Engineering Simplicity

Junos Fusion Provider Edge User Guide

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About This Guide

Junos Fusion Provider Edge simplifies network administration by enabling customers to configure an aggregation device to manage thousands of ports on satellite devices. Use the topics on this page to understand Junos Fusion, configure the aggregation device , and to manage satellite devices.

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PART

Junos Fusion Provider Edge

CHAPTER 1

Junos Fusion Provider Edge Overview

IN THIS CHAPTER

Junos Fusion Provider Edge Overview

Junos Fusion provides a method of significantly expanding the number of available network interfaces on a device—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*. Junos Fusion simplifies network administration because it appears to the larger network as a single, port-dense device that is managed using one IP address.

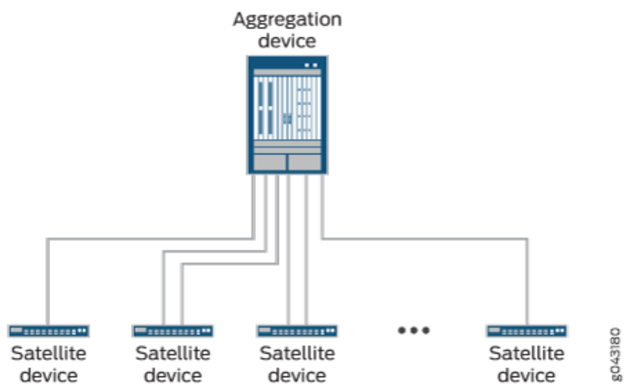
Junos Fusion Provider Edge brings the Junos Fusion technology to the service provider edge. For example in a Junos Fusion Provider Edge, MX Series 5G Universal Routing Platforms act as aggregation devices while EX4300 Series and QFX5100, QFX 5110, or QFX5200 Series switches act as satellite devices.

In a Junos Fusion Provider Edge topology, 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 Provider Edge. 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 Provider Edge topology.

Figure 1: Basic Junos Fusion Provider Edge Topology



The MX Series 5G Universal Routing Platform acting as the aggregation device in Junos Fusion Provider Edge 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 Provider Edge, and the network-facing interfaces on the satellite devices—*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 Provider Edge using multiple internal satellite management protocols. Network traffic can be forwarded between satellite devices through the aggregation device. Junos Fusion Provider Edge supports the IEEE 802.1BR standard.

Junos Fusion Provider Edge 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 Provider Edge 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 Provider Edge.

- Flexibility—You can easily expand the size of your Junos Fusion Provider Edge by adding satellite devices to it as your networking needs grow.
- Investment protection—In environments that need to expand because the capabilities of the aggregation device are maximized, a Junos Fusion Provider Edge can be a logical upgrade option because it enables the system to evolve with minimal disruption to the existing network and without having to remove the existing, previously purchased devices from the network.

RELATED DOCUMENTATION

Understanding Junos Fusion Provider Edge Components

IN THIS SECTION

This topic describes the components of a Junos Fusion Provider Edge.

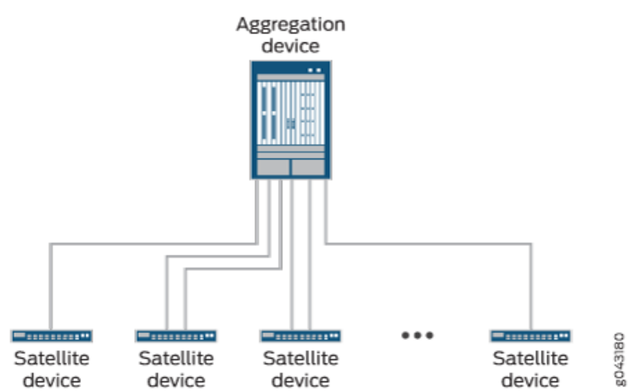
This topic covers:

Junos Fusion Topology

The 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.

See Figure 2 on page 6 for an illustration of the Junos Fusion topology.

Figure 2: Junos Fusion Topology



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 single point of management 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 support features that are supported by the version of Junos OS running on the aggregation device.

Aggregation Devices

An aggregation device:

- Has at least one connection to each satellite device.
- Runs Junos OS software for the entire Junos Fusion.
- Manages the entire Junos Fusion. All Junos Fusion configuration management is handled on the aggregation device, including interface configuration of the satellite device interfaces.

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

Satellite Devices

A satellite device:

- Runs a version of satellite software after being converted into a satellite device.
- Has at least one direct connection to the 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 Provider Edge are discussed in greater detail in Understanding Junos Fusion Provider Edge Software and Hardware Requirements.

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. All traffic passed between a satellite device and the aggregation device in a Junos Fusion traverses the cascade port.

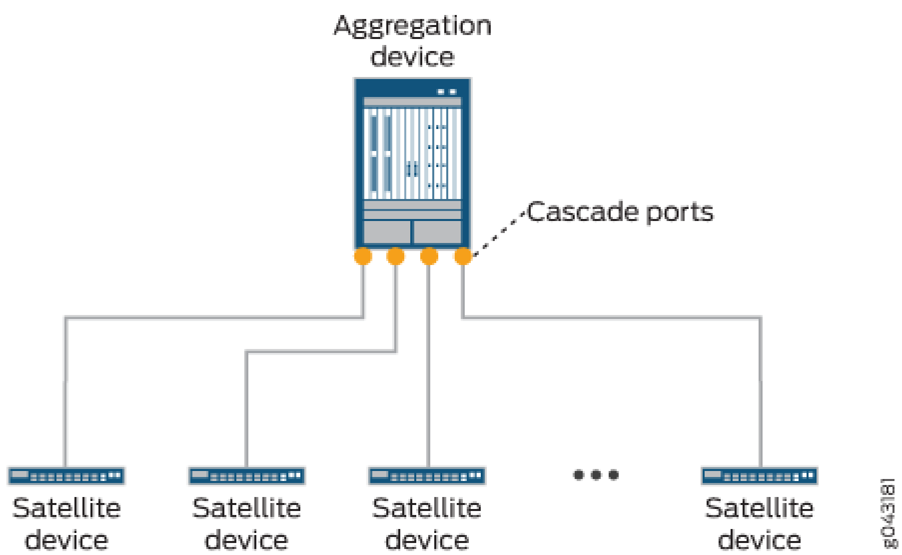
The link that connects an aggregation device to a satellite device has an interface on each end of the link. The interface on the aggregation device end of the link is a cascade port. The interface on the satellite device end of the link is an uplink port.

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 but not limited to a 10-Gbps SFP+ interface or a 40-Gbps QSFP+ interface, but any interface on the aggregation device that connects to the satellite device can be converted into a cascade port.

The location of the cascade ports in a Junos Fusion are illustrated in Figure 3 on page 8.

Figure 3: Cascade Ports



The hardware specifications for cascade ports in a Junos Fusion Provider Edge are discussed in greater detail in Understanding Junos Fusion Provider Edge 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.

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

An uplink port is typically but not limited to a 10-Gbps SFP+ interface or a 40-Gbps QSFP+ interface, but any 1-Gbps interface on the aggregation device that connects to the satellite device can also be converted into a cascade port.

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.

Understanding FPC Identifiers and Assignment in a Junos Fusion Fabric

In a Junos Fusion, each satellite device must have 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 on PIC 0 of a satellite device—a gigabit Ethernet interface on a satellite device that is using 101 as it's FPC ID— uses **ge-101/0/2** as it's interface name. The valid range for the FPC ID is 100 -255 in Junos OS Release 14.2 and 65 to 254 in Junos OS Release 16.1 and later.

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.

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 due to an FPC ID association issue.

Understanding Software in a Junos Fusion

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 the feature set 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 Provider Edge" on page 21.

The software specifications for a Junos Fusion Provider Edge are discussed in greater detail in Understanding Junos Fusion Provider Edge 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 an **xe** interface, for instance, remains **xe** regardless of whether the interface is or isn't 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 Fabric" on page 9.

  For instance, built-in port 2 on PIC 0—a gigabit Ethernet interface that is acting as an extended port—on an EX4300 switch that is acting as FPC slot 101 would be identified as:

  ge-101/0/2

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51

Understanding Satellite Device Clustering in a Junos Fusion

IN THIS SECTION

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.

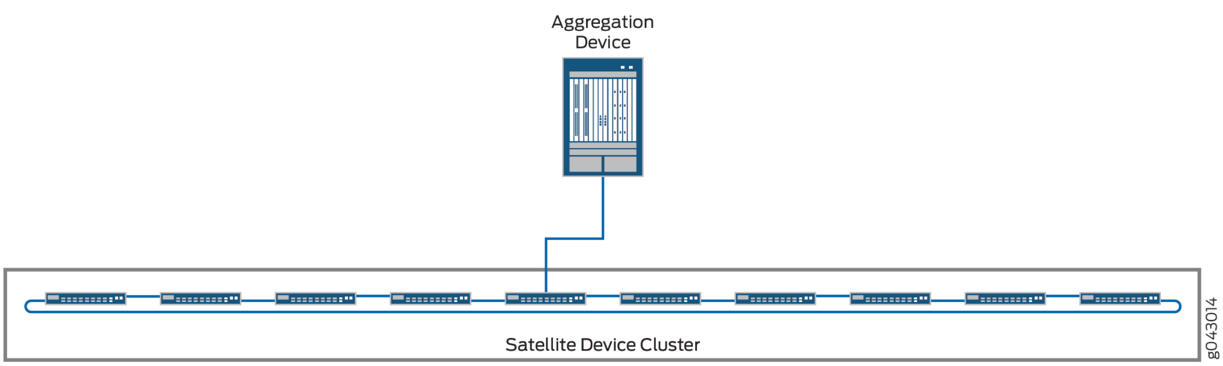
Satellite device clustering is particularly useful in scenarios where optical cabling options between buildings are limited and in scenarios where you want to preserve optical interfaces for other purposes. If you have, for instance, two buildings that have limited optical interfaces between each other 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 4 on page 12 shows a picture of a sample satellite device cluster connected to a single aggregation device.

Figure 4: 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 for additional information on candidate uplink port policies.

NOTE: DAC cables are not supported on cluster interfaces.

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 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.

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 1 on page 14for 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 1: 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
EX4300-24P (4 ports each on PIC1 and PIC2)	1/0 through 1/3 and 2/0 through 2/3

Table 1: Default Uplink Interfaces for Junos Fusion Enterprise Satellite Devices *(Continued)*

Device Type	Default Uplink Interfaces
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
EX4300-48P (4 ports each on PIC1 and PIC2)	1/0 through 1/3 and 2/0 through 2/3
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
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
Understanding Junos Fusion Enterprise Components
Configuring Uplink Port Policies on a Junos Fusion

Understanding Junos Fusion Ports

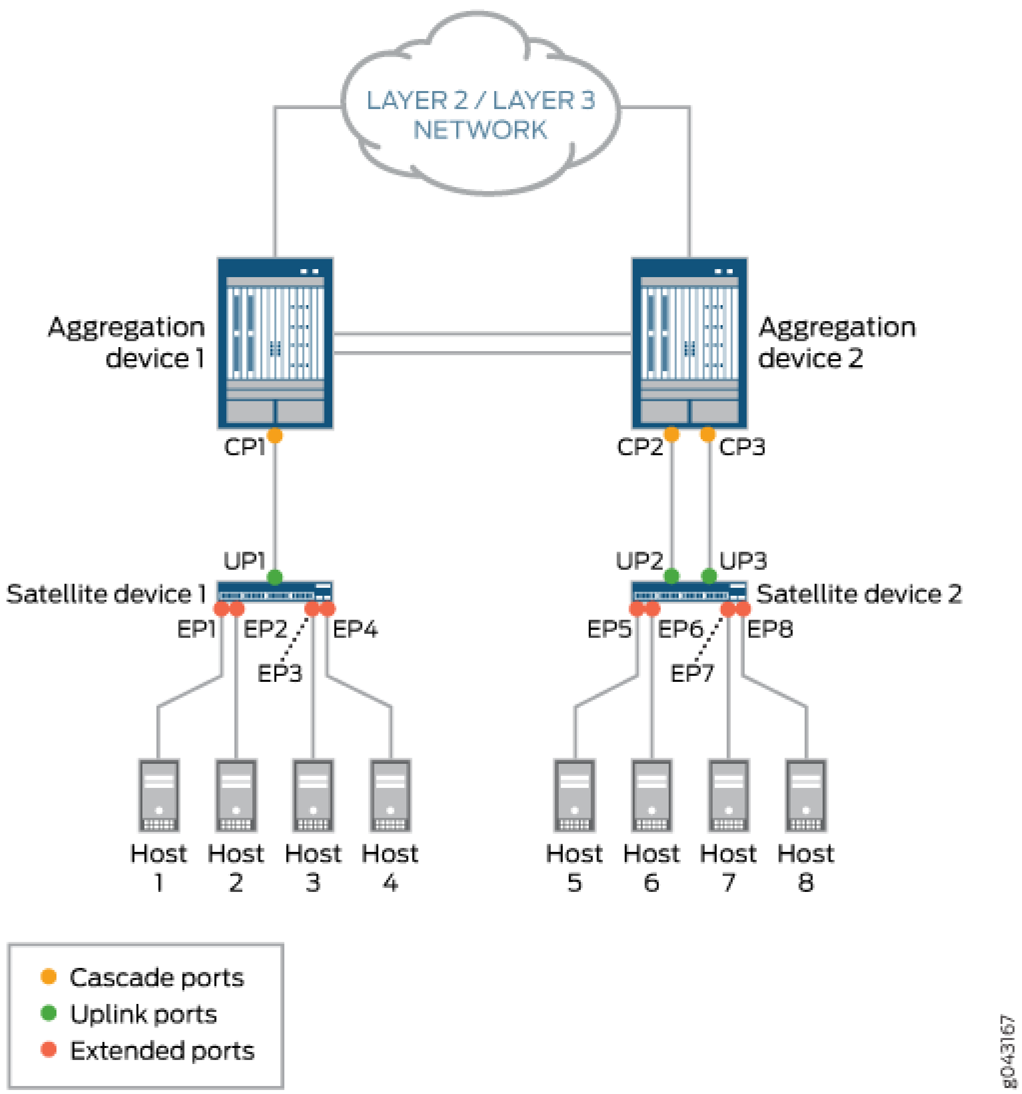
IN THIS SECTION

In a Junos Fusion topology, cascade, uplink, and extended ports are components that play key roles. Figure 5 on page 17 shows a sample Junos Fusion topology, which serves as a point of reference for this discussion of cascade, uplink, and extended ports.

In the Junos Fusion topology shown in Figure 5 on page 17, 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.

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



This topic provides the following information:

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 5 on page 17, 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.

When there are multiple cascade port connections to a satellite device, as shown in Figure 5 on page 17, 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 5 on page 17, 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.

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 5 on page 17, 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 5 on page 17, 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

- CoS policies

RELATED DOCUMENTATION

Understanding the Flow of Data Packets in a Junos Fusion Topology

hash-key

enhanced-hash-key

Understanding Port-Based Authentication in a Junos Fusion Provider Edge

Junos Fusion supports port-based authentication as defined by IEEE 802.1X standard to prevent unauthorized network access on the extended ports of the satellite devices. The satellite device blocks all packets to and from the supplicant (client) except for Extensible Authentication Protocol over LAN (EAPoL) packets at the interface. EAPoL allows the client to authenticate to an authentication server, such as a RADIUS server. Once the authentication server validates the supplicant's credentials, the switch opens the interface to the supplicant and allows access to the network. For more information on 802.1x authentication, see Configuring 802.1X Interface Settings on MX Series Routers in Enhanced LAN Mode.

Junos fusion also supports central Web authentication. Central Web authentication redirects Web browser requests to a central Web authentication server that manages the authentication and authorization process. Upon successful authorization, the user is allowed access to the network. For more information on central Web authentication, see Understanding Central Web Authentication.

NOTE: The authentication server in a Junos Fusion should be connected directly to the aggregation device and not to an extended port on a satellite device.

RELATED DOCUMENTATION

IEEE 802.1x Port-Based Network Access Control Overview

Understanding Central Web Authentication

Configuring 802.1X Interface Settings on MX Series Routers in Enhanced LAN Mode

Understanding Software in a Junos Fusion Provider Edge

IN THIS SECTION

This topic discusses the role of software in a Junos Fusion Provider Edge. 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, 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 the feature set 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 the satellite software. The satellite software, notably, applies features from the Junos OS software on the aggregation device onto the satellite device. The satellite software allows the satellite device to participate in the Junos Fusion, but does not provide any other software features for the satellite device.

You can run the same version of satellite software on satellite devices that are different hardware platforms. For instance, if your Junos Fusion included EX4300 and QFX5100 switches as satellite devices, the EX4300 and QFX5100 switches acting as satellite devices could install the satellite software from the same satellite software package.

Different satellite devices can run different versions of satellite software within the same Junos Fusion.

You can download satellite software from the software center for any satellite device. Additionally, you have the option to order some switches with the satellite software pre-installed 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 software on the aggregation device is upgraded. The satellite software packages on an individual satellite device can be updated manually using CLI commands on the aggregation device but are typically installed using 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 Junos OS onto the device before you can use it in your network as a standalone switch.

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

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

Understanding the Preboot eXecution Environment (PXE) Junos OS Software Package for QFX5100 Switches in a Junos Fusion

The Preboot eXecution Environment (PXE) software is a version of Junos OS that must be used to convert a QFX5100 switch that is running satellite software as a satellite device into a standalone switch that is running Junos OS software.

The first version of PXE software that can be used to convert a QFX5100 switch from a satellite device to a standalone switch is introduced at Junos OS Release 14.1X53-D16. The PXE version of Junos OS software supports the same feature set as the other Junos OS software packages for a release, but is specifically engineered to install Junos OS onto a device running satellite software.

The PXE version of Junos OS software is required for QFX5100 switches only. Standard Junos OS software can be used to convert the other devices acting as satellite devices into standalone devices.

The PXE version of Junos OS software can be downloaded from the Software Center with the other QFX5100 switch software packages. For more information on PXE software images, see the *Junos OS Release Notes* for your software release. For information on using the PXE version of Junos OS software to convert a QFX5100 device into a standalone device, see *Converting a Satellite Device in a Junos Fusion to a Standalone Device*.

Understanding Minimum Software Requirements for a Junos Fusion

An aggregation device:

- Must be running Junos OS Release 14.2R3, or a later version of Junos OS Release 14.2.

> **NOTE**: Junos Fusion is not supported in any Junos OS Release 15.1 release.

A satellite device:

- Must be running Junos OS Release 14.1X53-D16 or later prior to being converted into a satellite device.
- Must run a version of satellite software.

For more detailed information about satellite software support, see the Junos OS release notes for the version of Junos OS running on your aggregation device.

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 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 device is connected to a satellite device that is using an FPC ID that is part of a satellite software upgrade group, the device—unless it is already running the same version of satellite software—upgrades its satellite software using the satellite software associated with the satellite software upgrade group.

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 only a few satellite devices are updated at a time to minimize the effects of a traffic disruption due to too many satellite devices upgrading software simultaneously.

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 that a satellite software upgrade group is configured.

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

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise

Understanding Junos Fusion Provider Edge Software and Hardware Requirements

IN THIS SECTION

This topic describes the software and hardware requirements for a Junos Fusion Provider Edge.

It covers:

Aggregation Devices

This section details the hardware and software requirements for an aggregation device in a Junos Fusion Provider Edge.

It includes the following sections.

Aggregation Device Hardware Models

Table 2 on page 25 lists the hardware platforms that are supported as aggregation devices, and the Junos OS release that introduced aggregation device support to Junos Fusion Provider Edge for the hardware.

Table 2: Supported Aggregation Device Hardware and Initial Junos OS Release

Hardware	Initial Junos OS Release
MX5 Universal Routing Platform	14.2R6
MX10 Universal Routing Platform	14.2R6
MX40 Universal Routing Platform	14.2R6
MX80 Universal Routing Platform	14.2R6
MX104 Universal Routing Platform	14.2R6
MX204 Universal Routing Platform	17.4R1
MX240 Universal Routing Platform	14.2R3
MX480 Universal Routing Platform	14.2R3
MX960 Universal Routing Platform	14.2R3
MX2010 Universal Routing Platform	14.2R3
MX2020 Universal Routing Platform	14.2R3
MX10003 Universal Routing Platform	17.3R1
MX10008 Universal Routing Platform	20.1R1
MX10016 Universal Routing Platform	20.1R1

BEST PRACTICE: We recommend installing a 64-bit version of Junos OS on the aggregation devices in a Junos Fusion, particularly in topologies that support a large number of satellite devices.

Support for Junos Node Slicing

Starting in Junos OS Release 18.1R1, you can configure an aggregation device on a guest network function (GNF) on an MX480, MX960, MX2010, and MX2020 series router. Using Junos Node Slicing, you can create multiple partitions on a single MX router. These partitions are referred to as a guest network functions (GNFs). Each MX series router supports a maximum of 10 GNFs with each GNF supporting a separate aggregation device. The aggregation device on each GNF supports a maximum of 10 satellite devices.

For more information on Junos Node Slicing, see Junos Node Slicing Overview.

NOTE: In a Junos Fusion Provider Edge topology that has a GNF configured as the aggregation device, only EX4300 and QFX 5110 switches are supported as satellite devices.

NOTE: In the GNF, you should use the following line cards to support the cascade port on the aggregation device:

- MPC7
- MPC8
- MPC9

Maximum Number of Aggregation Devices

A Junos Fusion supports one aggregation device.

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 3 on page 27 provides a list of line cards on an MX Series 5G Universal Routing Platform that have interfaces that can be converted into cascade ports, and the initial Junos OS release when cascade port support was introduced for interfaces on the line card.

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

Table 3: MX Series 5G Universal Routing Platform Line Card Cascade Port Support

Hardware	Initial Junos OS Release
16x10GE MPC	14.2R3
MPC1 Q	14.2R3
MPC1E Q	14.2R3
MPC2 Q	14.2R3
MPC2E Q	14.2R3
MPC2 EQ	14.2R3
MPC2E EQ	14.2R3
MPC2E NG	14.2R6
MPC2E NG Q	14.2R6
MPC3E	14.2R3
MPC3E NG	14.2R6

Table 3: MX Series 5G Universal Routing Platform Line Card Cascade Port Support *(Continued)*

Hardware	Initial Junos OS Release
MPC3E NG Q	14.2R6
MPC4E	14.2R3
MPC5E	14.2R3
MPC5EQ	14.2R3
MPC6E **NOTE**: MPC6E is supported with the 10-Gigabit Ethernet MIC with SFP+ (24 Ports) only	14.2R3
MPC7E-10G	16.1R1
MPC7E-MRATE **NOTE**: You can configure the 10-Gigabit Ethernet, 40-Gigabit Ethernet, or the 100-Gigabit Ethernet ports on the MPC7E-MRATE as cascade ports.	16.1R1
MPC8E	16.1R1
MPC9E	16.1R1

Satellite Devices

This section details the hardware and software requirements for a satellite device in a Junos Fusion Provider Edge.

It includes the following sections:

Satellite Device Hardware Models

Table 4 on page 29 lists the hardware platforms that are supported as satellite devices, as well as the minimum Junos OS release that must be running on the satellite device before it can be converted from a standalone switch to a satellite device. A minimum version of Junos OS software is only required before a switch is converted into a satellite device. A satellite device in Junos Fusion Provider Edge runs satellite software after it is converted into a satellite device.

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.

Table 4: Supported Satellite Device Hardware and Initial Junos OS Release

Hardware	Initial Junos OS Release —Satellite Device	Initial Junos OS Release—Aggregation Device	Minimum Satellite Software Version
QFX5100-24Q	14.1X53-D16	14.2R3	1.0R1
QFX5100-48S	14.1X53-D16	14.2R3	1.0R1
QFX5100-48T	14.1X53-D16	14.2R3	1.0R1
QFX5100-96S	14.1X53-D16	14.2R3	1.0R1
QFX5110-48S	18.1R1	18.1R1	3.4R1
QFX5200-32C	18.1R1	18.1R1	3.4R1
EX4300-24P	14.1X53-D16	14.2R3	1.0R1
EX4300-24T	14.1X53-D16	14.2R3	1.0R1
EX4300-32F	14.1X53-D30	14.2R5	1.0R2.2

Table 4: Supported Satellite Device Hardware and Initial Junos OS Release *(Continued)*

Hardware	Initial Junos OS Release —Satellite Device	Initial Junos OS Release—Aggregation Device	Minimum Satellite Software Version
EX4300-32F-DC	14.1X53-D30	14.2R5	1.0R2.2
EX4300-48P	14.1X53-D16	14.2R3	1.0R1
EX4300-48T	14.1X53-D16	14.2R3	1.0R1
EX4300-48T-DC	14.1X53-D26	14.2R3	1.0R1

NOTE: The QFX5110-48S does not support channelized ports in a Junos Fusion environment.

Power over Ethernet Requirements for a Satellite Device

A satellite device that supports Power over Ethernet (PoE) must be running the minimum PoE controller software version. The EX4300 series switches must be running PoE controller software version 2.6.3.9.2.1 or higher.

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.

Maximum Number of Satellite Devices

Junos Fusion Provider Edge supports up to eighteen satellite devices on the MX5, MX10, MX40, MX80, and MX104 Universal Routing Platform. For all other MX Series routers, Junos Fusion Provider Edge supports up to sixty-four satellite devices.

Release History Table

Release	Description
18.1R1	Starting in Junos OS Release 18.1R1, you can configure an aggregation device on a guest network function (GNF) on an MX480, MX960, MX2010, and MX2020 series router.

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Converting a Satellite Device in a Junos Fusion to a Standalone Device | 132

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 6 on page 32.)

- 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 7 on page 33.).

Figure 6: Layer 2 Unicast Data Packet Flow Through a Junos Fusion Topology—Scenario 1

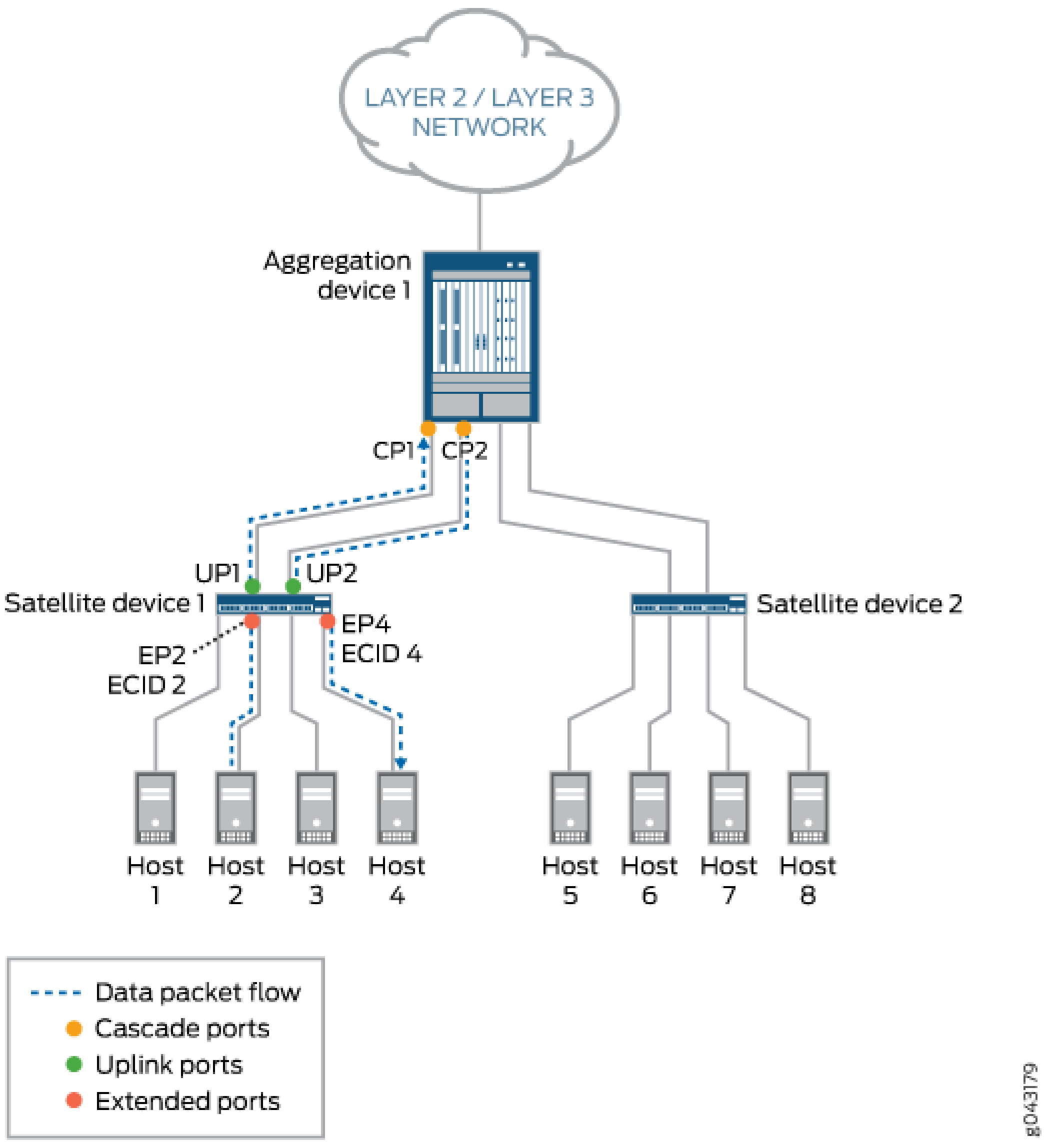
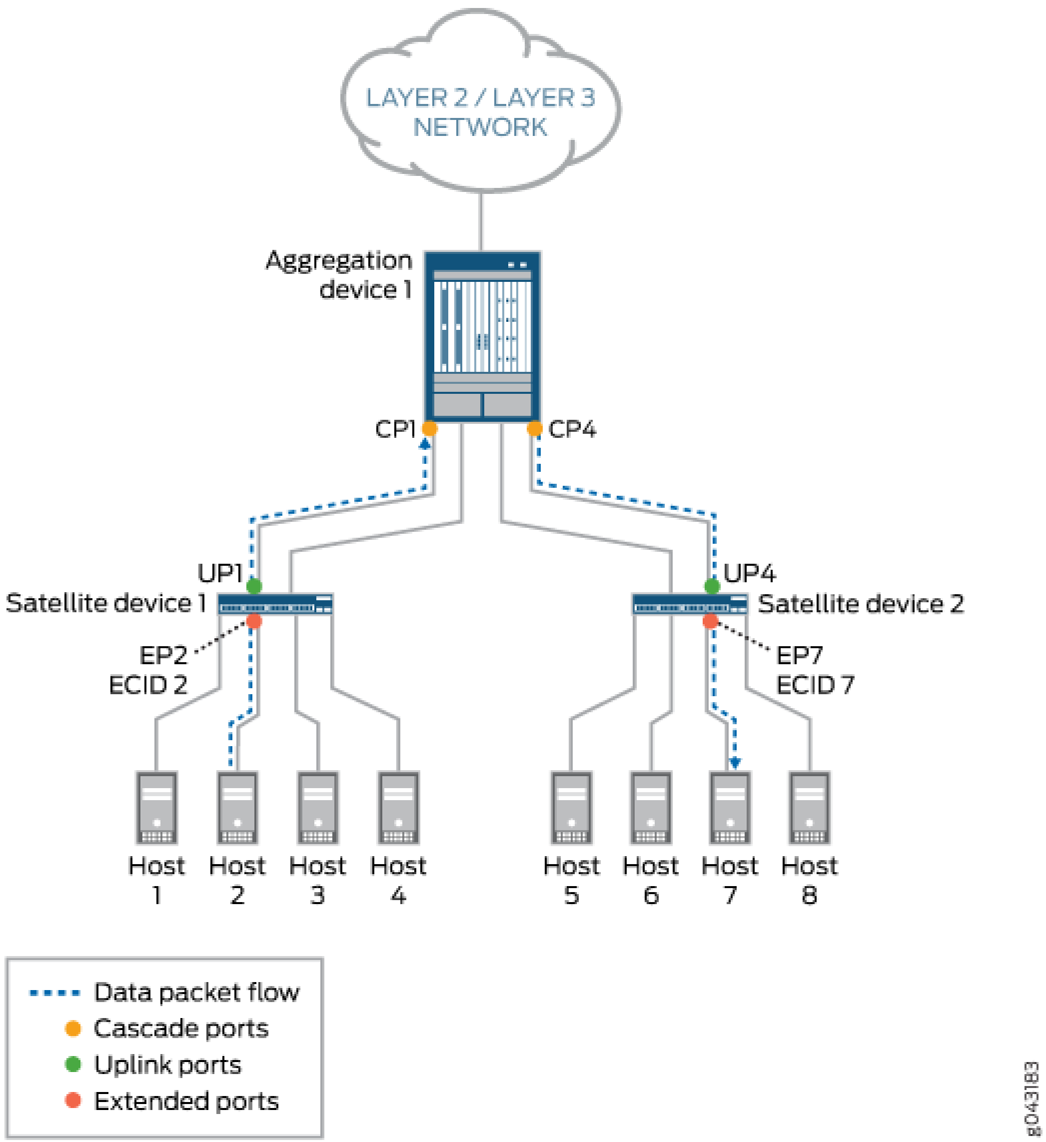


Figure 7: Layer 2 Unicast Data Packet Flow Through a Junos Fusion Topology—Scenario 2



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

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Understanding Junos Fusion Enterprise Components

Understanding Satellite Policies in a Junos Fusion

IN THIS SECTION

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.

