated Ethernet, you can configure LACP link protection and system priority at the aggregated Ethernet interface level using the **link-protection** and **system-priority** statements. Configuring values at this level results in only the configured interfaces using the defined configuration. LACP interface configuration also enables you to override global (chassis) LACP settings.

LACP link protection also uses port priority. You can configure port priority at the Ethernet interface **[ether-options]** hierarchy level using the **port-priority** statement. If you choose not to configure port priority, LACP link protection uses the default value for port priority (127).

NOTE: LACP link protection supports per-unit scheduling configuration on aggregated Ethernet interfaces.

To enable LACP link protection for an aggregated Ethernet interfaces, use the **link-protection** statement at the **[edit interfaces ae*X* aggregated-ether-options lacp]** hierarchy level:

```
[edit interfaces aeX aggregated-ether-options lacp]
link-protection;
   disable;
   revertive;
   non-revertive;
}
```

By default, LACP link protection reverts to a higher-priority (lower-numbered) link when that higher-priority link becomes operational or a link is added to the aggregator that is determined to be higher in priority. However, you can suppress link calculation by adding the **non-revertive** statement to the LACP link protection configuration. In nonrevertive mode, once a link is active and collecting and distributing packets, the subsequent addition of a higher-priority (better) link does not result in a switch and the current link remains active.

If LACP link protection is configured to be nonrevertive at the global (**[edit chassis]** hierarchy) level, you can add the **revertive** statement to the LACP link protection configuration to override the nonrevertive setting for the interface. In revertive mode, the addition of a higher-priority link to the aggregator results in LACP performing a priority recalculation and switching from the current active link to the new active link.

CAUTION: If both ends of an aggregator have LACP link protection enabled, make sure to configure both ends of the aggregator to use the same mode. Mismatching LACP link protection modes can result in lost traffic.

We strongly recommend you to use LACP on both ends of the aggregator, when you connect an aggregated Ethernet interface with two member interfaces to any other vendor device. Otherwise, the vendor device (say a Layer 2 switch, or a router), will not be able to manage the traffic coming from the two link aggregated Ethernet bundle. As a result, you might observe the vendor device sending back the traffic to the backup member link of the aggregated Ethernet interface.

Currently, MX-MPC2-3D, MX-MPC2-3D-Q, MX-MPC2-3D-EQ, MX-MPC1-3D, MX-MPC1-3D-Q, and MPC-3D-16XGE-SFPP do not drop traffic coming back to the backup link, whereas DPCE-R-Q-20GE-2XGE, DPCE-R-Q-20GE-SFP, DPCE-R-Q-40GE-SFP, DPCE-R-Q-4XGE-XFP, DPCE-X-Q-40GE-SFP, and DPCE-X-Q-4XGE-XFP drop traffic coming to the backup link.

Configuring LACP System Priority

To configure LACP system priority for aggregated Ethernet interfaces on the interface, use the **system-priority** statement at the **[edit interfaces ae*X* aggregated-ether-options lacp]** hierarchy level:

```
[edit interfaces aeX aggregated-ether-options lacp]
system-priority;
```

The system priority is a 2-octet binary value that is part of the LACP system ID. The LACP system ID consists of the system priority as the two most-significant octets and the interface MAC address as the six least-significant octets. The system with the numerically lower value for system priority has the higher priority. By default, system priority is 127, with a range of 0 to 65,535.

Configuring LACP System Identifier

To configure the LACP system identifier for aggregated Ethernet interfaces, use the **system-id** statement at the **[edit interfaces ae*X* aggregated-ether-options lacp]** hierarchy level:

```
[edit interfaces aeX aggregated-ether-options lacp]
system-id system-id;
```

The user-defined system identifier in LACP enables two ports from two separate devices to act as though they were part of the same aggregate group.

The system identifier is a 48-bit (6-byte) globally unique field. It is used in combination with a 16-bit system-priority value, which results in a unique LACP system identifier.

Configuring LACP administrative Key

To configure an administrative key for LACP, include the **admin-key *number*** statement at the **edit interfaces ae*x* aggregated-ether-options lacp]** hierarchy level:

```
[edit interfaces ae x aggregated-ether-options-lacp]
admin-key number;
```

NOTE: You must configure MC-LAG to configure the **admin-key** statement. For more information about MC-LAG, see *Configuring Multichassis Link Aggregation on MX Series Routers*.

Configuring LACP Port Priority

To configure LACP port priority for aggregated Ethernet interfaces, use the **port-priority** statement at the **[edit interfaces *interface-name* ether-options 802.3ad ae*X* lacp]** or **[edit interfaces *interface-name* ether-options 802.3ad ae*X* lacp]** hierarchy levels:

```
[edit interfaces interface-name ether-options 802.3ad aeX lacp]
port-priority priority;
```

The port priority is a 2-octet field that is part of the LACP port ID. The LACP port ID consists of the port priority as the two most-significant octets and the port number as the two least-significant octets. The system with the numerically lower value for port priority has the higher priority. By default, port priority is 127, with a range of 0 to 65,535.

Port aggregation selection is made by each system based on the highest port priority and are assigned by the system with the highest priority. Ports are selected and assigned starting with the highest priority port of the highest priority system and working down in priority from there.

NOTE: Port aggregation selection (discussed above) is performed for the active link when LACP link protection is enabled. Without LACP link protection, port priority is not used in port aggregation selection.

Tracing LACP Operations

To trace the operations of the LACP process, include the **traceoptions** statement at the **[edit protocols lacp]** hierarchy level:

```
[edit protocols lacp]
traceoptions {
  file <filename> <files number> <size size> <world-readable | no-world-readable>;
  flag flag;
  no-remote-trace;
}
```

You can specify the following flags in the **protocols lacp traceoptions** statement:

- **all**—All LACP tracing operations
- **configuration**—Configuration code
- **packet**—Packets sent and received
- **process**—LACP process events
- **protocol**—LACP protocol state machine
- **routing-socket**—Routing socket events
- **startup**—Process startup events

For general information about tracing, see the tracing and logging information in the *Junos OS Administration Library*.

LACP Limitations

LACP can link together multiple different physical interfaces, but only features that are supported across all of the linked devices will be supported in the resulting link aggregation group (LAG) bundle. For example, different PICs can support a different number of forwarding classes. If you use link aggregation to link together the ports of a PIC that supports up to 16 forwarding classes with a PIC that supports up to 8 forwarding classes, the resulting LAG bundle will only support up to 8 forwarding classes. Similarly, linking together a PIC that supports WRED with a PIC that does not support it will result in a LAG bundle that does not support WRED.

Example: Configuring Aggregated Ethernet LACP

Configure aggregated Ethernet LACP over a VLAN-tagged interface:

LACP with VLAN-Tagged Aggregated Ethernet

```
[edit interfaces]
ge--1/1/1 {
   ether-options {
      802.3ad ae0;
   }
}
ae0 {
   aggregated-ether-options {
      lacp {
         active;
      }
   }
   vlan-tagging;
   unit 0 {
      vlan-id 100;
      family inet {
         address 10.1.1.2/24 {
            vrrp-group 0 {
               virtual-address 10.1.1.4;
               priority 200;
            }
```

```
          }
        }
      }
    }
```

Configure aggregated Ethernet LACP over an untagged interface:

LACP with Untagged Aggregated Ethernet

```
[edit interfaces]
ge-1/1/1 {
  ether-options-options {
    802.3ad ae0;
  }
}
ae0 {
  aggregated-ether-options {
    lacp {
      active;
    }
  }
  unit 0 {
    family inet {
      address 10.1.1.2/24 {
        vrrp-group 0 {
          virtual-address 10.1.1.4;
          priority 200;
        }
      }
    }
  }
}
```

Related Documentation

- *lacp*
- *link-protection*
- *traceoptions*
- *Ethernet Interfaces Feature Guide for Routing Devices*

CHAPTER 15

SNMP MIB Support on Junos Fusion Enterprise

Chassis MIB Support (Junos Fusion)

The Chassis MIB has been enhanced to enable satellite devices to be represented in the chassis MIB. Satellite devices are represented as FPCs/slots (100, 101,102,..) in the aggregation device. The support is enabled using a separate range of container indices (CIDX), which allows the SNMP process to redirect relevant SNMP requests to the satellite device management process.

The CIDX for representing satellite device hardware components in Junos Fusion are offset by 100 from indices for hardware components on Junos devices; for example a regular CIDX 2 (Power Supply) is 102 for the power supply of the satellite device. Using these indices you can distinguish the satellite device hardware from the aggregate device. The L1 index for satellite device entries refers to their FPC slot identifiers. As per the chassis MIB convention, identifiers are 1-based. For example, satellite device 100 will have an L1 index of 101, satellite device 101 will have an L1 index of 102, and so on.

Table 48 on page 697shows the CIDXs used for satellite devices.

Table 48: CIDX's for Satellite Devices

CIDX	Component Type
102	Power Supply
104	Fan
107	FPC
108	PIC

The following tables have been enhanced to include object IDs for satellite devices:

- jnxContainersTable
- jnxContentsTable

- jnxFilledTable
- jnxOperatingTable
- jnxFRUTable

Examples of new object IDs in the jnxContainersTable:

```
jnxContainersType.102 = jnxSatelliteDeviceSlotPower.0
jnxContainersType.104 = jnxSatelliteDeviceSlotFan.0
jnxContainersType.107 = jnxSatelliteDeviceSlotFPC.0
jnxContainersType.108 = jnxSatelliteDeviceMediaCardSpacePIC.0
…
…
jnxContainersDescr.102 = SD PEM slot
jnxContainersDescr.104 = SD FAN slot
jnxContainersDescr.107 = SD FPC slot
jnxContainersDescr.108 = SD PIC slot
```

Examples of new object IDs in the jnxContentsTable:

```
jnxContentsType.102.102.1.0 = jnxSatelliteDeviceSlotPower
jnxContentsType.102.102.2.0 = jnxSatelliteDeviceSlotPower
jnxContentsType.104.102.1.0 = jnxSatelliteDeviceSlotFan
jnxContentsType.104.102.2.0 = jnxSatelliteDeviceSlotFan
jnxContentsType.104.102.3.0 = jnxSatelliteDeviceSlotFan
jnxContentsType.104.102.4.0 = jnxSatelliteDeviceSlotFan
jnxContentsType.104.102.5.0 = jnxSatelliteDeviceSlotFan
jnxContentsType.107.102.0.0 = jnxSatelliteDeviceSlotFPC
jnxContentsType.108.102.1.0 = jnxSatelliteDeviceMediaCardSpacePIC

…
jnxContentsDescr.102.102.1.0 = SD101 PEM 0
jnxContentsDescr.102.102.2.0 = SD101 PEM 1
jnxContentsDescr.104.102.1.0 = SD101 Fan Tray 0
jnxContentsDescr.104.102.2.0 = SD101 Fan Tray 1
jnxContentsDescr.104.102.3.0 = SD101 Fan Tray 2
jnxContentsDescr.104.102.4.0 = SD101 Fan Tray 3
jnxContentsDescr.104.102.5.0 = SD101 Fan Tray 4
jnxContentsDescr.107.102.0.0 = SD101 FPC: QFX5100-48S-6Q @ 101/*/*
jnxContentsDescr.108.102.1.0 = SD101 PIC: 48x10G-6x40G @ 101/0/*
```

The following SNMP traps are generated for Satellite Devices, which are also logged as syslog messages:

- Satellite Device (as FPC) add (online) or remove
- Satellite Device Fan add (online) or remove
- Satellite Device PSU add (online) or remove
- Satellite Device PIC add (online) or remove
- Satellite Device FAN failure or status
- Satellite Device PSU failure or status

Table 49 on page 699 shows the SNMP traps that can be generated for satellite devices.