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.

RELATED DOCUMENTATION

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Junos Fusion Provider Edge Supported Protocols

IN THIS SECTION

Junos Fusion Provider Edge expands the number of available network interfaces on an aggregation device by connecting satellite devices that act as extensions of the aggregation device. The entire system—the interconnected aggregation device and satellite devices—is called a Junos Fusion. Junos Fusion Provider Edge simplifies network aggregation device administration because the aggregation device acts as a single, port-dense device, managed using one IP address.

Layer 3 Protocols Supported on Junos Fusion Provider Edge

Starting with Junos OS Release 14.2R4, many of the routing protocols supported on MX Series routers have been extended to the satellite devices in a Junos Fusion Provider Edge topology. You can configure the following Layer 3 routing protocols on satellite device extended ports:

- BFD (Centralized only)
- BGP
- BGP for IPv6
- IS-IS
- OSPF
- OSPF version 3
- LACP

You can configure the following Layer 3 routing protocols on satellite device extended ports that are included in link aggregation groups (LAGs):

- BGP
- IS-IS
- OSPF
- LACP

BFD Support on Junos Fusion Provider Edge

Bidirectional Forwarding Detection (BFD) is a protocol used to detect failure in the data path. Hello packets are sent at a specified, regular interval. A neighbor failure is detected when the routing device stops receiving a reply after a specified interval. BFD works with a wide variety of network environments and topologies.

> **NOTE**: Junos Fusion Provider Edge only supports centralize BFD with the **no-delegate-processing** statement included in the [edit routing-options ppm] hierarchy. LACP does not work when **no-delegate-processing** is enabled.

For more information, see the following:

- Understanding BFD for BGP

- Understanding BFD for IS-IS
- *Understanding BFD for OSPF*

BGP Support on Junos Fusion Provider Edge

Border Gateway Protocol (BGP) is a standardized exterior gateway protocol that exchanges routing and reachability information between autonomous systems on the Internet. The protocol can be a path vector protocol or a distance-vector routing protocol. BGP makes routing decisions based on paths, network policies, or rule-sets configured by a network administrator for core routing decisions. For more information, see the BGP User Guide and the CLI statement bgp.

IS-IS Support on Junos Fusion Provider Edge

Intermediate System to Intermediate System (IS-IS) moves information within either a computer network, a group of physically connected computers, or between similar devices. It accomplishes this by determining the best route for traffic through a packet-switched network. For more information, see the IS-IS User Guide.

OSPF Support on Junos Fusion Provider Edge

Open Shortest Path First (OSPF) is a routing protocol for IP networks using a link state routing algorithm. This interior routing protocol operates within a single autonomous system. For more information, see the OSPF User Guide and the CLI statements *ospf* and ospf3.

LACP Support on Junos Fusion Provider Edge

Link Aggregation Contol Protocol (LACP) is one method of bundling several physical interfaces to form one logical aggregated Ethernet interface. For more information , see "Understanding Link Aggregation and Link Aggregation Control Protocol in a Junos Fusion" on page 821 and OBSOLETEConfiguring Aggregated Ethernet Interfaces and LACP.

Multicast Protocols Supported on Junos Fusion Provider Edge

You can configure the following multicast protocols on satellite device extended ports:

PIM on Junos Fusion Provider Edge

Protocol-Independent Multicast (PIM) is a family of multicast routing protocols for Internet Protocol (IP) networks that provide one-to-many and many-to-many distribution of data over a LAN, WAN or the Internet. It is termed protocol-independent because PIM does not include its own topology discovery mechanism, but instead uses routing information supplied by other routing protocols, in this case

Internet Group Management Protocol (IGMP) on extended ports. All four PIM modes work on extended ports—PIM sparse Mode (default), PIM dense Mode, bidirectional PIM, and PIM source-specific multicast.For more information, see the PIM Overview and the CLI statement pim.

IGMP on Junos Fusion Provider Edge

Internet Group Management Protocol (IGMP) is a communications protocol used by hosts and adjacent routers on IPv4 networks to establish multicast group membership. IGMP is an integral part of IP multicast, and is used for one-to-many networking applications such as online streaming video and gaming because it allows more efficient use of resources when supporting these types of applications. For more information, see Understanding IGMP and the CLI statement igmp.

MLD on Junos Fusion Provider Edge

Multicast Listener Discovery (MLD) is a component of the Internet Protocol Version 6 (IPv6) suite. MLD is used by IPv6 routers for discovering multicast listeners on a directly attached link, much like IGMP is used in IPv4. MLD uses ICMPv6 messaging in contrast to IGMP's bare IP encapsulation. For more information, see the mld CLI statement.

Junos Fusion supports multicast and broadcast packet replication on the aggregation device and the satellite devices. For more information on multicast replication, see "Understanding Multicast Replication in a Junos Fusion" on page 878.

BGP MVPN on Junos Fusion Provider Edge

BGP multicast VPN (MVPN) is a method for implementing multiprotocol multicast services on a BGP MPLS Layer 3 VPN. BGP MVPNs use existing BGP and MPLS VPN infrastructure to support multicast traffic between sets of senders and sets of receivers. Junos Fusion supports the connection of BGP-based multicast VPN CE devices on the extended ports of the satellite device. For more information, see *Configuring BGP MVPNs*.

VPN Protocols Supported on Junos Fusion Provider Edge

You can configure the following VPN protocols on satellite device extended ports:

NOTE: Extended ports on satellite devices can only be configured as customer edge (CE) router interfaces in a VPN. Provider edge (PE) router interfaces must be configured directly on the native port of the aggregation device.

Layer 2 Circuits on Junos Fusion Provider Edge

You can configure a local switching interface to ignore the MTU configuration set for an associated physical interface. This enables you to bring up a circuit between two logical interfaces that are defined on physical interfaces with different MTU values. For more information, see the Configuring Interfaces for Layer 2 Circuits Overview.

Layer 2 VPNs on Junos Fusion Provider Edge

Layer 2 VPNs provide communication between a provider network and a customer network. Provider edge routers or PEs at the edge of a provider network communicate with each customer edge or CE router. Customers configure their routers to carry all Layer 3 traffic, while the service provider needs to know only how much traffic the Layer 2 VPN needs to carry. For more information, see the Layer 2 VPNs and VPLS User Guide for Routing Devices.

Layer 3 VPNs on Junos Fusion Provider Edge

Layer 3 VPNs also provide communication between a provider network and a customer network. However, in a Layer 3 VPN, routing occurs on the service provider's router. Therefore, Layer 3 VPNs require more configuration on the part of the service provider, because the service provider's PE routers must store and process the customer's routes. For more information, see the Layer 3 VPNs User Guide for Routing Devices.

VPLS on Junos Fusion Provider Edge

Virtual Private LAN Service (VPLS) provides Ethernet-based multipoint to multipoint communication over IP or MPLS networks. It allows geographically dispersed sites to share an Ethernet broadcast domain by connecting sites with pseudowires. The technologies that can be used as pseudowire can be Ethernet over MPLS, L2TPv3 or even GRE. For more information, see the Layer 2 VPNs and VPLS User Guide for Routing Devices.

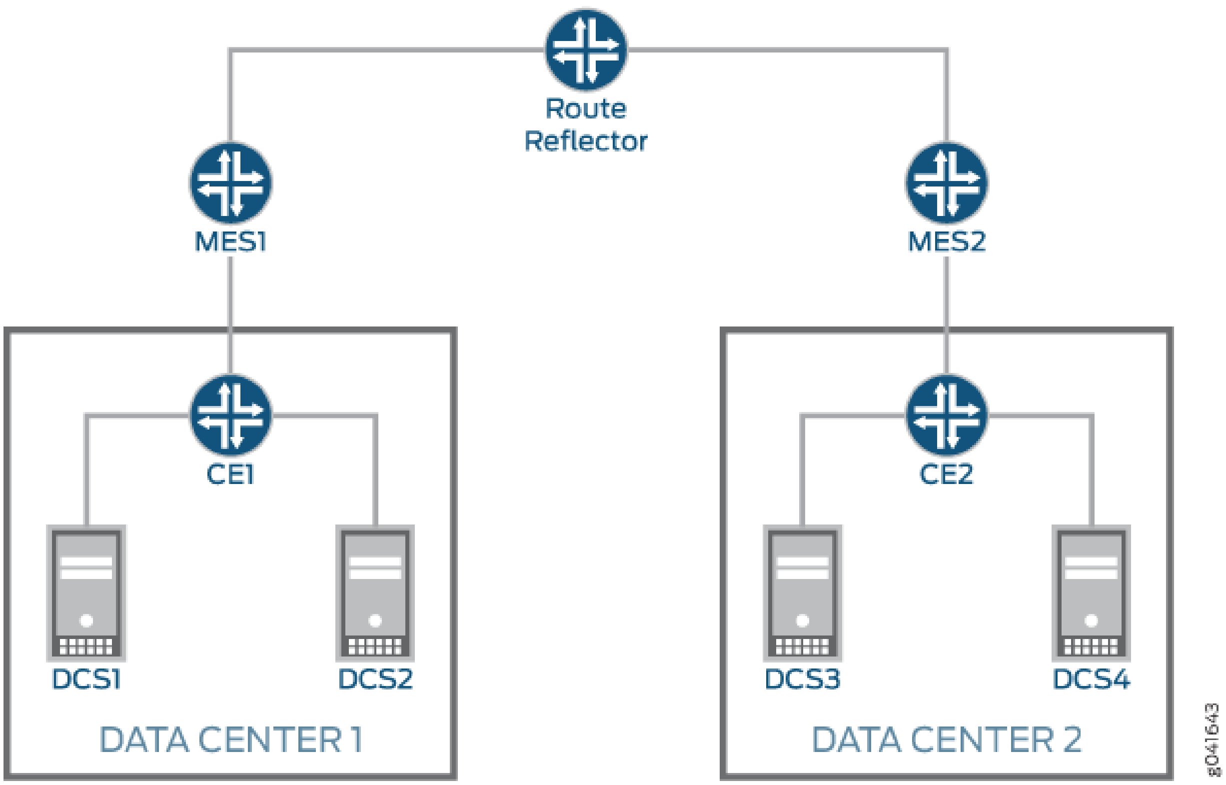
EVPN with VXLAN

You can configure ports on the satellite devices managed by MX Series routers to support Ethernet VPNs (EVPNs) with Virtual Extensible LAN (VXLAN) encapsulation. EVPN provides layer 2 VPN services with advance multi-homing capabilities by using the BGP control plane to distribute routes over IP or IP/MPLS backbone. VXLAN is a tunneling scheme that overlays layer 2 ethernet frames on top of layer 3 UDP packets. EVPN with VXLAN encapsulation allows you to create a logical network for hosts that span across a physical network and supports up to 16 million VXLAN segments. For more information on EVPN and VXLAN, see *Understanding EVPN with VXLAN Data Plane Encapsulation*.

EVPN-MPLS

An Ethernet VPN (EVPN) enables you to connect dispersed customer sites using a Layer 2 virtual bridge. EVPN-MPLS extends layer 2 VPN services over an MPLS network. It consists of customer edge (CE) devices connecting to MPLS edge switches, often provider edge (PE) devices that provide MPLS label functionality, EVPN-MPLS Junos Fusion Provider Edge supports connecting a customer edge (CE) on the extended ports of the satellite device. Figure 8 on page 41 shows a typical EVPN deployment. For more information on EVPN-MPLS, see *EVPN Overview*.

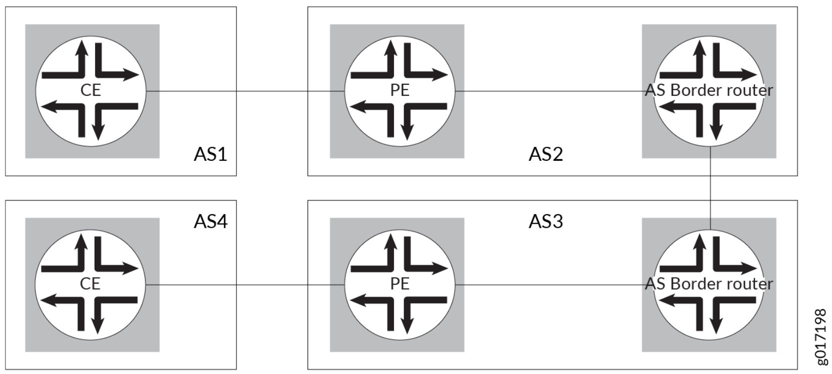
Figure 8: EVPN-MPLS Network



Interprovider and Carrier-of-Carrier VPNs

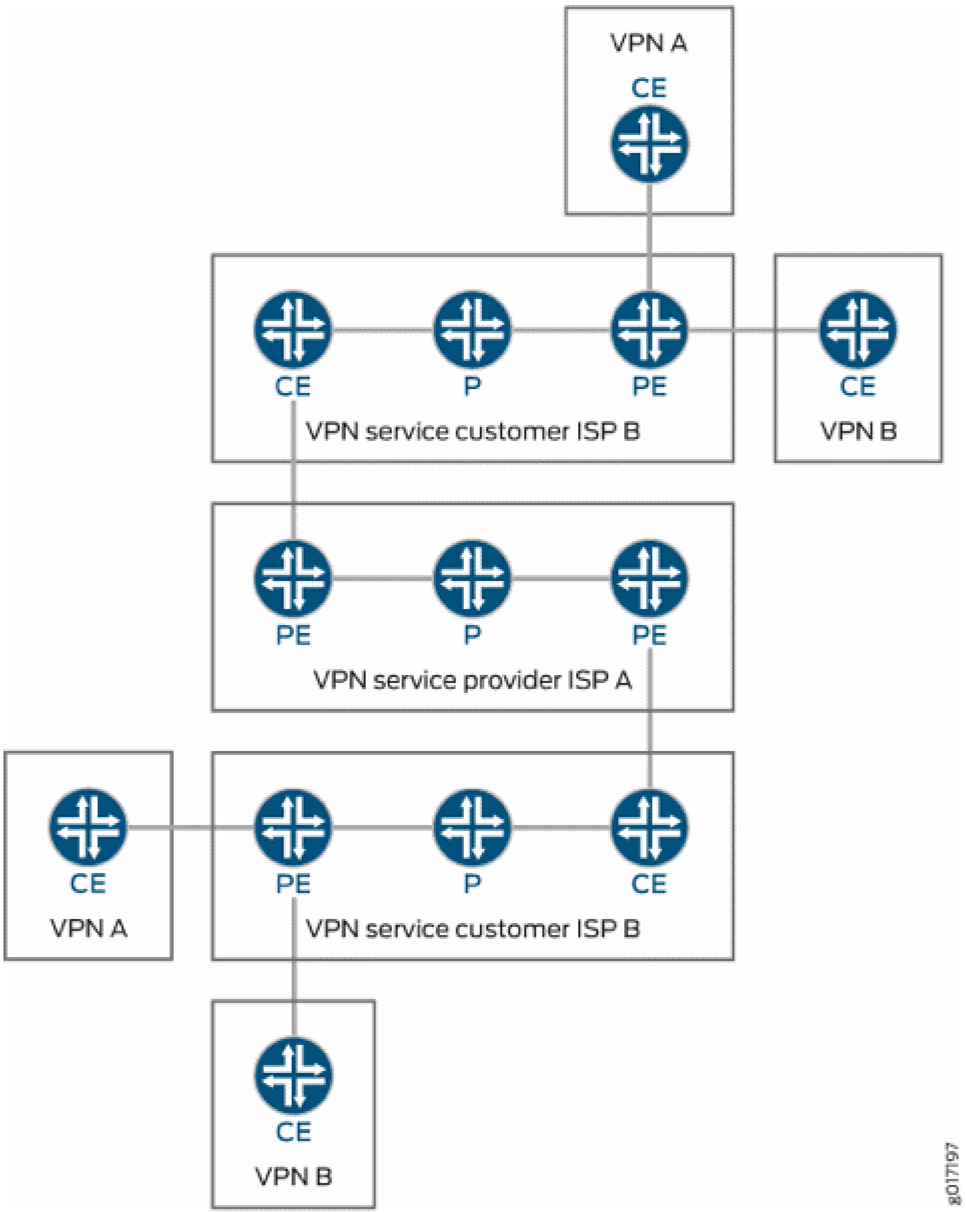
Interprovider VPNs provide connectivity between separate ASs. This functionality is used by a VPN customer who has connections to several different service providers, or different connections to the same service provider in different geographic regions, each of which has a different AS. For Interprovider VPNs, Junos Fusion only supports intra-AS connection on a Autonomous System Border Router (ASBR) to the extended port. For example, in Figure 9 on page 42, extended ports can only be used on the ASBR towards the PE router within each AS.

Figure 9: Inteprovider VPN Network Topology



Carrier-of-Carrier VPN service describes a hierarchical VPN (also known as a recursive VPN) model where one carrier (VPN service customer) transports their VPN traffic inside another carrier's VPN (VPN service provider). Figure 10 on page 43 shows the carrier-of-carrier model with a VPN service provider (ISP A) and a VPN service customer (ISP B). The VPN service provider is the backbone network carrier and provides VPN support for the VPN service customers. Junos Fusion PE currently supports PE routers for VPN service customers. In 21.1R1, Junos Fusion PE also supports PE routers for VPN service providers. VPN-IPv4 addresses for the VPN service customer are treated as external routes by the VPN service provider and are not imported into the VPN service provider's VRF table. The VPN service provider uses MPLS to route the VPN traffic, so it must be configured on the VPN service provider network. The VPN service customer only needs to configure MPLS in the CE device that is connected to the PE device of the VPN service provider. You can connect routers for Internet Service Provider as the customer and VPN Service Provider as the customer on the extended port.

Figure 10: Carrier-of-Carriers VPN Model



Junos Fusion Provider Edge supports 6vPE in both interprovider and carrier-of-carrier VPNs. For more information, see *Interprovider and Carrier-of-Carriers VPNs*.

RELATED DOCUMENTATION

Local Switching on Junos Fusion Provider Edge

IN THIS SECTION

Junos Fusion supports packet forwarding both on the aggregation device and on satellite devices. The default behavior is to forward the packets received on the extended port to the aggregation device. The satellite device does not perform any processing on the incoming traffic. The aggregation device processes and directs the data traffic.

Local switching in Junos Fusion reduces the traffic that is exchanged between satellite devices and the aggregation device by handling some of the local switching. When you enable local switching, the satellite device handles the bridging traffic locally on the satellite device. The satellite device maintains a bridge forwarding table with the local MAC addresses for devices that are connected directly to the satellite device and forwards the data packets with local MAC addresses. Packets with unknown MAC addresses are sent to the aggregate device. Local switching applies to all the ports on the satellite device.

To configure local switching on a satellite device, include the **local-switching** statement in the forwarding options hierarchy:

```
[edit forwarding-options]
satellite {
    fpc slot {
        local-switching;
    }
}
```

Selective VLAN Local Switching

In some cases, you might want to enable local switching for only a select number of VLANs on the satellite device–for example, offloading data traffic based on the type of service. This will allow you to control traffic more precisely. To enable selective VLAN local switching on a satellite device, include selected VLANs in a virtual switch routing instance. VLANs that are not included in the routing instance will default to forwarding data packets to the aggregate device.

To configure selective VLAN local switching on a satellite device, include the **selective-vlan-switching** statement in the forwarding options hierarchy with a virtual switch routing instance:

```
[edit forwarding-options]
satellite {
    fpc slot {
        selective-vlan-switching {
            routing-instance routing-instance-name;
        }
    }
}
```

When you have digital subscriber line access multiplexer (DSLAM) ports and broadband network gateway (BNG) ports on a satellite device, you should configure the satellite device to switch traffic locally from the DSLAM ports to the BNG port while restricting the traffic between two DSLAM ports. Configure the satellite device to switch traffic locally from a DSLAM port to a BNG port by including the **core-facing** keyword in all BNG port interfaces. Restrict switched traffic between DSLAM ports by including the **no-local switching** keyword in the bridge domain.

Policer

Traffic policing enables you to control the maximum rate of traffic that will be sent or received on an interface. A policer defines a set of traffic rate limits and sets the action for traffic that does not conform to the configured limits. Packets in a traffic flow that do not conform to traffic limits are either discarded or are marked with a different forwarding class or packet loss priority (PLP) level.

You can limit the flow of Layer 2 traffic that is sent to the aggregation device by applying an ingress policer at the satellite device. You configure the Layer 2 ingress policer by using the **input-policer** statement at the **[edit interfaces interface-name layer2-policer]** hierarchy level. Because the satellite device is only aware of locally switched logical interface, the ingress policer is applied to Layer 2 input traffic at the satellite device ports.

Example: Configuring Selective VLAN Local Switching

In this configuration example, the satellite device is configured with the following options:

- VLANs 101, 102, 103, and 104 are enabled for selective VLAN local switching.
- VLAN 101 and 102 have DSLAM traffic.
- Interface xe-100/0/0 is a BNG port.
- Interfaces xe-100/0/1 and xe-100/0/2

```
interfaces {
    xe-100/0/0 {
        unit 0 {
            family bridge {
                interface-mode trunk;
                vlan-id-list [100-110];
                core-facing;
            }
        }
    }
    xe-100/0/1 {
        layer2-policer {
            input-policer SD-policer-A;
        }
        unit 0 {
            family bridge {
                interface-mode trunk;
                vlan-id-list [100-110];
            }
        }
    }
    xe-100/0/2 {
        layer2-policer {
            input-policer SD-policer-A;
        }
        unit 0 {
            family bridge {
                interface-mode trunk;
                vlan-id-list [100-110];
            }
        }
```

```
    }
}
```

```
routing-instances {
    vs-1 {
        instance-type virtual-switch;
        interface xe-100/0/0.0;
        interface xe-100/0/2.0;
        interface xe-100/0/2.0;
        bridge-domains {
            bd-1 {
                vlan-id 101;
                no-local-switching;
            }
            bd-2 {
                vlan-id 102;
                no-local-switching;
            }
            bd-3 {
                vlan-id 103;
            }
            bd-4 {
                vlan-id 104;
            }
        }
    }
    forwarding-options {
        satellite {
            fpc 100 {
                sd-vlan-switching {
                    routing-instance vs-1;
                }
            }
        }
    }
}
```

RELATED DOCUMENTATION

Two-Color Policer Configuration Overview

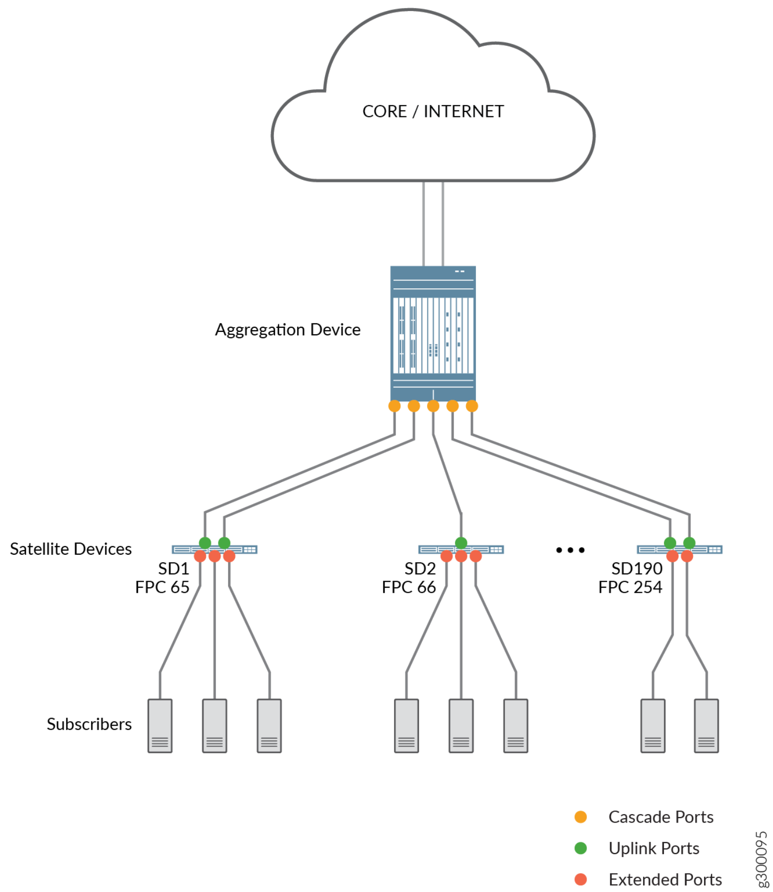
Broadband Subscription Services on Junos Fusion

IN THIS SECTION

Starting in Junos OS Release 18.4R1, Junos Fusion Provider Edge supports Broadband Edge Subscriber Management. The aggregation device in Junos Fusion functions as Broadband Network Gateway (BNG) while the extended ports on the satellite devices function as ports on the BNG. From the standpoint of a broadband network, the extended ports appear to be local physical ports and follow the Junos Fusion naming convention for port interfaces. The Satellite device is identified with a Flexible PIC Concentrator (FPC) ID and the extended ports use the FPC ID as part of the interface name.

Figure 11 on page 49 illustrates a basic subscriber network on a Junos Fusion Provider Edge. The first satellite device (satellite device 1) off the cascade port is identified with a FPC ID of 65 with the first extended port on satellite device 1 named as xe-65/0/0.

Figure 11: Broadband Network Gateway on Junos Fusion



NOTE:
BNG on Junos Fusion Provider Edge is supported only with a MX204, MX240, MX480, MX960, MX2010, MX2020, or MX10003 Universal Routing Platform as an aggregation device with EX4300, QFX5100, QFX5110, or QFX5200 switches as satellite devices.

BNG on Junos Fusion Provider Edge supports the following:

- DHCP and PPPoE Subscribers.
- Static and Dynamic VLANs.

- Full support for broadband subscriber firewall services.
- Non-Fusion broadband subscribers are also supported on the aggregation device. This means that the customer premise equipment can connect directly to the MX router.
- Deep packet inspections of layer 4 through layer 7 payloads.
- Lawful-intercept.

BNG on Junos Fusion Provider Edge has the following limitations:

- Support for satellite Devices with only a single connection to a cascade port on aggregation device.
- Port mirroring is not supported.
- The line rate of the cascade port limits the number of extended ports that can be provisioned. To prevent oversubscription on a Junos Fusion, we recommend that you do not provision the sum of the bandwidth for the ports on the satellite device to exceed the bandwidth of the cascade port.

For more information on configuring, provisioning, and managing broadband subscribers, see Junos OS Broadband Subscriber Management and Services Library

Benefits of Broadband Subscription on Junos Fusion

Broadband subscription support on Junos Fusion allows you to use a single point of management on an aggregation device to configure and manage a large number of network-facing subscriber interfaces to operate as a group on satellite devices. As your network grows, you can easily expand the size of your subscriber access network by adding satellite devices as they are needed. Junos Fusion supports both Broadband Subscribers and Non-Fusion broadband subscribers on the aggregation device. Existing Junos Fusion deployments can migrate to Broadband Subscriber management gradually by adding new subscribers to current Junos Fusion Provider Edge deployment while adding new satellite devices.

RELATED DOCUMENTATION

Understanding CoS on an MX Series Aggregation Device in Junos Fusion Provider Edge | 930

CHAPTER 2

Junos Fusion Provider Edge Configuration

IN THIS CHAPTER

Configuring Junos Fusion Provider Edge

IN THIS SECTION

This topic provides the instructions needed to configure a Junos Fusion Provider Edge. The instructions in this topic can also be used to add a new satellite device to a Junos Fusion Provider Edge after initial installation. It covers:

Preparing the Aggregation Device

This section provides instructions on the required steps to prepare a switch to become the aggregation device in a Junos Fusion Provider Edge.

This section does not discuss the cascade port, FPC slot identification, or the software upgrade group configuration, which are important elements of preparing your aggregation device for a Junos Fusion

Provider Edge installation and are discussed in "Configuring the Cascade Ports on the Aggregation Device" on page 53, "Configuring the FPC Slot Identifiers" on page 54, and "Configuring Software Upgrade Groups on the Aggregation Device" on page 55. The instructions for adding satellite devices to the Junos Fusion Provider Edge are also provided later in this topic.

To prepare your aggregation device for a Junos Fusion Provider Edge:

1. Enable Enhanced IP:

```
[edit]
user@aggregation-device# set chassis network-services enhanced-ip
```

2. Configure the Junos Fusion into single home mode:

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

> **NOTE**: Configuring the Junos Fusion into single home mode using this step is optional when the aggregation device is running Junos OS Release 14.2R5 or later.
>
> Configuring the Junos Fusion into single home mode is required when the aggregation device is running Junos OS Release 14.2R3 or 14.2R4.

3. Commit the configuration to both Routing Engines:

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

   If you are using an aggregation device with a single Routing Engine:

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

4. Ensure your aggregation device is running a version of Junos OS software that is compatible with Junos Fusion Provider Edge, such as Junos OS Release 14.2R3 or later. If the aggregation device does not have the correct version installed, upgrade your aggregation device.

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

5. Reboot both Routing Engines:

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

A reboot is required to enable enhanced IP.

If you only want to reboot a single Routing Engine:

```
user@aggregation-device> request system reboot
```

Reboot the other Routing Engine at a later time to ensure it is ready to manage the Junos Fusion in the event of a Routing Engine switchover.

Configuring the Cascade Ports on the Aggregation Device

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

A cascade port must be configured before a satellite device is recognized by the Junos Fusion Provider Edge. Cascade port configuration, therefore, is always a required step for configuring a Junos Fusion Provider Edge.

To configure a cascade port or ports:

1. Log in to the aggregation device.
2. Configure the interface on the aggregation device side of the link into 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
```

3. Commit the configuration:

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

If you want to commit the configuration to both Routing Engines:

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

Configuring the FPC Slot Identifiers

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 it's interface name. The range for the FPC ID is 100 -255 in Junos OS Release 14.2 and 65 to 254 in Junos OS Release 16.1 and later.

A Junos Fusion Provider Edge 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. Both options are discussed in "Understanding Junos Fusion Provider Edge Components" on page 5.

- To configure the FPC slot ID using connectivity-based FPC identification, 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
  ```

- To configure the FPC slot ID using unique-ID based FPC identification, use one of the following options:

- To map the FPC slot ID to a 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 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
```

- To map the FPC slot ID to a 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 functions as the FPC slot identifier.

For example, to map FPC slot ID to the satellite device using MAC address 12:34:56:AB:CD:EF:

```
[edit]
user@aggregation-device# set chassis satellite-management fpc 110 system-id 12:34:56:AB:CD:EF
```

If a prospective satellite device is connected to a Junos Fusion Provider Edge without having a configured FPC slot ID, the prospective satellite device does not participate in the Junos Fusion Provider Edge 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 Provider Edge due to an FPC ID association issue.

Configuring Software Upgrade Groups on the Aggregation Device

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 device is connected to a satellite device that is using an FPC ID that is part of a satellite software upgrade group, the device—unless it is already running the same version of satellite software—upgrades its satellite software using the satellite software associated with the satellite software upgrade group.

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 only a few satellite devices are updated at a time to minimize the effects of a traffic disruption due to too many satellite devices upgrading software simultaneously.

The two most common methods of installing satellite software onto an aggregation 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 configured and managed from the aggregation device.

To configure a software upgrade group:

1. Log in to the aggregation device.
2. Create the software upgrade group, and add the satellite devices to the 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 FPC slot ID number or range of numbers, of the satellite devices that are being added to the upgrade group. If you enter an existing upgrade group name as the *upgrade-group-name*, you add new satellite devices 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
```

3. 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 4.

4. Associate a satellite software package with the 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-1.0R1.1-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-1.0R1.1-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.

Preparing the Satellite Device

This section discusses the steps that must be performed on a standalone switch before converting it into a satellite device in a Junos Fusion Provider Edge.

To perform this procedure:

These instructions assume your device is already running Junos OS Release 14.1X53-D16 or later.

1. Log in to the device using the console port.
2. 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 in to 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, login using the console port.

3. (EX4300 switches only) After the reboot is complete, convert the built-in 40-Gbps QSFP+ interfaces 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 QSFP+ interfaces 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
```

This step is required for the 40-Gbps QSFP+ interfaces that will be used as uplink interfaces in a Junos Fusion.

This step is needed because the built-in 40-Gbps QSFP+ interfaces on EX4300 switches are configured into VCPs by default, and the default settings are restored after the device is zeroized.

The number of built-in 40-Gbps QSFP+ interfaces varies by EX4300 switch model. See *EX4300 Switches Hardware Overview*.

Adding Satellite Devices to the Junos Fusion Provider Edge

IN THIS SECTION

This section discusses the processes for adding satellite devices to a Junos Fusion Provider Edge.

A switch must be running the satellite software to operate as a satellite device. The instructions in this procedure include the required steps to install the satellite software onto your satellite device.

You can add satellite devices to your Junos Fusion Provider Edge using one of the following procedures:

Autoconverting a Switch into a Satellite Device

Use this procedure to automatically configure a switch into a satellite device when it is cabled into the aggregation device.

You can use the autoconversion procedure to add one or more satellite devices to your Junos Fusion topology. The autoconversion procedure is especially useful when you are adding multiple satellite devices to your Junos Fusion, because it allows you to easily configure the entire topology before or after cabling the satellite devices to the aggregation devices.

Before you begin:

- Ensure that your aggregation device is running Junos OS Release 14.2R3 or later, and that the satellite devices are running Junos OS Release 14.1X53-D16 or later.
- Ensure that you have prepared your satellite device for the installation, following the instructions in "Preparing the Satellite Device" on page 57.

To autoconvert a switch into a satellite device:

1. Cable a link between the aggregation device and the satellite device, if desired.

   NOTE: You can cable the aggregation device to the satellite device at any point in this procedure.

When the aggregation device is cabled to the satellite device during this procedure, the process for converting a switch into a satellite device to finalize this process occurs immediately.

If the aggregation device is not cabled to the satellite device, the process for converting a switch into a satellite device to finalize this process starts when the satellite device is cabled to the aggregation device.

2. Log in to the aggregation device.
3. Configure the cascade ports. See "Configuring the Cascade Ports on the Aggregation Device" on page 53.

   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
```

4. Associate an FPC slot ID with each satellite device.

   There are multiple methods of assigning FPC slot IDs. See "Configuring the FPC Slot Identifiers" on page 54.