Table 49: SNMP Traps Generated for Satellite Devices

Trap	Condition
jnxFruRemoval	Sent when the specified FRU (FAN/PSU) has been removed from the chassis, or the satellite device has been removed from the aggregation device's database
jnxFruInsertion	Sent when the specified FRU (FAN/PSU) has been inserted into the satellite device
jnxFruPowerOff	Sent when the specified FRU (FAN/PSU) has been powered off in the satellite device
jnxFruPowerOn	Sent when the specified FRU (FAN/PSU) has been powered on in the satellite device
jnxFruFailed	Sent when the specified FRU (FAN/PSU) has failed in the satellite device. Typically, this is due to the FRU not powering up or being unable to load software. FRU replacement might be required
jnxFruOK	
jnxFruOffline	Sent when FPC's new reported state is not online or PSU/FAN/PIC is not present due to satellite device removal
jnxFruOnline	Sent when specified FRU (FPC,PIC,PSU,FAN) gets added in the aggregation device database
jnxFruCheck	Sent when the specified FRU (FAN/PSU) has encountered operational errors

Given below are examples of the system log messages generated:

```
messages:Apr 15 21:28:36  card spmd[6706]: SPMD_SNMP_TRAP10: SNMP trap generated:
 Fru Offline (jnxFruContentsIndex 102, jnxFruL1Index 109, jnxFruL2Index 1,
jnxFruL3Index 0, jnxFruName SD108 PEM 0, jnxFruType 7, jnxFruSlot 0,
jnxFruOfflineReason 1, jnxFruLastPowerOff 0, jnxFruLastPowerOn 0)
```

```
messages:Apr 15 21:28:36  card spmd[6706]: SPMD_SNMP_TRAP10: SNMP trap generated:
 Fru Offline (jnxFruContentsIndex 104, jnxFruL1Index 109, jnxFruL2Index 1,
jnxFruL3Index 1, jnxFruName SD108 Fan Tray 0, jnxFruType 13, jnxFruSlot 0,
jnxFruOfflineReason 1, jnxFruLastPowerOff 0, jnxFruLastPowerOn 0)
```

```
messages:Apr 15 21:28:57  card spmd[8847]: SPMD_SNMP_TRAP7: SNMP trap generated:
 Fru Online (jnxFruContentsIndex 107, jnxFruL1Index 103, jnxFruL2Index 0,
jnxFruL3Index 0, jnxFruName SD102 FPC:  @ 102/*/*, jnxFruType 3, jnxFruSlot 102)
```

```
messages:Apr 15 21:28:36  card spmd[6706]: SPMD_SNMP_TRAP10: SNMP trap generated:
 Fru Offline (jnxFruContentsIndex 108, jnxFruL1Index 109, jnxFruL2Index 1,
jnxFruL3Index 0, jnxFruName SD108 PIC: 48x 10/100/1000 Base-T @ 108/0/*, jnxFruType
 11, jnxFruSlot 0, jnxFruOfflineReason 1, jnxFruLastPowerOff 0, jnxFruLastPowerOn
 0)
```

CHAPTER 16

Media Access Control Security (MACsec) on Junos Fusion Enterprise

Understanding Media Access Control Security on a Junos Fusion Enterprise

Media Access Control Security (MACsec) is widely used in campus deployments to secure network traffic between endpoints and access switches. You can enable MACsec on extended ports in a Junos Fusion Enterprise topology to provide secure communication between the satellite device and connected hosts.

MacSec Overview

MACsec is an 802.1AE IEEE industry-standard security technology that provides secure communication on Ethernet links between directly-connected nodes. MACsec is capable of identifying and preventing most security threats, including denial of service, intrusion, man-in-the-middle, masquerading, passive wiretapping, and playback attacks. MACsec provides point-to-point integrity and can be used in combination with other security solutions, such as IP Security (IPsec) and Secure Sockets Layer (SSL), to provide end-to-end network security.

See *Understanding Media Access Control Security (MACsec)* for a detailed overview of MACsec.

Enabling MACsec in a Junos Fusion Enterprise

To enable MACsec on a link connecting an endpoint device—such as a server, phone, or personal computer—to an extended port in a Junos Fusion Enterprise, the endpoint device must support MACsec and must be running client software that allows it to enable a MACsec-secured connection. A secure association using dynamic secure association security mode (dynamic SAK) must be configured on the extended port that connects to the host. The secure association keys are retrieved from the RADIUS server as part of the 802.1X authentication process. The keys are exchanged between the MACsec peers to create a secure connection.

MacSec configuration in Junos Fusion is done on the aggregated device and is identical for a standalone EX Series switch. See *Configuring MACsec on EX, SRX and Fusion Devices*.

NOTE: When MACsec is enabled in a Junos Fusion with dual aggregation devices, the exchange of EAPoL packets that takes place during the 802.1X authentication session is limited to one aggregation device (AD). The MKA protocol is triggered only on that (AD), and the keys generated by MKA are not synced across the ADs. If the AD on which the keys are generated fails, then the MACsec sessions must be re-authenticated using the other AD.

Related Documentation

- *Configuring MACsec on EX, SRX and Fusion Devices*

CHAPTER 17

Class of Service on Junos Fusion Enterprise

Understanding CoS in Junos Fusion Enterprise

Junos Fusion provides a method of significantly expanding the number of available network interfaces on an *aggregation device* by allowing the aggregation device to add interfaces through interconnections with *satellite devices*. The entire system—the interconnected aggregation device and satellite devices—is called Junos Fusion. Junos Fusion simplifies network administration by appearing in the network topology as a single device, and the single device is managed from a single IP address.

See Figure 12 on page 703 and Figure 13 on page 704 for illustrations of the Junos Fusion Enterprise topology.

Figure 12: Basic Junos Fusion Topology

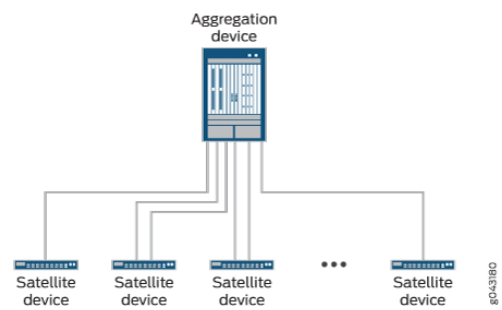
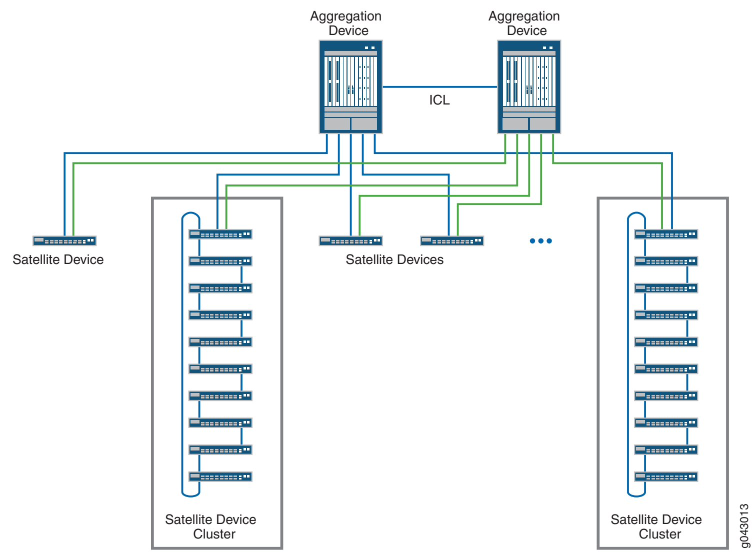


Figure 13: Junos Fusion Topology with Dual Aggregation Devices and Satellite Device Clusters



For Junos Fusion Enterprise, an aggregation device is an EX9200 switch that is running Junos OS Release 16.1R1 or later. Beginning with Junos OS Release 17.1R1, Junos Fusion Enterprise supports CoS. CoS configuration is the same on Junos Fusion Enterprise regardless of the selected architecture - single or dual aggregation devices, single or cluster satellite devices.

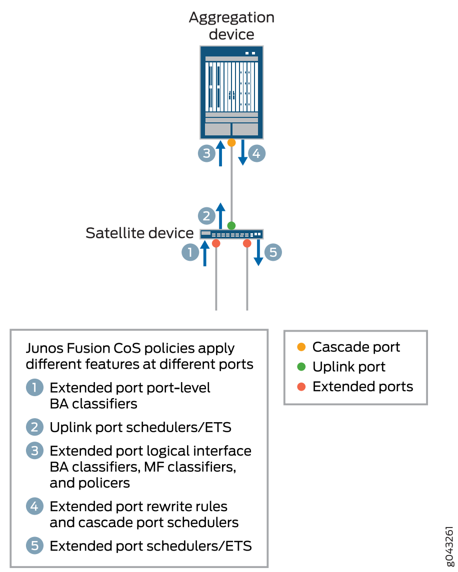
This topic describes class of service (CoS) on the different types of ports in Junos Fusion.

This topic covers:

Overview of CoS on Different Types of Ports in Junos Fusion

Figure 14 on page 705 provides an overview of packet flow through Junos Fusion and how CoS features are applied at the different ports.

Figure 14: Junos Fusion CoS Feature Application



All configuration for CoS policies for Junos Fusion is done on the aggregation device. For CoS policies that you define for extended ports, however, different portions of that policy are applied at different points in a packet's path through Junos Fusion. From Figure 14 on page 705:

1. As a packet enters an extended port, any port-level (physical interface-level) behavior aggregate (BA) classifier you define for that port is applied to derive a forwarding class and packet loss priority.

2. As that packet exits the uplink port, you can apply schedulers or enhanced transmission selection (ETS) based on the port-level BA classifier assigned at the ingress extended port.

3. As the packet enters the aggregation device at the cascade port, any multifield classifiers, policers, or logical interface-level BA classifiers you define for the ingress extended port are applied.

4. As the packet exits the aggregation device at the cascade port, any rewrite rules you define for the egress extended port, as well as any schedulers you define for the cascade port, are applied. Also, the forwarding class determined in the previous step is carried in the 801.2BR header to the satellite device and used to select the output queue at the egress extended port.

5. Finally, as the packet exits an extended port, any schedulers or ETS you define for that port are applied based on the forwarding class determined by the multifield classifiers, policers, or logical interface-level BA classifiers defined for the ingress extended port.

The following sections provide further information about implementing CoS on each port type in Junos Fusion.

CoS on Extended Ports and Uplink Ports in Junos Fusion

All class of service (CoS) scheduling policies for extended ports and uplink ports on the satellite devices are provisioned on the EX9200 aggregation device. Similarly, standard Junos OS CoS commands are issued on the EX9200 aggregation device for retrieving extended port and uplink port CoS states and queue statistics. The EX9200 aggregation device supports configuring the following CoS features for each extended port and uplink port on each satellite device:

- Behavior aggregate classifiers
- Multifield classifiers
- Input and output policers
- Forwarding classes
- Traffic control profiles
- Schedulers and scheduler maps
- Egress rewrite rules

NOTE: Configuring CoS policies on *satellite devices* (on both extended and uplink ports) has the following restrictions:

- IP precedence classifiers are not supported. DSCP classifiers are supported, however.
- Interpolated drop profiles are not supported.
- The **transmit-rate** option is supported for schedulers. However, the **remainder**, **rate-limit**, and **exact** options are not supported under **transmit-rate**.