   Examples:

   - 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
```

   - 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
```

   - To map FPC slot ID to the satellite device using MAC address 12:34:56:AB:CD:EF:

```
[edit]
user@aggregation-device# set chassis satellite-management fpc 110 system-id
12:34:56:AB:CD:EF
```

5. (Recommended) Configure an alias name for the satellite device:

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

where *slot-id* is the FPC slot ID of the satellite device defined in the previous step, and *alias-name* is the alias.

For example, to configure the satellite device numbered 101 as **qfx5100-48s-1**:

```
[edit]
user@aggregation-device# set chassis satellite-management fpc 101 alias qfx5100-48s-1
```

6. Configure an FPC slot ID into a software upgrade group. See "Configuring Software Upgrade Groups on the Aggregation Device" on page 55.

For example, to add the satellite device using FPC slot ID 101 to an existing software group named **group1**, or create a software upgrade group named **group1** and add the satellite device using FPC slot 101 to the software upgrade group:

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

If you are creating a new software upgrade group in this step, you also need to associate the group with a satellite software image. You can skip this final step if the software upgrade group has already been created and a satellite software package association exists.

The configuration with the satellite software upgrade group must be committed before a satellite software image is associated with a satellite software upgrade group:

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

After committing the configuration, associate a satellite software image named **satellite-1.0R1.1-signed.tgz** to the upgrade group named **group1**:

```
user@aggregation-device> request system software add /var/tmp/satellite-1.0R1.1-signed.tgz
upgrade-group group1
```

7. Enable automatic satellite conversion:

```
[edit]
user@aggregation-device# set chassis satellite-management auto-satellite-conversion satellite slot-id
```

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

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

8. Commit the configuration:

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

If you want to commit the configuration to both Routing Engines:

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

The satellite software upgrade on the satellite device begins after this final step is completed, or after you cable the satellite device to a cascade port using automatic satellite conversion if you have not already cabled the satellite device to the aggregation device.

After the satellite software update, the switch operates as a satellite device in the Junos Fusion.

Manually Converting a Switch into a Satellite Device

Use this procedure to manually convert a switch into a satellite device after cabling it into the Junos Fusion Provider Edge.

This procedure should be used to convert a switch that is not currently acting as a satellite device into a satellite device. A switch might not be recognized as a satellite device for several reasons, including that the device was not previously autoconverted into a satellite device or that the switch had previously been reverted from a satellite device to a standalone switch.

Before you begin:

- Ensure that your aggregation device is running Junos OS Release 14.2R3 or later, and that the switches that will become satellite devices are running Junos OS Release 14.1X53-D16 or later.

- Ensure that you have prepared your switches that will become satellite devices for the installation, following the instructions in the "Preparing the Satellite Device" on page 57 section.

To manually convert a switch into a satellite device:

1. Cable a link between the aggregation device and the satellite device.
2. Log in to the aggregation device.
3. Configure the link on the aggregation device into a cascade port, if you have not done so already. See "Configuring the Cascade Ports on the Aggregation Device" on page 53.

   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
   ```

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

   There are multiple methods of assigning FPC slot IDs. See "Configuring the FPC Slot Identifiers" on page 54.

   Examples:

   - 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
     ```

   - 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
     ```

   - To map FPC slot ID to the satellite device using MAC address 12:34:56:AB:CD:EF:

     ```
     [edit]
     user@aggregation-device# set chassis satellite-management fpc 110 system-id
     12:34:56:AB:CD:EF
     ```

5. Configure the interface on the aggregation device into a software upgrade group. See "Configuring Software Upgrade Groups on the Aggregation Device" on page 55.

For example, to add the satellite device using FPC slot ID 101 to an existing software group named **group1**, or create a software upgrade group named **group1** and add the satellite device using FPC slot 101 to the software upgrade group:

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

If you are creating a new software upgrade group in this step, you also need to associate the group with a satellite software image. You can skip this final step if the software upgrade group has already been created and a satellite software package association exists.

The configuration with the satellite software upgrade group must be committed before a satellite software image is associated with the satellite software upgrade group:

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

After committing the configuration, associate a satellite software image named **satellite-1.0R1.1-signed.tgz** to the upgrade group named **group1**:

```
user@aggregation-device> request system software add /var/tmp/satellite-1.0R1.1-signed.tgz
upgrade-group group1
```

6. Commit the configuration:

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

If you want to commit the configuration to both Routing Engines:

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

7. Manually configure the switch into a satellite device:

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

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
```

The satellite software upgrade on the satellite device begins after this final step is completed.

After the satellite software update, the switch operates as a satellite device in the Junos Fusion Provider Edge.

Configuring a Switch into a Satellite Device Before Interconnecting It into a Junos Fusion Provider Edge

Before you begin:

- Ensure that your switch that will become a satellite device is running Junos OS Release 14.1X53-D16 or later. See Installing Software Packages on QFX Series Devices for information on upgrading Junos OS on your device.
- Ensure that you have copied the satellite software onto the device that will become a satellite device.

Use this procedure to install the satellite software onto a switch before interconnecting it into the Junos Fusion Provider Edge as a satellite device. Installing the satellite software on a switch before interconnecting it into the Junos Fusion Provider Edge allows you to more immediately deploy the switch as a satellite device by avoiding the downtime associated with the satellite software installation procedure in the Junos Fusion Provider Edge.

You can manually install the satellite software onto a switch by entering the following command:

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

For instance, to install the satellite software package **satellite-1.0R1.1-signed.tgz** stored in the **/var/tmp/** folder on the switch:

```
user@satellite-device> request chassis device-mode satellite /var/tmp/satellite-1.0R1.1-signed.tgz
```

The device will reboot to complete the satellite software installation.

After the satellite software is installed, follow this procedure to connect the switch into the Junos Fusion Provider Edge:

1. Log in to the aggregation device.
2. Configure the link on the aggregation device into a cascade port, if you have not done so already. See "Configuring the Cascade Ports on the Aggregation Device" on page 53.

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 assigning FPC slot IDs. See "Configuring the FPC Slot Identifiers" on page 54.

   Examples:

   - 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
     ```

   - 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
     ```

   - To map FPC slot ID to the satellite device using MAC address 12:34:56:AB:CD:EF:

     ```
     [edit]
     user@aggregation-device# set chassis satellite-management fpc 110 system-id
     12:34:56:AB:CD:EF
     ```

4. Configure the satellite switch into a satellite software upgrade group that is using the same version of satellite software that was manually installed onto the switch. See "Configuring Software Upgrade Groups on the Aggregation Device" on page 55.

   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 a link between the aggregation device and the satellite device.

RELATED DOCUMENTATION

Verifying Connectivity, Device States, Satellite Software Versions, and Operations in a Junos Fusion

Understanding Junos Fusion Provider Edge Components | 5

Understanding Software in a Junos Fusion Provider Edge | 21

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 | **51**

Configuring or Expanding a Junos Fusion Enterprise

CHAPTER 3

Junos Fusion Provider Edge Configuration Statements

IN THIS CHAPTER

aging-timer (Junos Fusion)

IN THIS SECTION

Syntax

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

Hierarchy Level

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

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

alarm (Satellite Policies)

IN THIS SECTION

Syntax

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

Hierarchy Level

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

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

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

Understanding Satellite Policies in a Junos Fusion

alias (Junos Fusion)

IN THIS SECTION

Syntax

```
alias alias;
```

Hierarchy Level

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

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

auto-satellite-conversion (Junos Fusion)

IN THIS SECTION

Syntax

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

Hierarchy Level

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

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" on page 51 or Configuring or Expanding a Junos Fusion Enterprise.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

cascade-port

IN THIS SECTION

Syntax

```
cascade-port;
```

Hierarchy Level

```
[edit interfaces interface-name]
```

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" on page 51 or Configuring or Expanding a Junos Fusion Enterprise.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

cascade-ports

IN THIS SECTION

Syntax

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

Hierarchy Level

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

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" on page 5 or Understanding Junos Fusion Enterprise Components.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

description (Junos Fusion)

IN THIS SECTION

Syntax

```
description description;
```

Hierarchy Level

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

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

environment-monitoring-policy (satellite-management)

IN THIS SECTION

Syntax

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

Hierarchy Level

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

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

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

Understanding Satellite Policies in a Junos Fusion

environment-monitoring-policy (satellite-policies)

IN THIS SECTION

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]
```

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

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

Understanding Satellite Policies in a Junos Fusion

fpc (Junos Fusion)

IN THIS SECTION

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]
```

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 Enterprise or Junos Fusion Provider Edge, the *slot-id* must have a value of 34 or greater.

> **NOTE**: MPC10E and MPC11E are not supported in Junos Fusion, but can coexist with other MPC line cards in the MX router chassis that conncect to satellite devices. When using MPC10E/MPC11E line cards in an MX series router that is supporting Junos Fusion, you must use a value range of 160 - 252 as the FPC identifier for the satellite device interfaces.
>
> Junos Fusion does not support the hyper mode feature, so you must also use the **set forwarding-options no-hyper-mode** statement.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

local-switching and **selective-vlan-switching** introduced in Junos OS Release 17.2R1 for Junos Fusion Provider Edge.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

linkdown (satellite-policies alarm)

IN THIS SECTION

Syntax

```
linkdown [ignore | red | yellow]
```

Hierarchy Level

```
[edit policy-options satellite-policies environment-monitoring-policy policy-
name alarm]
```

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

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

Understanding Satellite Policies in a Junos Fusion

network-services

IN THIS SECTION

Syntax

```
network-services (ethernet | enhanced-ethernet | ip | enhanced-ip | lan);
```

Hierarchy Level

```
[edit chassis]
```

Description

Set the router's network services to a specific mode of operation. On MX240, MX480, and MX960 routers, MPC5E and MPC7E power on only if the network services mode configured is **enhanced-ip** or **enhanced-ethernet**.

MX2010 and MX2020 support only **enhanced-ip** and **enhanced-ethernet** network services modes.

Default

- MX80, MX104, MX2010, MX2020—**enhanced-ip**
- MX240, MX480, MX960—**ip**

Options

ethernet—Set the router's network services to Ethernet and use standard, compiled firewall filter format.

enhanced-ethernet—Set the router's network services to enhanced Ethernet and use enhanced mode capabilities. Only MPCs and MS-DPCs are powered on in the chassis.

ip—Set the router's network services to Internet Protocol and use standard, compiled firewall filter format.

enhanced-ip—Set the router's network services to enhanced Internet Protocol and use enhanced mode capabilities. Only MPCs and MS-DPCs are powered on in the chassis. Non-service DPCs do not work with enhanced network services mode options. This feature is enabled by default on MX80, MX104, MX2010, and MX2020 Universal Routing Platforms.

lan—Set the router's network services to LAN and use standard, compiled firewall filter format. Reboot the system after setting the router's network services to LAN.

Required Privilege Level

interface—To view this statement in the configuration.

interface-control—To add this statement to the configuration.

Release Information

Statement introduced before Junos OS Release 8.5.

enhanced-ethernet and **enhanced-ip** options introduced in Junos OS Release 11.4.

limited-ifl-scaling option introduced in Junos OS Release 15.1R3 for MX Series routers.

RELATED DOCUMENTATION

- Network Services Mode Overview
- Firewall Filters and Enhanced Network Services Mode Overview
- Configuring Junos OS to Run a Specific Network Services Mode in MX Series Routers
- Configuring Enhanced IP Network Services for a Virtual Chassis
- Limiting the Maximum Number of Logical Interfaces on MX Series Routers With MS-DPCs in Enhanced IP Network Services Mode

satellite (Junos Fusion Automatic Satellite Conversion)

IN THIS SECTION

Syntax

```
satellite [slot-id | range | all];
```

Hierarchy Level

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

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 or "Configuring Junos Fusion Provider Edge" on page 51.

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 or "Configuring Junos Fusion Provider Edge" on page 51.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51

Configuring or Expanding a Junos Fusion Enterprise

satellite (Junos Fusion Satellite Software Upgrade Groups)

IN THIS SECTION

Syntax

```
satellite [slot-id | range | all];
```

Hierarchy Level

```
[edit chassis satellite-management upgrade-groups upgrade-group-name]
```

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

satellite-management (Junos Fusion)

IN THIS SECTION

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;
        }
    }
    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;
            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]
```

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.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

serial-number (Junos Fusion)

IN THIS SECTION

Syntax

```
serial-number serial-number;
```

Hierarchy Level

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

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 or "Understanding Junos Fusion Provider Edge 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.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

Statement introdcued in Junos OS Release 16.1R1 for Junos Fusion Enterprise.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

selective-vlan-switching

IN THIS SECTION

Syntax

```
selective-vlan-switching {
    routing-instance routing-instance;
}
```

Hierarchy Level

```
[edit forwarding-options satellite fpc],
```

Description

Enables local switching for only a select number of VLANs on the satellite device.

Options

routing-instance	Configure routing instance.

Required Privilege Level

admin—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 17.2R1.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51

single-home (Junos Fusion)

IN THIS SECTION

Syntax

```
single-home {
    satellite [slot-id |slot-id-range | all];
}
```

Hierarchy Level

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

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

Statement introdcued in Junos OS Release 16.1R1 for Junos Fusion Enterprise.

RELATED DOCUMENTATION

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Configuring or Expanding a Junos Fusion Enterprise

system-id (Junos Fusion)

IN THIS SECTION

Syntax

```
system-id mac-address;
```

Hierarchy Level

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

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" on page 5 or Understanding Junos Fusion Enterprise 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.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

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term (satellite-policies)

IN THIS SECTION

Syntax

```
term term-name{
    from {
        product-modelmodel-name;
    }
}
```

Hierarchy Level

```
[edit policy-options satellite-policies candidate-uplink-policy policy-name],
[edit policy-options satellite-policies environment-monitoring-policy policy-
name],
[edit policy-options satellite-policies forwarding-policy policy-name]
```

Description

Create and configure a term in a candidate uplink satellite policy, an environment monitoring satellite policy, or a forwarding policy satellite policy, within a satellite policy.

A term in a candidate uplink policy, an environment monitoring policy, or a forwarding policy for satellite devices is used to apply the policy to certain satellite devices only. The more complex options that are available for other policies in Junos OS—such as the terms available for routing policies—are not available for satellite policies.

The actions of a candidate uplink satellite policy, an environment monitoring satellite policy, or forwarding-policy satellite policy are defined at the [**edit policy-options satellite-policies candidate-uplink-policy *policy-name*** , [**edit policy-options satellite-policies environment-monitoring-policy *policy-name***], and [**edit policy-options satellite-policies forwarding-policy *policy-name***hierarchy levels.

Options

term *term-name*	Specifies the user-defined name of the term. A *term* is a named structure in which match conditions and actions are defined. A candidate uplink policy or environment monitoring policy can contain multiple terms. The term name can contain letters, numbers, and hyphens (-) and can be up to 255 characters long. To include spaces in the name, enclose the entire name in double quotation marks.
from	(Optional) Defines the match criteria for the satellite policy. The only match criteria available for a satellite policy is the product model. If you omit the **from** option, the satellite policy is applied globally.
product-model *model-name*	Defines the product model of the satellite device that uses the satellite policy. If you want the satellite policy to apply to all EX4300 switches in the satellite device role, enter **EX4300*** as the *model-name*.

If you want the satellite policy to apply to all QFX5100 switches in the satellite device role, enter **QFX5100*** as the *model-name*.

Required Privilege Level

admin—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 14.2R3.

Statement introduced in Junos OS Release 16.1R1 for Junos Fusion Enterprise.

RELATED DOCUMENTATION

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

Understanding Satellite Policies in a Junos Fusion

upgrade-groups (Junos Fusion)

IN THIS SECTION

Syntax

```
upgrade-groups upgrade-group-name {
    satellite [slot-id | range | all];
}
```

Hierarchy Level

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

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 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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

Statement introdcued in Junos OS Release 16.1R1 for Junos Fusion Enterprise.

RELATED DOCUMENTATION

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CHAPTER 4

Junos Fusion Provider Edge Administration

IN THIS CHAPTER

Managing Satellite Software Upgrade Groups in a Junos Fusion

IN THIS SECTION

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" on page 51 or Configuring or Expanding a Junos Fusion Enterprise.

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" on page 51 or Configuring or Expanding a Junos Fusion Enterprise.

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" on page 51 or Configuring or Expanding a Junos Fusion Enterprise.

Modifying the Satellite Software Used by a Satellite 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.

To associate a new satellite software image with the software upgrade group:

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

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Verifying Connectivity, Device States, Satellite Software Versions, and Operations in a Junos Fusion

IN THIS SECTION

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

IN THIS SECTION

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.

```
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

IN THIS SECTION

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.

```
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

IN THIS SECTION

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

IN THIS SECTION

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

IN THIS SECTION

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

IN THIS SECTION

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

IN THIS SECTION

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

IN THIS SECTION

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 | 51

Configuring or Expanding a Junos Fusion Enterprise

Converting a Satellite Device in a Junos Fusion to a Standalone Device

IN THIS SECTION

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*.

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*.

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 *Remove 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 | 21

Understanding Software in a Junos Fusion Enterprise

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*, 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*.

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

Junos Fusion Hardware and Software Compatibility Matrices

Converting a Satellite Device in a Junos Fusion to a Standalone Device

CHAPTER 5

Junos Fusion Provider Edge Operational Commands

IN THIS CHAPTER

request chassis device-mode satellite

IN THIS SECTION

Syntax

```
request chassis device-mode satellite package-name
```

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" on page 51 or Configuring or Expanding a Junos Fusion Enterprise 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

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
```

Release Information

Command introduced in Junos OS Release 14.1X53-D16.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51

Configuring or Expanding a Junos Fusion Enterprise

request chassis satellite disable

IN THIS SECTION

Syntax

```
request chassis satellite disable
    <device-alias alias-name>
    <fpc-slot fpc-slot>
```

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

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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

request chassis satellite enable

IN THIS SECTION

Syntax

```
request chassis satellite enable
    <device-alias alias-name>
    <fpc-slot fpc-slot>
```

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

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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise

Configuring Junos Fusion Provider Edge | 51

request chassis satellite file-copy

IN THIS SECTION

Syntax

```
request chassis satellite file-copy [remote | local] <source-URL> <destination-
URL>
```

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

Sample Output

request chassis satellite file-copy

```
user@aggregation-device> request chassis satellite file-copy /var/tmp/file_name sd101:/var/tmp/
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

request chassis satellite install

IN THIS SECTION

Syntax

```
request chassis satellite install package-name
    [fpc-slot fpc-slot | device-alias device-alias]
    <no-confirm>
```

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

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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

request chassis satellite interface

IN THIS SECTION

Syntax

```
request chassis satellite interface interface-name
    device-mode satellite
```

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" on page 51 or Configuring or Expanding a Junos Fusion Enterprise.

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

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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

request chassis satellite login

IN THIS SECTION

Syntax

```
request chassis satellite login
    <fpc-slot fpc-slot>
    <interface-name interface-name>
```

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

Sample Output

request chassis satellite login fpc-slot 101

```
user@aggregation-device> request chassis satellite login fpc-slot 101
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

request chassis satellite reboot

IN THIS SECTION

Syntax

```
request chassis satellite reboot
    <fpc-slot fpc-slot>
    <range range>
```

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

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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

request chassis satellite restart

IN THIS SECTION

Syntax

```
request chassis satellite restart
    [fpc-slot fpc-slot | range range]
    <process-name>
```

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

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

request chassis satellite shell-command

IN THIS SECTION

Syntax

```
request chassis satellite shell-command
    [fpc-slot fpc-slot |range ]
    <remote-command>
```

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

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

request system software add

IN THIS SECTION

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>
```

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.

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.

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.

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.

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.

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.

In Junos OS, ***package-name*** can be either 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***.

- 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).

For Junos OS Evolved, if you are trying to reinstall an already installed application, use the **force** option. The **force** option will cause the program to remove the existing application before reinstalling it.

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. 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. The **reboot** command is not needed to install third-party applications on devices running Junos OS Evolved.
restart	(Optional) (For Junos OS Evolved only) This option allows you to upgrade the system using an application-level restart without requiring a reboot when possible. First the system determines how many applications need to restart (start with a new version), and then, after sending output to the CLI session, it restarts those applications. Restarted applications resync their state from the system. You can use the request system software validate-restart command before using the **request system software add restart** command to determine if the upgrade to the new image can be done by application-restart or if it requires a reboot.
set [*package-name1package-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" on page 21, Understanding Software in a Junos Fusion Enterprise, and *Managing Satellite Software Upgrade Groups in a Junos Fusion*.

upgrade-with-config

(Optional) Install one or more configuration files.

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.

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.

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 primary Routing Engine, all the T640 primary 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 primary Routing Engine, all the T1600 or T4000 primary 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

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 ...
```

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 add restart (Junos OS Evolved for fixed form platforms)

```
user@device> request system software add restart /var/tmp/qfx-ms-fixed-1-target1-ifmanarpcos.iso
Adding software images. This process can take several minutes. Please be
patient...
Download and Validate in Progress
re0: Starting upgrade : /var/tmp/qfx-ms-fixed-1-target1-ifmanarpcos.iso
re0: Single RE upgrade detected.
re0: Installing IMA keys of the incoming ISO image...
re0: Validating existing configs. See /var/log/validation_config.log for config
validation logs.
re0: Validation Passed. Going ahead with Installation
re0: Starting the installation...
re0: Copying files to //soft/junos-evo-install-qfx-ms-fixed-
x86-64-19.2R1-20190522.4-EVOI20190523235333-1...
re0: Running post install commands...
re0: Post install sequence was successful.
re0: Installation of image junos-evo-install-qfx-ms-fixed-
x86-64-19.2R1-20190522.4-EVOI20190523235333-1 done.
re0: Boot version is now 'junos-evo-install-qfx-ms-fixed-
x86-64-19.2R1-20190522.4-EVOI20190523235333-1'
Image validation and installation succeeded. Restarting Applications.

*** Restart Apps list ***
arpd
ifmand
cosd
Activating active instance of app arpd on node re0
Activating active instance of app ifmand on node re0
Activating active instance of app cosd on node re0
Image activation succeeded for arpd on node re0
Stopping active instance of app arpd on node re0
Image activation succeeded for ifmand on node re0
Stopping active instance of app ifmand on node re0
Image activation succeeded for cosd on node re0
```

```
Stopping active instance of app cosd on node re0
App arpd stopped on node re0
Starting active instance of app arpd on node re0
App ifmand stopped on node re0
Starting active instance of app ifmand on node re0
App cosd stopped on node re0
Starting active instance of app cosd on node re0
App cosd started/restarted on node re0
App ifmand started/restarted on node re0
App arpd started/restarted on node re0
*** Restart Summary ***
   *** Restart Success ***
   arpd
   ifmand
   cosd
Please check the status of applications using 'show system alarms'
```

command-name

```
user@device> request system software add restart /var/tmp/qfx-ms-fixed-1-target2-
ifmanarpcossysman.iso
Adding software images. This process can take several minutes. Please be
patient...
Download and Validate in Progress
re0: Starting upgrade : /var/tmp/qfx-ms-fixed-1-target2-ifmanarpcossysman.iso
re0: Single RE upgrade detected.
re0: Installing IMA keys of the incoming ISO image...
re0: Validating existing configs. See /var/log/validation_config.log for config
validation logs.
re0: Validation Passed. Going ahead with Installation
re0: Starting the installation...
re0: Copying files to //soft/junos-evo-install-qfx-ms-fixed-
x86-64-19.2R1-20190522.4-EVOI20190523235731-1...
re0: Running post install commands...
re0: Post install sequence was successful.
re0: Installation of image junos-evo-install-qfx-ms-fixed-
x86-64-19.2R1-20190522.4-EVOI20190523235731-1 done.
re0: Boot version is now 'junos-evo-install-qfx-ms-fixed-
x86-64-19.2R1-20190522.4-EVOI20190523235731-1'
Image validation and installation succeeded. Restarting Applications.
```

```
*** Restart Apps list ***
sysman
arpd
ifmand
cosd
Activating active instance of app sysman on node re0
Image activation succeeded for sysman on node re0
Restarting active instance of app sysman on node re0
App sysman started/restarted on node re0
Activating active instance of app arpd on node re0
Activating active instance of app ifmand on node re0
Activating active instance of app cosd on node re0
Image activation succeeded for arpd on node re0
Stopping active instance of app arpd on node re0
Image activation succeeded for ifmand on node re0
Stopping active instance of app ifmand on node re0
Image activation succeeded for cosd on node re0
Stopping active instance of app cosd on node re0
App cosd stopped on node re0
Starting active instance of app cosd on node re0
App ifmand stopped on node re0
Starting active instance of app ifmand on node re0
App arpd stopped on node re0
Starting active instance of app arpd on node re0
App cosd started/restarted on node re0
App ifmand started/restarted on node re0
App arpd started/restarted on node re0
*** Restart Summary ***
   *** Restart Success ***
   sysman
   arpd
   ifmand
   cosd
Please check the status of applications using 'show system alarms'
```

command-name

```
user@device> request system software add restart /var/tmp/qfx-ms-fixed-1-target3-
ifmanarpcossysmanimgdorchd.iso
ifmanarpcossysmanimgdor
Adding software images. This process can take several minutes. Please be
```

```
patient...
Download and Validate in Progress
re0: Starting upgrade : /var/tmp/qfx-ms-fixed-1-target3-
ifmanarpcossysmanimgdorchd.iso
re0: Single RE upgrade detected.
re0: Installing IMA keys of the incoming ISO image...
re0: Validating existing configs. See /var/log/validation_config.log for config
validation logs.
re0: Validation Passed. Going ahead with Installation
re0: Starting the installation...
re0: Copying files to //soft/junos-evo-install-qfx-ms-fixed-
x86-64-19.2R1-20190522.4-EVOI20190524000025...
re0: Running post install commands...
re0: Post install sequence was successful.
re0: Installation of image junos-evo-install-qfx-ms-fixed-
x86-64-19.2R1-20190522.4-EVOI20190524000025-gsanka-1 done.
re0: Boot version is now 'junos-evo-install-qfx-ms-fixed-
x86-64-19.2R1-20190522.4-EVOI20190524000025'
Image validation and installation succeeded. Restarting Applications.

*** Restart Apps list ***
sysman
arpd
ifmand
cosd
imgd
orchestratord
Activating active instance of app sysman on node re0
Image activation succeeded for sysman on node re0
Restarting active instance of app sysman on node re0
App sysman started/restarted on node re0
Activating active instance of app arpd on node re0
Activating active instance of app ifmand on node re0
Activating active instance of app cosd on node re0
Image activation succeeded for arpd on node re0
Stopping active instance of app arpd on node re0
Image activation succeeded for ifmand on node re0
Stopping active instance of app ifmand on node re0
Image activation succeeded for cosd on node re0
Stopping active instance of app cosd on node re0
App arpd stopped on node re0
Starting active instance of app arpd on node re0
App ifmand stopped on node re0
```

```
Starting active instance of app ifmand on node re0
App cosd stopped on node re0
Starting active instance of app cosd on node re0
App cosd started/restarted on node re0
App arpd started/restarted on node re0
App ifmand started/restarted on node re0
Activating active instance of app imgd on node re0
Activating active instance of app orchestratord on node re0
Image activation succeeded for imgd on node re0
Image activation succeeded for orchestratord on node re0
Restarting active instance of app imgd on node re0
Restarting active instance of app orchestratord on node re0
```

request system software add restart (Junos OS Evolved for chassis-based platforms)

```
user@host> request system software add a.iso restart
Adding software images. This process can take several minutes. Please be
patient...


*** List of Offlined FPCs ***
FPC0
FPC1
FPC2

Perform online for above FPCs (y/n) ? y

*** Incompatible FPCs ***

FPC0
FPC1

Warning: Perform offline for above incompatible FPCs

Perform offline for above incompatible FPCs (y/n) ? n

Aborting Software Upgrade

user@host>
```

command-name

```
user@host> request system software add a.iso restart
Adding software images. This process can take several minutes. Please be
patient...

*** Unsupported frus list ***
fpc0

Perform offline for above unsupported FPCs

Offline the incompatible FRUs before proceeding for upgrade?
Enter yes to proceed with offline for incompatible frus or no to abort the
upgrade.. Proceed? [yes,no] (no) yes


*** Restart Apps list ***
sysman
arpd
mgd
orchestratord

*** Offlining of Unsupported frus may take few mins ***
fpc0 has been successfully offlined

*** Offlining of Unsupported frus are done ***
Activating active instance of app sysman on node re0
Activating active instance of app sysman on node re1
Activating active instance of app sysman on node fpc0
Image activation succeeded for sysman on node re0
Restarting active instance of app sysman on node re0
Image activation succeeded for sysman on node re1
Restarting active instance of app sysman on node re1
Image activation failed on node fpc0
App does not exist sysman on node fpc0
App sysman started/restarted on node re0
App sysman started/restarted on node re1
Activating active instance of app arpd on node re0
Image activation succeeded for arpd on node re0
Stopping active instance of app arpd on node re0
App arpd stopped on node re0
Starting active instance of app arpd on node re0
```

```
App arpd started/restarted on node re0
Activating active instance of app mgd on node re0
Activating active instance of app mgd on node re1
Activating active instance of app orchestratord on node re0
Image activation succeeded for mgd on node re0
Image activation succeeded for mgd on node re1
Image activation succeeded for orchestratord on node re0
Activating new version of the software on node fpc0
Activating new version of the software on node re0
Activating new version of the software on node re1
Image activation failed on node fpc0
Image activation succeeded on node re0
Image activation succeeded on node re1

*** Onlining of Unsupported frus may take few mins ***
fpc0 could not  to be onlined

*** Onlining of Unsupported frus are done ***
Restarting active instance of app mgd on node re0
Restarting active instance of app mgd on node re1
Restarting active instance of app orchestratord on node re0
*** Restart Summary ***
  *** Restart Success ***
  sysman
  sysman
  arpd
  *** Restart Failure ***
  sysman
Please restart the failed applications
Please check the status of applications using 'show system alarms'

WARNING: cli has been replaced by an updated version:
CLI release 20190916.173330_rbu-builder.r1055817 built by rbu-builder on
2019-09-16 18:02:02 UTC
Restart cli using the new version ? [yes,no] (yes) yes

Restarting cli ...
{master}
user@host>
```

request system software add no-validate (SRX Series device)

```
user@host> request system software add /var/tmp/junos-
srxsme-20.4I-20200810_dev_common.0.0833.tgz no-copy no-validate
Formatting alternate root (/dev/ad0s2a)...
/dev/ad0s2a: 600.0MB (1228732 sectors) block size 16384, fragment size 2048
        using 4 cylinder groups of 150.00MB, 9600 blks, 19200 inodes.
super-block backups (for fsck -b #) at:
32, 307232, 614432, 921632
Installing package '/altroot/cf/packages/install-tmp/
junos-20.4I-20200810_dev_common.0.0833' ...
Verified junos-boot-srxsme.tgz signed by PackageDevelopmentECP256_2020 method
ECDSA256+SHA256
Verified junos-srxsme-domestic signed by PackageDevelopmentECP256_2020 method
ECDSA256+SHA256
Verified manifest signed by PackageDevelopmentECP256_2020 method ECDSA256+SHA256

WARNING:     The software that is being installed has limited support.
WARNING:     Run 'file show /etc/notices/unsupported.txt' for details.

JUNOS 20.4I-20200810_dev_common.0.0833 will become active at next reboot
WARNING: A reboot is required to load this software correctly
WARNING:     Use the 'request system reboot' command
WARNING:         when software installation is complete
Saving state for rollback ...

user@host> request system software add /var/tmp/junos-srxsme-19.4R1.3.tgz no-copy no-validate
WARNING: Package junos-19.4R1.3 version 19.4R1.3 is not compatible with current
loader
WARNING: Automatic recovering loader, please wait ...
Upgrading Loader...
#####################################
Verifying the loader image... OK
WARNING: The new boot firmware will take effect when the system is rebooted.
WARNING: Loader recover finish.
Formatting alternate root (/dev/ad0s1a)...
/dev/ad0s1a: 598.5MB (1225692 sectors) block size 16384, fragment size 2048
     using 4 cylinder groups of 149.62MB, 9576 blks, 19200 inodes.
super-block backups (for fsck -b #) at:
32, 306464, 612896, 919328
Installing package '/altroot/cf/packages/install-tmp/junos-19.4R1.3' ...
Verified junos-boot-srxsme-19.4R1.3.tgz signed by PackageProductionEc_2019
```

```
method ECDSA256+SHA256
Verified junos-srxsme-19.4R1.3-domestic signed by PackageProductionEc_2019
method ECDSA256+SHA256
Verified junos-boot-srxsme-19.4R1.3.tgz signed by PackageProductionEc_2019
method ECDSA256+SHA256 V
erified junos-srxsme-19.4R1.3-domestic signed by PackageProductionEc_2019 method
ECDSA256+SHA256
JUNOS 19.4R1.3 will become active at next reboot
WARNING: A reboot is required to load this software correctly
WARNING: Use the 'request system reboot' command
WARNING: when software installation is complete Saving state for rollback ...
```

request system software add (SRX Series device)

```
user@host> request system software add /var/tmp/junos-srxsme-19.4R2.3.tgz
WARNING: Package junos-19.4R2.3 version 19.4R2.3 is not compatible with this
system.
WARNING: Please install a package with veloadr support, 20.3 or higher.
```

Release Information

Command introduced before Junos OS Release 7.4.

best-effort-load and **unlink** options added in Junos OS Release 7.4.

sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

set [***package-name1package-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.