While CoS features for satellite device ports are configured on the aggregation device, the actual classification, queueing, and scheduling is performed on the satellite devices. Information on actual traffic shaping is not passed back to the aggregation device. Logical interface statistics for the **show interfaces** command are collected on the aggregate device and do not include shaping rate data. For actual traffic statistics gathered on satellite device interfaces, use the statistics for the physical interface and not the logical interface.

NOTE: CoS statistics are not supported on extended ports.

CoS on Cascade Ports in Junos Fusion

When a cascade port is created, two logical interfaces are automatically created:

- One in-band management logical interface (assigned unit 32769) for traffic that only flows between the aggregation device and the satellite devices, such as keepalives, for provisioning information, and for software updates.
- One for data logical interface (assigned unit 32770) for regular traffic that flows into and out of Junos Fusion.

Per-unit scheduling is automatically enabled on the cascade port to support multiple queues on each of the logical interfaces.

NOTE: **All cascade ports must be configured on Modular Port Concentrators (MPCs) that support per-unit scheduling.**

50 Mbps of bandwidth is reserved for the management logical interface. The remaining bandwidth is available to the data logical interface. A shaping rate of 10 percent is also applied to the management logical interface, which means it can use up to 10 percent of the full interface bandwidth, if available.

The default scheduling policy is applied to the data logical interface. This reserves 95 percent of the available bandwidth and buffer space for the best effort forwarding class (mapped to queue 0) and 5 percent for the network control forwarding class (mapped to queue 3). You can create custom forwarding classes and schedulers by applying a custom scheduler map to this logical interface.

Release History Table

Release	Description
17.1R1	Beginning with Junos OS Release 17.1R1, Junos Fusion Enterprise supports CoS.

Related Documentation

- Junos Fusion Enterprise Overview on page 3
- Understanding Junos Fusion Enterprise Components on page 5
- Configuring CoS in Junos Fusion Enterprise on page 707

Configuring CoS in Junos Fusion Enterprise

Junos Fusion significantly expands the number of available network interfaces on an *aggregation device* by allowing the aggregation device to add interfaces through interconnections with *satellite devices*. The entire system—the interconnected aggregation device and satellite devices—is called Junos Fusion. Junos Fusion simplifies network administration by appearing in the network topology as a single device, and the single device is managed from a single IP address.

This topic describes how to configure CoS on the different types of ports in Junos Fusion.

This topic covers:

Configuring Behavior Aggregate Classifiers on Satellite Device Extended Ports

Normally, you apply a behavior aggregate (BA) classifier to a logical interface on an EX9200 device at the **[edit class-of-service interfaces *interface-name* unit *logical-unit-number*]** hierarchy level. When traffic from a satellite device extended port reaches the aggregation device, the BA classifier configured for the logical interface level of the satellite device extended port is applied the same as it is for traffic from other non-extended ports to help determine the forwarding class of the traffic; policers and multifield classifiers can also factor in determining the forwarding class of the traffic. When the aggregation devices sends the traffic out to the satellite device, the forwarding class is carried in the 801.2BR header. The satellite device then uses the forwarding class to select the output queue at the *egress extended port*.

You can also apply a BA classifier at the physical interface level of an extended port. This classifier is used to determine the output queue at the *uplink port* of the satellite device.

NOTE: IP precedence classifiers are not supported on extended ports at the physical interface level. DSCP classifiers are supported, however.

NOTE: You cannot apply a physical interface-level classifier on an EX9200 local port.

To add a behavior aggregate classifier to the physical interface level of a satellite device extended port in Junos Fusion:

1. Define the classifier.

```
[edit class-of-service]
user@ex9200-agg-device#set classifiers dscp dscp-1 forwarding-class best-effort-3
   loss-priority low code-points 001010
```

2. Apply the classifier to the physical extended port.

```
[edit class-of-service]
user@ex9200-agg-device#set interfaces xe-100/0/33 classifiers dscp dscp-1
```

3. Commit the changes and then confirm the configuration.


```
[edit class-of-service]
user@ex9200-agg-device# show
classifiers {
    dscp dscp-1 {
        forwarding-class best-effort-3 {
            loss-priority low code-points 001010;
        }
    }
}
interfaces {
    xe-100/0/33 {
        classifiers {
            dscp dscp-1;
        }
    }
}
```

In the above configuration example, packets entering port xe-100/0/33 with a DSCP value of **001010** will be assigned a forwarding class of **best-effort-3** to select the output queue at the uplink port as the packet travels from the satellite device to the aggregation device.

See Also

- Understanding Junos Fusion Ports on page 17
- *Understanding How Behavior Aggregate Classifiers Prioritize Trusted Traffic*
- *Overview of Assigning Service Levels to Packets Based on Multiple Packet Header Fields*

Configuring Rewrite Rules on Satellite Device Extended Ports

You apply rewrite rules to logical interfaces on satellite device extended ports.

To add a rewrite rule to a satellite device extended port in a Junos Fusion:

1. Define the rewrite rule.

   ```
   [edit class-of-service]
   user@ex9200-agg-device#set rewrite-rules ieee-802.1 rewrite1p forwarding-class
     best-effort loss-priority low code-point 010
   ```

2. Apply the rewrite rule to a logical interface.

   ```
   [edit class-of-service]
   user@ex9200-agg-device#set interfaces xe-108/0/47 unit 0 rewrite-rules ieee-802.1
     rewrite1p
   ```

3. Commit the changes and then confirm the configuration.

```
[edit class-of-service]
user@ex9200-agg-device# show
rewrite-rules {
    ieee-802.1 rewrite1p {
```



```
        forwarding-class best-effort {
            loss-priority low code-point 010;
        }
    }
}
interfaces {
    xe-108/0/47 {
        unit 0 {
            rewrite-rules {
                ieee-802.1 rewrite-1p;
            }
        }
    }
}
```

In Junos OS, rewrite rules only look at the forwarding class and packet loss priority of the packet (as assigned by a behavior aggregate or multifield classifier at ingress), not at the incoming CoS value, to determine the CoS value to write to the packet header at egress. The above configuration means that, for any packet exiting the xe-108/0/47.0 interface that has a forwarding class of **best-effort** and a packet loss priority of **low**, the ieee-802.1 CoS value will be rewritten to **010**.

See Also

- Understanding Junos Fusion Ports on page 17

- *Rewriting Packet Headers to Ensure Forwarding Behavior*

Changing the Default Scheduling Policy on an Aggregated Device Cascade Port

When a cascade port is created, two logical interfaces are automatically created:

- One in-band management logical interface (assigned unit 32769) for traffic that only flows between the aggregation device and the satellite devices, such as keepalives, for provisioning information, and for software updates.
- One for data logical interface (assigned unit 32770) for regular traffic that flows into and out of Junos Fusion.

Let's say, for example, that interface xe-0/0/1 is configured as a cascade port. The command **show interfaces xe-0/0/1 terse** produces output similar to the following:

```
user@ex9200-agg-device# run show interfaces xe-0/0/1 terse
Interface               Admin Link Proto    Local                 Remote
xe-0/0/1                up    up
xe-0/0/1.32769          up    up   inet     10.0.0.5/30
xe-0/0/1.32770          up    up   bridge
```

The control logical interface (unit 32769) is automatically assigned an internal traffic control profile (__cp_control_tc_prof) that guarantees 50 Mbps of bandwidth for the logical interface, a 10 percent shaping rate, and the default scheduling policy. The default scheduling policy is applied to the data logical interface. For example:

```
user@ex9200-agg-device# run show class-of-service interface xe-0/0/1
Physical interface: xe-0/0/1, Index: 144
Maximum usable queues: 8, Queues in use: 4
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled

  Logical interface: xe-0/0/1.32769, Index: 344
Object                  Name                   Type                    Index
Traffic-control-profile __cp_control_tc_prof   Output                  17227
Classifier              ipprec-compatibility   ip                         13

  Logical interface: xe-0/0/1.32770, Index: 343
Object                  Name                   Type                    Index
Scheduler-map           <default>              Output                      2
```

and:

```
user@ex9200-agg-device# run show class-of-service scheduler-hierarchy interface
xe-0/0/1
Interface/                    Shaping Guarnteed  Guaranteed/   Queue   Excess
Resource name                    rate      rate       Excess  weight   weight
                                kbits     kbits     priority          high/low
  xe-0/0/1.32770             10000000         0                          1    1
    BE                       10000000         0     Low   Low     118
    NC                       10000000         0     Low   Low       6
  xe-0/0/1.32769              1000000     50000                         62   62
    BE                        1000000     47500     Low   Low     118
    NC                        1000000      2500     Low   Low       6
```

You can create custom forwarding classes and schedulers for the data logical interface by applying a customer scheduler map to that logical interface. For example, to apply a customer scheduler policy to the data logical interface:

1. Create customer schedulers.

   ```
   [edit class-of-service]
   user@ex9200-agg-device#set schedulers AF_SCH_CORE transmit-rate percent 40
   user@ex9200-agg-device#set schedulers AF_SCH_CORE buffer-size percent 40
   user@ex9200-agg-device#set schedulers AF_SCH_CORE priority medium-high
   user@ex9200-agg-device#set schedulers BE_SCH_CORE transmit-rate percent 10
   user@ex9200-agg-device#set schedulers BE_SCH_CORE buffer-size percent 10
   user@ex9200-agg-device#set schedulers BE_SCH_CORE priority low
   user@ex9200-agg-device#set schedulers EF_SCH_CORE transmit-rate percent 40
   user@ex9200-agg-device#set schedulers EF_SCH_CORE buffer-size percent 40
   user@ex9200-agg-device#set schedulers EF_SCH_CORE priority medium-low
   user@ex9200-agg-device#set schedulers NC_SCH_CORE transmit-rate percent 10
   user@ex9200-agg-device#set schedulers NC_SCH_CORE buffer-size percent 10
   user@ex9200-agg-device#set schedulers NC_SCH_CORE priority high
   ```

2. Create a scheduler map.

```
[edit class-of-service]
user@ex9200-agg-device# set scheduler-maps CORE_SCHED_MAP forwarding-class
  BE scheduler BE_SCH_CORE
user@ex9200-agg-device# set scheduler-maps CORE_SCHED_MAP forwarding-class
  EF scheduler EF_SCH_CORE
user@ex9200-agg-device# set scheduler-maps CORE_SCHED_MAP forwarding-class
  AF scheduler AF_SCH_CORE
user@ex9200-agg-device# set scheduler-maps CORE_SCHED_MAP forwarding-class
  NC scheduler NC_SCH_CORE
```

3. Apply the scheduler map to the data logical interface.

```
[edit class-of-service]
user@ex9200-agg-device# set interfaces xe-0/0/1 unit 32770 scheduler-map
  CORE_SCHED_MAP
```

4. Commit the changes and then confirm the configuration.

```
[edit class-of-service]
user@ex9200-agg-device# show
interfaces {
    xe-0/0/1 {
        unit 32770 {
            scheduler-map CORE_SCHED_MAP;
        }
    }
}
scheduler-maps {
    CORE_SCHED_MAP {
        forwarding-class BE scheduler BE_SCH_CORE;
        forwarding-class EF scheduler EF_SCH_CORE;
        forwarding-class AF scheduler AF_SCH_CORE;
        forwarding-class NC scheduler NC_SCH_CORE;
    }
}
schedulers {
    BE_SCH_CORE {
        transmit-rate percent 10;
        buffer-size percent 10;
        priority low;
    }
    EF_SCH_CORE {
        transmit-rate percent 40;
        buffer-size percent 40;
        priority medium-low;
    }
    AF_SCH_CORE {
        transmit-rate percent 40;
        buffer-size percent 40;
        priority medium-high;
    }
    NC_SCH_CORE {
        transmit-rate percent 10;
        buffer-size percent 10;
        priority high;
```

```
    }
}
```