On EX Series switches, the **set** [***package-name1package-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-name1package-name2package-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.

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**.

RELATED DOCUMENTATION

Format for Specifying Filenames and URLs in Junos OS CLI Commands
request system software delete
request system software rollback
request system storage cleanup
Installing Software Packages on QFX Series Devices
Upgrading Software on a QFabric System
Managing Satellite Software Upgrade Groups in a Junos Fusion
request system software add (Maintenance)
Routing Matrix with a TX Matrix Plus Router Solutions Page

request system software delete

IN THIS SECTION

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>
<package-name>
<all-third-party-packages>
```

Description

Use this command to 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. Type the package-name explicitly and do not use the tab key to auto-complete the command.

software-package (Not available on Junos OS Evolved) Software package or bundle name. You can see this software package name by using the **show system software** command. Type the software package name explicitly and do not use the tab key to auto-complete the command.

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

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**.

all-third-party-packages (Junos OS Evolved only) (Optional) Delete all third-party software on the device.

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

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.
```

Release Information

Command introduced before Junos OS Release 7.4.

sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

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.

upgrade-group, and **version** options introduced in Junos OS Release 14.2R3 for Junos Fusion.

all-third-party-packages option introduced in Junos OS Evolved Release 19.4R2.

RELATED DOCUMENTATION

request system software add

request system software rollback

request system software validate

Routing Matrix with a TX Matrix Plus Router Solutions Page

request system software rollback

IN THIS SECTION

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>
<reboot>
<validate>
<with-old-snapshot-config>
```

Description

Use this command to revert 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

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
```

Release Information

Command introduced before Junos OS Release 7.4.

sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

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.

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.

RELATED DOCUMENTATION

request system software abort

request system software add

request system software delete

request system software validate

request system configuration rescue delete

request system configuration rescue save

Routing Matrix with a TX Matrix Plus Router Solutions Page

request system storage cleanup

IN THIS SECTION

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)
```

Description

Use this command to free storage space on the router or switch by rotating log files and proposing a list of files for 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:

- You are 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)
  ```

- When **request system storage cleanup** is executed, Junos OS Evolved displays the types of files that are being deleted. See the Sample Output section below for an example.
- Prior to Junos OS Evolved Release 20.1R1, the command cleans up any ISO files on the system, rotates syslogs, and clears trace files. It does not remove user-created files. Starting in Junos OS Evolved Release 20.1R1, this command does not remove ISO images from the system. It removes all core files, log files from **/var/log/**, and all **/var/log/*** files. To remove old images from the device, use the `request system software delete` command.
- In Junos OS Evolved, the system computes the available space and emits o/p on console for reference.

In Junos OS Evolved, the **request system storage cleanup | display xml rpc** command displays different XML tags for different file types. In Junos OS, only the **file** tag is displayed for all types of files. For more information about the differences between Junos OS and Junos OS Evolved, see How Junos OS Evolved Differs from Junos OS.

Options

all-members	(EX4200 switches and MX Series routers only) (Optional) Delete files on the Virtual Chassis primary Routing Engine only. 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) Deep clean all temporary files and rotate logs. This option cleans up all the user-created files under **/tmp** and **/var/tmp** directories.
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, primary, 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

Output Fields

Table 5 on page 200 describes the output fields for the **request system storage cleanup** command. Output fields are listed in the approximate order in which they appear.

Table 5: 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.
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) yes

  -------------------------------
  node:  re0
  -------------------------------
  Clearing all core files



  Clearing all local host core files and files from /var/log/watchdog



  Clearing node specific core files



  Clearing FPC log  files



  Clearing logical-systems log files



  Clearing journal logs



  Clearing all /var/log/* files
```

```
      Size      Date               Name
      4.0K  Thu Nov 21 11:25  /var/log/__policy_names_rpdc__
      4.0K  Thu Nov 21 11:27  /var/log/__policy_names_rpdn__
      8.0K  Thu Nov 21 11:27  /var/log/alarm-mgmtd
      4.0K  Thu Nov 21 11:24  /var/log/boot_init.log
      4.0K  Thu Nov 21 11:25  /var/log/charonctl_trace.log
      4.0K  Thu Nov 21 11:23  /var/log/check_restore_recovery_bios.log
      4.0K  Thu Nov 21 11:29  /var/log/clksynced.log
       80K  Thu Nov 21 11:27  /var/log/configd-streamer.log
      4.0K  Thu Nov 21 11:25  /var/log/core_mgr.log
         0  Thu Nov 21 11:24  /var/log/cscript.log
      4.0K  Thu Nov 21 11:29  /var/log/ddosd.log
      4.0K  Thu Nov 21 11:25  /var/log/disk_mgmt
      4.0K  Thu Nov 21 11:29  /var/log/eth_linkmon.log
      960K  Thu Nov 21 11:48  /var/log/evo-cda-zx.log
      2.9M  Thu Nov 21 15:27  /var/log/evo_dns_relay.log
       12K  Thu Nov 21 11:29  /var/log/evoinit.log
      8.0K  Thu Nov 21 15:24  /var/log/fibd-proxy.log
      4.0K  Thu Nov 21 11:25  /var/log/imgd.log
      4.0K  Thu Nov 21 11:28  /var/log/interactive-commands
       16K  Thu Nov 21 11:29  /var/log/kfirewall-agent.log
         0  Thu Nov 21 11:27  /var/log/mcelog.log
       12K  Thu Nov 21 11:29  /var/log/mem_mgmt.log
         0  Thu Nov 21 11:26  /var/log/mem_monitor.dat
       84K  Thu Nov 21 15:27  /var/log/messages
         0  Thu Nov 21 11:26  /var/log/mgd-api
      4.0K  Thu Nov 21 11:25  /var/log/mgmt-ethd-helper.log
       44K  Thu Nov 21 11:28  /var/log/mib2d
      4.0K  Thu Nov 21 11:25  /var/log/mstr.log
       84K  Thu Nov 21 11:28  /var/log/packetio-cout.log
      1.4M  Thu Nov 21 11:48  /var/log/picd.log
      4.0K  Thu Nov 21 11:29  /var/log/platform_mon.log
      4.0K  Thu Nov 21 11:29  /var/log/ptp_fpga.log
      4.0K  Thu Nov 21 15:27  /var/log/security
      4.0K  Thu Nov 21 11:29  /var/log/set_mgmt_mac.log
       92K  Thu Nov 21 15:25  /var/log/sinet.log
       16K  Thu Nov 21 11:28  /var/log/snmpd
      4.0K  Thu Nov 21 11:29  /var/log/ss.log
      4.0K  Thu Nov 21 11:24  /var/log/ssh-key-utils.log
      4.0K  Thu Nov 21 11:28  /var/log/sshd_lua.log
      4.0K  Thu Nov 21 11:29  /var/log/sysconfig.log
      4.0K  Thu Nov 21 11:29  /var/log/sysstart.log
      4.0K  Thu Nov 21 11:28  /var/log/system-events
```

```
     20K  Thu Nov 21 11:24  /var/log/uswitch.log
     24K  Thu Nov 21 11:23  /var/log/uswitch.log.prev
    4.0K  Thu Nov 21 11:26  /var/log/validator_debug.log
    8.0K  Thu Nov 21 15:24  /var/log/wtmp
    4.2M  Thu Nov 21 11:48  /var/log/zookeeper--server-re0.log
    4.0K  Thu Nov 21 11:25  /var/log/zookeeper--server-re0.out
    4.0K  Thu Nov 21 11:27  /var/log/ztp.log

  Clearing all JSON files in /var/log/objmon


  Cleared traces for application all node all pid all


  Clearing SI traces


  Removing any ISO files in /data

  Current list of software versions installed

Active boot device is primary : /dev/vda
List of installed version(s) :

    '-' running version
    '>' next boot version after upgrade/downgrade
    '<' rollback boot version

 -   junos-evo-install-ptx-fixed-x86-64-20.1-201911201458.0-EVO - [2019-11-21
11:23:21]

  Current space available in /soft: 14752420 K and /data: 2788736 K
```

request system storage cleanup dry-run (Junos OS Evolved)

```
user@host> request system storage cleanup dry-run
  -------------------------------
  node:  re0
  -------------------------------
  List of all core files to be cleared:
```

```
  List of local_host core files to be cleared:


  List of core sub directory files to be cleared:


  List of log files from FPCs to be cleared:


  List of log files from logical systems to be cleared:


  Clears all App logs, App traces, App SI traces and App core files
from /var/log/*, /var/log/traces/*, /var/log/si_traces/* and /var/core/*


  Clears all JSON files in /var/log/objmon/ during cleanup


  List of ISO files from /data partition to be cleared:

  Current list of software versions installed
  Removes older software versions - Minimum two versions would be left around

Active boot device is primary : /dev/vda
List of installed version(s) :

    '-' running version
    '>' next boot version after upgrade/downgrade
    '<' rollback boot version

 -   junos-evo-install-ptx-fixed-x86-64-20.1-201911201458.0-EVO - [2019-11-21
11:23:21]
```

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-Ax0tz5.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
```

Release Information

Command introduced in Junos OS Release 7.4.

dry-run option introduced in Junos OS Release 7.6.

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.

show chassis alarms

IN THIS SECTION

Syntax

```
show chassis alarms
```

Syntax (MX Series Routers)

```
show chassis alarms
<all-members>
<local>
<member member-id>
```

Syntax (SRX1500, SRX4100, and SRX4200)

```
show chassis alarms
1 alarms currently active
```

```
Alarm time               Class  Description
2020-02-28 10:07:16 CST  Major  FPC0: PEM 0 Not Present
```

Syntax (SRX4600)

```
show chassis alarms
node0:
---------------------------------------------------------------------------
2 alarms currently active
Alarm time Class Description
2020-10-08 19:42:06 UTC Major FPC 0 BITS CPLD Version Mismatch
2020-10-08 19:42:06 UTC Minor PEM 1 Not Present
```

Syntax (TX Matrix Routers)

```
show chassis alarms
<lcc number | scc>
```

Syntax (TX Matrix Plus Routers)

```
show chassis alarms
<lcc number | sfc number>
```

Syntax (MX104, MX2010, MX2020, and MX2008 Universal Routing Platforms)

```
show chassis alarms
<satellite [slot-id slot-id]>
```

Syntax (MX10003, MX204, MX10008, OCX Series, PTX Series, ACX Series, EX9251, and EX9253)

```
show chassis alarms
```

Syntax (QFX Series)

```
show chassis alarms
<interconnect-device name>
<node-device name>
```

Description

Display information about the conditions that have been configured to trigger alarms. In Junos, the chassis alarms are different from the system alarms (viewed by using the **show system alarms** command). The system alarms indicate a missing rescue configuration or software license, where valid. For more information, see Alarm Overview.

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

Output Fields

Table 6 on page 226 lists the output fields for the **show chassis alarms** command. Output fields are listed in the approximate order in which they appear.

Table 6: 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 primary.

```
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 primary, 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 primary, 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 primary just gained primary role. When the primary has just gained primary role, 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 alarms (ACX710 Router)

```
user@host> show chassis alarms
Alarm time               Class  Description
2011-01-23 21:42:46 PST  Major  PTP Local Clock OOS
2011-01-23 21:42:46 PST  Major  PTP No Foreign Master
2011-01-23 21:42:46 PST  Major  Chassis Loss of all Equipment Clock Synch
References
2011-01-23 21:42:46 PST  Major  Chassis Loss of Equipment Clock Synch Reference 1
2011-01-23 21:42:46 PST  Major  Chassis Loss of Equipment Clock Synch Reference 2
2011-01-23 21:42:46 PST  Major  Equipment Clock QL Below Threshold
2011-01-23 21:42:46 PST  Major  TOD Input A Signal Fail
2011-01-23 21:42:46 PST  Major  1PPS lost
2011-01-23 21:42:46 PST  Major  SyncE Port incompatible Media Type
```

Release Information

Command introduced before Junos OS Release 7.4.

sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

satellite option introduced in Junos OS Release 14.2R3 for Junos Fusion.

Command introduced in Junos OS Release 18.2R1 for EX9253 Switches and MX10008 Universal Routing Platforms.

RELATED DOCUMENTATION

Configuring an RMON Alarm Entry and Its Attributes
Chassis Conditions That Trigger Alarms

show chassis environment

IN THIS SECTION

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>
```

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

Output Fields

Table 7 on page 253 lists the output fields for the **show chassis environment** command. Output fields are listed in the approximate order in which they appear.

Table 7: 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.

Table 7: show chassis environment Output Fields *(Continued)*

Field Name	Field Description
	• 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 7: 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
    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
        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
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      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
      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
        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
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
        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
        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
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
        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
      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
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
      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
...
```

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
        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
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
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```
      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
      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
    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
        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
```

Release Information

Command introduced before Junos OS Release 7.4.

sfc option introduced for the TX Matrix Plus router in Junos OS Release 9.6.

monitored option added in Junos OS Release 12.1x48 for PTX Series Packet Transport Routers.

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.

RELATED DOCUMENTATION

show chassis environment adc

show chassis environment cb

show chassis environment ccg

show chassis environment fpc

IN THIS SECTION

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, OCX Series, PTX3000, PTX10008 devices and Junos OS Evolved 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
```

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

Output Fields

Table 8 on page 366 lists the output fields for the **show chassis environment fpc** command. Output fields are listed in the approximate order in which they appear.

Table 8: 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 8: 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
  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
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
          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
  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
        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
       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
```

Release Information

Command introduced before Junos OS Release 7.4.

satellite option introduced in Junos OS Release 14.2R3.

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

show chassis environment pem

IN THIS SECTION

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, MX10008, OCX Series, EX9251, and EX9253 devices)

```
show chassis environment pem
<slot>
```

Syntax (QFX Series)

```
show chassis environment pem
<slot (interconnect-device name slot ) | (node-device name)>
```

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

Output Fields

Table 9 on page 448 lists the output fields for the **show chassis environment pem** command. Output fields are listed in the approximate order in which they appear.

Table 9: 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.
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.

Table 9: show chassis environment pem Output Fields *(Continued)*

Field Name	Field Description
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***.

Release Information

Command introduced before Junos OS Release 7.4.

satellite option introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

show chassis hardware

show chassis environment routing-engine

IN THIS SECTION

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 and PTX Series Devices)

```
show chassis environment routing-engine
<slot>
<all-members>
<local>
<member member-id>
```

Syntax (QFX Series and OCX Series)

```
show chassis environment routing-engine
interconnect-device name
```

Syntax (EX9251 and EX9253 Switches; ACX500, ACX5048 and ACX5096 Routers)

```
show chassis environment routing-engine
```

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

Output Fields

Table 10 on page 468 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 10: 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 Primary—Routing Engine is online, operating as Primary. • 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
```

Release Information

Command introduced before Junos OS Release 7.4.

sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

RELATED DOCUMENTATION

request chassis routing-engine master

show chassis routing-engine

show chassis firmware

IN THIS SECTION

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 (QFX Series)

```
show chassis firmware
interconnect-device name
node-device name
```

Syntax (ACX5048 and ACX5096 Routers)

```
show chassis firmware
interconnect-device name
node-device name
```

Syntax (EX Series Switches)

```
show chassis firmware
<detail>
<satellite [slot-id slot-id |device-alias  alias-name]>
```

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

Output Fields

Table 11 on page 479 lists the output fields for the show chassis firmware command. Output fields are listed in the approximate order in which they appear.

Table 11: 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.

Table 11: show chassis firmware Output Fields *(Continued)*

Field Name	Field Description
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 (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 (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 (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
                         PIC0 CPLD0 7.b
                         PIC0 CPLD1 7.b
                         PIC0 CPLD2 7.b
                         PIC0 CPLD3 7.b
                         PIC0 CPLD4 7.b
                         PIC0 CPLD5 7.b
                         PIC0 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
                         PIC0 CPLD0 7.b
                         PIC0 CPLD1 7.b
                         PIC0 CPLD2 7.b
                         PIC0 CPLD3 7.b
                         PIC0 CPLD4 7.b
                         PIC0 CPLD5 7.b
                         PIC0 CPLD6 c6.a
                         PIC0 CPLD7 -NA-
                         PIC0 CPLD8 7.b
                         PIC0 CPLD9 7.b
                         PIC0 CPLD10 7.b
                         PIC0 CPLD11 7.b
                         PIC0 CPLD12 7.b
                         PIC0 CPLD13 7.b
                         PIC0 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
```

Release Information

Command introduced before Junos OS Release 7.4.

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.

satellite option introduced in Junos OS Release 14.2R3.

show chassis fan

IN THIS SECTION

Syntax

```
show chassis fan
```

Syntax (MX Series Routers)

```
show chassis fan
<all-members>
<local>
<member member-id>
```

Syntax (MX104, MX204, MX2010, MX2020, MX2008, and MX10003 Universal Routing Platform)

```
show chassis fan
<satellite [slot-id slot-id |device-alias alias-name]>
```

Syntax (QFX Series)

```
show chassis fan
<interconnect-device name>
```

Syntax (TX Matrix Router)

```
show chassis fan
<lcc number | scc>
```

Syntax (TX Matrix Plus Router)

```
show chassis fan
<lcc number | sfc number>
```

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

Output Fields

Table 12 on page 498 lists the output fields for the **show chassis fan** command. Output fields are listed in the approximate order in which they appear.

Table 12: show chassis fan Output Fields

Field Name	Field Description
Item	Fan item identifier.

Table 12: show chassis fan Output Fields *(Continued)*

Field Name	Field Description
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.
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 (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 (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 (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
```

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.

satellite option introduced in Junos OS Release 14.2R3.

Command output introduced for Junos OS Evolved Release 19.1R1.

show chassis hardware

IN THIS SECTION

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>
```

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.

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 13 on page 518.

Table 13: 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

Output Fields

Table 14 on page 519 lists the output fields for the **show chassis hardware** command. Output fields are listed in the approximate order in which they appear.

Table 14: show chassis hardware Output Fields

Field Name	Field Description	Level of Output
Item	Show information about the device hardware.	All levels
Version	Revision level of the chassis component.	All levels
Part number	Part number of the chassis component.	All levels
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**

Table 14: show chassis hardware Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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**

Table 14: show chassis hardware Output Fields ***(Continued)***

Field Name	Field Description	Level of Output
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	All levels

Table 14: show chassis hardware Output Fields *(Continued)*

Field Name	Field Description	Level of Output
	1x ADSL Annex A—ADSL 2/2+ Annex A PIM (one port, for POTS) **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, 4xFX0, 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).	

Table 14: show chassis hardware Output Fields ***(Continued)***

Field Name	Field Description	Level of Output
	• **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

show chassis hardware (MX10008 Router)

```
user@host> show chassis hardware

Hardware inventory:
Item                 Version   Part number   Serial number      Description
Chassis                                      DE538              JNP10008 [MX10008]
Midplane             REV 27    750-054097    ACPD6954           Midplane 8
Routing Engine 0               BUILTIN       BUILTIN            RE X10
Routing Engine 1               BUILTIN       BUILTIN            RE X10 128
CB 0                 REV 10    750-079562    CAKF2158           Control Board
```

```
CB 1              REV 05   711-065897   CAJG2680           Control Board
FPC 1             REV 04   750-084779   CAKN5706           JNP10K-LC2101
  CPU             REV 05   750-073391   CAKJ2864           LC 2101 PMB
  PIC 0                    BUILTIN      BUILTIN            4xQSFP28 SYNCE
    Xcvr 0        REV 01   740-046565   XXL0BQM            QSFP+-40G-SR4
    Xcvr 1        REV 01   740-032986   QB350242           QSFP+-40G-SR4
    Xcvr 2        REV 01   740-054053   QE408285           QSFP+-4X10G-SR
    Xcvr 3        REV 01   740-046565   QF3300Z9           QSFP+-40G-SR4
  PIC 1                    BUILTIN      BUILTIN            4xQSFP28 SYNCE
    Xcvr 0        REV 01   740-067442   QJ2200LD           QSFP+-40G-SR4
    Xcvr 1        REV 01   740-038153   APF170500382DP     QSFP+-40G-CU3M
    Xcvr 2        REV 01   740-067442   QI4302LC           QSFP+-40G-SR4
  PIC 2                    BUILTIN      BUILTIN            4xQSFP28 SYNCE
    Xcvr 0        REV 01   740-067442   1ACP1335119        QSFP+-40G-SR4
    Xcvr 1        REV 01   740-067442   1ACP1313156        QSFP+-40G-SR4
    Xcvr 2        REV 01   740-067442   QK050040           QSFP+-40G-SR4
    Xcvr 3        REV 01   740-067442   QJ2201BG           QSFP+-40G-SR4
  PIC 3                    BUILTIN      BUILTIN            4xQSFP28 SYNCE
    Xcvr 0        REV 01   740-058734   1ECQ12400CS        QSFP-100GBASE-SR4
    Xcvr 1        REV 01   740-046565   QF3300ZX           QSFP+-40G-SR4
    Xcvr 2        REV 01   740-061405   1ECQ12510FH        QSFP-100G-SR4-T2
    Xcvr 3        REV 01   740-032986   QB491182           QSFP+-40G-SR4
  PIC 4                    BUILTIN      BUILTIN            4xQSFP28 SYNCE
    Xcvr 0        REV 01   740-067442   QJ2200D5           QSFP+-40G-SR4
    Xcvr 1        REV 01   740-054053   XXS0L95            QSFP+-4X10G-SR
  PIC 5                    BUILTIN      BUILTIN            4xQSFP28 SYNCE
    Xcvr 0        REV 01   740-054053   QE251550           QSFP+-4X10G-SR
    Xcvr 1        REV 01   740-054053   XZB01D5            QSFP+-4X10G-SR
    Xcvr 3        REV 01   740-046565   QI1402F9           QSFP+-40G-SR4
FPD Board         REV 07   711-054687   ACPF2896           Front Panel Display
PEM 1             REV 02   740-049388   1EDL62102PR        Power Supply AC
PEM 2             REV 02   740-049388   1EDL60300H2        Power Supply AC
PEM 4             REV 02   740-049388   1EDL603003Z        Power Supply AC
PEM 5             REV 01   740-049388   1EDL339001B        Power Supply AC
FTC 0             REV 14   750-050108   ACNW3344           Fan Controller 8
FTC 1             REV 14   750-050108   ACPE3978           Fan Controller 8
Fan Tray 0        REV 09   760-054372   ACNV5507           Fan Tray 8
Fan Tray 1        REV 09   760-054372   ACNV5371           Fan Tray 8
SFB 0             REV 25   750-050058   ACPH6821           Switch Fabric (SIB) 8
SFB 1
SFB 2             REV 24   750-050058   ACNZ0641           Switch Fabric (SIB) 8
```

```
SFB 3             REV 27   750-050058   ACPH9127          Switch Fabric (SIB) 8
SFB 5             REV 24   750-050058   ACNX7396          Switch Fabric (SIB) 8
```

show chassis hardware (PTX10008 Router)

```
root@host> show chassis hardware
Hardware inventory:
Item              Version  Part number  Serial number     Description
Chassis                                 DK404             JNP10008 [PTX10008]
Midplane          REV 28   750-054097   ACPP2394          Midplane 8
Routing Engine 0           BUILTIN      BUILTIN           RE-PTX-2X00x4
Routing Engine 1           BUILTIN      BUILTIN           RE-PTX-2X00x4
CB 0              REV 04   750-068820   ACPT5303          Control Board
CB 1              REV 04   750-068820   ACPR1627          Control Board
FPC 6             REV 13   750-068822   ACPB2753          LC1102 - 12C / 36Q /
14
         4X
  CPU                      BUILTIN      BUILTIN           FPC CPU
  PIC 0                    BUILTIN      BUILTIN           12x100GE/36x40GE/
144x10
             GE
    Xcvr 0        REV 01   740-067442   XV304N6           QSFP+-40G-SR4
    Xcvr 1        REV 01   740-067442   XV30A5M           QSFP+-40G-SR4
    Xcvr 2        REV 01   740-067442   XV300HC           QSFP+-40G-SR4
    Xcvr 3        REV 01   740-067443   XU20L17           QSFP+-40G-SR4
    Xcvr 4        REV 01   740-067442   XV303XG           QSFP+-40G-SR4
    Xcvr 5        REV 01   740-067443   XV306QC           QSFP+-40G-SR4
    Xcvr 6        REV 01   740-067442   XV303Y7           QSFP+-40G-SR4
    Xcvr 7        REV 01   740-067443   XX60DMR           QSFP+-40G-SR4
    Xcvr 9        REV 01   740-067443   XX60DNY           QSFP+-40G-SR4
    Xcvr 10       REV 01   740-054053   QF4605WF          QSFP+-4X10G-SR
    Xcvr 13       REV 01   740-058734   1ECQ115007D       QSFP-100GBASE-SR4
    Xcvr 15       REV 01   740-046565   QH06035R          QSFP+-40G-SR4
    Xcvr 16       REV 01   740-046565   QH0602KC          QSFP+-40G-SR4
    Xcvr 17       REV 01   740-046565   QH0507PA          QSFP+-40G-SR4
    Xcvr 18       REV 01   740-046565   QH06035M          QSFP+-40G-SR4
    Xcvr 24       REV 01   740-046565   QH0507QL          QSFP+-40G-SR4
    Xcvr 25       REV 01   740-067443   XV20CWP           QSFP+-40G-SR4
    Xcvr 34       REV 01   740-046565   QH06035U          QSFP+-40G-SR4
    Xcvr 35       REV 01   740-067443   XX60DN9           QSFP+-40G-SR4
FPC 7             REV 41   750-051357   ACPL3446          LC1101 - 30C / 30Q / 96X
```

```
  CPU                       BUILTIN      BUILTIN           FPC CPU
  PIC 0                     BUILTIN      BUILTIN           30x100GE/30x40GE/96x10GE
    Xcvr 0         REV 01   740-067443   XX60DPC           QSFP+-40G-SR4
    Xcvr 1         REV 01   740-054053   QF4605W7          QSFP+-4X10G-SR
    Xcvr 2         REV 01   740-067443   XX60DP8           QSFP+-40G-SR4
    Xcvr 3         REV 01   740-067442   XV30FYM           QSFP+-40G-SR4
    Xcvr 4         REV 01   740-067442   1ACP133406Z       QSFP+-40G-SR4
    Xcvr 5         REV 01   740-067443   XX60DP5           QSFP+-40G-SR4
    Xcvr 8         REV 01   740-046565   QH060355          QSFP+-40G-SR4
    Xcvr 12        REV 01   740-058734   1ECQ115008C       QSFP-100GBASE-SR4
    Xcvr 15        REV 01   740-046565   QH0602KG          QSFP+-40G-SR4
    Xcvr 16        REV 01   740-046565   QH0602LG          QSFP+-40G-SR4
    Xcvr 17        REV 01   740-046565   QH06035S          QSFP+-40G-SR4
    Xcvr 18        REV 01   740-046565   QH0602KS          QSFP+-40G-SR4
    Xcvr 24        REV 01   740-067443   QI2902DP          QSFP+-40G-SR4
Power Supply 2     REV 02   740-049388   1EDL70200NP       Power Supply AC
Power Supply 3     REV 02   740-049388   1EDL603005C       Power Supply AC
Power Supply 4     REV 02   740-049388   1EDL70200P1       Power Supply AC
Power Supply 5     REV 02   740-049388   1EDL70200B7       Power Supply AC
FTC 0              REV 16   750-050108   ACPK8682          Fan Controller 8
FTC 1              REV 16   750-050108   ACPR9530          Fan Controller 8
Fan Tray 0         REV 10   760-054372   ACPR9509          Fan Tray 8
Fan Tray 1         REV 10   760-054372   ACPV7260          Fan Tray 8
SIB 1              REV 28   750-050058   ACPV6306          Switch Fabric 8
SIB 2              REV 28                ACPR2569          Switch Fabric 8
SIB 3              REV 28   750-05       ACPW7402          Switch Fabric 8
SIB 4              REV 28   750-050058   ACPR2577          Switch Fabric 8
FPD Board          REV 07   711-054687   ACPM4965          Front Panel Display
```

show chassis hardware clei-models (PTX10016 Router)

```
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            00000000000000000000000
PSM 5              REV 0B   740-033727   VG00015            00000000000000000000000
PSM 6              REV 0B   740-033727   VH00097            00000000000000000000000
PSM 7              REV 0C   740-033727   VJ00151            00000000000000000000000
PSM 8              REV 0C   740-033727   VJ00149            00000000000000000000000
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
```

Release Information

Command introduced before Junos OS Release 7.4.

models option introduced in Junos OS Release 8.2.

sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

Information for **disk** and **usb** introduced in Junos OS Release 15.1X53-D60 for QFX10002, QFX10008, and QFX10016 switches.

> **NOTE**: Routers and routing platforms use the basic syntax, unless otherwise listed. For example, the EX Series has an additional satellite parameter available.

RELATED DOCUMENTATION

show chassis power

show chassis led satellite

IN THIS SECTION

Syntax

```
show chassis led satellite [slot-id slot-id |device-alias  alias-name]
```

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

Output Fields

Table 15 on page 537 lists the output fields for the **show chassis led satellite** command. Output fields are listed in the approximate order in which they appear.

Table 15: 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 Primary (**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

Table 15: show chassis led Output Fields *(Continued)*

Field Name	Field Description
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
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

Table 15: show chassis led Output Fields *(Continued)*

Field Name	Field Description
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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

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

Understanding Junos Fusion Provider Edge Components | 5

Understanding Junos Fusion Enterprise Components

show chassis routing-engine

IN THIS SECTION

Syntax

```
show chassis routing-engine
<bios | slot>
```

Syntax (ACX Series, PTX Series, and MX104 Universal Routing Platforms.)

```
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 (MX204 and MX10003 Universal Routing Platforms)

```
show chassis routing-engine
<slot>
<bios>
<errors>
```

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>
```

Syntax (Junos OS Evolved)

```
show chassis routing-engine
<slot>
<bios>
<hard-disk-test>
```

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.
hard-disk-test	(Junos OS Evolved only) (Optional) Display the health of the hard disk. Use **disk** ***/dev/disk-name*** **status** to display the status of a particular disk.
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

Output Fields

Table 16 on page 545 lists the output fields for the **show chassis routing-engine** command. Output fields are listed in the approximate order in which they appear.

Table 16: 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**.

Table 16: show chassis routing-engine Output Fields *(Continued)*

Field Name	Field Description
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. **NOTE**: When the chassis has two Routing Engines, the amount of DRAM should be the same on both. A DRAM size mismatch error can result when the Routing Engines have different amounts of DRAM. 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.

Table 16: show chassis routing-engine Output Fields *(Continued)*

Field Name	Field Description
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.
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.

Table 16: show chassis routing-engine Output Fields *(Continued)*

Field Name	Field Description
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 16: 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.