5. Verify your changes.

```
user@ex9200-agg-device# run show class-of-service interface xe-0/0/1
Physical interface: xe-0/0/1, Index: 144
Maximum usable queues: 8, Queues in use: 4
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled

  Logical interface: xe-0/0/1.32769, Index: 344
Object                  Name                   Type                    Index
Traffic-control-profile __cp_control_tc_prof   Output                  17227
Classifier              ipprec-compatibility   ip                         13

  Logical interface: xe-0/0/1.32770, Index: 343
Object                  Name                   Type                    Index
Scheduler-map           CORE_SCHED_MAP         Output                  23433
```

and:

```
user@ex9200-agg-device# run show class-of-service scheduler-hierarchy interface
 xe-0/0/1
Interface/                    Shaping Guarnteed  Guaranteed/   Queue   Excess
Resource name                    rate      rate       Excess  weight   weight

                                kbits     kbits     priority          high/low

  xe-0/0/1.32770             10000000         0                            1
 1
    BE                       10000000         0      Low   Low      12
    EF                       10000000         0   Medium   Low      50
    AF                       10000000         0   Medium   Low      50
    NC                       10000000         0     High High       12
  xe-0/0/1.32769              1000000     50000                           62
62
    BE                        1000000     47500      Low   Low     118
    NC                        1000000      2500      Low   Low       6
```

See Also

- *How Schedulers Define Output Queue Properties*
- *Default Schedulers Overview*

Related Documentation

- Understanding CoS in Junos Fusion Enterprise on page 703

CHAPTER 18

Extending a Junos Fusion Enterprise Using EVPN-MPLS

Understanding EVPN-MPLS Interworking with Junos Fusion Enterprise and MC-LAG

Starting with Junos OS Release 17.4R1, you can use Ethernet VPN (EVPN) to extend a Junos Fusion Enterprise or multichassis link aggregation group (MC-LAG) network over an MPLS network to a data center or campus network. With the introduction of this feature, you can now interconnect dispersed campus and data center sites to form a single Layer 2 virtual bridge.

Figure 15 on page 716 shows a Junos Fusion Enterprise topology with two EX9200 switches that serve as aggregation devices (PE2 and PE3) to which the satellite devices are multihomed. The two aggregation devices use an interchassis link (ICL) and the Inter-Chassis Control Protocol (ICCP) protocol from MC-LAG to connect and maintain the Junos Fusion Enterprise topology. PE1 in the EVPN-MPLS environment interworks with PE2 and PE3 in the Junos Fusion Enterprise with MC-LAG.

Figure 15: EVPN-MPLS Interworking with Junos Fusion Enterprise

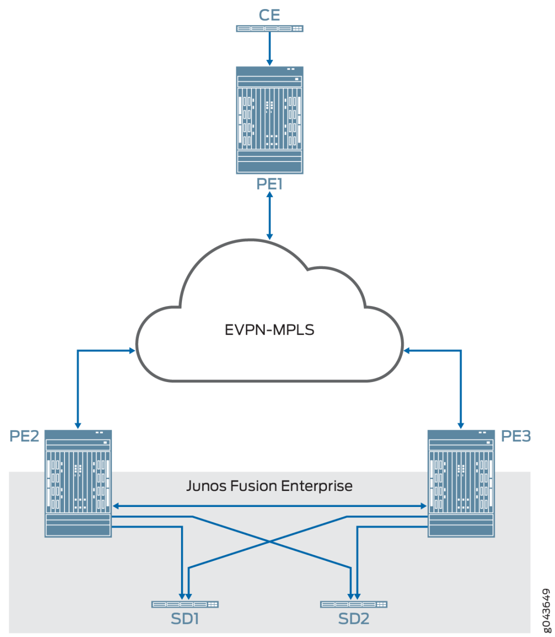
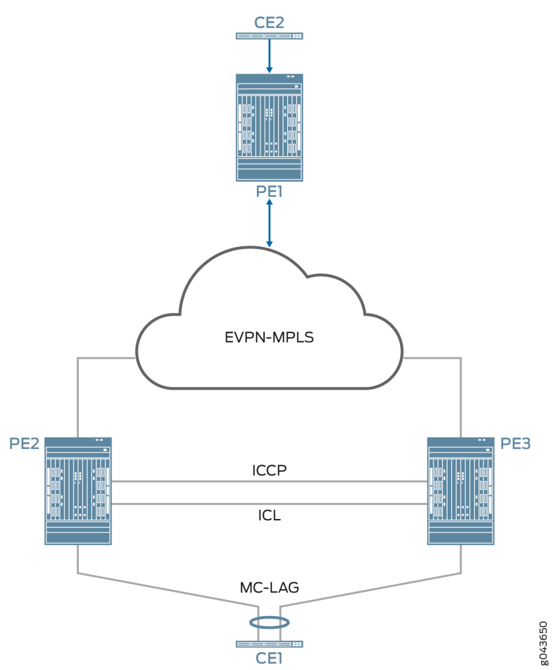


Figure 16 on page 716 shows an MC-LAG topology in which customer edge (CE) device CE1 is multihomed to PE2 and PE3. PE2 and PE3 use an ICL and the ICCP protocol from MC-LAG to connect and maintain the topology. PE1 in the EVPN-MPLS environment interworks with PE2 and PE3 in the MC-LAG environment.

Figure 16: EVPN-MPLS Interworking with MC-LAG



Throughout this topic, Figure 15 on page 716 and Figure 16 on page 716 serve as references to illustrate various scenarios and points.

The use cases depicted in Figure 15 on page 716 and Figure 16 on page 716 require the configuration of both EVPN multihoming in active-active mode and MC-LAG on PE2 and PE3. EVPN with multihoming active-active and MC-LAG have their own forwarding logic for handling traffic, in particular, broadcast, unknown unicast, and multicast (BUM) traffic. At times, the forwarding logic for EVPN with multihoming active-active and MC-LAG contradict each other and causes issues. This topic describes the issues and how the EVPN-MPLS interworking feature resolves these issues.

NOTE:

Other than the EVPN-MPLS interworking-specific implementations described in this topic, EVPN-MPLS, Junos Fusion Enterprise, and MC-LAG offer the same functionality and function the same as the standalone features.

Benefits of Using EVPN-MPLS with Junos Fusion Enterprise and MC-LAG

Use EVPN-MPLS with Junos Fusion Enterprise and MC-LAG to interconnect dispersed campus and data center sites to form a single Layer 2 virtual bridge.

BUM Traffic Handling

In the use cases shown in Figure 15 on page 716 and Figure 16 on page 716, PE1, PE2, and PE3 are EVPN peers, and PE2 and PE3 are MC-LAG peers. Both sets of peers exchange control information and forward traffic to each other, which causes issues. Table 50 on page 718 outlines the issues that arise, and how Juniper Networks resolves the issues in its implementation of the EVPN-MPLS interworking feature.

Table 50: BUM Traffic: Issues and Resolutions

BUM Traffic Direction	EVPN Interworking with Junos Fusion Enterprise and MC-LAG Logic	Issue	Juniper Networks Implementation Approach
North bound (PE2 receives BUM packet from a locally attached single- or dual-homed interfaces).	PE2 floods BUM packet to the following: • All locally attached interfaces, including the ICL, for a particular broadcast domain. • All remote EVPN peers for which PE2 has received inclusive multicast routes.	Between PE2 and PE3, there are two BUM forwarding paths—the MC-LAG ICL and an EVPN-MPLS path. The multiple forwarding paths result in packet duplication and loops.	• BUM traffic is forwarded on the ICL only. • Incoming traffic from the EVPN core is not forwarded on the ICL. • Incoming traffic from the ICL is not forwarded to the EVPN core.
South bound (PE1 forwards BUM packet to PE2 and PE3).	PE2 and PE3 both receive a copy of the BUM packet and flood the packet out of all of their local interfaces, including the ICL.	PE2 and PE3 both forward the BUM packet out of the ICL, which results in packet duplication and loops.	

Split Horizon

In the use cases shown in Figure 15 on page 716 and Figure 16 on page 716, split horizon prevents multiple copies of a BUM packet from being forwarded to a CE device (satellite device). However, the EVPN-MPLS and MC-LAG split horizon implementations contradict each other, which causes an issue. Table 51 on page 718 explains the issue and how Juniper Networks resolves it in its implementation of the EVPN-MPLS interworking feature.

Table 51: BUM Traffic: Split Horizon-Related Issue and Resolution

BUM Traffic Direction	EVPN Interworking with Junos Fusion Enterprise and MC-LAG Logic	Issue	Juniper Networks Implementation Approach
North bound (PE2 receives BUM packet from a locally attached dual-homed interface).	• Per EVPN-MPLS forwarding logic: ◦ Only the designated forwarder (DF) for the Ethernet segment (ES) can forward BUM traffic. ◦ The local bias rule, in which the local peer forwards the BUM packet and the remote peer drops it, is not supported. • Per MC-LAG forwarding logic, local bias is supported.	The EVPN-MPLS and MC-LAG forwarding logic contradicts each other and can prevent BUM traffic from being forwarded to the ES.	Support local bias, thereby ignoring the DF and non-DF status of the port for locally switched traffic.

Table 51: BUM Traffic: Split Horizon-Related Issue and Resolution (continued)

BUM Traffic Direction	EVPN Interworking with Junos Fusion Enterprise and MC-LAG Logic	Issue	Juniper Networks Implementation Approach
South bound (PE1 forwards BUM packet to PE2 and PE3).	Traffic received from PE1 follows the EVPN DF and non-DF forwarding rules for a mulithomed ES.	None.	Not applicable.

MAC Learning

EVPN and MC-LAG use the same method for learning MAC addresses—namely, a PE device learns MAC addresses from its local interfaces and synchronizes the addresses to its peers. However, given that both EVPN and MC-LAG are synchronizing the addresses, an issue arises.

Table 52 on page 719 describes the issue and how the EVPN-MPLS interworking implementation prevents the issue. The use cases shown in Figure 15 on page 716 and Figure 16 on page 716 illustrate the issue. In both use cases, PE1, PE2, and PE3 are EVPN peers, and PE2 and PE3 are MC-LAG peers.

Table 52: MAC Learning: EVPN and MC-LAG Synchronization Issue and Implementation Details

MAC Synchronization Use Case	EVPN Interworking with Junos Fusion Enterprise and MC-LAG Logic	Issue	Juniper Networks Implementation Approach
MAC addresses learned locally on single- or dual-homed interfaces on PE2 and PE3.	• Between the EVPN peers, MAC addresses are synchronized using the EVPN BGP control plane. • Between the MC-LAG peers, MAC addresses are synchronized using the MC-LAG ICCP control plane.	PE2 and PE3 function as both EVPN peers and MC-LAG peers, which result in these devices having multiple MAC synchronization paths.	• For PE1: use MAC addresses synchronized by EVPN BGP control plane. • For PE2 and PE3: use MAC addresses synchronized by MC-LAG ICCP control plane.
MAC addresses learned locally on single- or dual-homed interfaces on PE1.	Between the EVPN peers, MAC addresses are synchronized using the EVPN BGP control plane.	None.	Not applicable.

Handling Down Link Between Cascade and Uplink Ports in Junos Fusion Enterprise

NOTE: This section applies only to EVPN-MPLS interworking with a Junos Fusion Enterprise.

In the Junos Fusion Enterprise shown in Figure 15 on page 716, assume that aggregation device PE2 receives a BUM packet from PE1 and that the link between the cascade port on PE2 and the corresponding uplink port on satellite device SD1 is down. Regardless of whether the BUM packet is handled by MC-LAG or EVPN multihoming active-active, the result is the same—the packet is forwarded via the ICL interface to PE3, which forwards it to dual-homed SD1.

To further illustrate how EVPN with multihoming active-active handles this situation with dual-homed SD1, assume that the DF interface resides on PE2 and is associated with the down link and that the non-DF interface resides on PE3. Typically, per EVPN with multihoming active-active forwarding logic, the non-DF interface drops the packet. However, because of the down link associated with the DF interface, PE2 forwards the BUM packet via the ICL to PE3, and the non-DF interface on PE3 forwards the packet to SD1.

Layer 3 Gateway Support

The EVPN-MPLS interworking feature supports the following Layer 3 gateway functionality for extended bridge domains and VLANs:

- Integrated routing and bridging (IRB) interfaces to forward traffic between the extended bridge domains or VLANs.
- Default Layer 3 gateways to forward traffic from a physical (bare-metal) server in an extended bridge domain or VLAN to a physical server or virtual machine in another extended bridge domain or VLAN.

Release History Table

Release	Description
17.4R1	Starting with Junos OS Release 17.4R1, you can use Ethernet VPN (EVPN) to extend a Junos Fusion Enterprise or multichassis link aggregation group (MC-LAG) network over an MPLS network to a data center or campus network.

Example: EVPN-MPLS Interworking With Junos Fusion Enterprise

This example shows how to use Ethernet VPN (EVPN) to extend a Junos Fusion Enterprise over an MPLS network to a geographically distributed campus or enterprise network.

EVPN-MPLS interworking is supported with a Junos Fusion Enterprise, which is based on a multichassis link aggregation group (MC-LAG) infrastructure to provide redundancy for the EX9200 switches that function as aggregation devices.

The aggregation devices in the Junos Fusion Enterprise are connected to a provider edge (PE) device in an MPLS network. The PE device can be either an MX Series router or an EX9200 switch.

This example shows how to configure the aggregation devices in the Junos Fusion Enterprise and the PE device in the MPLS network to interwork with each other.

- Starting with Junos OS Release 19.1R1, the **no-arp-suppression** configuration statement is no longer supported on any device.

Requirements

This example uses the following hardware and software components:

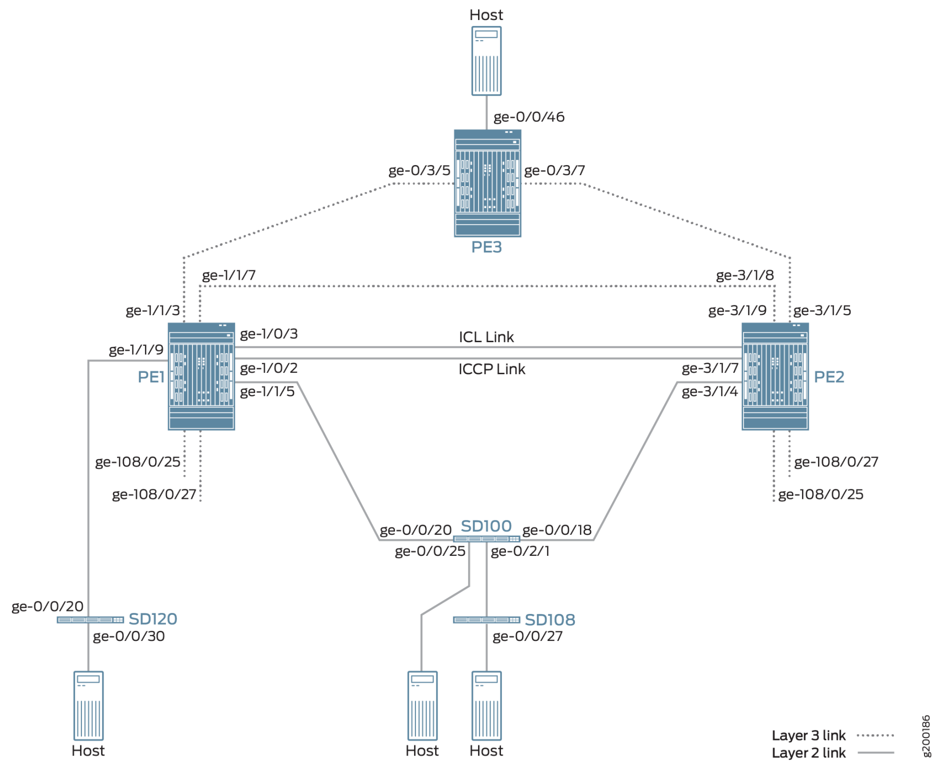
- Three EX9200 switches:
  - PE1 and PE2, which both function as aggregation devices in the Junos Fusion Enterprise and EVPN BGP peers in the EVPN-MPLS overlay network.
  - PE3, which functions as an EVPN BGP peer in the EVPN-MPLS overlay network.
- The EX9200 switches are running Junos OS Release 17.4R1 or later software.

NOTE: Although the Junos Fusion Enterprise includes three satellite devices, this example focuses on the configuration of the PE1, PE2, and PE3. For more information about configuring satellite devices, see "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

Overview and Topology

Figure 17 on page 722 shows a Junos Fusion Enterprise with dual aggregation devices PE1 and PE2. The aggregation devices are connected using an interchassis link (ICL) and communicate with each other using the Inter-Chassis Control Protocol (ICCP).

Figure 17: EVPN-MPLS Interworking with Junos Fusion Enterprise



The Junos Fusion Enterprise also includes three satellite devices. Satellite device SD120 is a standalone satellite device that has a single-homed connection to PE1. Satellite devices SD100 and SD108 are included in a cluster named Cluster_100_108. SD100 is the only cluster member with a connection to an aggregation device, in this case, multhomed connections to PE1 and PE2.

The topology in Figure 17 on page 722 also includes PE3, which is positioned at the edge of an MPLS network. PE3 functions as the gateway between the Junos Fusion Enterprise network and a geographically distributed campus or enterprise network. PE1, PE2, and PE3 run EVPN, which enables hosts in the Junos Fusion Enterprise network to communicate with hosts in the campus or enterprise network by way of the intervening MPLS network.

From the perspective of the EVPN-MPLS interworking feature, PE3 functions solely as an EVPN BGP peer, and PE1 and PE2 in the Junos Fusion Enterprise have dual roles:

- Aggregation devices in the Junos Fusion Enterprise.
- EVPN BGP peers in the EVPN-MPLS network.

Because of the dual roles, PE1 and PE2 are configured with Junos Fusion Enterprise, EVPN, BGP, and MPLS attributes.

Table 53 on page 723 outlines key Junos Fusion Enterprise and EVPN (BGP and MPLS) attributes configured on PE1, PE2, and PE3.

Table 53: Key Junos Fusion Enterprise and EVPN (BGP and MPLS) Attributes Configured on PE1, PE2, and PE3

Key Attributes	PE1	PE2	PE3
Junos Fusion Enterprise Attributes			
Interfaces	ICL: ge-1/0/3 ICCP: ge-1/0/2	ICL: ge-3/1/9 ICCP: ge-3/1/7	Not applicable
EVPN-MPLS			
Interfaces	Connection to PE3: ge-1/1/3 Connection to PE2: ge-1/1/7	Connection to PE3: ge-3/1/5 Connection to PE1: ge-3/1/8	Connection to PE1: ge-0/3/5 Connection to PE2: ge-0/3/7
IP addresses	BGP peer address: 10.25.0.1	BGP peer address: 10.25.0.2	BGP peer address: 10.25.0.3
Autonomous system	100	100	100
Virtual switch routing instances	evpn1	evpn1	evpn1

Note the following about the EVPN-MPLS interworking feature and its configuration:

- You must configure Ethernet segment identifiers (ESIs) on the dual-homed extended ports in the Junos Fusion Enterprise. The ESIs enable EVPN to identify the dual-homed extended ports.
- The only type of routing instance that is supported is the virtual switch instance (**set routing-instances *name* instance-type virtual-switch**).
- Only one virtual switch instance is supported with Junos Fusion Enterprise.
- On the aggregation devices in the Junos Fusion Enterprise, you must include the bgp-peer configuration statement in the **[edit routing-instances *name* protocols evpn mclag]** hierarchy level. This configuration statement enables the interworking of EVPN-MPLS with Junos Fusion Enterprise on the aggregation devices.
- Address Resolution Protocol (ARP) suppression is not supported.

Aggregation Device (PE1 and PE2) Configuration

To configure aggregation devices PE1 and PE2, perform these tasks.

NOTE: This section focuses on enabling EVPN-MPLS on PE1 and PE2. As a result, the Junos Fusion Enterprise configuration on PE1 and PE2 is performed without the use of the configuration synchronization feature. For information about configuration synchronization, see *Understanding Configuration Synchronization*.

CLI Quick Configuration

PE1: Junos Fusion Enterprise Configuration

```
set interfaces ge-1/1/9 cascade-port
set interfaces ge-1/1/5 cascade-port
set chassis satellite-management fpc 120 cascade-ports ge-1/1/9
set chassis satellite-management cluster Cluster_100_108 cluster-id 2
set chassis satellite-management cluster Cluster_100_108 cascade-ports ge-1/1/5
set chassis satellite-management cluster Cluster_100_108 fpc 100 alias SD100
set chassis satellite-management cluster Cluster_100_108 fpc 100 system-id
  88:e0:f3:1f:3d:50
set chassis satellite-management cluster Cluster_100_108 fpc 108 alias SD108
set chassis satellite-management cluster Cluster_100_108 fpc 108 system-id
  88:e0:f3:1f:c8:d1
set chassis satellite-management cluster Cluster_100_108 fpc 100 member-id 1
set chassis satellite-management cluster Cluster_100_108 fpc 108 member-id 8
set chassis satellite-management upgrade-groups upgrade_120 satellite 120
set chassis satellite-management upgrade-groups upgrade_100 satellite 100
set chassis satellite-management redundancy-groups rg1 redundancy-group-id 2
set chassis satellite-management redundancy-groups chassis-id 1
set chassis satellite-management redundancy-groups rg1 peer-chassis-id 2
  inter-chassis-link ge-1/0/3
set chassis satellite-management redundancy-groups rg1 cluster Cluster_100_108
set interfaces ge-1/0/2 description iccp-link
set interfaces ge-1/0/2 unit 0 family inet address 10.20.20.1/24
set interfaces ge-1/0/3 description icl-link
set interfaces ge-1/0/3 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-1/0/3 unit 0 family ethernet-switching vlan members 100
set switch-options service-id 1
```