Table 16: show chassis routing-engine Output Fields *(Continued)*

Field Name	Field Description
	• **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 (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 (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 (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 (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
```

Release Information

Command introduced before Junos OS Release 7.4.

sfc option introduced in Junos OS Release in 9.6 for the TX Matrix Plus router.

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.

satellite option introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

request chassis routing-engine master

Configuring Routing Engine Redundancy

Switching the Global Primary and Backup Roles in a Virtual Chassis Configuration

show chassis satellite

IN THIS SECTION

Syntax

```
show chassis satellite
[device-alias device-alias | fpc-slot fpc-slot | cluster cluster-name]
[brief | detail | extensive | terse]
<since time>
```

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

Output Fields

Table 17 on page 573 lists the output fields for the **show chassis satellite** command. Output fields are listed in the approximate order in which they appear.

Table 17: show chassis satellite Output Fields

Field Name	Field Description	Level of Output
Fields for Interface		

Table 17: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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 17: 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:	brief terse extensive none

Table 17: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
	• **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.	
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 17: 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

Table 17: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
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

Table 17: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 17: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
Candidate uplink interfaces (pic/port)	Uplink failure detection candidate uplink interfaces.	detail

Table 17: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 17: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
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

Table 17: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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>
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise

Configuring Junos Fusion Provider Edge | 51

show chassis satellite extended-port

IN THIS SECTION

Syntax

```
show chassis satellite extended-port interface-name
<fpc-slot fpc-slot>
<interface-name interface-name>
[brief | detail | extensive | terse]
<since time>
```

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

Output Fields

Table 18 on page 590 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 18: show chassis satellite extended-port Output Fields

Field Name	Field Description	Level of Output
Fields for Interface		

Table 18: show chassis satellite extended-port Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 18: show chassis satellite extended-port Output Fields ***(Continued)***

Field Name	Field Description	Level of Output
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

Table 18: show chassis satellite extended-port Output Fields *(Continued)*

Field Name	Field Description	Level of Output
IFD Idx	The internal interface index.	brief terse detail extensive none
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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise

Configuring Junos Fusion Provider Edge | 51

show chassis satellite interface

IN THIS SECTION

Syntax

```
show chassis satellite interface
<interface-name>
[ brief | detail | extensive ]
<since time>
```

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

Output Fields

Table 19 on page 597 lists the output fields for the **show chassis satellite interface** command. Output fields are listed in the approximate order in which they appear.

Table 19: 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

Table 19: show chassis satellite interface Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 19: show chassis satellite interface Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

show chassis satellite neighbor

IN THIS SECTION

Syntax

```
show chassis satellite neighbor
[interface-name]
[ brief | detail | extensive | terse]
<since time>
```

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

Output Fields

Table 20 on page 605 lists the output fields for the **show chassis satellite neighbor** command. Output fields are listed in the approximate order in which they appear.

Table 20: show chassis satellite neighbor Output Fields

Field Name	Field Description	Level of Output
Fields for Interface		
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

Table 20: show chassis satellite neighbor Output Fields ***(Continued)***

Field Name	Field Description	Level of Output
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

Table 20: show chassis satellite neighbor Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 20: show chassis satellite neighbor Output Fields ***(Continued)***

Field Name	Field Description	Level of Output
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
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

Table 20: show chassis satellite neighbor Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 20: show chassis satellite neighbor Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

show chassis satellite software

IN THIS SECTION

Syntax

```
show chassis satellite software
[ brief | detail ]
```

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

Output Fields

Table 21 on page 614 lists the output fields for the **show chassis satellite neighbor** command. Output fields are listed in the approximate order in which they appear.

Table 21: 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

Table 21: show chassis satellite software Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

show chassis satellite statistics

IN THIS SECTION

Syntax

```
show chassis satellite statistics
<device-alias device-alias>
```

```
<fpc-slot fpc-slot>
<cluster cluster-name>
```

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

Output Fields

Table 22 on page 618 lists the output fields for the **show chassis satellite statistics** command. Output fields are listed in the approximate order in which they appear.

Table 22: 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 22: 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.

Table 22: show chassis satellite statistics Output Fields *(Continued)*

Field Name	Field Description
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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

show chassis satellite unprovision

IN THIS SECTION

Syntax

```
show chassis satellite unprovision
[brief | detail | extensive]
[cluster cluster-name]
<since time>
```

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" on page 51 or Configuring or Expanding a Junos Fusion Enterprise 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

Output Fields

Table 23 on page 627 lists the output fields for the **show chassis satellite unprovision** command. Output fields are listed in the approximate order in which they appear.

Table 23: 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

Table 23: show chassis satellite unprovision Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
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

Table 23: show chassis satellite unprovision Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 23: show chassis satellite unprovision Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise

Configuring Junos Fusion Provider Edge | 51

show chassis satellite upgrade-group

IN THIS SECTION

Syntax

```
show chassis satellite upgrade-group
<upgrade-group-name>
[ brief | detail | extensive | terse]
```

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

Output Fields

Table 24 on page 634 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 24: 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

Table 24: show chassis satellite upgrade-group Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 24: show chassis satellite upgrade-group Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise
Configuring Junos Fusion Provider Edge | 51

show chassis temperature-thresholds

IN THIS SECTION

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 (QFX Series)

```
show chassis temperature-thresholds
<interconnect-device name>
<node-device name>
```

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

Output Fields

Table 25 on page 641 lists the output fields for the **show chassis temperature-thresholds** command. Output fields are listed in the approximate order in which they appear.

Table 25: show chassis temperature-thresholds Output Fields

<table>
<tr><th>Field name</th><th>Field Description</th></tr>
<tr><td>Item</td><td>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.</td></tr>
<tr><td>Fan speed</td><td> 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 70°C 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 75°C 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. </td></tr>
</table>

Table 25: show chassis temperature-thresholds Output Fields *(Continued)*

Field name	Field Description
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 (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 (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
```

Release Information

Command introduced in Junos OS Release 8.0.

sfc command introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

satellite option introduced in Junos OS Release 14.2R3.

Command introduced in Junos OS Release 18.2R1 for MX10008 Routers and EX9253 Switches.

show interfaces extensive satellite-device

IN THIS SECTION

Syntax

```
show interfaces extensive satellite-device (device-alias | all)
```

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

Output Fields

Table 26 on page 678 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 26: 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 26: 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**

Table 26: show interfaces extensive satellite-device Output Fields *(Continued)*

<table>
<tr><th>Field Name</th><th>Field Description</th><th>Level of Output</th></tr>
<tr><td>IPv6 transit statistics</td><td>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.</td><td>detail extensive</td></tr>
<tr><td>Input errors</td><td>Input errors on the interface. The following paragraphs explain the counters whose meaning might not be obvious:
• Errors—Sum of the incoming frame terminates 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.</td><td>extensive</td></tr>
</table>

Table 26: 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 terminates 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**

Table 26: show interfaces extensive satellite-device Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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 26: 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	**extensive**

Table 26: show interfaces extensive satellite-device Output Fields ***(Continued)***

Field Name	Field Description	Level of Output
	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.”	
Filter statistics	**Receive** and **Transmit** statistics reported by the PIC's MAC address filter subsystem.	**extensive**

Table 26: 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

Table 26: show interfaces extensive satellite-device Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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 26: 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

Table 26: show interfaces extensive satellite-device Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 26: show interfaces extensive satellite-device Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise

show interfaces satellite-device

IN THIS SECTION

Syntax

```
show interfaces satellite-device  (device-alias | all)
```

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

Output Fields

Table 27 on page 706 lists the output fields for the **show interfaces satellite-device** command. Output fields are listed in the approximate order in which they appear.

Table 27: 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
Minimum links needed	Minimum number of aggregated links.	All levels
Minimum bandwidth needed	Minimum bandwidth configured for aggregated bundle.	All levels

Table 27: show interfaces satellite-device Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 27: show interfaces satellite-device Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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**
Flags	Information about the logical interface.	All levels

Table 27: show interfaces satellite-device Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise

show interfaces statistics

IN THIS SECTION

Syntax

```
show interfaces statistics interface-name
<satellite-device [device-alias-name |all ]>
<detail>
```

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

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
```

Release Information

Command introduced before Junos OS Release 7.4.

Command introduced in Junos OS Release 12.2 for ACX Series Routers.

satellite-device option introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

clear interfaces statistics

show interfaces terse satellite-device

IN THIS SECTION

Syntax

```
show interfaces terse satellite-device (device-alias | all)
```

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

Output Fields

Table 28 on page 731 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 28: 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
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise

show system core-dumps

IN THIS SECTION

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)>
```

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.

For Junos OS, all cores files are stored at **/var/core/re**. For Junos OS Evolved, a core file created during early bootup is stored in **/var/core/re**. But a core file created later in the bootup, for example, after the Routing Engine slot number can be determined, is stored in **/var/core/re0** or **/var/core/re1**. The command **show system core-dumps** continues to show all cores generated.

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, primary, 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

Output Fields

Table 29 on page 739 describes the output fields for the **show system core-dumps** command. Output fields are listed in the approximate order in which they appear.

Table 29: 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.

Table 29: show system core-dumps Output Fields *(Continued)*

Field Name	Field Description
Modified	Last file modification date and time.
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.

Table 29: show system core-dumps Output Fields *(Continued)*

Field Name	Field Description
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.
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.

Table 29: show system core-dumps Output Fields *(Continued)*

Field Name	Field Description
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%)
```

Release Information

Command introduced before Junos OS Release 8.5.

sfc option introduced in Junos OS Release 9.6 for the TX Matrix Plus router.

re0, **re1**, and **routing-engine** options introduced for dual Routing Engines in Junos OS Release 13.1.

satellite option introduced in Junos OS Release 14.2R3.

core-file-info option is deprecated in Junos OS Release 16.1R3.

show system storage satellite

IN THIS SECTION

Syntax

```
show system storage satellite
<fpc-slot>
device-alias <device-alias>
```

Description

Displays the storage usage of satellite devices in Junos Fusion.

Options

none	Display the storage usage for all listed satellite devices.
detail	(Optional) Display detail output.
fpc-slot	(Optional) Display satellite device connection information for the satellite device using the specified FPC slot number only.
device-alias *device-alias*	(Optional) Display satellite device connection information for the satellite device using the specified device alias only.

Required Privilege Level

view

Output Fields

Table 30 on page 756 describes the output fields for the **show system storage** command. Output fields are listed in the approximate order in which they appear.

Table 30: show system storage Output Fields

Field Name	Field Description
Filesystem	Name of the filesystem.
Size	Size of the filesystem.
Used	Amount of space used in the filesystem.
Avail	Amount of space available in the filesystem.
Use %	Percentage of the filesystem space that is being used.
Mounted on	Directory in which the filesystem is mounted.

Sample Output

show system storage satellite

```
user@host> show system storage satellite
Slot-ID: 125
Filesystem       Size  Used Avail Use% Mounted on
rootfs           665M  287M  330M  47% /
udev             896M   24K  896M   1% /dev
none             896M   24K  896M   1% /dev
tmpfs            936M  812K  935M   1% /run
/dev/sda3        665M  287M  330M  47% /
```

```
/dev/sda5        327M   99M  207M  33% /var
tmpfs            936M  812K  935M   1% /run
tmpfs            936M   14M  923M   2% /var/volatile
/dev/sda1        481M  254M  228M  53% /boot
/dev/sda2        259M  2.1M  240M   1% /app_disk
tmpfs            936M  812K  935M   1% /run/named-chroot/var/run/named
tmpfs            936M  812K  935M   1% /run/named-chroot/var/run/bind
none             896M   24K  896M   1% /run/named-chroot/dev/random
none             896M   24K  896M   1% /run/named-chroot/dev/zero
none             896M   24K  896M   1% /run/named-chroot/dev/null

Slot-ID: 134
Filesystem       Size  Used Avail Use% Mounted on
rootfs           665M  287M  330M  47% /
udev             896M   24K  896M   1% /dev
none             896M   24K  896M   1% /dev
tmpfs            936M  812K  935M   1% /run
/dev/sda3        665M  287M  330M  47% /
/dev/sda5        327M   97M  209M  32% /var
tmpfs            936M  812K  935M   1% /run
tmpfs            936M   13M  924M   2% /var/volatile
/dev/sda1        481M  254M  228M  53% /boot
/dev/sda2        259M  2.1M  240M   1% /app_disk
tmpfs            936M  812K  935M   1% /run/named-chroot/var/run/named
tmpfs            936M  812K  935M   1% /run/named-chroot/var/run/bind
none             896M   24K  896M   1% /run/named-chroot/dev/random
none             896M   24K  896M   1% /run/named-chroot/dev/zero
none             896M   24K  896M   1% /run/named-chroot/dev/null
```

Release Information

Command introduced in Junos OS Release 17.1R1.

CHAPTER 6

Power over Ethernet, LLDP, and LLDP-MED on a Junos Fusion Provider Edge

IN THIS CHAPTER

Understanding Power over Ethernet in a Junos Fusion

IN THIS SECTION

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.

For information on PoE controller software requirements in a Junos Fusion Provider Edge, see "Understanding Junos Fusion Provider Edge Software and Hardware Requirements" on page 24

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

Verifying PoE Configuration and Status for a Junos Fusion (CLI Procedure)

Understanding LLDP and LLDP-MED on a Junos Fusion

IN THIS SECTION

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

IN THIS SECTION

PoE Configurable Options

Table 31 on page 764 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 31: 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.

Table 31: Configurable PoE Options and Default Settings ***(Continued)***

Option	Default	Description
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)

Understanding Power over Ethernet in a Junos Fusion

Verifying PoE Configuration and Status for a Junos Fusion (CLI Procedure)

IN THIS SECTION

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

IN THIS SECTION

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

IN THIS SECTION

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

Understanding Power over Ethernet in a Junos Fusion

CHAPTER 7

Configuration Statements for Power over Ethernet and Power Supply Management on a Junos Fusion Provider Edge

IN THIS CHAPTER

disable (Power over Ethernet)

IN THIS SECTION

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]
```

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.

Release Information

Statement introduced in Junos OS Release 9.0.

all-extended option introduced in Junos OS Release 16.1R1.

Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

RELATED DOCUMENTATION

Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch

Configuring PoE Interfaces on EX Series Switches

Configuring Power over Ethernet in a Junos Fusion

guard-band

IN THIS SECTION

Syntax

```
guard-band watts;
```

Hierarchy Level

```
[edit poe],
[edit poe (all | fpc slot-number)]
```

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.

Release Information

Statement introduced in Junos OS Release 9.0.

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.

RELATED DOCUMENTATION

Configuring PoE Interfaces on EX Series Switches

Configuring Power over Ethernet in a Junos Fusion

interface (Power over Ethernet)

IN THIS SECTION

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]
```

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.

Release Information

Statement introduced in Junos OS Release 9.0.

Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

RELATED DOCUMENTATION

Configuring PoE Interfaces on EX Series Switches

Configuring Power over Ethernet in a Junos Fusion

management

IN THIS SECTION

Syntax

```
management (class | static | high-power);
```

Hierarchy Level

```
[edit poe],
[edit poe (all | fpc slot-number)]
```

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 based on the class of the connected powered device. If LLDP power negotiation is enabled, the powered device can request more or less power. LLDP power negotiation is enabled by default in class management mode.

  If LLDP power negotiation is disabled, the power allocation is determined solely by the class of the connected powered device. If there is no powered device connected, standard 15.4W power is allocated on the interface. For more information about disabling LLDP power negotiation, see Device Discovery Using LLDP and LLDP-MED on Switches.

- **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.

  > **NOTE**: Static mode is not supported in PoE-bt.

- **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.

Release Information

Statement introduced in Junos OS Release 9.0.

Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

RELATED DOCUMENTATION

Understanding PoE on EX Series Switches

Configuring PoE Interfaces on EX Series Switches

Configuring Power over Ethernet in a Junos Fusion

maximum-power (Interface)

IN THIS SECTION

Syntax

```
maximum-power watts;
```

Hierarchy Level

```
[edit poe interface (all | all-extended | interface-name)]
```

Description

Configure the maximum amount of power that the switch can supply to the PoE port. The maximum power configuration is valid when the PoE power management is in static mode. If PoE power management is in class mode, which is the default, the maximum power configuration will have no effect on the power allocation. For more information on power management configuration options, see `management`.

NOTE: Maximum power configuration is not supported in PoE-bt (IEEE 802.3bt).

NOTE: 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.

Release Information

Statement introduced in Junos OS Release 9.0.

RELATED DOCUMENTATION

Configuring PoE Interfaces on EX Series Switches

Configuring Power over Ethernet in a Junos Fusion

n-plus-n (satellite-management)

IN THIS SECTION

Syntax

```
n-plus-n
```

Hierarchy Level

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

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.

Release Information

Statement introduced in Junos OS Release 16.1R1.

RELATED DOCUMENTATION

Understanding Power over Ethernet in a Junos Fusion

poe

IN THIS SECTION

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]
```

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.

Release Information

Statement introduced in Junos OS Release 9.0.

Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

RELATED DOCUMENTATION

Configuring PoE Interfaces on EX Series Switches

Configuring Power over Ethernet in a Junos Fusion

priority (Power over Ethernet)

IN THIS SECTION

Syntax

```
priority (low | high);
```

Hierarchy Level

```
[edit poe interface (interface-name | all | all-extended)]
```

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.

Release Information

Statement introduced in Junos OS Release 9.0.

Statement introduced in Junos OS Release 17.2R1 for a Junos Fusion Provider Edge.

RELATED DOCUMENTATION

Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch

Configuring PoE Interfaces on EX Series Switches

Configuring Power over Ethernet in a Junos Fusion

psu (satellite-management)

IN THIS SECTION

Syntax

```
psu {
    redundancy {
        n-plus-n;
    }
}
```

Hierarchy Level

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

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.

Release Information

Statement introduced in Junos OS Release 16.1R1.

RELATED DOCUMENTATION

Understanding Power over Ethernet in a Junos Fusion

redundancy (satellite-management)

IN THIS SECTION

Syntax

```
redundancy {
    n-plus-n;
}
```

Hierarchy Level

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

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.

Release Information

Statement introduced in Junos OS Release 16.1R1.

RELATED DOCUMENTATION

Understanding Power over Ethernet in a Junos Fusion

CHAPTER 8

Operational Commands for Power over Ethernet and Power Supply Management on Junos Fusion Provider Edge

IN THIS CHAPTER

show chassis satellite power-budget-statistics

IN THIS SECTION

Syntax

```
show chassis satellite power-budget-statistics
<slot-id slot-id-number>
```

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

Output Fields

Table 32 on page 796 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 32: 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.

Table 32: show chassis satellite-management power-budget-statistics Output Fields *(Continued)*

Field Name	Field Description
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.
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
```

Release Information

Command introduced in Junos OS Release 16.1R1.

RELATED DOCUMENTATION

Understanding Power over Ethernet in a Junos Fusion

show poe controller

IN THIS SECTION

Syntax

```
show poe controller
```

Description

Display configuration and status of the PoE controllers.

Required Privilege Level

view

Output Fields

Table 33 on page 800 lists the output fields for the **show poe controller** command. Output fields are listed in the approximate order in which they appear.

Table 33: 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.
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.

Table 33: show poe controller Output Fields *(Continued)*

Field Name	Field Description
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
```

Release Information

Command introduced in Junos OS Release 9.0.

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.

RELATED DOCUMENTATION

show poe interface

request system firmware upgrade poe

Verifying PoE Configuration and Status (CLI Procedure)

Verifying PoE Configuration and Status for a Junos Fusion (CLI Procedure)

Monitoring PoE Power Consumption (CLI Procedure)

Upgrading the PoE Controller Software

show poe interface

IN THIS SECTION

Syntax

```
show poe interface
<fpc-slot number>
<interface-name>
```

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

Output Fields

Table 34 on page 804 lists the output fields for the **show poe interface** command. Output fields are listed in the approximate order in which they appear.

Table 34: show poe interface Output Fields

Field Name (All Interfaces Output)	Field Name (Single Interface Output)	Field Description
Interface	**PoE Interface**	Interface name.

Table 34: 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.

Table 34: show poe interface Output Fields ***(Continued)***

Field Name (All Interfaces Output)	Field Name (Single Interface Output)	Field Description
	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. • **4P Port that deliver only 2 Pair non IEEE**—Signature failure on Alt-B, allowing power only on Alt-A (Non IEEE or Legacy PD). • **4P Port delivering 2P non IEEE**—Non-IEEE PD was detected using 4P matrix in BT mode and power as 2Pair . • **4P Port delivering 4P non IEEE**—Non-IEEE PD was detected using 4P matrix in BT mode and power as 4Pair. • **4P Port delivering 2P IEEE SSPD**—802.3BT- SSPD was detected using 4P matrix and operate as 2P if requested class =< 4. • **4P Port delivering 4P IEEE SSPD**—802.3BT- SSPD was detected using 4P matrix and operate as 4P if requested class > 4. • **4P Port delivering 2P IEEE DSPD in 1st phase**—802.3BT- DSPD was detected using 4P matrix and operate as 2P due to 4pair candidate validation in two cycles. • **4P Port delivering 2P IEEE DSPD**—802.3BT- DSPD was detected using 4P matrix and operate as 2P.

Table 34: show poe interface Output Fields *(Continued)*

Field Name (All Interfaces Output)	Field Name (Single Interface Output)	Field Description
		• **4P Port delivering 4P IEEE DSPD**—802.3BT- DSPD was detected using 4P matrix and operate as 4P. • **Force Power BT 4P**—Port matrix 4P and delivers power on both pair sets due to force power command. • **Force Power BT Error**—Force power command was set, one of the port pair sets stop delivering power, from at least one reason out of various reasons (System related, Device related, port related or Pair set related). • **Connection Check error**—This error will be reported only in 4 pair port when invalid connection check signature was detected. In such case detection fail counter will be incremented. • **Open**—Port is not connected (Equivalent to Detection in Progress).
	FourPair status	Status of four-pair PoE (PoE-4P), a Juniper Networks extension to the IEEE 802.3at standard, which can be enabled for high or ultra-high power delivery: • **Enabled**—High or ultra-high power mode is enabled. • **Disabled**—High or ultra-high power mode is disabled. See Enabling PoE on EX Series Switches (CLI Procedure) for information on how to enable four-pair PoE.

Table 34: show poe interface Output Fields ***(Continued)***

Field Name (All Interfaces Output)	Field Name (Single Interface Output)	Field Description
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. • **DS/BT**—Interface is configured for dual-signature powered devices. • **SS/BT**—Interface is configured for single-signature powered devices.
Max power	**Power limit on the interface**	Maximum power that can be provided by the interface. This is determined by the class of the powered device. For dual-signature devices, each pair set has its own class. The maximum power will be the total of the maximum power for the two classes: **max power = class x + class y** for dual signature **x/y**. For example, a dual-signature device with a class value displayed as 5/5 has a maximum power of 90W, because class 5 has a maximum power of 45W. 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.

Table 34: show poe interface Output Fields *(Continued)*

Field Name (All Interfaces Output)	Field Name (Single Interface Output)	Field Description
Class	Class of power device	IEEE 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-bt supports power devices with dual signatures. For dual-signature devices, the output value contains both the class values, e.g. **5/5**. For single-signature devices, the output value is formatted as **5/-**.
	PoE Mode	IEEE PoE standard supported by the interface—either **802.3af**, or **802.3at**, **ultra-poe**, or **802.3bt**.

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 (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
```

show poe interface (PoE-bt mode)

```
user@switch> show poe interface
Interface    Admin      Oper     Pair/Mode  Max     Priority  Power          Class
             status     status   status     power             consumption
 ge-0/0/0    Enabled    ON       SS/BT      15.4W   Low       12.0W  (L)      3/-
 ge-0/0/1    Enabled    ON       4P/BT      60.0W   Low       55.0W           4/-
 ge-0/0/2    Enabled    ON       4P/POH     90.0W   Low       81.0W           4/-
 ge-0/0/3    Enabled    ON       SS/BT      90.0W   High      80.0W           8/-
 ge-0/0/4    Enabled    ON       SS/BT      75.0W   Low       65.0W(L)        7/-
 ge-0/0/5    Enabled    ON       SS/BT      30.0W   Low       27.0W           4/-
 ge-0/0/6    Enabled    ON       SS/BT      15.4W   Low       13.0W           3/-
 ge-0/0/7    Enabled    ON       SS/BT      60.0W   Low       49.0W           6/-
 ge-0/0/8    Enabled    ON       DS/BT      90.0W   Low       78.0W           5/5
 ge-0/0/9    Enabled    ON       DS/BT      75.0W   Low       68.0W(L)        5/4
 ge-0/0/10   Enabled    ON       DS/BT      60.0W   Low       55.0W           4/4
```

show poe interface (PoE-bt mode: 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
Four-pair status             :  NA
Power limit on the interface : 90.0W
Priority                     : Low
Power consumed               : 78.0W
Class of power device        :   5/5
PoE Mode                     : 802.3bt
```

Release Information

Command introduced in Junos OS Release 9.0.

Command introduced in Junos OS Release 12.2 for ACX2000 routers.

RELATED DOCUMENTATION

show poe controller

Enabling PoE on EX Series Switches (CLI Procedure)

CHAPTER 9

Monitoring Junos Fusion Provider Edge

IN THIS CHAPTER

Connectivity Fault Management in Junos Fusion

Connectivity fault management (CFM) allows the Ethernet network to be monitored according to IEEE 802.1AG and ITU-T Y.1731 standards. A CFM session monitors the maintenance endpoints (MEPs) in a maintenance association (MA). MEPS use continuity check messages (CCMs) to determine the connectivity status between MEPs in the MA.

Junos Fusion Provider Edge supports CFM sessions on the extended ports of the satellite devices via the cascade port on the aggregation device. The aggregation device handles and processes the transmission and reception of the CFM messages. From a CFM perspective, the satellite devices operate in a transparent mode.

CFM selects the cascade port that is associated with a satellite device as the anchor for the CFM sessions that are configured on the extended ports of the satellite device and it processes the sessions in the PFE that is associated with the cascade port. When a satellite device is connected to multiple cascade ports on the aggregation device, CFM selects the first available cascade port as the anchor. If the anchor cascade port fails, the next available cascade port is selected as anchor and the CFM sessions processing is moved to the PFE of newly selected anchor. The CFM sessions can flap when the sessions are re-anchored. During the switchover, the measurement interval in the CFM session restarts.

Junos Fusion Provider Edge supports the following CFM feature:

- Distributed and inline CFM sessions.
- CCM status for down MEPs and multiple up MEPs
- Support for link trace (LT) and loopback (LB).
- Delay measurement (DM)and synthetic loss measurement (SLM) as defined in ITU-T Y-1731 standard.

For more information on configuring CFM, see IEEE 802.1ag OAM Connectivity Fault Management Overview

NOTE: Junos Fusion Provider Edge only supports enhanced CFM mode.

CHAPTER 10

SNMP MIB Support on Junos Fusion Provider Edge

IN THIS CHAPTER

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 35 on page 816shows the CIDXs used for satellite devices.

Table 35: CIDX’s for Satellite Devices

CIDX	Component Type
102	Power Supply
104	Fan
107	FPC

Table 35: CIDX's for Satellite Devices *(Continued)*

CIDX	Component Type
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 36 on page 818 shows the SNMP traps that can be generated for satellite devices.

Table 36: 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

Table 36: SNMP Traps Generated for Satellite Devices *(Continued)*

Trap	Condition
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 11

Link Aggregation and Link Aggregation Control Protocol on Junos Fusion Provider Edge

IN THIS CHAPTER

Understanding Link Aggregation and Link Aggregation Control Protocol in a Junos Fusion

IN THIS SECTION

Link Aggregation in Junos Fusion

Link aggregation is used to aggregate Ethernet interfaces between two devices. The aggregated Ethernet interfaces that participate in a *link aggregation group (LAG)* are called *member links*. Because a LAG is composed of multiple member links, even if one member link fails, the LAG continues to carry traffic over the remaining links.

Link Aggregation Control Protocol in Junos Fusion

Link Aggregation Contol Protocol (LACP) is one method of bundling several physical interfaces to form one logical aggregated Ethernet interface. LACP is a subcomponent of the IEEE 802.3ad standard and is used as a discovery protocol. The LACP mode can be active or passive. The transmitting link is known as the *actor*, and the receiving link is known as the *partner*. If the actor and partner are both in passive mode, they do not exchange LACP packets, and the aggregated Ethernet links do not come up. If either the actor or partner is active, they do exchange LACP packets. By default, LACP is in passive mode on aggregated Ethernet interfaces. To initiate transmission of LACP packets and response to LACP packets, you must enable LACP active mode. You can configure Ethernet links to actively transmit protocol data units (PDUs), or you can configure the links to passively transmit them, sending out LACP PDUs only when they receive them from another link. You can configure both VLAN-tagged and untagged aggregated Ethernet interfaces without LACP enabled. 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 LAG without user intervention.
- Link monitoring to check whether both ends of the bundle are connected to the correct group.

The satellite devices provide network interfaces that send and receive network traffic and process the periodic transmission of LACP packets. You can include extended ports (physical interface on a satellite device that provides a connection to servers or endpoints) or local ports in LAGs and MC-LAGs, but not both.

When a dual-homed end device is deployed with Junos Fusion, the network interface cards form a LAG with the Junos Fusion. During a Junos Fusion upgrade, the end device may not be able to exchange LACP PDUs. In such a situation you can configure an interface to be in the **up** state even if no PDUs are exchanged. Use the **force-up** statement to configure an interface when the peer has limited LACP capability. The interface selects the associated LAG by default, whether the LACP mode is active or passive. When there are no received PDUs, the partner is considered to be working in the passive mode. Therefore, LACP PDU transmissions are controlled by the transmitting link.

Configuring Link Aggregation and LACP in Junos Fusion

1. Create a logical aggregated Ethernet interface.
2. Define the parameters associated with the logical aggregated Ethernet interface, such as a logical unit, interface properties, and Link Aggregation Control Protocol (LACP).
3. Define the member links to be contained within the aggregated Ethernet interface—for example, two local 10-Gigabit Ethernet interfaces on the aggregation device or two extended ports on the aggregation device.

- LAGs and MC-LAGs cannot include a mix of extended ports and local ports on the aggregation device.
- LAGs can span across multiple satellite devices in Junos Fusion Provider Edge.
- LAGs cannot contain both single-homed and multihomed members.
- Existing restrictions that apply to LAGs and MC-LAGs also apply to LAGs and MC-LAGs that include extended ports.

4. Configure LACP for link detection.

Software and Hardware Guidelines when Configuring Link Aggregation and LACP in Junos Fusion

Keep in mind these hardware and software guidelines:

- Up to 1750 LAGs are supported in Junos Fusion Provider Edge and Junos Fusion Enterprise, and the LAGs are numbered from ae0 through ae4091.
- Up to 16 members are supported in a LAG in Junos Fusion Provider Edge and Junos Fusion Enterprise.
- Configure the LAG 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.
- Configure LACP for dual-homed extended ports identically on both of the aggregation devices; otherwise LACP will not be in a forwarding state.

RELATED DOCUMENTATION

Junos Fusion Provider Edge Overview | 3

Understanding Junos Fusion Ports

Configuring Junos OS for Supporting Aggregated Devices

Configuring an Aggregated Ethernet Interface

On Fast Ethernet, Tri-Rate Ethernet copper, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces on M Series and T Series routers, you can associate a physical interface with an aggregated Ethernet interface.

NOTE: On a Junos Fusion, you can include extended ports (physical interface on a satellite device that provides a connection to servers or endpoints) or local ports in link aggregation groups (LAGs) and MC-LAGs, but not both. For information on extended ports, see *Understanding Junos Fusion Ports* .

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 (fastether-options | gigether-options) 802.3ad aex
```

You specify the interface instance number ***x*** to complete the link association; ***x*** can be from 0 through 127, for a total of 128 aggregated interfaces on M Series and T Series routers and can be from 1 through 480, for a total of 480 aggregated interfaces on MX Series routers. For MX Series routers running Junos release 14.2R3 and later you can configure a maximum of 1000 aggregated interfaces. Aggregated interfaces are numbered from **ae0** through **ae4092**.

NOTE: On MX2010 and MX2020 routers you can configure a maximum of 800 aggregated interfaces.

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, and for a sample configuration, see Example: Configuring Aggregated Ethernet Interfaces.

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.

Configuring Junos OS for Supporting Aggregated Devices

IN THIS SECTION

Junos OS supports the aggregation of physical devices into defined virtual links, such as the link aggregation of Ethernet interfaces defined by the IEEE 802.3ad standard.

Tasks for configuring aggregated devices are:

Configuring Virtual Links for Aggregated Devices

To define virtual links, you need to specify the associations between physical and logical devices within the **[edit interfaces]** hierarchy, and assign the correct number of logical devices by including the **device-**

count statement at the **[edit chassis aggregated-devices ethernet]** and **[edit chassis aggregated-devices sonet]** hierarchy levels:

```
[edit chassis]
aggregated-devices {
    ethernet {
        device-count number;
    }
    sonet {
        device-count number;
    }
}
```

The aggregated interfaces are numbered from **ae0** through **ae4091**. The maximum number of aggregated interfaces supported by different routers is listed below:

- For PTX Series routers, you can configure a maximum of 128 aggregated interfaces.
- For M Series and T Series routers, you can configure a maximum of 128 aggregated interfaces (LAG bundles).
- In Junos release 14.2R2 and earlier, you can configure a maximum of 480 aggregated interfaces on MX Series routers.
- In Junos release 14.2R3 and later, you can configure a maximum of 1000 aggregated interfaces on MX240, MX480, and MX960 routers.
- In Junos release 14.2R3 and later, you can configure a maximum of 800 aggregated interfaces on MX2010 and MX2020 routers.
- In Junos OS 15.1F5 and 15.1F6 releases, you can configure a maximum of 480 aggregated interfaces on MX240, MX480, and MX960 routers.
- In Junos OS 15.1F5 and 15.1F6 releases, you can configure a maximum of 800 aggregated interfaces on MX2010 and MX2020 routers.

For SONET/SDH, starting with Junos OS Release 13.2, the maximum number of logical interfaces is 64, numbered from **as0** through **as63**. In releases before Junos OS Release 13.2, the maximum was 16.

Table 37 on page 827 lists the MX Series routers and the maximum number of interfaces per LAG and the maximum number of LAG groups they support. MX Series routers can support up to 64 LAGs.

Table 37: Maximum Interface Per LAG and Maximum LAGs per MX Router

MX Series Routers	Maximum Interfaces per LAG	Maximum LAG Groups
MX5, MX10, MX40, MX80, and MX104	16	Limited by the interface capacity. 80 on MX104.
MX240, MX480, MX960, MX10003, MX2010, and MX2020	64	1000

Configuring LACP Link Protection at the Chassis Level

Link Aggregation Control Protocol (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. 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 link protection enables you to force active and standby links within an aggregated Ethernet. You configure LACP link protection by using the **link-protection** and **system-priority** statements at either the chassis or interface level and by configuring port priority at the interface level using the **system-priority** statement. Configuring LACP parameters at the chassis level results in all aggregated Ethernet interfaces using the defined values unless overridden by the LACP configuration on a specific interface.

```
[edit chassis]
aggregated-devices {
    ethernet {
        lacp {
            link-protection {
                non-revertive;
            }
            system-priority priority;
        }
    }
}
```

NOTE: LACP link protection also uses port priority. You can configure port priority at the Ethernet interface **[gigether-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).

Enabling LACP Link Protection

To enable LACP link protection for aggregated Ethernet interfaces on the chassis, use the **link-protection** statement at the **[edit chassis aggregated-devices ethernet lacp]** hierarchy level:

```
[edit chassis aggregated-devices ethernet lacp]
link-protection {
    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, after 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.

BEST PRACTICE: (MX Series) In a highly scaled configuration over aggregated Ethernet, we recommend that you prevent the router from performing such a switch by including the **non-revertive** statement. Failure to do so may result in some traffic loss if a MIC on which a member interface is located reboots. Using the **non-revertive** statement for this purpose is not effective if both the primary and secondary interfaces are on the MIC that reboots.

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.

Configuring System Priority

To configure LACP system priority for aggregated Ethernet interfaces on the chassis, use the **system-priority** statement at the **[edit chassis aggregated-devices ethernet lacp]** hierarchy level:

```
[edit chassis aggregated-devices ethernet lacp]
system-priority 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 through 65,535.

Configuring the Maximum Links Limit

To configure the maximum links limit, use the **maximum-links** statement at the **[edit chassis aggregated-devices]** hierarchy level:

```
[edit chassis aggregated-devices]
maximum-links maximum-links-limit;
```

Configuring PPM on Junos Fusion

If you use Junos Fusion with Junos OS Release 14.2R3, you need to ensure that link aggregation (and STP) work properly by configuring timers for the periodic packet management (PPM) daemons on the aggregation and satellite devices. We recommend using the following timer values:

```
[edit routing-options ppm]
    redistribution-timer 120;
    tcp-keepalive-interval 3000;
    tcp-keepalive-idle 3000;
```

Starting in Junos OS Release 14.2R4, the timer values that ensure proper link aggregation and STP functions are configured by default if you use Junos Fusion with Junos OS.

Release History Table

Release	Description
15.1F5	In Junos OS 15.1F5 and 15.1F6 releases, you can configure a maximum of 480 aggregated interfaces on MX240, MX480, and MX960 routers.

15.1F5	In Junos OS 15.1F5 and 15.1F6 releases, you can configure a maximum of 800 aggregated interfaces on MX2010 and MX2020 routers.
14.2R4	Starting in Junos OS Release 14.2R4, the timer values that ensure proper link aggregation and STP functions are configured by default if you use Junos Fusion with Junos OS.
14.2R3	In Junos release 14.2R3 and later, you can configure a maximum of 1000 aggregated interfaces on MX240, MX480, and MX960 routers.
14.2R3	In Junos release 14.2R3 and later, you can configure a maximum of 800 aggregated interfaces on MX2010 and MX2020 routers.
14.2R3	If you use Junos Fusion with Junos OS Release 14.2R3, you need to ensure that link aggregation (and STP) work properly by configuring timers for the periodic packet management (PPM) daemons on the aggregation and satellite devices.
14.2R2	In Junos release 14.2R2 and earlier, you can configure a maximum of 480 aggregated interfaces on MX Series routers.
13.2	For SONET/SDH, starting with Junos OS Release 13.2, the maximum number of logical interfaces is 64, numbered from as0 through as63.

RELATED DOCUMENTATION

Configuring Aggregated SONET/SDH Interfaces

CHAPTER 12

Uplink Failure Detection on Junos Fusion Provider Edge

IN THIS CHAPTER

Overview of Uplink Failure Detection on a Junos Fusion

The uplink failure detection feature on a Junos Fusion enables satellite devices to detect link failures on the uplink interfaces used to connect to aggregation devices. When uplink failure detection detects uplink failure on a satellite device, all of the device's extended ports (which connect to host devices) are shut down. Shutting down the extended ports allows downstream host devices to more quickly identify and adapt to the outage. For example, when a host device is connected to two satellite devices, and uplink failure detection shuts down the extended ports on one satellite device, the host device can more quickly recognize the uplink failure and redirect traffic through the other, active satellite device.

You can configure uplink failure detection globally, for all satellite devices of a Junos Fusion, and for individual satellite devices. Uplink failure detection configuration at the satellite device level overrides the global uplink failure detection configuration.

Uplink failure detection configuration allows you to configure these options:

- The minimum number of active uplink ports a satellite device must have to remain active. The default is one active uplink port. You can use this option to specify more minimum active ports.
- The amount of time uplink failure detection waits to try to re-enable disabled extended ports. This wait time is called a hold-down period. It is intended to avoid port flapping on the extended ports when uplink port connectivity is unstable. The default hold-down period is six seconds.

Uplink failure detection must know which ports on a satellite device can be used as uplink ports. These are called candidate uplink ports. Table 38 on page 832 shows the default set of candidate uplink ports that uplink failure detection selects for failure detection. If you choose not to use the default uplink ports for your satellite devices, you need to specify which uplink ports you want to use for uplink failure detection by creating a candidate uplink port profile and applying it to the satellite device's uplink failure detection configuration.

> **CAUTION**: The physically connected uplink ports on a satellite device must be defined as candidate uplink ports in the Junos Fusion configuration. If the uplink ports on a satellite device are not configured as candidate uplink ports, uplink failure detection cannot be enabled on the device, and a system log message is generated.

Table 38: UFD Default Uplink Interfaces for Satellite Devices

Device Type	Default Uplink Interfaces
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
QFX5100-24Q-2P (4 ports on PIC 0)	0/20 through 0/23
QFX5100-48S-6Q (6 QSFP+ ports)	0/48 through 0/53
QFX5100-48T-6Q (6 QSFP+ ports)	0/48 through 0/53
QFX5100-96S-8Q (8 QSFP+ ports)	0/96 through 0/103

RELATED DOCUMENTATION

Overview of Uplink Failure Detection on a Junos Fusion | 831

Configuring Uplink Failure Detection on a Junos Fusion

IN THIS SECTION

The uplink failure detection feature on a Junos Fusion enables satellite devices to detect link failures on the uplink interfaces used to connect to aggregation devices. When uplink failure detection detects uplink failure on a satellite device, all of the device's extended ports (which connect to host devices) are shut down.

The following topics describe how to configure uplink failure detection on a Junos Fusion:

Enabling Uplink Failure Detection on a Junos Fusion

You can enable uplink failure detection on a Junos Fusion at the following levels in the configuration hierarchy:

- To enable uplink failure detection globally, for all satellite devices in the Junos Fusion, include the uplink failure detection configuration at the **[edit chassis satellite-management]** level.
- To enable uplink failure detection on a specific satellite device, include the uplink failure detection configuration at the **[edit chassis satellite-management fpc *slot-id*]** level. Uplink failure detection configuration applied to a satellite device overrides the global uplink failure detection configuration.

Uplink failure detection configuration syntax is the same at all hierarchy levels. This topic shows how to configure uplink failure detection at the global level, but you can also apply uplink failure detection configuration at the satellite device level.

To enable uplink failure detection on a Junos Fusion, do the following on the fabric's aggregation device:

1. Enable uplink failure detection with default settings:

```
[edit chassis satellite-management]
user@switch# set uplink-failure-detection
```

The default configuration parameters are described in Table 39 on page 834.

2. (Optional) Apply custom uplink failure detection settings by specifying a candidate uplink port policy:

```
[edit chassis satellite-management uplink-failure-detection]
user@switch# candidate-uplink-policy policy-name
```

For information about configuring candidate uplink policies, see "Configuring a Candidate Uplink Port Policy" on page 835.

Table 39: Junos Fusion Uplink Failure Detection Default Configuration

Configuration Parameter	Description	Default
holddown	Configures the interval of time uplink failure detection waits before trying to re-enable a satellite device's extended ports after shutting them down due to an uplink port failure.	6 seconds
minimum-links	Configures the minimum number of active uplink ports a satellite device must have. If a satellite device has fewer than this number of active uplink ports, uplink failure detection shuts down its extended ports.	1 link
uplink-port-group	Defines a set of candidate uplink ports to assign to satellite devices.	Each satellite device model has a set of default uplink ports. You only need to assign uplink ports if you do not want to use the default ports. See UFD Default Uplink Interfaces for Satellite Devices on page 832 for the default uplink ports by device.

Configuring a Candidate Uplink Port Policy

IN THIS SECTION

A candidate uplink port policy contains uplink failure detection uplink port configuration that you can apply to satellite devices to override the default uplink failure detection behavior.

You can enter configuration statements in a candidate uplink port policy at these levels of the hierarchy:

- Enter configuration statements at the level **[edit policy-options satellite-policies candidate-uplink-port-policy *policy-name*]** to override the default uplink failure detection behavior. Statements configured at this level are applied if the policy is applied to a satellite device that does not match a **product-model** statement in any term in the policy. If the policy contains no terms, the statements at this level are applied to every satellite device to which the policy is applied.

- Create terms within the candidate uplink port policy at the level **[edit policy-options satellite-policies candidate-uplink-port-policy *policy-name* term *term-name*]**. Use terms to apply different uplink failure detection configurations to certain satellite devices, based on their product model. Each term contains match criteria that is compared against the model name of each satellite device to which the policy is applied. If the criteria matches the device model, the configuration specified in the term is applied to the device. Terms are evaluated in the order they appear in the configuration. The first term that matches a satellite device is applied to the device.

Configuring a candidate uplink port policy is described in the following sections:

Configuring Candidate Uplink Port Policy Default Configuration

Uplink failure detection has the following default configuration parameters that apply if you enable uplink failure detection with no additional configuration:

- The default configuration settings are described in Table 39 on page 834.

- The default uplink ports that are assigned to each satellite device type are described in "Overview of Uplink Failure Detection on a Junos Fusion" on page 831.

A candidate uplink port policy can contain configuration statements that override the defaults if the policy is applied to a satellite device that does not match a **product-model** statement in any term in the policy.

To configure a candidate uplink port policy default configuration:

1. (Optional) Specify the interval of time uplink failure detection waits before trying to re-enable a satellite device's extended ports after shutting them down due to an uplink port failure:

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

2. (Optional) Specify the minimum number of active uplink ports a satellite device must have. If a satellite device has fewer than this number of active uplink ports, uplink failure detection shuts down its extended ports:

```
[edit policy-options satellite-policies candidate-uplink-port-policy policy-name]
user@switch# set minimum-links link-count
```

3. (Optional) Specify an uplink port group to assign to satellite devices:

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

For information about configuring an uplink port group, see "Configuring an Uplink Port Group" on page 838.

Configuring Candidate Uplink Port Policy Terms

You can configure terms in a candidate uplink port policy to apply uplink failure detection configuration to certain satellite devices, based on their device model. For example, you can create a term that matches all QFX 5100 Series switches. When the policy is applied to a QFX 5100 Series switch, the other configuration statements in the term are applied to the switch. If the policy is applied to satellite devices that are not QFX 5100 Series switches, the configuration statements in the term are not applied. When a candidate uplink port policy has multiple terms, the terms are evaluated in the order they appear in the configuration. The first term that matches a satellite device is applied to that satellite device.

To configure a candidate uplink port policy term:

1. Specify which device models the term will apply to:

```
[edit policy-options satellite-policies candidate-uplink-port-policy policy-
name term term-name from]
user@switch# set-product-model model-name
```

   The other configuration statements in the term are only applied to satellite devices whose device model matches the match term *model-name*.

   The match term *model-name* can be a complete device model name, to match that device model exactly. You can also use the wildcard character (*) in the match term to match zero or more of any character.

   Some examples of using the wildcard character in the match term:

   - To apply the satellite policy to all EX 4300 Series switches in the satellite device role, enter **EX4300*** as the *model-name*.
   - To apply the satellite policy to all QFX 5100 Series switches in the satellite device role, enter **QFX5100*** as the *model-name*.
   - To apply the satellite policy to QFX 5100 Series switches with model names that start with QFX5100-96, enter **QFX5100-96*** as the *model-name*.

2. (Optional) Specify the interval of time uplink failure detection waits to re-enable a satellite device's extended ports after shutting them down due to an uplink port failure:

```
[edit policy-options satellite-policies candidate-uplink-port-policy policy-
name term term-namefrom]
user@switch# set holddown interval
```

3. (Optional) Specify the minimum number of active uplink ports a satellite device must have. If a satellite device has fewer than this number of active uplink ports, uplink failure detection shuts down its extended ports:

```
[edit policy-options satellite-policies candidate-uplink-port-policy policy-
name]
user@switch# set minimum-links link-count
```

4. (Optional) Specify an uplink port group to assign to satellite devices:

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

For information about configuring an uplink port group, see "Configuring an Uplink Port Group" on page 838.

Configuring an Uplink Port Group

An 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. Every satellite device type has default candidate uplink ports, which are described in "Overview of Uplink Failure Detection on a Junos Fusion" on page 831. You do not need to create uplink ports groups if you want to use the default candidate uplink ports on satellite devices.

CAUTION: The physically connected uplink ports on a satellite device must be defined as candidate uplink ports in the Junos Fusion configuration. If the uplink ports on a satellite device are not configured as candidate uplink ports, uplink failure detection cannot be enabled on the device, and a system log message is generated.

To create an uplink port group:

1. Specify the uplink port group name:

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

2. Configure the PICs that will 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 that will 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]
```

RELATED DOCUMENTATION

Overview of Uplink Failure Detection on a Junos Fusion | 831

CHAPTER 13

Configuration Statements for Uplink Failure Detection on Junos Fusion Provider Edge

IN THIS CHAPTER

candidate-uplink-port-policy (satellite-policies)

IN THIS SECTION

Syntax

```
candidate-uplink-port-policy policy-name{
    <holddownholddown-time>;
    <minimum-linksnumber-of-links>;
    <uplink-port-group uplink-port-group-name>;
    term term-name {
        from {
            product-model model-name;
            <holddown holddown-time>;
            <minimum-links number-of-links>;
            <uplink-port-group uplink-port-group-name>;
        }
    }
}
```

Hierarchy Level

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

Description

Configures a candidate uplink port profile, which contains uplink failure detection feature configuration that can be applied to satellite devices in a Junos Fusion.

Default

There is no configured candidate uplink port profile, by default.

Options

policy-name	User-defined name for the 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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51

Configuring or Expanding a Junos Fusion Enterprise

holddown (candidate-uplink-port-profile)

IN THIS SECTION

Syntax

```
holddown interval;
```

Hierarchy Level

```
[edit policy-options satellite-policies candidate-uplink-port-profileprofile-
name]
[edit policy-options satellite-policies candidate-uplink-port-profile profile-
name term term-name from]
```

Description

Configures the interval of time uplink failure detection waits before trying to try re-enable a satellite device's extended ports after shutting them down due to an uplink port failure. It is intended to avoid port flapping on the extended ports when uplink port connectivity is unstable.

Default

The default holddown interval is 6 seconds.

Options

interval—The holddown interval, in seconds. Valid values are 1-600 seconds.

Required Privilege Level

admin—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | **51**

Configuring or Expanding a Junos Fusion Enterprise

minimum-links (candidate-uplink-port-profile)

IN THIS SECTION

Syntax

```
minimum-links link-count;
```

Hierarchy Level

```
[edit policy-options satellite-policies candidate-uplink-port-profile profile-
name]
[edit policy-options satellite-policies candidate-uplink-port-profile profile-
name term term-name from]
```

Description

Configures the minimum number of active uplink ports a satellite device must have. If a satellite device has fewer than this number of active uplink ports, uplink failure detection shuts down its extended ports.

Default

The default number of minimum links is 1.

Options

link-count—Specifies the minimum number of active uplink ports a satellite device must have. Valid values are 1-32 links.

Required Privilege Level

admin—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

pic (satellite-policies port-group-alias)

IN THIS SECTION

Syntax

```
pic pic-number {
    port [port-number | port-number-range | all];
}
```

Hierarchy Level

```
[edit policy-options satellite-policies port-group-alias port-group-alias-name]
```

Description

Specify the PIC number to apply a port group alias for satellite policies in a Junos Fusion.

You must also specify the ports on the PIC when you use this statement.

Options

pic-number The PIC number 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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51

Configuring or Expanding a Junos Fusion Enterprise

port (satellite-policies port-group-alias)

IN THIS SECTION

Syntax

```
port [port-number | port-number-range | all];
```

Hierarchy Level

```
[edit policy-options satellite-policies port-group-alias port-group-alias-name
pic pic-number]
```

Description

Specify the port or ports to apply a port group alias for satellite policies in a Junos Fusion.

You must also specify the PIC when you use this statement.

Options

port-number	The port number on the PIC on the satellite device.
port-number-range	A range of port numbers on the PIC.
all	All ports on the PIC.

Required Privilege Level

admin—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

port-group-alias (satellite-policies)

IN THIS SECTION

Syntax

```
port-group-alias port-group-alias-name {
    pic pic-number {
        port [port-number | port-number-range | all];
```

```
    }
}
```

Hierarchy Level

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

Description

Configure a port group alias for satellite policies in a Junos Fusion.

A port group alias is used to define the candidate uplink ports on satellite devices that use the satellite policy.

CAUTION: The physically connected uplink ports on a satellite device must be defined as candidate uplink ports in the Junos Fusion configuration. If the uplink ports on a satellite device are not configured as candidate uplink ports, uplink failure detection cannot be enabled on the device, and a system log message is generated.

A port group alias is associated with a satellite policy using the **set uplink-port-group** ***uplink-port-group-name*** statement in the [**edit policy-options satellite-policies** `candidate-uplink-policy` ***policy-name***] hierarchy.

Default

Each satellite device model has a set of default uplink ports (see "Overview of Uplink Failure Detection on a Junos Fusion" on page 831). You only need to assign an uplink port group to a satellite device if you do not want to use the default uplink ports.

Options

port-group-alias-name	The user-defined name of the port group alias.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

product-model (Junos Fusion)

IN THIS SECTION

Syntax

```
product-model model-name;
```

Hierarchy Level

```
[edit policy-options satellite-policies candidate-uplink-port-policy policy-name
term term-name from]
[edit policy-options satellite-policies candidate-uplink-port-policy policy-name
term term-name from]
```

```
[edit policy-options satellite-policies forwarding-policy policy-name term term-
name from]
```

Description

Define the satellite device product models that will use the candidate uplink port policy defined in the **from** statement.

The other statements in the same **from** statement are applied to satellite devices that match the **product-model *model-name*** definition. Those configuration statements are not applied to satellite devices that do not match the definition.

Options

model-name Defines the satellite device product models that will use the candidate uplink port policy. It can be a complete device model name, to match that device model exactly. You can also use the wildcard character (*) in the match term to match zero or more of any character.

Some examples of using the wildcard character in the match term:

- To apply the satellite policy to all EX4300 switches in the satellite device role, enter **EX4300*** as the *model-name*.
- To apply the satellite policy to all QFX5100 switches in the satellite device role, enter **QFX5100*** as the *model-name*.
- To apply the satellite policy to QFX5100 switches with model names that start with QFX5100-96, enter **QFX5100-96*** as the *model-name*.

Required Privilege Level

admin—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

satellite-policies

IN THIS SECTION

Syntax

```
satellite-policies {
    <candidate-uplink-port-profile policy-name> {
        <holddownholddown-time>;
        <minimum-linksnumber-of-links>;
        <uplink-port-group uplink-port-group-name>;
        term term-name {
            from {
                product-model model-name;
                <holddown holddown-time>;
                <minimum-links number-of-links>;
                <uplink-port-group uplink-port-group-name>;
            }
        }
    }
    environment-monitoring-policy policy-name {
        <alarm <linkdown>
        term term-name {
```

```
            from {
                product-model model-name;
            }
        }
    }
    forwarding-policy {
         policy-name {
            port-group-extended name;
                filter filter-name;
                mirror-egress port-group-mirror port-group-mirror;
            mirror-ingress port-group-mirror port-group-mirror,
                port-group-uplink port-group-uplnk-name
                    holddown time;
            term term-name {
                from {
                    port-group-extended name;
                        filter filter-name;
                        mirror-egress port-group-mirror port-group-mirror;
                    mirror-ingress port-group-mirror port-group-mirror,
                        port-group-uplink port-group-uplnk-name
                            holddown time;
                    product-model model-name;
                    port-group-extended port-group-alias-name {
                        port-group-uplink port-group-alias-name;
                    }
                }
            }
        }
    }
    port-group-alias port-group-alias-name {
        pic pic-number {
        port [port-number | port-number-range | all];
        }
    }
```

Hierarchy Level

```
[edit policy-options]
```

Description

Configure satellite policies for a Junos Fusion.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51

Configuring or Expanding a Junos Fusion Enterprise

term (candidate-uplink-policy)

IN THIS SECTION

Syntax

```
term term-name{
    from {
        product-model model-name;
        <holddown holddown-time>;
        <minimum-links number-of-links>;
        <uplink-port-group uplink-port-group-name>;
    }
}
```

Hierarchy Level

```
[edit policy-options satellite-policies candidate-uplink-port-profile policy-
name]
```

Description

Create and configure a term in a candidate uplink satellite policy within a Junos Fusion.

A term in a candidate uplink port policy in a Junos Fusion is used to apply an uplink failure detection configuration to certain satellite devices, based on their product model only. The more complex options that are available for other policies in Junos OS—such as the terms available for routing policies—are not available for candidate uplink port policies.

Options

term-name The user-defined name of the term.

A *term* is a named structure in which match conditions and configuration statements are defined. A candidate uplink policy policy can contain multiple terms. The terms are evaluated in the order they appear in the configuration. The first term that matches a satellite device is applied to that satellite device.

from The statements under the **from** statement define the satellite device model match criteria and uplink failure detection configuration for the term. Each term can contain only one **from** statement.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

uplink-failure-detection (Junos Fusion)

IN THIS SECTION

Syntax

```
uplink-failure-detection {
    <candidate-uplink-policy policy-name>;
}
```

Hierarchy Level

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

Description

Enables uplink failure detection in a Junos Fusion.

The uplink failure detection feature on a Junos Fusion enables satellite devices to detect link failures on the uplink interfaces used to connect to aggregation devices. When uplink failure detection detects uplink failure on a satellite device, all of the device's extended ports (which connect to host devices) are shut down. Shutting down the extended ports allows downstream host devices to more quickly identify and adapt to the outage. For example, when a host device is connected to two satellite devices, and uplink failure detection shuts down the extended ports on one satellite device, the host device can more quickly recognize the uplink failure and redirect traffic through the other, active satellite device.

You can configure uplink failure detection in a Junos Fusion for a single satellite device using the **fpc** ***slot-id*** option. If uplink failure detection is enabled without specifying the **fpc** ***slot-id*** option, uplink failure detection is enabled for all cascade ports on the aggregation device.

If you enable uplink failure detection without the **candidate-uplink-policy** substatement, the default uplink failure detection settings are applied. To configure non-default uplink failure detection settings, include the **candidate-uplink-policy** substatement. Candidate uplink policies are configured under **[edit policy-options satellite-policies candidate-uplink-port-policy]**.

Default

Uplink failure detection is disabled.

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.

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

uplink-port-group (Junos Fusion)

IN THIS SECTION

Syntax

```
uplink-port-group group-name;
```

Hierarchy Level

```
[edit policy-options satellite-policies candidate-uplink-port-profile profile-
name]
[edit policy-options satellite-policies candidate-uplink-port-profile profile-
name term term-name from]
```

Description

In Junos Fusion configuration, assign an uplink port group to a candidate uplink port policy.

An uplink port group defines a set of candidate uplink ports that are assigned to satellite devices to which the candidate uplink port group is assigned.

> **CAUTION**: The physically connected uplink ports on a satellite device must be defined as candidate uplink ports in the Junos Fusion configuration. If the uplink ports on a satellite device are not configured as candidate uplink ports, uplink failure detection cannot be enabled on the device, and a system log message is generated.

Uplink port groups are defined under **[edit policy-options satellite-policies port-group-alias]**.

Default

Each satellite device model has a set of default uplink ports (see "Overview of Uplink Failure Detection on a Junos Fusion" on page 831). You only need to assign an uplink port group to a satellite device if you do not want to use the default uplink ports.

Options

group-name	The name of the port group to assign.

Required Privilege Level

admin—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring Junos Fusion Provider Edge | 51
Configuring or Expanding a Junos Fusion Enterprise

CHAPTER 14

Operational Commands for Uplink Failure Detection on Junos Fusion Provider Edge

IN THIS CHAPTER

show chassis satellite

IN THIS SECTION

Syntax

```
show chassis satellite
[device-alias device-alias | fpc-slot fpc-slot | cluster cluster-name]
```

```
[brief | detail | extensive | terse]
<since time>
```

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

Output Fields

Table 40 on page 862 lists the output fields for the **show chassis satellite** command. Output fields are listed in the approximate order in which they appear.

Table 40: 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 40: 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:	brief terse extensive none

Table 40: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
	• **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.	
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 40: 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

Table 40: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
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

Table 40: show chassis satellite Output Fields ***(Continued)***

Field Name	Field Description	Level of Output
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

Table 40: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
Candidate uplink interfaces (pic/port)	Uplink failure detection candidate uplink interfaces.	detail

Table 40: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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

Table 40: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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
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