PE1: EVPN-MPLS Configuration

```
set interfaces lo0 unit 0 family inet address 10.25.0.1/32
set interfaces ge-1/1/3 unit 0 family inet address 10.0.1.1/30
set interfaces ge-1/1/3 unit 0 family mpls
set interfaces ge-1/1/7 unit 0 family inet address 10.0.3.1/30
set interfaces ge-1/1/7 unit 0 family mpls
set interfaces ge-108/0/25 unit 0 esi 00:01:02:03:04:00:01:02:04:26
set interfaces ge-108/0/25 unit 0 esi all-active
set interfaces ge-108/0/25 unit 0 family ethernet-switching vlan members v100
```

```
set interfaces ge-108/0/27 unit 0 esi 00:01:02:03:04:00:01:02:04:28
set interfaces ge-108/0/27 unit 0 esi all-active
set interfaces ge-108/0/27 unit 0 family ethernet-switching vlan members v100
set routing-options router-id 10.25.0.1
set routing-options autonomous-system 100
set protocols mpls interface lo0.0
set protocols mpls interface ge-1/1/3.0
set protocols mpls interface ge-1/1/7.0
set protocols bgp local-address 10.25.0.1
set protocols bgp peer-as 100
set protocols bgp local-as 100
set protocols bgp group evpn-mes type internal
set protocols bgp group evpn-mes family evpn signaling
set protocols bgp group evpn-mes peer-as 100
set protocols bgp group evpn-mes neighbor 10.25.0.2
set protocols bgp group evpn-mes neighbor 10.25.0.3
set protocols ospf traffic-engineering
set protocols ospf area 0.0.0.0 interface ge-1/1/3.0
set protocols ospf area 0.0.0.0 interface lo0.0
set protocols ospf area 0.0.0.0 interface fxp0.0 disable
set protocols ospf area 0.0.0.0 interface ge-1/1/7.0
set protocols ldp interface lo0.0
set protocols ldp interface ge-1/1/3.0
set protocols ldp interface ge-1/1/7.0
set routing-instances evpn1 instance-type virtual-switch
set routing-instances evpn1 interface ge-108/0/25.0
set routing-instances evpn1 interface ge-108/0/27.0
set routing-instances evpn1 interface ge-1/0/3.0
set routing-instances evpn1 route-distinguisher 10.25.0.1:1
set routing-instances evpn1 vrf-target target:100:1
set routing-instances evpn1 protocols evpn label-allocation per-instance
set routing-instances evpn1 protocols evpn extended-vlan-list 100
set routing-instances evpn1 protocols evpn mclag bgp-peer 10.25.0.2
set routing-instances evpn1 switch-options service-id 2
set routing-instances evpn1 vlans v100 vlan-id 100
```

PE2: Junos Fusion Enterprise Configuration

```
set interfaces ge-3/1/4 cascade-port
set chassis satellite-management cluster Cluster_100_108 cluster-id 2
set chassis satellite-management cluster Cluster_100_108 cascade-ports ge-3/1/4
set chassis satellite-management cluster Cluster_100_108 fpc 100 alias SD100
set chassis satellite-management cluster Cluster_100_108 fpc 100 system-id
  88:e0:f3:1f:3d:50
set chassis satellite-management cluster Cluster_100_108 fpc 108 alias SD108
set chassis satellite-management cluster Cluster_100_108 fpc 108 system-id
  88:e0:f3:1f:c8:d1
set chassis satellite-management cluster Cluster_100_108 fpc 100 member-id 1
set chassis satellite-management cluster Cluster_100_108 fpc 108 member-id 8
set chassis satellite-management upgrade-groups upgrade_100 satellite 100
set chassis satellite-management redundancy-groups rg1 redundancy-group-id 2
set chassis satellite-management redundancy-groups chassis-id 2
set chassis satellite-management redundancy-groups rg1 peer-chassis-id 1
  inter-chassis-link ge-3/1/9
```

```
set chassis satellite-management redundancy-groups rg1 cluster Cluster_100_108
set interfaces ge-3/1/7 description iccp-link
set interfaces ge-3/1/7 unit 0 family inet address 10.20.20.2/24
set interfaces ge-3/1/9 description icl-link
set interfaces ge-3/1/9 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-3/1/9 unit 0 family ethernet-switching vlan members 100
set switch-options service-id 1
```

PE2: EVPN-MPLS Configuration

```
set interfaces lo0 unit 0 family inet address 10.25.0.2/32
set interfaces ge-3/1/5 unit 0 family inet address 10.0.4.2/30
set interfaces ge-3/1/5 unit 0 family mpls
set interfaces ge-3/1/8 unit 0 family inet address 10.0.3.2/30
set interfaces ge-3/1/8 unit 0 family mpls
set interfaces irb unit 0 family inet address 10.5.5.1/24 virtual-gateway-address 10.5.5.5
set interfaces ge-108/0/25 unit 0 esi 00:01:02:03:04:00:01:02:04:26
set interfaces ge-108/0/25 unit 0 esi all-active
set interfaces ge-108/0/25 unit 0 family ethernet-switching vlan members v100
set interfaces ge-108/0/27 unit 0 esi 00:01:02:03:04:00:01:02:04:28
set interfaces ge-108/0/27 unit 0 esi all-active
set interfaces ge-108/0/27 unit 0 family ethernet-switching vlan members v100
set routing-options router-id 10.25.0.2
set routing-options autonomous-system 100
set protocols mpls interface lo0.0
set protocols mpls interface ge-3/1/5.0
set protocols mpls interface ge-3/1/8.0
set protocols bgp local-address 10.25.0.2
set protocols bgp peer-as 100
set protocols bgp local-as 100
set protocols bgp group evpn-mes type internal
set protocols bgp group evpn-mes family evpn signaling
set protocols bgp group evpn-mes peer-as 100
set protocols bgp group evpn-mes neighbor 10.25.0.1
set protocols bgp group evpn-mes neighbor 10.25.0.3
set protocols ospf traffic-engineering
set protocols ospf area 0.0.0.0 interface ge-3/1/5.0
set protocols ospf area 0.0.0.0 interface lo0.0
set protocols ospf area 0.0.0.0 interface fxp0.0 disable
set protocols ospf area 0.0.0.0 interface ge-3/1/8.0
set protocols ldp interface lo0.0
set protocols ldp interface ge-3/1/5.0
set protocols ldp interface ge-3/1/8.0
set routing-instances evpn1 instance-type virtual-switch
set routing-instances evpn1 interface ge-108/0/25.0
set routing-instances evpn1 interface ge-108/0/27.0
set routing-instances evpn1 interface ge-3/1/9.0
set routing-instances evpn1 route-distinguisher 10.25.0.2:1
set routing-instances evpn1 vrf-target target:100:1
set routing-instances evpn1 protocols evpn label-allocation per-instance
set routing-instances evpn1 protocols evpn extended-vlan-list 100
set routing-instances evpn1 protocols evpn mclag bgp-peer 10.25.0.1
set routing-instances evpn1 switch-options service-id 2
set routing-instances evpn1 vlans v100 vlan-id 100
```



```
set routing-instances evpn1 vlans v100 l3-interface irb.0
set routing-instances evpn1 vlans v100 no-arp-suppression
```

PE1: Configuring Junos Fusion Enterprise

Step-by-Step Procedure

1. Configure the cascade ports.

```
[edit]
user@switch# set interfaces ge-1/1/9 cascade-port
user@switch# set interfaces ge-1/1/5 cascade-port
```

2. Configure the FPC slot ID for standalone satellite device SD120 and map it to a cascade port.

```
[edit]
user@switch# set chassis satellite-management fpc 120 cascade-ports ge-1/1/9
```

3. Create a satellite device cluster, and assign a name and a cluster ID to it.

```
[edit]
user@switch# set chassis satellite-management cluster Cluster_100_108 cluster-id
  2
```

4. Define the cascade ports associated with the satellite device cluster.

```
[edit]
user@switch# set chassis satellite-management cluster Cluster_100_108
  cascade-ports ge-1/1/5
user@switch# set chassis satellite-management cluster Cluster_100_108
  cascade-ports ge-1/1/9
```

5. Configure the FPC slot ID number, and map it to the MAC address of satellite devices SD100 and SD108, respectively.

```
[edit]
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 100
  alias SD100
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 100
  system-id 88:e0:f3:1f:3d:50
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 108
  alias SD108
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 108
  system-id 88:e0:f3:1f:c8:d1
```

6. Assign a member ID to each satellite device in the satellite device cluster.

```
[edit]
```

```
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 100
  member-id 1
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 108
  member-id 8
```

7. Create two satellite software upgrade groups—one that includes satellite device SD120 and another that includes satellite device SD100.

```
[edit]
user@switch# set chassis satellite-management upgrade-groups upgrade_120
  satellite 120
user@switch# set chassis satellite-management upgrade-groups upgrade_100
  satellite 100
```

8. Create and configure a redundancy group, which includes the aggregation devices and satellite devices in Cluster_100_108.

```
[edit]
user@switch# set chassis satellite-management redundancy-groups rg1
  redundancy-group-id 2
user@switch# set chassis satellite-management redundancy-groups chassis-id 1
user@switch# set chassis satellite-management redundancy-groups rg1
  peer-chassis-id 2 inter-chassis-link ge-1/0/3
user@switch# set chassis satellite-management redundancy-groups rg1 cluster
  Cluster_100_108
```

9. Configure the ICL and ICCP links.

```
[edit]
user@switch# set interfaces ge-1/0/2 description iccp-link
user@switch# set interfaces ge-1/0/2 unit 0 family inet address 10.20.20.1/24
user@switch# set interfaces ge-1/0/3 description icl-link
user@switch# set interfaces ge-1/0/3 unit 0 family ethernet-switching
  interface-mode trunk
user@switch# set interfaces ge-1/0/3 unit 0 family ethernet-switching vlan members
  100
user@switch# set switch-options service-id 1
```

NOTE: While this step shows the configuration of interface ge-1/0/2, which is designated as the ICCP interface, it does not show how to configure the ICCP attributes on interface ge-1/0/2. By default, ICCP is automatically provisioned in a Junos Fusion Enterprise using dual aggregation devices. For more information about the automatic provisioning of ICCP, see “Configuring or Expanding a Junos Fusion Enterprise” on page 45.

PE1: Configuring EVPN-MPLS

Step-by-Step Procedure

1. Configure the loopback interface and the interfaces connected to the other PE devices.

```
[edit]
user@switch# set interfaces lo0 unit 0 family inet address 10.25.0.1/32
user@switch# set interfaces ge-1/1/3 unit 0 family inet address 10.0.1.1/30
user@switch# set interfaces ge-1/1/3 unit 0 family mpls
user@switch# set interfaces ge-1/1/7 unit 0 family inet address 10.0.3.1/30
user@switch# set interfaces ge-1/1/7 unit 0 family mpls
```

2. Configure the extended ports with EVPN multihoming in active-active mode, an ESI, and map the ports to VLAN v100..

```
[edit]
user@switch# set interfaces ge-108/0/25 unit 0 esi 00:01:02:03:04:00:01:02:04:26
user@switch# set interfaces ge-108/0/25 unit 0 esi all-active
user@switch# set interfaces ge-108/0/25 unit 0 family ethernet-switching vlan
  members v100
user@switch# set interfaces ge-108/0/27 unit 0 esi 00:01:02:03:04:00:01:02:04:28
user@switch# set interfaces ge-108/0/27 unit 0 esi all-active
user@switch# set interfaces ge-108/0/27 unit 0 family ethernet-switching vlan
  members v100
```

3. Assign a router ID and the autonomous system in which PE1, PE2, and PE3 reside.

```
[edit]
user@switch# set routing-options router-id 10.25.0.1
user@switch# set routing-options autonomous-system 100
```

4. Enable MPLS on the loopback interface and interfaces ge-1/1/3.0 and ge-1/1/7.0.

```
[edit]
user@switch# set protocols mpls interface lo0.0
user@switch# set protocols mpls interface ge-1/1/3.0
user@switch# set protocols mpls interface ge-1/1/7.0
```

5. Configure an IBGP overlay that includes PE1, PE2, and PE3.

```
[edit]
user@switch# set protocols bgp local-address 10.25.0.1
user@switch# set protocols bgp peer-as 100
user@switch# set protocols bgp local-as 100
user@switch# set protocols bgp group evpn-mes type internal
user@switch# set protocols bgp group evpn-mes family evpn signaling
user@switch# set protocols bgp group evpn-mes peer-as 100
user@switch# set protocols bgp group evpn-mes neighbor 10.25.0.2
```



```
user@switch# set protocols bgp group evpn-mes neighbor 10.25.0.3
```

6. Configure OSPF as the internal routing protocol for EVPN by specifying an area ID and interfaces on which EVPN-MPLS is enabled.

```
[edit]
user@switch# set protocols ospf traffic-engineering
user@switch# set protocols ospf area 0.0.0.0 interface ge-1/1/3.0
user@switch# set protocols ospf area 0.0.0.0 interface lo0.0
user@switch# set protocols ospf area 0.0.0.0 interface fxp0.0 disable
user@switch# set protocols ospf area 0.0.0.0 interface ge-1/1/7.0
```

7. Configure the Label Distribution Protocol (LDP) on the loopback interface and the interfaces on which EVPN-MPLS is enabled.

```
[edit]
user@switch# set protocols ldp interface lo0.0
user@switch# set protocols ldp interface ge-1/1/3.0
user@switch# set protocols ldp interface ge-1/1/7.0
```

8. Configure a virtual switch routing instance for VLAN v100, and include the interfaces and other entities associated with the VLAN.

```
[edit]
user@switch# set routing-instances evpn1 instance-type virtual-switch
user@switch# set routing-instances evpn1 interface ge-108/0/25.0
user@switch# set routing-instances evpn1 interface ge-108/0/27.0
user@switch# set routing-instances evpn1 interface ge-1/0/3.0
user@switch# set routing-instances evpn1 route-distinguisher 10.25.0.1:1
user@switch# set routing-instances evpn1 vrf-target target:100:1
user@switch# set routing-instances evpn1 protocols evpn label-allocation
  per-instance
user@switch# set routing-instances evpn1 protocols evpn extended-vlan-list 100
user@switch# set routing-instances evpn1 protocols evpn mclag bgp-peer 10.25.0.2
user@switch# set routing-instances evpn1 switch-options service-id 2
user@switch# set routing-instances evpn1 vlans v100 vlan-id 100
```

PE2: Configuring Junos Fusion Enterprise

Step-by-Step Procedure

1. Configure the cascade port.

```
[edit]
user@switch# set interfaces ge-3/1/4 cascade-port
```

2. Create a satellite device cluster, and assign a name and a cluster ID to it.

```
[edit]
```



```
user@switch# set chassis satellite-management cluster Cluster_100_108 cluster-id
  2
```

3. Define the cascade port associated with the satellite device cluster.

```
[edit]
user@switch# set chassis satellite-management cluster Cluster_100_108
  cascade-ports ge-3/1/4
```

4. Configure the FPC slot ID number, and map it to the MAC address of satellite devices SD100 and SD108, respectively.

```
[edit]
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 100
  alias SD100
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 100
  system-id 88:e0:f3:1f:3d:50
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 108
  alias SD108
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 108
  system-id 88:e0:f3:1f:c8:d1
```

5. Assign a member ID to each satellite device in the satellite device cluster.

```
[edit]
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 100
  member-id 1
user@switch# set chassis satellite-management cluster Cluster_100_108 fpc 108
  member-id 8
```

6. Create a satellite software upgrade group that includes satellite device SD100.

```
[edit]
user@switch# set chassis satellite-management upgrade-groups upgrade_100
  satellite 100
```

7. Create and configure a redundancy group, which includes the aggregation devices and satellite devices in Cluster_100_108.

```
[edit]
user@switch# set chassis satellite-management redundancy-groups rg1
  redundancy-group-id 2
user@switch# set chassis satellite-management redundancy-groups chassis-id 2
user@switch# set chassis satellite-management redundancy-groups rg1
  peer-chassis-id 1inter-chassis-link ge-3/1/9
user@switch# set chassis satellite-management redundancy-groups rg1 cluster
  Cluster_100_108
```


8. Configure the ICL and ICCP links.

```
[edit]
user@switch# set interfaces ge-3/1/7 description iccp-link
user@switch# set interfaces ge-3/1/7 unit 0 family inet address 10.20.20.2/24
user@switch# set interfaces ge-3/1/9 description icl-link
user@switch# set interfaces ge-3/1/9 unit 0 family ethernet-switching
  interface-mode trunk
user@switch# set interfaces ge-3/1/9 unit 0 family ethernet-switching vlan members
  100
user@switch# set switch-options service-id 1
```

NOTE: While this step shows the configuration of interface ge-3/1/7, which is designated as the ICCP interface, it does not show how to configure the ICCP attributes on interface ge-3/1/7. By default, ICCP is automatically provisioned in a Junos Fusion Enterprise using dual aggregation devices. For more information about the automatic provisioning of ICCP, see "Configuring or Expanding a Junos Fusion Enterprise" on page 45.

PE2: Configuring EVPN-MPLS

Step-by-Step Procedure

1. Configure the loopback interface, the interfaces connected to the other PE devices, and an IRB interface that is also configured as a default Layer 3 gateway.

```
[edit]
user@switch# set interfaces lo0 unit 0 family inet address 10.25.0.2/32
user@switch# set interfaces ge-3/1/5 unit 0 family inet address 10.0.4.2/30
user@switch# set interfaces ge-3/1/5 unit 0 family mpls
user@switch# set interfaces ge-3/1/8 unit 0 family inet address 10.0.3.2/30
user@switch# set interfaces ge-3/1/8 unit 0 family mpls
user@switch# set interfaces irb unit 0 family inet address 10.5.5.1/24
  virtual-gateway-address 10.5.5.5
```

2. Configure the extended ports with EVPN multihoming in active-active mode, an ESI, and map the ports to VLAN v100..

```
[edit]
user@switch# set interfaces ge-108/0/25 unit 0 esi 00:01:02:03:04:00:01:02:04:26
user@switch# set interfaces ge-108/0/25 unit 0 esi all-active
user@switch# set interfaces ge-108/0/25 unit 0 family ethernet-switching vlan
  members v100
user@switch# set interfaces ge-108/0/27 unit 0 esi 00:01:02:03:04:00:01:02:04:28
user@switch# set interfaces ge-108/0/27 unit 0 esi all-active
user@switch# set interfaces ge-108/0/27 unit 0 family ethernet-switching vlan
  members v100
```


3. Assign a router ID and the autonomous system in which PE1, PE2, and PE3 reside.

```
[edit]
user@switch# set routing-options router-id 10.25.0.2
user@switch# set routing-options autonomous-system 100
```

4. Enable MPLS on the loopback interface and interfaces ge-3/1/5.0 and ge-3/1/8.0.

```
[edit]
user@switch# set protocols mpls interface lo0.0
user@switch# set protocols mpls interface ge-3/1/5.0
user@switch# set protocols mpls interface ge-3/1/8.0
```

5. Configure an IBGP overlay that includes PE1, PE2, and PE3.

```
[edit]
user@switch# set protocols bgp local-address 10.25.0.2
user@switch# set protocols bgp peer-as 100
user@switch# set protocols bgp local-as 100
user@switch# set protocols bgp group evpn-mes type internal
user@switch# set protocols bgp group evpn-mes family evpn signaling
user@switch# set protocols bgp group evpn-mes peer-as 100
user@switch# set protocols bgp group evpn-mes neighbor 10.25.0.1
user@switch# set protocols bgp group evpn-mes neighbor 10.25.0.3
```

6. Configure OSPF as the internal routing protocol for EVPN by specifying an area ID and interfaces on which EVPN-MPLS is enabled.

```
[edit]
user@switch# set protocols ospf traffic-engineering
user@switch# set protocols ospf area 0.0.0.0 interface ge-3/1/5.0
user@switch# set protocols ospf area 0.0.0.0 interface lo0.0
user@switch# set protocols ospf area 0.0.0.0 interface fxp0.0 disable
user@switch# set protocols ospf area 0.0.0.0 interface ge-3/1/8.0
```

7. Configure the LDP on the loopback interface and the interfaces on which EVPN-MPLS is enabled.

```
[edit]
user@switch# set protocols ldp interface lo0.0
user@switch# set protocols ldp interface ge-3/1/5.0
user@switch# set protocols ldp interface ge-3/1/8.0
```

8. Configure a virtual switch routing instance for VLAN v100, and include the interfaces and other entities associated with the VLAN.

```
[edit]
user@switch# set routing-instances evpn1 instance-type virtual-switch
```

```
user@switch# set routing-instances evpn1 interface ge-108/0/25.0
user@switch# set routing-instances evpn1 interface ge-108/0/27.0
user@switch# set routing-instances evpn1 interface ge-3/1/9.0
user@switch# set routing-instances evpn1 route-distinguisher 10.25.0.2:1
user@switch# set routing-instances evpn1 vrf-target target:100:1
user@switch# set routing-instances evpn1 protocols evpn label-allocation
   per-instance
user@switch# set routing-instances evpn1 protocols evpn extended-vlan-list 100
user@switch# set routing-instances evpn1 protocols evpn mclag bgp-peer 10.25.0.1
user@switch# set routing-instances evpn1 switch-options service-id 2
user@switch# set routing-instances evpn1 vlans v100 vlan-id 100
user@switch# set routing-instances evpn1 vlans v100 l3-interface irb.0
user@switch# set routing-instances evpn1 vlans v100 no-arp-suppression
```

PE3 Configuration

CLI Quick Configuration

PE3: EVPN-MPLS Configuration

```
set interfaces lo0 unit 0 family inet address 10.25.0.3/32
set interfaces ge-0/3/5 unit 0 family inet address 10.0.1.2/30
set interfaces ge-0/3/5 unit 0 family mpls
set interfaces ge-0/3/7 unit 0 family inet address 10.0.4.1/30
set interfaces ge-0/3/7 unit 0 family mpls
set interfaces ge-0/0/46 unit 0 esi 00:01:02:03:04:00:01:02:04:12
set interfaces ge-0/0/46 unit 0 esi all-active
set interfaces ge-0/0/46 unit 0 family ethernet-switching vlan members 100
set routing-options router-id 10.25.0.3
set routing-options autonomous-system 100
set routing-options forwarding-table export evpn-pplb
set policy-options policy-statement evpn-pplb from protocol evpn
set policy-options policy-statement evpn-pplb then load-balance per-packet
set protocols mpls interface lo0.0
set protocols mpls interface ge-0/3/5.0
set protocols mpls interface ge-0/3/7.0
set protocols bgp local-address 10.25.0.3
set protocols bgp peer-as 100
set protocols bgp local-as 100
set protocols bgp group evpn-mes type internal
set protocols bgp group evpn-mes family evpn signaling
set protocols bgp group evpn-mes peer-as 100
set protocols bgp group evpn-mes neighbor 10.25.0.2
set protocols bgp group evpn-mes neighbor 10.25.0.1
set protocols ospf traffic-engineering
set protocols ospf area 0.0.0.0 interface ge-0/3/5.0
set protocols ospf area 0.0.0.0 interface lo0.0
set protocols ospf area 0.0.0.0 interface fxp0.0 disable
set protocols ospf area 0.0.0.0 interface ge-0/3/7.0
set protocols ldp interface lo0.0
set protocols ldp interface ge-0/3/5.0
set protocols ldp interface ge-0/3/7.0
set routing-instances evpn1 instance-type virtual-switch
set routing-instances evpn1 interface ge-0/0/46.0
```

```
set routing-instances evpn1 route-distinguisher 10.25.0.3:1
set routing-instances evpn1 vrf-target target:100:1
set routing-instances evpn1 protocols evpn label-allocation per-instance
set routing-instances evpn1 protocols evpn extended-vlan-list 100
set routing-instances evpn1 switch-options service-id 2
set routing-instances evpn1 vlans v100 vlan-id 100
```