Table 40: show chassis satellite Output Fields *(Continued)*

Field Name	Field Description	Level of Output
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>
```

Release Information

Command introduced in Junos OS Release 14.2R3.

RELATED DOCUMENTATION

Configuring or Expanding a Junos Fusion Enterprise

CHAPTER 15

Multicast Replication on Junos Fusion Provider Edge

IN THIS CHAPTER

Understanding Multicast Replication in a Junos Fusion

IN THIS SECTION

This topic introduces how multicast packets are replicated in a Junos Fusion and forwarded to multicast subscribers on satellite device extended ports.

Junos Fusion Multicast Replication Overview

Aggregation devices and satellite devices work together to manage the traffic flow from multicast sources to multicast destination ports in a Junos Fusion, resolving a source packet forwarding path to multiple destination ports.

Multicast source packets might be received through a network port on the aggregation device or an extended port on a satellite device. When a multicast source packet ingresses at a satellite device, the satellite device sends the source packet on an uplink port to the aggregation device. The satellite device load-balances forwarded source traffic over the available uplink ports to the aggregation device.

The aggregation device that initially receives the source traffic to be forwarded is referred to as the *ingress aggregation device*. All multicast destination resolution is done on the aggregation devices. In Junos Fusion architectures with multiple aggregation devices, the ingress aggregation device also forwards the multicast traffic to the other aggregation device or devices to reach multicast subscribers that are only accessible through those other devices, or to support the forwarding behavior of a particular Junos Fusion architecture.

To forward multicast traffic to destinations on satellite device extended ports, the aggregation device uses E-channel Identifier (ECID) mappings to determine the forwarding paths to the destination extended ports, including which cascade ports link to the corresponding satellite devices. (See "ECIDs for Multicast Traffic" on page 880.) Multicast traffic flowing from the aggregation device to destination satellite devices is load-balanced over the available cascade ports to each destination satellite device. Satellite devices use the ECID in the multicast packets from the aggregation device to determine which local port or ports should receive the multicast traffic.

NOTE: This behavior applies similarly to flooding unknown unicast traffic within a VLAN in a Junos Fusion.

By default, the ingress aggregation device replicates multicast and broadcast packets to forward to each destination extended port. This behavior is referred to as *ingress multicast replication*. The aggregation device sends multiple copies of the packet to each satellite device, one copy for each destination extended port on that satellite device, identified by the extended port's unicast ECID. See "Ingress Replication at the Aggregation Device to Satellite Devices" on page 882 for more information.

Starting in Junos OS Release 16.1, Junos Fusion supports enabling *egress multicast replication*, also referred to as *local replication*, where satellite devices replicate the multicast and broadcast packets destined for their local ports. Egress or local replication uses special multicast ECIDs corresponding to one or more extended ports to which a satellite device should forward the traffic. (See "ECIDs for Multicast Traffic" on page 880.) Local replication helps to distribute most of the replication load from aggregation devices to the satellite devices where the traffic egresses, and reduces traffic on cascade ports. When enabled, local replication applies to all satellite devices in the Junos Fusion; you cannot enable it only for individual satellite devices.

Local replication behavior differs slightly for different types of multicast and broadcast traffic, and for different Junos Fusion architectures. See "Egress (Local) Replication on the Satellite Devices" on page 884 for details.

To avoid creating loops and broadcast storms, for both ingress and egress multicast replication, both the aggregation devices and satellite devices maintain split-horizon next-hop information to prevent resending multicast or broadcast packets back out of the ingress port.

ECIDs for Multicast Traffic

Traffic sent between aggregation devices and satellite devices is sent over a logical path, called an *e-channel*. The packets sent between the aggregation device and satellite device include the IEEE 802.1BR E-channel tag (ETAG) header with an E-channel identifier (ECID). The ECID identifies the path that will be used in forwarding traffic packets. Each extended port is identified by a unique ECID value. Junos Fusion reserves ECID values 1 through 4095 for unicast data packets. ECID values from 4096 through 16382, also called *multicast ECIDs*, are reserved for multicast, VLAN flooding, and broadcast data packets. Multicast ECIDs correspond to one or more destination extended ports on a satellite device.

The aggregation device automatically creates virtual interfaces named **sd-*fpc-id*/0/0** (where *fpc-id* is the satellite device ID) to represent satellite devices, and uses these virtual interfaces as the next-hop interface when forwarding traffic to a satellite device.

When local replication is disabled, similar to unicast packet flow (see *Understanding the Flow of Data Packets in a Junos Fusion Topology*), the aggregation device assigns a unicast ECID value for each destination extended port on a satellite device for both unicast traffic and multicast traffic. The aggregation device replicates multicast packets, tags them with the assigned ECID for the destination, and sends a copy to each destination extended port by way of the corresponding satellite device interface.

When local replication is enabled, Junos Fusion uses ECID values greater than 4095 to identify multicast traffic and associate one or more extended ports on a satellite device as the multicast destination. Junos Fusion dynamically assigns multicast ECID values. When the aggregation device requires a new multicast ECID value for a group of ports or if it needs to add a port to an existing ECID, the process is as follows:

1. The aggregation device sends a request to the satellite device to assign an ECID value (or update an existing ECID mapping when multicast group or VLAN membership changes).

2. The satellite device assigns an ECID value and adds an entry to its ECID table to map the ECID value to the corresponding extended ports.

3. The satellite device sends a message back to the aggregation device with the ECID value that satisfies the request for the corresponding extended ports.

4. The aggregation device adds this information to its ECID table. It uses the **sd** virtual interface as the next-hop interface to send multicast traffic for those extended ports on the satellite device.

When the satellite device receives a data packet from the aggregation device with a multicast ECID value, the satellite device begins to replicate and forward packets to the extended ports associated with that ECID. Satellite devices do not do multicast lookups; they only maintain ECID tables to determine the port or ports corresponding to an ECID in a packet received from the aggregation device. The aggregation devices perform all multicast route maintenance and forwarding path resolution.

An ECID value is only unique locally on the satellite device. Another satellite device can use the same ECID value for its own extended ports. The aggregation device maintains a composite mapping of ECID values to the different satellite devices and the corresponding extended ports on those satellite devices.

Multicast Replication Limitations in a Junos Fusion

Junos Fusion strives to optimize data replication on satellite devices when local replication is enabled. However, for the following features, although local replication might be enabled, Junos Fusion does not trigger egress replication optimization, and instead defaults to using ingress replication:

- Multicast traffic on pure Layer 3 extended ports
- Multicast Listener Discovery (MLD) snooping on an IPv6 network

You might choose not to enable local replication because egress multicast replication is incompatible with some Junos OS protocol and traffic management features programmed on individual extended ports. The following features do not work when egress multicast replication is enabled; if you want to use these features, you cannot take advantage of egress replication optimizations:

- VLAN tag manipulations, such as VLAN tag translations, VLAN tag stacking, and VLAN per-port policies. Using egress multicast replication with this feature can cause dropped packets due to unexpected VLAN tags.
- Multicast support for the extended ports on the edge side of Pseudowire connection in a VPLS network.
- Multicast support for the extended ports on the edge side of EVPNs.
- Multicast VPN deployments.
- Features that perform egress actions on individual extended ports, such as egress local-port mirroring (port mirroring on endpoints connected to satellite device extended ports).

Release History Table

Release	Description
16.1	Starting in Junos OS Release 16.1, Junos Fusion supports enabling egress multicast replication, also referred to as local replication, where satellite devices replicate the multicast and broadcast packets destined for their local ports.

RELATED DOCUMENTATION

Ingress Replication at the Aggregation Device to Satellite Devices | 882

Understanding the Flow of Data Packets in a Junos Fusion Topology

Ingress Replication at the Aggregation Device to Satellite Devices

By default, Junos Fusion uses ingress replication on the aggregation devices to replicate and forward copies of packets to multicast destinations.

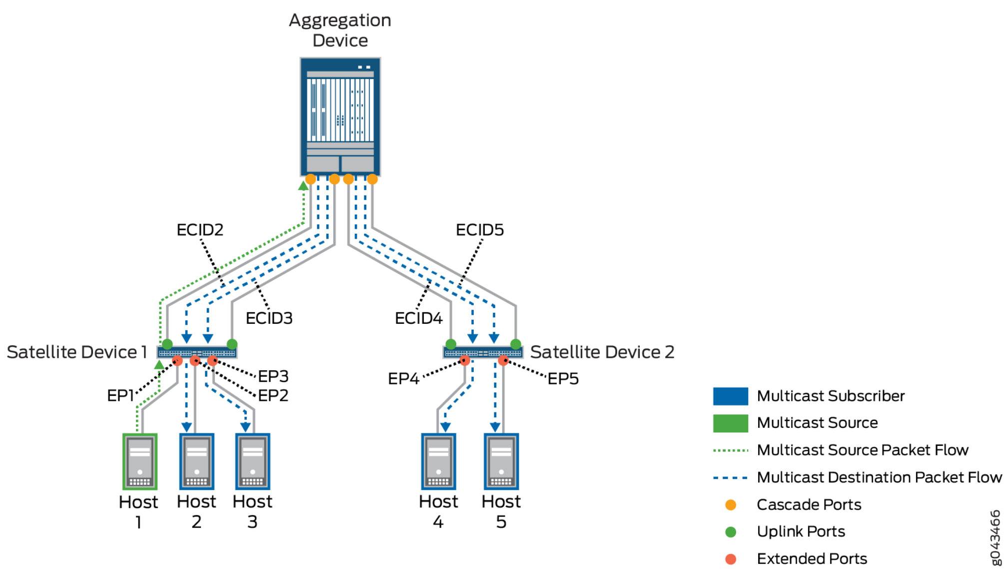
In ingress replication mode, the ingress aggregation device replicates the multicast packets and forwards them to every destination extended port. The data packet flow is similar to unicast data packet flow from the multicast source to each destination.

Figure 12 on page 883 shows multicast source data packets received from a multicast source on an extended port, EP1, with traffic destined for endpoints connected to extended ports EP2 through EP5. Each extended port has an associated E-channel Identifier (ECID) value that the aggregation device uses to forward the data packet to each destination extended port. The aggregation device replicates the data packets for all multicast destination extended ports on all attached satellite devices, as follows:

- Two copies for satellite device 1 (for EP2 and EP3)

- Two copies for satellite device 2 (for EP4 and EP5)

Figure 12: Ingress Replication at the Aggregation Device



The aggregation device sends each packet on the respective cascade ports to the satellite devices with destination extended ports. Multicast traffic destined for EP2 is tagged with ECID2, traffic destined for EP3 is tagged with ECID3, and so on for all the destination extended ports on both satellite devices. The satellite devices receive and forward the packets to their respective extended ports.

The aggregation device maintains multicast routing information and next-hop tables, including ECID label mappings to satellite devices and the corresponding extended ports. For a multicast destination on a satellite device, the aggregation device resolves the next-hop path through a corresponding cascade port that reaches the satellite device. When there are multiple cascade port links to a satellite device, the aggregation device load-balances the traffic to choose which cascade port to use.

Each receiving satellite device maintains tables that map the assigned ECIDs to the corresponding extended ports, and simply forwards outgoing multicast packets to the destination extended ports. The satellite devices do not maintain multicast routing information.

Other multicast destinations might be reached through local ports on the aggregation device, rather than through extended ports. For these destinations, the aggregation device creates and sends copies to those local ports directly.

Multicast support using ingress replication does not scale well for a large number of multicast destinations or higher bandwidth multicast traffic. Ingress replication increases aggregation device Packet Forwarding Engine processing load and consumes bandwidth on the links between cascade ports and uplink ports, potentially resulting in link oversubscription and latency among multicast recipients.

You can alternatively enable *egress multicast replication*, also referred to as *local replication*. Local replication optimizes multicast replication by distributing the replication load between the aggregation devices and the satellite devices that have multicast destination ports. However, local replication requires more control plane processing than ingress replication, which results in a slight increase in multicast group join and leave latency. See "Egress (Local) Replication on the Satellite Devices" on page 884 for more information on how local replication works for different types of multicast or broadcast traffic.

RELATED DOCUMENTATION

Understanding Multicast Replication in a Junos Fusion | 878
Egress (Local) Replication on the Satellite Devices | 884
Understanding the Flow of Data Packets in a Junos Fusion Topology

Egress (Local) Replication on the Satellite Devices

IN THIS SECTION

Egress multicast replication in a Junos Fusion is referred to as *local replication*. In egress or local replication mode, the aggregation device optimizes replication by off-loading replication whenever possible to satellite devices that have destination extended ports. From the point of view of the aggregation device, replication is supported at an egress port, and from the point of view of the satellite device, replication is managed locally. Local replication alleviates some of the problems associated with ingress replication, reducing the potential for bandwidth oversubscription and replication latency when there are a large number of receivers.

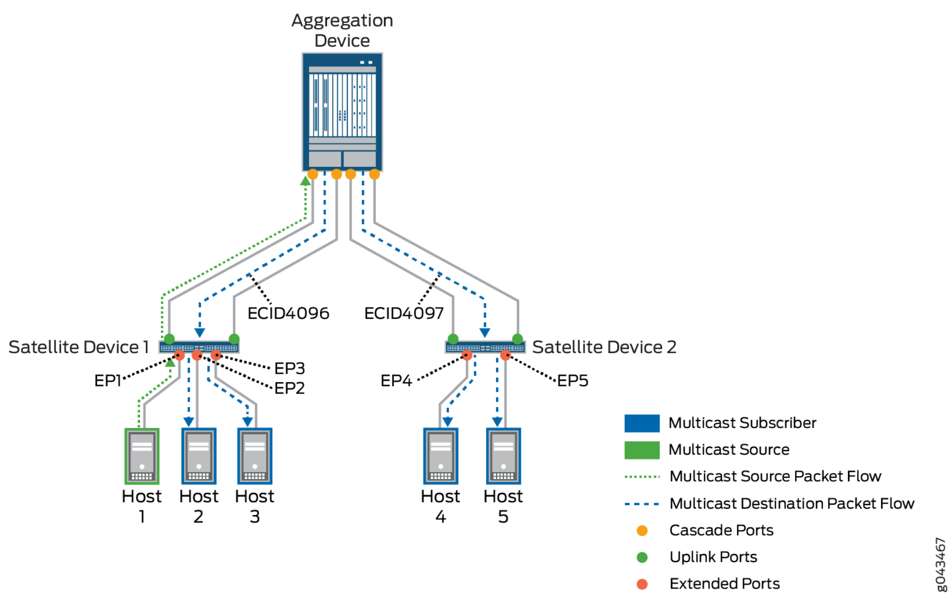
Local replication is performed at Layer 2. Each receiving satellite device maintains tables that map the assigned ECIDs to corresponding destination extended ports, and simply forward outgoing multicast or broadcast packets to local extended ports. For Layer 3 multicast traffic, such as when forwarding packets between VLANs, the aggregation device performs replication to resolve Layer 3 information not maintained by satellite devices.

This topic describes local replication behavior for multicast traffic forwarded to the access side both within and across VLANs and when flooding traffic within a VLAN.

Local Replication for Layer 2 Multicast Traffic with IGMP Snooping

Figure 13 on page 885 illustrates Layer 2 multicast traffic flow with IGMP snooping when local replication is enabled.

Figure 13: Local Replication with Layer 2 Multicast and IGMP Snooping in Junos Fusion



A data packet is received from a multicast source on an extended port, EP1, with traffic destined for endpoints connected to extended ports EP2 through EP5. The aggregation device acquires *multicast* ECIDs from the satellite devices, which represent a set of multicast destination extended ports on each satellite device. The diagram shows ECID value ECID4096 is assigned to the multicast subscribers behind extended ports EP2 and EP3 on satellite device 1, and ECID4097 is assigned to the multicast subscribers behind extended ports EP4 and EP5 on satellite device 2. The aggregation device creates only one copy of the source packet for each satellite device that has multicast destination extended ports, inserts the corresponding satellite device multicast ECID value in the IEEE 802.1BR ETAG header of each copy, and forwards the copies to those satellite devices.

In this case, the aggregation device creates two copies, forwards one with ECID4096 to satellite device 1, and forwards the other with ECID4097 to satellite device 2. Each satellite device receives its copy and uses the multicast ECID value to determine which of its extended ports should receive the multicast traffic. Satellite device 1 replicates the packet and forwards copies to EP2 and EP3; satellite device 2 replicates the packet and forwards copies to EP4 and EP5.

When forwarding replicated multicast packets to satellite devices, the aggregation device resolves the next-hop path through a corresponding cascade port that reaches the satellite device. When there are multiple cascade port links to a satellite device, the aggregation device load-balances the traffic when choosing which cascade port to use.

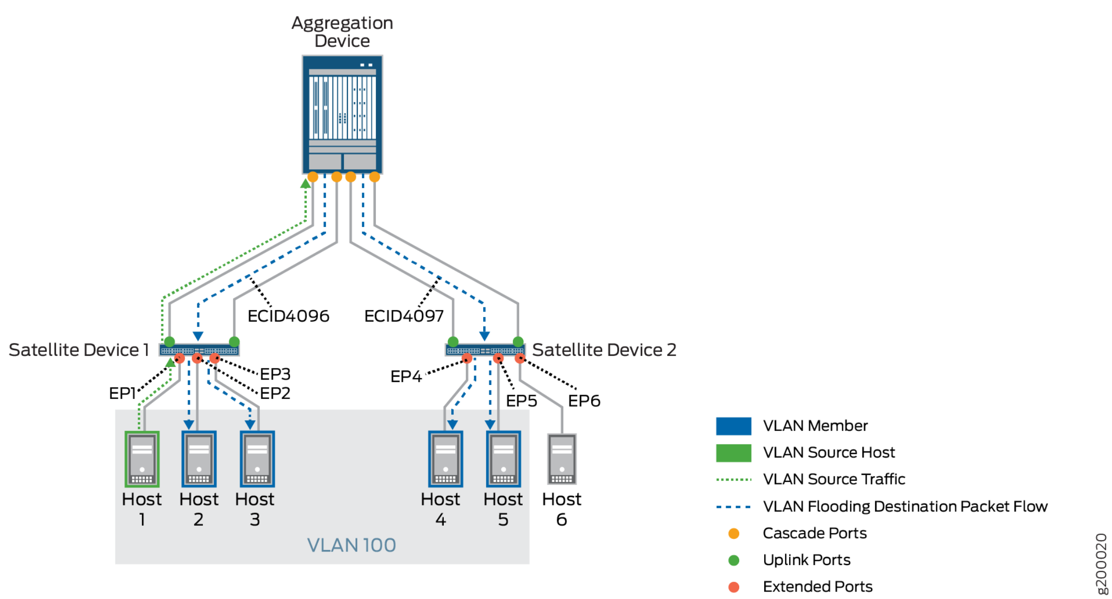
Other multicast destinations might be reached through ports on the aggregation devices, rather than through extended ports. For these destinations, the aggregation device creates and sends copies to those local ports directly.

Local Replication for VLAN Flooding

An aggregation device might initiate VLAN flooding (broadcasting or flooding the packet out to all interfaces in the VLAN) to learn the MAC address for a destination that is not already in its Ethernet switching tables. When local replication is not enabled, the aggregation device uses ingress replication, creating and sending copies to each destination extended port on each satellite device that has destination extended ports in the VLAN. With local replication enabled, the aggregation device requests multicast ECIDs to represent the extended ports in the VLAN on each satellite device. The aggregation device sends a copy of the source packet tagged with each ECID in the IEEE 802.1BR header to the corresponding satellite device. Each receiving satellite device does the replication locally for its extended ports in the VLAN.

Figure 14 on page 886 illustrates the packet flow for VLAN flooding when local replication is enabled.

Figure 14: Local Replication with VLAN Flooding



In this example, a multicast source packet for VLAN 100 ingresses on EP1, and satellite device 1 forwards the packet to the aggregation device. The aggregation device cannot resolve the destination MAC address, and decides to flood the packet to all extended port destinations in VLAN 100.

> **NOTE**: When a source packet ingresses at a satellite device with uplink ports to dual aggregation devices, the satellite device load-balances forwarding the ingress traffic among the available uplink ports, so either aggregation device might receive the source packet and manage flooding the packet to destination VLAN members.

Multicast ECID4096 is allocated to represent extended ports on satellite device 1 that are members of VLAN 100—EP1, EP2 and EP3, and multicast ECID4097 represents extended ports on satellite device 2 that are also members of VLAN 100—EP4 and EP5. Host 6 behind extended port EP6 is not a member of VLAN 100 and is not a destination for the flooded traffic. The aggregation device creates one copy of the packet tagged with ECID4096 and sends it to satellite device 1, and sends one copy tagged with ECID4097 to satellite device 2. Satellite device 1 replicates and forwards the packet for its own destination ports in VLAN 100, EP2 and EP3. (The ingress ECID split-horizon mechanism prevents forwarding traffic to the ingress port, EP1.) Satellite device 2 replicates and forwards the packet for EP4 and EP5, its local destination ports in VLAN 100. The extended port mapping for ECID4097 does not include EP6, so satellite device 2 does not forward the packet to that port.

When there are multiple cascade port links to a satellite device, the aggregation device load-balances the traffic when choosing which cascade port to use.

For destination VLAN members reachable through aggregation device ports (rather than extended ports), the aggregation device creates and sends copies to those local ports directly.

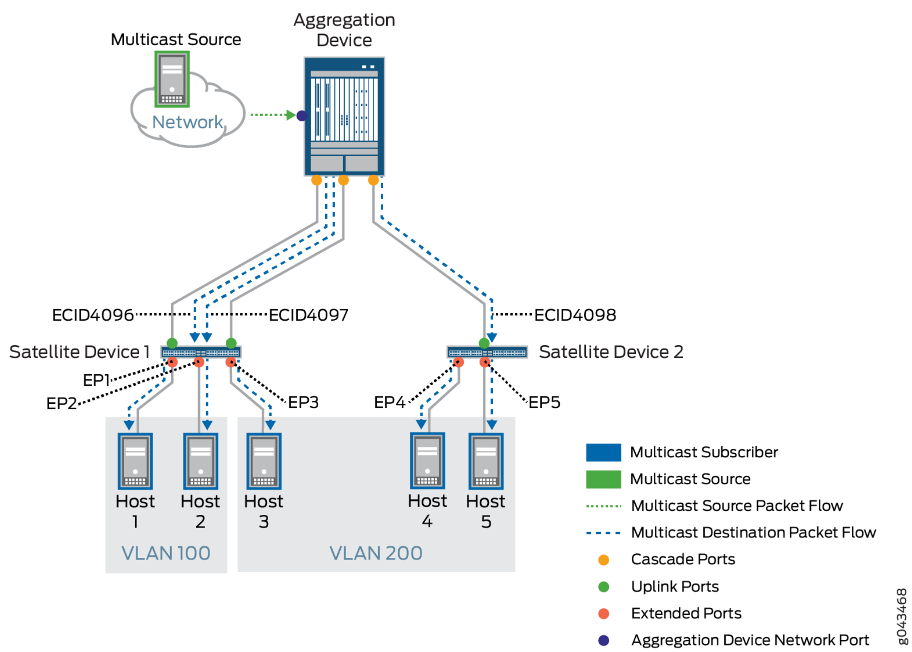
Local Replication for Layer 3 Multicast Traffic Over IRB Interfaces

Integrated Routing and Bridging (IRB) provides support for Layer 2 bridging and Layer 3 routing on the same interface, and IRB interfaces are used to route traffic between VLANs. Because satellite devices do not maintain Layer 3 routing information, local replication on the satellite devices only occurs for Layer 2 traffic, and the aggregation device manages the replication of multicast destination packets at Layer 3.

In Junos Fusion Enterprise or Junos Fusion Provider Edge architectures, the aggregation device forwarding the traffic replicates the multicast source packet for each IRB interface in the Layer 3 replication list for a multicast group, and performs a VLAN tag rewrite for each corresponding VLAN. When there are extended ports in multiple VLANs on a satellite device that are receivers in the same multicast group, the aggregation device sends copies to each IRB with its corresponding VLAN ID to that satellite device. If an IRB interface (VLAN membership) spans multiple satellite devices, the aggregation device creates and sends one copy to each satellite device that has multicast receivers that are members of that VLAN. Each satellite device then replicates and forwards copies of the received packet for its local multicast destination extended ports.

Figure 15 on page 888 shows an example of Layer 3 multicast replication for VLANs over IRB interfaces in a Junos Fusion. In this case, two VLANs with corresponding IRB interfaces are configured on the aggregation device. In this case, multicast source packets ingress on an aggregation device port, and multicast subscribers are connected to extended ports EP1 through EP5, where extended ports EP1 and EP2 are in VLAN 100 and EP3 through EP5 are in VLAN 200.

Figure 15: Local Replication with Layer 3 Multicast



When the aggregation device receives a packet from the multicast source, it manages the Layer 3 replication by acquiring multicast ECIDs representing the destination extended ports in each VLAN on each satellite device, and creating, tagging, and forwarding copies on each VLAN's IRB interface to the satellite devices that have destination extended ports. As the figure shows, the aggregation device creates 3 copies of the source packet, as follows:

- Multicast ECID4096 represents EP1 and EP2 in VLAN 100 on satellite device 1. The aggregation device forwards one copy tagged with ECID4096 to satellite device 1 for the VLAN 100 IRB interface.
- Multicast ECID4097 represents EP3 in VLAN 200 on satellite device 1. The aggregation device forwards a second copy tagged with ECID4097 to satellite device 1 for the VLAN 200 IRB interface.
- Multicast ECID4098 represents EP4 and EP5 in VLAN 200 on satellite device 2. The aggregation device forwards a third copy tagged with ECID4098 for the VLAN 200 IRB interface to satellite device 2.

Each satellite device manages the Layer 2 processing by replicating the packets received from the aggregation device for the multicast subscribers behind its extended ports in each VLAN, as follows:

- Satellite device 1 replicates and forwards packets tagged with ECID4096 to extended ports EP1 and EP2, and forwards packets tagged with ECID4097 to EP3.
- Satellite device 2 replicates and forwards the packets tagged with ECID4096 to extended ports EP4 and EP5.

When there are multiple cascade port links to a satellite device, the aggregation device load-balances the traffic when choosing which cascade port to use.

For multicast destination VLAN members reachable through aggregation device ports (rather than extended ports), the aggregation device creates and sends copies to those local ports using the corresponding IRB interfaces.

RELATED DOCUMENTATION

Understanding Multicast Replication in a Junos Fusion | 878
Ingress Replication at the Aggregation Device to Satellite Devices | 882
Configuring Egress (Local) Replication on a Junos Fusion | 889

Configuring Egress (Local) Replication on a Junos Fusion

By default, egress replication (also called *local replication*) for multi-destination traffic is disabled, and Junos Fusion uses ingress replication on the access side. When you enable local replication, the feature is activated for all satellite devices that are connected to the aggregation device. You cannot enable local replication for just a few selected satellite devices, specific bridge domains, or specific route prefixes.

To enable local replication on the satellite devices, configure the `local-replication` statement at the **[edit forwarding-options satellite]** hierarchy level.

```
[edit forwarding-options satellite]
user@router1# set local-replication
```

The `show multicast summary satellite` operational command displays **Egress replication: Enabled** when this feature is configured.

See "Understanding Multicast Replication in a Junos Fusion" on page 878 for an overview of Junos Fusion multicast replication and the limitations to enabling this feature. Some Junos OS protocol and traffic management features are not supported with egress replication, and you should not plan to configure local replication if you want to use those features.

RELATED DOCUMENTATION

CHAPTER 16

Configuration Statements and Operational Commands for Multicast Support

IN THIS CHAPTER

local-replication

IN THIS SECTION

Syntax

```
local-replication
```

Hierarchy Level

```
[edit forwarding-options satellite]
```

Description

Enables multicast replication on all the satellite devices that are connected to the aggregation device. You cannot selectively enable local replication for specific satellite devices, bridge domains, or route prefixes.

Required Privilege Level

routing—To view this statement in the configuration.

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

Release Information

Statement introduced in Junos OS Release 16.1.

RELATED DOCUMENTATION

Configuring Egress (Local) Replication on a Junos Fusion | 889

show bridge flood nexthops satellite

IN THIS SECTION

Syntax

```
show bridge flood nexthops satellite
<brief | detail | extensive>
<nexthop-id nexthop-id>
```

Description

Display bridge domain flood next hop information for satellite device destinations.

You can use this command to:

- View the current list of all flood traffic composite next hops.
- See details about a specified composite next hop.
- Follow aggregation device composite next-hop processing as the aggregation device resolves and updates composite next-hop table entries for extended port destinations.

The aggregation device allocates ECID tags that represent multicast or broadcast destinations behind satellite device extended ports, associates them with the corresponding satellite device virtual interfaces (**sd-*fpc-id*/0/0**), and updates flood next-hop table entries accordingly. More detailed output from this command shows events that result in next-hop table updates.

Options

brief | detail | extensive	(Optional) Display the specified level of output. The default output level is **brief**.

nexthop-id *nexthop-id*	Display more detailed bridge flooding next hop information only for the specified next hop.

Required Privilege Level

view

Output Fields

Table 41 on page 894 lists the output fields for the **show bridge flood next-hops satellite** command. Output fields are listed in the approximate order in which they appear.

Table 41: show bridge flood next-hops satellite Command Output Fields

Field Name	Field Description	Level of Output
Next-hop ID	Next-hop ID for each next- hop entry displayed.	All
Composite function	Purpose of a composite next-hop entry. Values include: • FLOOD_ALL—Flood next hop. • FLOOD_ALL_SPLIT_HZ—Flood next hop including split-horizon information.	All
Table	Name of next-hop routing or forwarding table for the listed entry.	All

Table 41: show bridge flood next-hops satellite Command Output Fields *(Continued)*

Field Name	Field Description	Level of Output
Flags	Flags giving additional information about a next-hop entry. Values include: • SAT—The entry is a satellite destination composite next hop for an extended port destination that has been resolved and updated with the corresponding satellite device interface, **sd-*fpc-id*/0/0**, and the associated ECID shown in the **label** field. • ST—The entry is stale and waiting to be refreshed. • RU—The entry is stale, but is marked to be reused.	All
aggregation-device	Next-hop IDs and corresponding interfaces to reach local flood destination ports on the aggregation device.	detail extensive
satellite-device-id *id*	Satellite device ID with the next-hop IDs and interface names to reach extended ports that are flood destinations on the listed satellite device. When an ECID has been assigned to destination extended ports on a satellite device, this field lists the satellite next-hop ID, the corresponding virtual satellite device interface (**sd-*fpc-id*/0/0**), and the allocated ECID (**label** field).	detail extensive
label	ECID associated with a group of flood destination extended ports on the satellite device specified in the **satellite-device-id** field.	detail extensive
When	Elapsed time since an event related to a flood next-hop entry change.	extensive

Table 41: show bridge flood next-hops satellite Command Output Fields *(Continued)*

Field Name	Field Description	Level of Output
Event	Brief description of the event related to a flood next-hop entry change.	extensive
Action	Brief description of actions that resulted from the event.	extensive

Sample Output

show bridge flood next hops

```
user@host> > show bridge flood next-hops satellite nexthop-id 962 detail
Next-hop    Composite          Table                    Flags
ID          function
962         FLOOD_ALL_SPLIT_HZ default-switch
    satellite-device-id 100:
        ->610 xe-100/0/6.0
        ->611 xe-100/0/7.0
    satellite-device-id 103:
        ->682 xe-103/0/30.0
        ->683 xe-103/0/31.0
        ->684 xe-103/0/32.0
        ->685 xe-103/0/33.0
        ->686 xe-103/0/34.0
        ->687 xe-103/0/35.0
```

command-name

Release Information

Command introduced in Junos OS Release 16.1.

RELATED DOCUMENTATION

Understanding Multicast Replication in a Junos Fusion | 878
Egress (Local) Replication on the Satellite Devices | 884

show bridge flood satellite

IN THIS SECTION

Syntax

```
show bridge flood satellite
<brief | detail | extensive>
<bridge-domain-name bridge-domain-name>
<vswitch-name vswitch-name>
```

Description

Display bridge flood routing information for the satellite devices in Junos Fusion Provider Edge.

This command lists flood routes by route prefix for each bridge domain. Each flood route prefix entry lists the ingress replication next-hop ID (**NhIndex**). When egress (local) replication is enabled and the bridge domain has multiple destination extended ports on a satellite device, the aggregation device:

- Creates a satellite device next-hop chain to reach those destinations through their corresponding satellite devices.

- Updates the flood route entry with a satellite next-hop chain ID (**Satellite-Nh**).

When a flood route does not have a satellite next-hop chain, the value **0** is displayed in the **Satellite-Nh** column. When the **Satellite-Nh** value is non-zero, the aggregation device uses the satellite next-hop chain instead of the original ingress replication next-hop (**NhIndex**). You can see satellite device flood next-hop chain details, including the ECIDs assigned to satellite device flood destination extended ports, using the **detail** option and the **bridge-domain-name** option for a specific bridge domain.

Options

brief | detail | extensive	(Optional) Display the specified level of output.
bridge-domain-name *bridge-domain-name*	Display bridge flooding information for the specified bridge domain.
vswitch-name *vswitch-name*	Display bridge flood information for the specified virtual satellite device.

Required Privilege Level

view

Output Fields

Table 42 on page 898 lists the output fields for the **show bridge flood satellite** command. Output fields are listed in the approximate order in which they appear, although the display order varies between the different levels of output.

Table 42: show bridge flood satellite Command Output Fields

Field Name	Field Description	Level of Output
Bridging domain	Bridge domain name.	All
Flood Routes	Flood route information listed by route prefix.	All
Prefix	Flood route prefix.	All

Table 42: show bridge flood satellite Command Output Fields *(Continued)*

Field Name	Field Description	Level of Output
Token	Internal ID for flood route prefix.	All
NhIndex	The ingress replication next-hop for the flood route.	All
Satellite-Nh	Satellite device next-hop ID when local replication is enabled and there are multiple flood destination extended ports.	All
Next-hop information	Details for each next hop, listed by next-hop or satellite next-hop iID.	detail extensive
aggregation-device	Next-hop interfaces for ports that are flood destinations on the aggregation device, listed by next-hop ID.	detail extensive
satellite-device-id ***id***	Next-hop interfaces for extended ports that are flood destinations on satellite devices, listed by satellite next-hop ID.	detail extensive
label	ECID assigned to a satellite device interface.	detail extensive
When	Elaspsed time since an event related to a flood route entry change.	extensive
Event	Brief description of the event related to a flood route entry change.	extensive
Action	Brief description of actions that resulted from the event.	extensive

Sample Output

show bridge flood satellite

```
user@host> show bridge flood satellite
Paste router command output hereVSwitch instance: default-switch
  ------------ Bridging domain: bd100 ------------
    Flood Routes:
    Prefix                    Token         NhIndex      Satellite-Nh
    00.02.00.01.60.03.e0/51   0x3001F       797          1186
    00.02.ff.fe.60.00.20/51   0x30001       794          1183
  ------------ Bridging domain: bd1000 ------------
    Flood Routes:
    Prefix                    Token         NhIndex      Satellite-Nh
    00.03.00.01.60.04.00/51   0x30020       806          0
    00.03.ff.fe.60.00.40/51   0x30002       803          0
  ------------ Bridging domain: bd1500 ------------
    Flood Routes:
    Prefix                    Token         NhIndex      Satellite-Nh
    00.08.00.01.60.04.a0/51   0x30025       851          1475
    00.08.ff.fe.60.00.e0/51   0x30007       848          1472
  ------------ Bridging domain: bd1600 ------------
    Flood Routes:
    Prefix                    Token         NhIndex      Satellite-Nh
    00.09.00.01.60.04.c0/51   0x30026       860          1481
    00.09.ff.fe.60.01.00/51   0x30008       857          1478
  ------------ Bridging domain: bd1700 ------------
    Flood Routes:
    Prefix                    Token         NhIndex      Satellite-Nh
    00.0a.00.01.60.04.e0/51   0x30027       869          1487
    00.0a.ff.fe.60.01.20/51   0x30009       866          1484
  ------------ Bridging domain: bd1800 ------------
    Flood Routes:
    Prefix                    Token         NhIndex      Satellite-Nh
    00.0b.00.01.60.05.00/51   0x30028       878          1493
    00.0b.ff.fe.60.01.40/51   0x3000A       875          1490
  ------------ Bridging domain: bd1900 ------------
    Flood Routes:
    Prefix                    Token         NhIndex      Satellite-Nh
    00.0c.00.01.60.05.20/51   0x30029       887          1499
    00.0c.ff.fe.60.01.60/51   0x3000B       884          1496
  ------------ Bridging domain: bd2000 ------------
```

```
    Flood Routes:
    Prefix                   Token         NhIndex       Satellite-Nh
    00.0e.00.01.60.05.60/51  0x3002B       905           1511
    00.0e.ff.fe.60.01.a0/51  0x3000D       902           1508
```

Release Information

Command introduced in Junos OS Release 16.1.

RELATED DOCUMENTATION

Understanding Multicast Replication in a Junos Fusion | 878
Egress (Local) Replication on the Satellite Devices | 884

show bridge satellite device

IN THIS SECTION

Syntax

```
show bridge satellite device
<brief | detail>
< device-id device-id>
```

Description

Display status and control information for all satellite devices or a specified satellite device.

Options

brief | detail	(Optional) Display the specified level of output. The default output level is **brief**.
device-id *device-id*	(Optional) Display information for the specified satellite device.

Required Privilege Level

view

Output Fields

Table 43 on page 902 lists the output fields for the **show bridge satellite device** command. Output fields are listed in the approximate order in which they appear, although the display order varies between the different levels of output.

Table 43: show bridge satellite device Command Output Fields

Field Name	Field Description	Level of Output
Device ID **Device** (detail view)	Satellite device ID.	All
Interface Index **Device Interface Index** (detail view)	Internal ID for the satellite device virtual interface.	All

Table 43: show bridge satellite device Command Output Fields *(Continued)*

Field Name	Field Description	Level of Output
Interface Name **Device Interface Name** (detail view)	Satellite device virtual interface name (**sd-*fpc-id*/0/0**, where *fpc-id* is the satellite device ID).	All
State **Device Interface State** (detail view)	State of the satellite device virtual interface. If the interface is created and active, possible values include **Up** or **Down**.	All
Connection State **Device connection Status** (detail view)	State of the satellite device interface connection to the aggregation device. The connection state is monitored using keep-alive messages between satellite and aggregation device control processes. Possible values include **Up** or **Down**.	All
Requests	Number of request messages sent to the listed satellite device aggregation device to allocate or update ECID mappings.	All
Responses	Number of response messages returned from the listed satellite device to the aggregation device for granting ECID requests.	All
Device connection uptime	Duration of the connection between the aggregation device and the specified satellite device.	detail

Table 43: show bridge satellite device Command Output Fields *(Continued)*

Field Name	Field Description	Level of Output
Device heartbeat status	Status of keep-alive message exchange between satellite device and aggregation device control processes.	detail
Echo packets sent	Number of keep-alive packets sent to the satellite device from the aggregation device.	detail
Echo packets received	Number of keep-alive response packets sent to the aggregation device from the satellite device.	detail
Multicast IPC stats	Number of inter-process control (IPC) messages sent from the aggregation device to the satellite device related to multicast functions on the satellite device. This value is displayed for active satellite device connections.	detail
Bridge IPC stats	Number of IPC messages sent from the aggregation device to the satellite device related to Layer 2 bridging functions on the satellite device. This value is displayed for active satellite device connections.	detail

Sample Output

show bridge satellite device

```
user@host> show bridge satellite device
Device    Interface   Interface                   Connection
ID        index       Name                 State  State       Requests    Responses
100       370         sd-100/0/0.32770     Up     Up          5           5
101       342         sd-101/0/0.32770     Up     Up          4           4
```

```
102       365        sd-102/0/0.32770    Up     Up         3          3
105       364        sd-105/0/0.32770    Up     Up         2          2
```

Release Information

Command introduced in Junos OS Release 16.1.

RELATED DOCUMENTATION

Understanding Multicast Replication in a Junos Fusion | 878

show multicast ecid-mapping satellite

IN THIS SECTION

Syntax