PE3: Configuring EVPN-MPLS

Step-by-Step Procedure

1. Configure the interfaces on EVPN-MPLS interworking occurs.

```
[edit]
user@switch# set interfaces lo0 unit 0 family inet address 10.25.0.3/32
user@switch# set interfaces ge-0/3/5 unit 0 family inet address 10.0.1.2/30
user@switch# set interfaces ge-0/3/5 unit 0 family mpls
user@switch# set interfaces ge-0/3/7 unit 0 family inet address 10.0.4.1/30
user@switch# set interfaces ge-0/3/7 unit 0 family mpls
```

2. Configure interface ge-0/0/46 with EVPN multihoming in active-active mode, an ESI, and map the ports to VLAN v100..

```
[edit]
user@switch# set interfaces ge-0/0/46 unit 0 esi 00:01:02:03:04:00:01:02:04:12
user@switch# set interfaces ge-0/0/46 unit 0 esi all-active
user@switch# set interfaces ge-0/0/46 unit 0 family ethernet-switching vlan
  members 100
```

3. Assign a router ID and the autonomous system in which the PE1, PE2, and PE3 reside.

```
[edit]
user@switch# set routing-options router-id 10.25.0.2
user@switch# set routing-options autonomous-system 100
```

4. Enable per-packet load-balancing for EVPN routes when EVPN multihoming active-active mode is used.

```
[edit]
user@switch# set routing-options forwarding-table export evpn-pplb
user@switch# set policy-options policy-statement evpn-pplb from protocol evpn
user@switch# set policy-options policy-statement evpn-pplb then load-balance
  per-packet
```

5. Enable MPLS on the loopback interface and interfaces ge-0/3/5.0 and ge-0/3/7.0.

```
[edit]
user@switch# set protocols mpls interface lo0.0
user@switch# set protocols mpls interface ge-0/3/5.0
user@switch# set protocols mpls interface ge-0/3/7.0
```

6. Configure an IBGP overlay that includes PE1, PE2, and PE3.

```
[edit]
user@switch# set protocols bgp local-address 10.25.0.3
user@switch# set protocols bgp peer-as 100
user@switch# set protocols bgp local-as 100
user@switch# set protocols bgp group evpn-mes type internal
user@switch# set protocols bgp group evpn-mes family evpn signaling
user@switch# set protocols bgp group evpn-mes peer-as 100
user@switch# set protocols bgp group evpn-mes neighbor 10.25.0.2
user@switch# set protocols bgp group evpn-mes neighbor 10.25.0.1
```

7. Configure OSPF as the internal routing protocol for EVPN by specifying an area ID and interfaces on which EVPN-MPLS is enabled.

```
[edit]
user@switch# set protocols ospf traffic-engineering
user@switch# set protocols ospf area 0.0.0.0 interface ge-0/3/5.0
user@switch# set protocols ospf area 0.0.0.0 interface lo0.0
user@switch# set protocols ospf area 0.0.0.0 interface fxp0.0 disable
user@switch# set protocols ospf area 0.0.0.0 interface ge-0/3/7.0
```

8. Configure the LDP on the loopback interface and the interfaces on which EVPN-MPLS is enabled.

```
[edit]
user@switch# set protocols ldp interface lo0.0
user@switch# set protocols ldp interface ge-0/3/5.0
user@switch# set protocols ldp interface ge-0/3/7.0
```

9. Configure a virtual switch routing instance for VLAN v100, and include the interfaces and other entities associated with the VLAN.

```
[edit]
user@switch# set routing-instances evpn1 instance-type virtual-switch
user@switch# set routing-instances evpn1 interface ge-0/0/46.0
user@switch# set routing-instances evpn1 route-distinguisher 10.25.0.3:1
user@switch# set routing-instances evpn1 vrf-target target:100:1
user@switch# set routing-instances evpn1 protocols evpn label-allocation
   per-instance
user@switch# set routing-instances evpn1 protocols evpn extended-vlan-list 100
user@switch# set routing-instances evpn1 switch-options service-id 2
user@switch# set routing-instances evpn1 vlans v100 vlan-id 100
```


Release History Table

Release	Description
19.1R1	Starting with Junos OS Release 19.1R1, the **no-arp-suppression** configuration statement is no longer supported on any device.

Related Documentation

- Understanding EVPN-MPLS Interworking with Junos Fusion Enterprise and MC-LAG on page 715

CHAPTER 19

Storm Control on a Junos Fusion Enterprise

Understanding Storm Control on a Junos Fusion Enterprise

Storm control enables the switch to monitor traffic levels and to drop broadcast, multicast, and unknown unicast packets when a specified traffic level—known as the storm control level or storm control bandwidth—is exceeded, preventing the packets from proliferating and degrading service. As an alternative to having the switch drop packets, you can configure storm control to shut down interfaces or temporarily disable interfaces when the storm control level is exceeded.

Storm control configuration in a Junos Fusion Enterprise is identical for a standalone EX9200 switch. For more information, see Understanding Storm Control for Managing Traffic Levels on Switching Devices.

In a Junos Fusion Enterprise with dual aggregation devices there are special considerations that impact storm control functionality. The following requirements should be understood when configuring storm control for a Junos Fusion Enterprise:

- Broadcast, multicast, and unknown unicast packets received on the extended port of a satellite device can be forwarded to two different aggregation devices, so the storm control profile is applied to the cumulative traffic reaching a particular aggregation device, not the cumulative traffic received on the extended port of the satellite device.
- If the storm control level is exceeded and the resulting action is to shut down the port, the aggregation device which detects the storm brings down the extended port, and the status is synced to the peer aggregation device.
- The shutdown is applied at the physical interface level; in a standalone EX9200 switch, storm control shutdown is applied at the logical interface level.
- Executing the **clear ethernet-switching recovery-timeout** command on one aggregation device also clears the error on the other aggregation device.
- In the event of a shutdown, if the recovery timer is configured, the error is cleared on both aggregation devices when the timer expires.

CHAPTER 20

DHCP Snooping and Port Security on a Junos Fusion Enterprise

Understanding Port Security Features on a Junos Fusion Enterprise

Port security features help protect the access ports on your device against attacks such as address spoofing (forging) and Layer 2 denial of service. The switching device monitors DHCP messages sent from untrusted hosts and extracts their IP addresses and lease information. This information is used to build and maintain the DHCP snooping database. Only hosts that can be verified using this database are allowed access to the network.

The following port security features are supported in a Junos Fusion Enterprise:

- DHCP snooping
- DHCPv6 snooping
- Dynamic ARP inspection (DAI)
- IP source guard
- IPv6 source guard
- IPv6 neighbor discovery (ND) inspection
- IPv6 router advertisement (RA) guard

Configuration for DHCP snooping and other port security features in a Junos Fusion Enterprise is identical for a standalone EX9200 switch. The range of port security configuration options are beyond the scope of this document. For additional information, see Configuring Port Security Features and the Port Security Feature Guide for EX9200 Switches.

In a Junos Fusion Enterprise with dual aggregation devices, there are special considerations that impact the DHCP snooping database. The following requirements should be understood when configuring DHCP port security features for a Junos Fusion Enterprise:

- The DHCP snooping database is synchronized across aggregation devices. Synchronization is automatic for all dual-homed clients; there is no manual configuration required to sync the DHCP snooping database.

NOTE: DHCP relay and DHCP server bindings are not synchronized.

- DAI and ND inspection statistics are synchronized on both aggregation devices.
- DHCP port security configuration must match on both aggregation devices, so DHCP port security features should be configured using configuration groups that are applied to both aggregation devices using commit synchronization. See "Understanding Configuration Synchronization in a Junos Fusion" on page 25 and "Enabling Configuration Synchronization Between Aggregation Devices in a Junos Fusion" on page 77.
- Executing the **clear dhcp-security binding** command on one aggregation device also clears the bindings on the other aggregation device.
- DHCP port security features are not supported for single-homed clients in a dual-aggregation device topology, since the DHCP snooping database is synchronized only for dual-homed clients.

CHAPTER 21

MAC Limiting and Persistent MAC Learning on a Junos Fusion Enterprise

Understanding MAC Address Limiting and Persistent MAC Learning on a Junos Fusion Enterprise

MAC limiting enhances port security by limiting the number of MAC addresses that can be learned within a VLAN, which prevents flooding of the Ethernet switching table. You can configure MAC limiting to drop packets or to shut down interfaces when the MAC limit is exceeded.

Persistent MAC learning—also called sticky MAC addresses—enables an interface to retain dynamically learned MAC addresses when the switch is restarted or if the interface goes down and is brought back online, preventing traffic loss for trusted workstations.

MAC limiting and persistent MAC learning configuration in a Junos Fusion Enterprise is identical for a standalone EX9200 switch. For more information on MAC limiting, see Understanding MAC Limiting. For more information on persistent MAC learning, see Understanding Persistent MAC Learning (Sticky MAC).

In a Junos Fusion Enterprise, there are special considerations that impact MAC limiting and persistent MAC learning functionality.

MAC Address Limiting on a Junos Fusion Enterprise

The following actions are possible when the MAC limit is reached on an interface:

- None—No impact on functionality of the aggregation device or the satellite device. Traffic is forwarded from the satellite device to the aggregation device.
- Shutdown—The extended port on the satellite device is shutdown when the MAC limit is reached on the aggregation device.
- Drop—The unlearnt source MAC packet is forwarded by the satellite device and dropped on the aggregation device.

The following requirements should be understood when configuring MAC address limiting for a Junos Fusion Enterprise with dual aggregation devices:

- There is the potential for MAC addresses received on an extended port to be forwarded to different aggregation devices. To prevent inconsistency, the learned MAC addresses are synchronized across both aggregation devices. If one aggregation device is not able to install a MAC address due to MAC limiting, that MAC address is deleted from the peer aggregation device.
- For the shutdown action, the shutdown on extended ports is applied at the physical interface level; in a standalone EX9200 switch, MAC limiting shutdown is applied at the logical interface level.
- Executing the **clear ethernet-switching recovery-timeout** command on one aggregation device also clears the error on the other aggregation device.
- In the event of a shutdown, if the recovery timer is configured, the error is cleared on both aggregation devices when the timer expires.

Persistent MAC Learning on a Junos Fusion Enterprise

The following requirements should be understood when configuring persistent MAC learning for a Junos Fusion Enterprise with dual aggregation devices:

- MAC addresses learnt locally or remotely are treated as persistent entries and saved in the persistent file on both aggregation devices.
- Persistent MAC learning cannot be enabled on the ICL interface. This is enforced by commit check.
- When persistent MAC learning is configured on extended ports of a single-homed satellite device, MAC addresses learned locally are learned as persistent addresses, and MAC addresses learned on the peer are learned as remote dynamic addresses.
- Clearing the **persistent-mac** on one aggregation device also deletes the entry from other aggregation device.

If you move a device within your network that has a persistent MAC address entry on the switch, use the **clear ethernet-switching table persistent-mac** command to clear the persistent MAC address entry from the interface. If you move the device and do not clear the persistent MAC address from the original port on which it was learned, then the new port will not learn the MAC address of the device and the device will not be able to connect.

If the original port is down when you move the device, then the new port will learn the MAC address and the device can connect. However, if you do not clear the persistent MAC address on the original port, then when the port restarts, the system reinstalls the persistent MAC address in the forwarding table for that port. If this occurs, the persistent MAC address is removed from the new port and the device loses connectivity.