```
show multicast ecid-mapping satellite
    <brief | detail | extensive>
    <device-id device-id>
    <ecid ecid>
    <reference-id reference-id>
```

Description

Displays entries in the satellite multicast ECID mapping database.

ECID database entries map a group of extended ports to an ECID value for the satellite devices in a Junos Fusion. Each entry also records the next hop to reach the corresponding destination extended ports.

Options

brief | detail | extensive	(Optional) Display the specified level of output.
device-id *device-ID*	Display information from the ECID database for a specified satellite device ID.
ecid *ecid*	Display information from the ECID database for a specified ECID.
reference-id *reference ID*	Display information from the ECID database for a specified internally-assigned reference ID related to the ECID request messages exchanged during ECID allocation (used for troubleshooting issues with ECID allocation).

Required Privilege Level

view

Output Fields

Table 44 on page 906 lists the output fields for the **show multicast ecid-mapping satellite** command. Output fields are listed in the approximate order in which they appear.

Table 44: show multicast ecid-mapping satellite Command Output Fields

Field Name	Field Description	Level of Output
Satellite Device ID	Satellite device ID.	All

Table 44: show multicast ecid-mapping satellite Command Output Fields *(Continued)*

Field Name	Field Description	Level of Output
ECID	ECID assigned to a grouping of extended ports on the satellite device. Satellite devices have multiple ECIDs assigned that represent different groups of extended ports.	All
State	Status of requesting and allocating the ECID. Values include: • Init—An ECID mapping entry for a group of ports has been created. • Request Scheduled—An ECID mapping entry has been queued for an ECID value request. • Request Sent—The ECID request has been sent to the corresponding satellite device. • Response Received—An ECID value has been received from the satellite device. • Sync—An ECID mapping with an ECID value is to be synchronized with a satellite device. • Ready—An ECID next hop has been created and is ready to be referenced for forwarding.	All
Flags	Internal flag values for troubleshooting.	All
nhid	Satellite device next-hop ID associated with the ECID.	All
Reference ID	Internal reference ID assigned to an ECID request message, used for troubleshooting ECID communication with satellite devices.	All (with specified **device-id** or **ecid**)

Sample Output

show multicast ecid-mapping satellite

```
user@host> show multicast ecid-mapping satellite
Satellite    ECID        State                     Flags
Device ID
100          4129        Ready [nhid=612]          0x0
                 xe-100/0/6.0
                 xe-100/0/7.0
100          4097        Ready [nhid=1061]         0x0
                 xe-100/0/0.0
                 xe-100/0/1.0
100          4122        Ready [nhid=1190]         0x0
                 xe-100/0/2.0
                 xe-100/0/3.0
                 xe-100/0/4.0
                 xe-100/0/5.0
103          4103        Ready [nhid=1062]         0x0
                 xe-103/0/5.0
                 xe-103/0/6.0
103          4104        Ready [nhid=1068]         0x0
                 xe-103/0/7.0
                 xe-103/0/8.0
103          4105        Ready [nhid=1069]         0x0
                 xe-103/0/10.0
                 xe-103/0/9.0
103          4106        Ready [nhid=1070]         0x0
                 xe-103/0/11.0
                 xe-103/0/12.0
103          4107        Ready [nhid=1071]         0x0
                 xe-103/0/13.0
                 xe-103/0/14.0
103          4109        Ready [nhid=1097]         0x0
                 xe-103/0/15.0
                 xe-103/0/16.0
103          4110        Ready [nhid=1074]         0x0
                 xe-103/0/17.0
                 xe-103/0/18.0
103          4111        Ready [nhid=1075]         0x0
                 xe-103/0/19.0
                 xe-103/0/20.0
```

```
103          4112        Ready [nhid=1076]          0x0
                 xe-103/0/21.0
                 xe-103/0/22.0
```

show multicast ecid-mapping satellite (for specified satellite device-id and ECID)

```
user@host> show multicast ecid-mapping satellite device-id 100 ecid 4101
Satellite    ECID        State                      Reference ID
  Device ID
  100          4101        Ready [nhid=1845]          14
```

Release Information

Command introduced in Junos OS Release 16.1.

RELATED DOCUMENTATION

Understanding Multicast Replication in a Junos Fusion | 878
Egress (Local) Replication on the Satellite Devices | 884

show multicast next-hops satellite

IN THIS SECTION

Syntax

```
show multicast next-hops satellite
```

Description

Display satellite multicast next-hop table information.

The output lists next-hops for all interfaces in the VPLS address family used in multicast replication.

Options

brief | detail (Optional) Output level is the same when either option or no option is specified.

Required Privilege Level

view

Output Fields

Table 45 on page 910 lists the output fields for the **show multicast next-hops satellite** command. Output fields are listed in the approximate order in which they appear, although the display order varies between the different levels of output.

Table 45: show multicast next-hops satellite Command Output Fields

Field Name	Field Description	Level of Output
Next-hop ID	Next-hop ID in the database.	All
Interface Index	Internal ID for a satellite device virtual interface.	All

Table 45: show multicast next-hops satellite Command Output Fields *(Continued)*

Field Name	Field Description	Level of Output
Interface Name	Interface name for configured interfaces in the Junos Fusion. A satellite device virtual interface named **sd-*fpc-id*/0/0** is used to send traffic to extended ports on satellite device *fpc-id*.	All
Label	A multicast ECID assigned to the satellite device interface next hop. If no ECIDs are assigned for the interface, the value displayed in this field is 0. Satellite device interfaces might have multiple ECIDs listed that represent different groups of multicast destination extended ports on that satellite device.	All
Flags	Flags giving additional information about a next-hop entry. Values include: • SAT—The entry is a satellite composite next hop for extended port destinations that has been resolved and updated with the corresponding satellite device interface, **sd-*fpc-id*/0/0**, and the associated ECID shown in the **Label** field.	All

Sample Output

show multicast next-hops satellite

```
user@host> show multicast next-hops satellite
Next-hop     Interface    Interface
ID           index        Name                    Label   Flags
186          1            unknown                 0
530          323          unknown                 0
```

```
574          331          lc-0/0/0.32769        0
578          335          ge-0/0/4.32770        0
583          341          ge-0/0/7.32770        0
584          343          ge-0/0/8.32770        0
585          345          ge-0/0/9.32770        0
586          337          ge-0/0/5.32770        0
587          339          ge-0/0/6.32770        0
610          347          xe-100/0/6.0          0
611          349          xe-100/0/7.0          0
612          348          sd-100/0/0.32770      4129   SAT
618          350          xe-100/0/0.0          0
619          351          xe-100/0/1.0          0
620          352          xe-100/0/2.0          0
621          353          xe-100/0/3.0          0
622          354          xe-100/0/4.0          0
…
1061         348          sd-100/0/0.32770      4097   SAT
1062         346          sd-103/0/0.32770      4103   SAT
1068         346          sd-103/0/0.32770      4104   SAT
1069         346          sd-103/0/0.32770      4105   SAT
1070         346          sd-103/0/0.32770      4106   SAT
1071         346          sd-103/0/0.32770      4107   SAT
1074         346          sd-103/0/0.32770      4110   SAT
1075         346          sd-103/0/0.32770      4111   SAT
1076         346          sd-103/0/0.32770      4112   SAT
1077         346          sd-103/0/0.32770      4113   SAT
1078         346          sd-103/0/0.32770      4114   SAT
1079         346          sd-103/0/0.32770      4115   SAT
1080         346          sd-103/0/0.32770      4116   SAT
1081         346          sd-103/0/0.32770      4117   SAT
1082         346          sd-103/0/0.32770      4118   SAT
1085         346          sd-103/0/0.32770      4121   SAT
1097         346          sd-103/0/0.32770      4109   SAT
1189         346          sd-103/0/0.32770      4120   SAT
1190         348          sd-100/0/0.32770      4122   SAT
1363         433          ge-0/0/1.0            0
1364         434          ge-0/0/2.0            0
```

Release Information

Command introduced in Junos OS Release 16.1.

RELATED DOCUMENTATION

Understanding Multicast Replication in a Junos Fusion | 878

show multicast snooping next-hops satellite | 913

show multicast snooping next-hops satellite

IN THIS SECTION

Syntax

```
show multicast snooping next-hops satellite
<brief | detail | extensive>
<nexthop-id nexthop-id>
```

Description

Display detailed multicast next-hop information for satellite device destinations.

You can use this command to:

- View the current list of all multicast traffic next hops.
- See details about a specified multicast next hop.
- Follow aggregation device composite next-hop processing as the aggregation device resolves and updates multicast next-hop table entries for extended port destinations.

The aggregation device allocates ECID tags that represent multicast or broadcast destinations behind satellite device extended ports, associates them with the corresponding satellite device virtual interfaces (**sd-*fpc-id*/0/0**), and updates multicast next-hop table entries accordingly. More detailed output from this command shows events that result in next-hop table updates.

Options

brief | detail | extensive	(Optional) Display the specified level of output. The default output level is **brief**.
nexthop-id *nexthop-id*	Display more detailed multicast satellite next-hop information only for the specified next-hop ID.

Required Privilege Level

view

Output Fields

Table 46 on page 914 lists the output fields for the **show ethernet-switching flood next-hops satellite** command. Output fields are listed in the approximate order in which they appear.

Table 46: show multicast snooping next-hops satellite Command Output Fields

Field Name	Field Description	Level of Output
Next-hop ID	Multicast next-hop ID (original multicast next hop used with ingress multicast replication).	All
Forwarding Next-Hop Type	Type of next-hop entry. Values include: • COMPOSITE—Composite next hop.	All
Table	Name of routing or forwarding table for the listed entry.	All

Table 46: show multicast snooping next-hops satellite Command Output Fields *(Continued)*

Field Name	Field Description	Level of Output
Flags	Flags giving additional information about a next-hop entry. Values include: • SAT—The entry is a satellite destination composite next hop for an extended port destination that has been resolved and updated with the corresponding satellite device interface, **sd-*fpc*/0/0**, and the associated ECID shown in the **label** field. • ST—The entry is stale and waiting to be refreshed. • RU—The entry is stale, but is marked to be reused.	All
Mrouter	Next-hop list for multicast routers connected to the bridge domain or VLAN.	detail extensive
aggregation-device	Next-hop IDs and corresponding interfaces for the composite next hop to reach local multicast destination ports on the aggregation device.	detail extensive
satellite-device-id *id*	Satellite device ID with the next-hop IDs and corresponding interface names for the composite next-hop chain to reach extended ports that are multicast destinations on that satellite device. When an ECID has been assigned to destination extended ports on a satellite device, this field lists the satellite next-hop ID, the corresponding virtual satellite device interface (**sd-*fpc-id*/0/0**), and the allocated ECID (**label** field).	detail extensive

Table 46: show multicast snooping next-hops satellite Command Output Fields *(Continued)*

Field Name	Field Description	Level of Output
AE	Link aggregation group interface next-hop IDs and interface names for multicast destination composite next hops.	detail extensive
label	ECID associated with one or more multicast destination extended ports on the satellite device in the **satellite-device-id** field.	detail extensive
Linked Next-hop	Multicast satellite next-hop ID (next hop used with egress multicast replication).	detail extensive
When	Elapsed time since an event related to a multicast next-hop entry change.	extensive
Event	Brief description of the event related to a multicast next-hop entry change.	extensive
Action	Brief description of actions that resulted from the event.	extensive

Sample Output

show multicast snooping next-hops satellite

```
user@host> show multicast snooping next-hops satellite

Next-hop    Forwarding          Table                    Flags
ID          Next-Hop
            Type
2097265     COMPOSITE           inet.0
2097267     COMPOSITE           inet.0
2097270     COMPOSITE           inet.0
```

```
2097271     COMPOSITE           inet.0
2094267     COMPOSITE           inet.0                   SAT
```

show multicast snooping next-hops satellite nexthop-id (detail view for a specified next-hop ID)

```
user@host> show multicast snooping next-hops satellite nexthop-id 524296 detail
  Next-hop    Forwarding          Table                    Flags
  ID          Next-Hop
              Type
  524296      COMPOSITE           inet.0                   SAT
      satellite-device-id 106:
          ->1839 sd-106/0/0.32770 label=4104
      MRouter:
        524293
          aggregation-device:
              ->1708 et-0/0/30.0
              ->1826 xe-0/0/28:1.0
          satellite-device-id 100:
              ->1845 sd-100/0/0.32770 label=4101
          satellite-device-id 106:
              ->1847 sd-106/0/0.32770 label=4103
      Linked Next-hop: 524295
```

show multicast snooping next-hops satellite nexthop-id (extensive view for a specified next-hop ID)

```
user@host> show multicast snooping next-hops satellite nexthop-id 1048576 extensive
Next-hop    Forwarding          Table                    Flags
ID          Next-Hop
            Type
1048576     COMPOSITE           default
    satellite-device-id 100:
        ->54297 xe-100/0/12.0
        ->54299 xe-100/0/13.0
    satellite-device-id 101:
        ->54303 xe-101/0/12.0
        ->54339 xe-101/0/13.0
```

```
    Linked Next-hop: 1048578

When            Event                         Action
1w0d 21:07:51.281 Next-hop linking            Linked with satellite nhid:1048578
1w0d 21:07:51.260 Adding satellite Indirect   DB add
1w0d 21:07:51.260 Processing translate Q      Translating Multicast composite INH
                                              sd-100/0/0.32770 ECID:4105
[nhid=627]
                                              sd-101/0/0.32770 ECID:4104
[nhid=626]
1w0d 21:07:51.260 inh dependency              [ECID 4105] nhid:627 -->
inhid:1048576
1w0d 21:07:51.260 inh dependency              [ECID 4104] nhid:626 -->
inhid:1048576
1w0d 21:07:51.254 inh dependency              [ECID 4105] nhid:627 -->
inhid:1048576
1w0d 21:07:51.254 Add to translate Q          inhid:1048576 added
1w0d 21:07:51.254 inh dependency              [ECID 4104] nhid:626 -->
inhid:1048576
1w0d 21:07:51.241 Translate Q Skip            inhid:1048576: [ECID=0] Next-hop
not ready
1w0d 21:07:51.241 Translate Q Skip            inhid:1048576: [ECID=0] Next-hop
not ready
1w0d 21:07:51.241 Processing translate Q      Translating Multicast composite INH
1w0d 21:07:51.241 Add to translate Q          inhid:1048576 added
1w0d 21:07:51.241 Add to translate Q          Original INH decoded - Adding to
Translate Q
1w0d 21:07:51.241 ECID reference              Added ECID reference-ID:2
1w0d 21:07:51.241 ECID reference              Added ECID reference-ID:1
1w0d 21:07:51.241 Next-hop add                Linked to fwd CNH extension:
0xa67a200
                                              list[4]: {54297 54299 54303 54339 }
                                              nhid:1048576 from kernel
                                              fwd nhid[619]:
```

Release Information

Command introduced in Junos OS Release 16.1.

RELATED DOCUMENTATION

Understanding Multicast Replication in a Junos Fusion | 878
Egress (Local) Replication on the Satellite Devices | 884
show multicast snooping route satellite | 919

show multicast snooping route satellite

IN THIS SECTION

Syntax

```
show multicast snooping route satellite
<brief | detail | extensive>
<bridge-domain-name bridge-domain-name | <vlan-name vlan-name>
<group group-address>
<source source-address>
<vswitch-name virtual-switch-name>
```

Description

Display Layer 2 multicast routing information (with IGMP snooping) for destination ports on satellite devices.

This command lists multicast routing entries by route prefix and bridge domain name (Junos Fusion Provider Edge). Each route entry lists the next-hop ID (**NH Index**) used when the aggregation device performs ingress multicast replication. When local replication is enabled and the VLAN has multicast destination extended ports on a satellite device, the aggregation device:

- Creates a satellite device next-hop chain to those multicast destinations through their corresponding satellite device.
- Updates the multicast route entry with a link to the satellite next-hop chain (**Linked NH Index**).

If a multicast route does not have a satellite next-hop chain, **Linked NH Index** is **0**. When the **Linked NH Index** value is non-zero, **NH Index** refers to the *original* next-hop information, but the aggregation device uses the satellite next-hop chain (**Linked NH Index**) for routing multicast traffic to satellite device extended ports. Use the **detail** or **extensive** option to expand the output to include details about the original next-hop and satellite next-hop chains.

Options

brief | detail | extensive	(Optional) Display the specified level of output. The default output level is **brief**. The **detail** output level expands the original and satellite device next-hop chains for each route displayed. The **extensive** output level includes details about multicast next-hop entry update events used mainly for troubleshooting.
bridge-domain-name *bridge-domain-name*	(Junos Fusion Provider Edge only) Filter output to display bridge domain flooding information only for the specified bridge domain name.
group *group-address*	Filter output to display flooding information only for the specified multicast group.
source *source-address*	Filter output to display flooding information only for the specified multicast source.
vswitch-name *virtual-switch-name*	Filter output to display flooding information only for the specified Layer 2 virtual switch.

Required Privilege Level

view

Output Fields

Table 47 on page 921 lists the output fields for the **show multicast snooping route satellite** command. Output fields are listed in the approximate order in which they appear.

Table 47: show multicast snooping route satellite Command Output Fields

Field Name	Field Description	Level of Output
Route	Multicast route information listed by route prefix under this heading.	All
(S, G/m)	Multicast entry state.	All
Bridge Domain	Bridge domain or VLAN name.	All
NH Index	Multicast next-hop ID (original multicast next hop used with ingress multicast replication).	brief
Linked NH Index	Multicast satellite next-hop ID (next hop used with egress multicast replication).	brief
Next-hop information	Detailed list of next-hop chain information for the original and satellite next-hop chains, listed by original next-hop index (**NH Index**) and satellite next-hop chain index (**Linked NH Index**) output field values.	detail extensive
Mrouter	Next-hop chain list for multicast routers connected to the bridge domain or VLAN.	detail extensive
aggregation-device	Next-hop IDs and corresponding interfaces for the composite next hop to reach local multicast destination ports on the aggregation device.	detail extensive

Table 47: show multicast snooping route satellite Command Output Fields *(Continued)*

Field Name	Field Description	Level of Output
satellite-device-id ***id***	Satellite device ID with the next-hop IDs and corresponding interface names for the composite next-hop chain to reach extended ports that are multicast destinations on that satellite device. When an ECID has been assigned to destination extended ports on a satellite device, this field lists the satellite next-hop ID, the corresponding virtual satellite device interface (**sd-*fpc-id*/0/0**), and the allocated ECID (**label** field).	detail extensive
AE	Link aggregation group interface next-hop IDs and interface names multicast destination composite next hops.	detail extensive
label	ECID associated with one or more multicast destination extended ports on the satellite device in the **satellite-device-id** field.	
When	Elapsed time since an event related to a multicast next-hop entry addition or update.	extensive
Event	Brief description of the event related to a multicast next-hop entry addition or update.	extensive
Action	Brief description of actions that resulted from the event.	extensive

Sample Output

show multicast snooping route satellite

```
user@host> show multicast snooping route satellite

-----VSwitch Instance: default-switch----
Route: 00.04.00.01.00.00.233.252.0.0.0.0.0.0.0.00.00/72
  (S, G/m): (*, 233.252.0.0.0/24)
    Bridge Domain:   bd100
    NH Index:        1048582
    Linked NH Index: 1048620
Route: 00.05.00.01.00.00.233.252.0.0.0.0.0.0.0.00.00/72
  (S, G/m): (*, 233.252.0.0.0/24)
    Bridge Domain:   bd1
    NH Index:        1048582
    Linked NH Index: 1048620
Route: 00.06.00.01.00.00.233.252.0.0.0.0.0.0.0.00.00/72
  (S, G/m): (*, 233.252.0.0.0/24)
    Bridge Domain:   bd10
    NH Index:        1048582
    Linked NH Index: 1048620
```

show multicast snooping route satellite detail

```
user@host> show multicast snooping route satellite detail

-----VSwitch Instance: default-switch----
  Route: 00.03.00.01.00.00.233.252.0.0.0.0.0.0.0.00.00/52
      (S, G/m): (*, 233.252.0.0/4)
       Bridge Domain: VLAN800
        Next-hop information:
          524287
            MRouter:
              524286
                aggregation-device:
                    ->1708 et-0/0/30.0
                    ->1826 xe-0/0/28:1.0
                satellite-device-id 100:
                    ->1838 xe-100/0/49:3.0
```

```
                satellite-device-id 106:
                    ->1834 xe-106/0/11.0
          524294
            MRouter:
              524293
                aggregation-device:
                    ->1708 et-0/0/30.0
                    ->1826 xe-0/0/28:1.0
                satellite-device-id 100:
                    ->1845 sd-100/0/0.32770 label=4101
                satellite-device-id 106:
                    ->1847 sd-106/0/0.32770 label=4103
Route: 00.03.00.01.00.00.233.252.0.1.0.0.0.0.0.00.00/80
    (S, G/m): (*, 233.252.0.1/32)
     Bridge Domain: VLAN800
      Next-hop information:
        524295
          satellite-device-id 106:
              ->1804 xe-106/0/13.0
            MRouter:
              524286
                aggregation-device:
                    ->1708 et-0/0/30.0
                    ->1826 xe-0/0/28:1.0
                satellite-device-id 100:
                    ->1838 xe-100/0/49:3.0
                satellite-device-id 106:
                    ->1834 xe-106/0/11.0
          524296
            satellite-device-id 106:
                ->1839 sd-106/0/0.32770 label=4104
            MRouter:
              524293
                aggregation-device:
                    ->1708 et-0/0/30.0
                    ->1826 xe-0/0/28:1.0
                satellite-device-id 100:
                    ->1845 sd-100/0/0.32770 label=4101
                satellite-device-id 106:
                    ->1847 sd-106/0/0.32770 label=4103
```

show multicast snooping route satellite group

```
user@host> show multicast snooping route satellite group 233.252.0.1
-----VSwitch Instance: default-switch----
Route: 00.04.00.01.00.00.233.252.0.1.0.0.0.0.0.00.00/80
  (S, G/m): (*, 233.252.0.1/32)
    Bridge Domain:   bd100
    NH Index:        1048585
    Linked NH Index: 1048621
```

show multicast snooping route satellite bridge-domain-name (for specific bridge domain with detail view on Junos Fusion Provider Edge)

```
user@host> show multicast snooping route satellite bridge-domain-name bd100 group 233.252.0.1 detail
-----VSwitch Instance: default-switch----
Route: 00.04.00.01.00.00.233.252.0.1.0.0.0.0.0.00.00/80
    (S, G/m): (*, 233.252.0.1/32)
     Bridge Domain: bd100
      Next-hop information:
        1048576
          satellite-device-id 100:
              ->54297 xe-100/0/12.0
              ->54299 xe-100/0/13.0
          satellite-device-id 101:
              ->54303 xe-101/0/12.0
              ->54339 xe-101/0/13.0
        1048578
          satellite-device-id 100:
              ->627 sd-100/0/0.32770 label=4105
          satellite-device-id 101:
              ->626 sd-101/0/0.32770 label=4104
```

Release Information

Command introduced in Junos OS Release 16.1.

RELATED DOCUMENTATION

show multicast statistics satellite

IN THIS SECTION

Syntax

```
show multicast statistics satellite
<brief | detail >
```

Description

Display statistics about multicast satellite routing tables and ECID management.

Options

brief | detail (Optional) Display the specified level of output. The default output level is **brief**.

Required Privilege Level

view

Sample Output

show multicast statistics satellite

```
user@host> show multicast statistics satellite
Multicast Statistics:
    Number of flood route entries:            8000
    Number of satellite flood route entries:  8000
    Number of MCINET route entries:           44000
    Number of satellite MCINET route entries: 36000
    Unicast VPLS next-hops(non-satellite):    32
    Number of satellite ECID next-hops:       12
    Number of VPLS composite next-hops:       12000
    Number of satellite composite next-hops:  12000
    Number of Indirect next-hops:             28002
    Number of Satellite Indirect next-hops:   28001
    Number of ECIDs requested:                14
    Number of ECID responses received:        14
    Number of ECID delete messages:           2
    Number of ECID mapping entries in DB:     12
    Number of ECID mapping entries ready:     12
```

Release Information

Command introduced in Junos OS Release 16.1.

RELATED DOCUMENTATION

Understanding Multicast Replication in a Junos Fusion | 878

show multicast summary satellite

IN THIS SECTION

Syntax

```
show multicast summary satellite
```

Description

Display summary status of multicast replication features in a Junos Fusion.

This command displays whether or not egress multicast replication (also called local replication) is enabled. When local replication is configured, this command displays **Egress replication: Enabled**, and **Egress replication: Disabled** otherwise.

This command also displays the graceful restart state of the satellite management control plane processes for local replication when these processes are first activated or have been restarted. The **Restart phase** output field value indicates the phase where the restart process stalled or failed, or displays a **Complete** message if the restart process completed successfully.

Options

This command has no options.

Required Privilege Level

view

Sample Output

show multicast summary satellite

```
user@host>show multicast summary satellite
Multicast:
    Restart phase:      Complete (11/11)
    Egress replication: Enabled
```

Release Information

Command introduced in Junos OS Release 16.1.

RELATED DOCUMENTATION

Understanding Multicast Replication in a Junos Fusion | 878

Configuring Egress (Local) Replication on a Junos Fusion | 889

show multicast statistics satellite | 926

CHAPTER 17

Class of Service on Junos Fusion Provider Edge

IN THIS CHAPTER

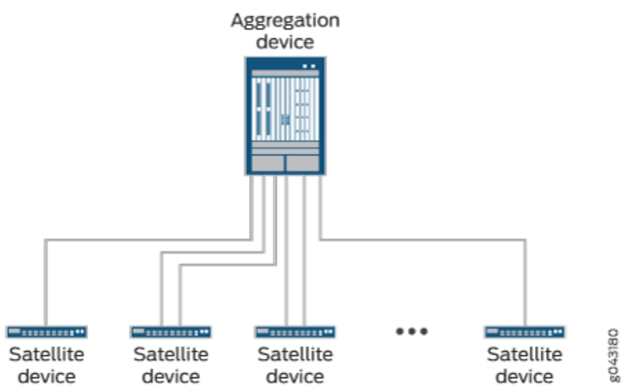
Understanding CoS on an MX Series Aggregation Device in Junos Fusion Provider Edge

IN THIS SECTION

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 16 on page 931 for an illustration of the Junos Fusion topology.

Figure 16: Junos Fusion Topology



An aggregation device can be an MX240, MX480, MX960, or MX2020 Universal Routing Platform that is running Junos OS Release 14.2R3 or later.

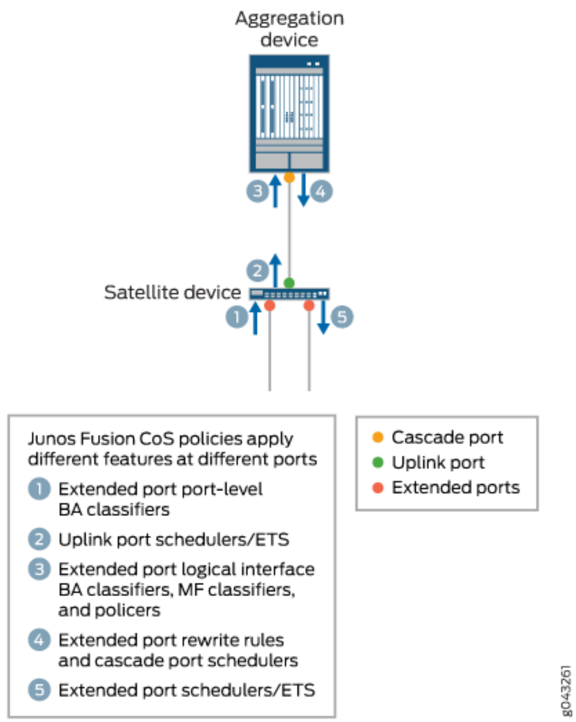
This topic describes class of service (CoS) on the different types of ports in Junos Fusion.

This topic covers:

Overview of CoS on Different Types of Ports in Junos Fusion

Figure 17 on page 932 provides an overview of packet flow through Junos Fusion and how CoS features are applied at the different ports.

Figure 17: 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 17 on page 932:

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, unless the rewrite rule is associated with an extended port logical interface. 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 MX Series aggregation device. Similarly, standard Junos OS CoS commands are issued on the MX Series aggregation device for retrieving extended port and uplink port CoS states and queue statistics. The MX Series 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
- Per-unit and hierarchical schedulers (extended ports only)
- Egress rewrite rules

NOTE: Configuring CoS policies on *satellite devices* (on both extended and uplink ports) has the following restrictions:

- Fixed classifiers are not supported.
- 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: You cannot retrieve CoS statistics on extended ports through an SNMP query. To see CoS statistics on an extended port, use the **show interfaces queue interface-name *extended-port-interface-name*** and **show interfaces *extended-port-interface-name* extensive** commands.

Per-unit and Hierarchical Scheduling on Extended Ports

Beginning with Junos OS 17.2R1, Junos Fusion Provider Edge supports per-unit and hierarchical schedulers on extended ports. To support per-unit or hierarchical scheduling on an extended port, all cascade ports on the aggregation device for that extended port must have a queueing chip.

NOTE: Multihomed satellite devices do not support per-unit and hierarchical scheduling.

To enable per-unit scheduling on an extended port, enable the **per-unit-scheduler** option at the **[edit interfaces *interface-name*]** hierarchy level for the extended port.

To enable hierarchical scheduling on an extended port, enable the **hierarchical-scheduler** option at the **[edit interfaces *interface-name*]** hierarchy level for the extended port.

NOTE: If you enable hierarchical scheduling on an extended port, you must also explicitly configure schedulers at the interface set or VLAN level.

Junos Fusion treats the cascade ports connecting the aggregation device to the satellite device as aggregated Ethernet ports with aggregation done automatically without configuration. By default the Junos Fusion implementation of hierarchical CoS applies the scheduler parameters across all cascade ports in **scale** mode. Because **scale** mode divides the configured shaper equally across the cascade ports, traffic drops can start before a customer reaches its committed rate for a particular flow. Starting with Junos OS Release 18.1R1, you can set all cascade ports on an aggregation device to be in **replicate** mode, thereby copying scheduler parameters to each level of the aggregated interface member links, and automatically target all of an extended port's traffic to a specific cascade port. To do this, simply enable **target-mode** for the satellite device at the **[edit chassis satellite-management fpc *fpc-number*]** hierarchy level. For example:

```
[edit]
user@host# show chassis satellite-management
fpc 100 {
    target-mode;
    cascade-ports [ xe-0/0/1:0 xe-1/0/0:1 xe-1/0/0:2 xe-1/0/1:1 ];
}
```

CAUTION: Enabling or disabling **target-mode** disrupts traffic on the satellite device while extended ports are deleted and re-added and cascade ports are reconfigured on the aggregate device.

Broadband Subscriber Services Support

Starting in Junos OS Release 18.4R1, Junos Fusion Provider Edge supports Broadband Edge Subscriber Management, including standard CoS functionality for Broadband Edge Subscriber Management.

BNG on Junos Fusion Provider Edge supports the following CoS scheduling hierarchies:

- Dynamic logical interface set/Static-VLAN-Demux/Extended port physical interface
- Dynamic logical interface/Extended port physical interface
- Dynamic logical interface set/Extended port physical interface
- Dynamic logical interface/Dynamic logical interface set/Extended port physical interface

To support 4 levels of hierarchical scheduling (for example, queue/dynamic logical interface/dynamic logical interface set/extended port physical interface), you need MPCs on the aggregation device that support at least 5 levels of hierarchical scheduling. This is because one level of scheduling is consumed by the cascade port. Every MPC on the aggregation device configured for Broadband Edge Subscriber Management must support at least 4 levels of hierarchical scheduling. Also, the **maximum-hierarchy-levels** option at the **[edit interfaces interface-name** `hierarchical-scheduler`**]** hierarchy for the extended port must be set to one less what the MPC for the associated cascade port supports because of the one level of scheduling the cascade port consumes.

Classifiers and rewrite rules are supported on subscriber logical interfaces.

Shaping calculations include the 801.BR overhead bytes.

NOTE: Multicast is supported through a separate VLAN on the extended port, but multicast is not supported using subscriber dynamic profiles and there is no CoS bandwidth adjustment support for the subscribers.

The show class-of-service scheduler-hierarchy interface command is supported and shows the cascade port as part of the hierarchy. For example:

```
user@host > show class-of-service scheduler-hierarchy interface
demux0.3221225473
Interface/                            Shaping     Guarnteed
Guaranteed/       Queue       Excess
Resource name                       rate          rate
Excess          weight       weight
                                        kbits         kbits
priority                  high/low
ge-100/0/0(xe-2/0/5)             10000000
  ge-100/0/0(xe-2/0/5) RTP
                                    10000000
  demux0.3221225473                 1000
0                                       500   500
    best-effort                     1000             0             Low
Low          95
    network-control                 1000             0             Low
Low           5
```

In the above sample output, **ge-100/0/0** is the extended port and **xe-2/0/5** is the cascade port.

CoS Hierarchical Port Scheduling with Enhanced Transmission Selection in Junos Fusion

In Junos Fusion, the satellite device can be either a QFX5100 or an EX4300 device. The QFX5100 supports enhanced transmission selection (ETS), which is described in IEEE 802.1Qaz. Configuration support for ETS has been added to the MX Series device only for satellite device ports that support this feature. If ETS is configured on the MX Series aggregation device for a satellite device port that does not support ETS, the satellite devices converts the ETS configuration to port scheduler.

NOTE: Local ports on the MX Series aggregation device do not support ETS.

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
18.4R1	Starting in Junos OS Release 18.4R1, Junos Fusion Provider Edge supports Broadband Edge Subscriber Management, including standard CoS functionality for Broadband Edge Subscriber Management.
18.1R1	Starting with Junos OS Release 18.1R1, you can set all cascade ports on an aggregation device to be in replicate mode, thereby copying scheduler parameters to each level of the aggregated interface member links, and automatically target all of an extended port’s traffic to a specific cascade port.
17.2R1	Beginning with Junos OS 17.2R1, Junos Fusion Provider Edge supports per-unit and hierarchical schedulers on extended ports.

RELATED DOCUMENTATION

Configuring CoS on an MX Series Aggregation Device in Junos Fusion

IN THIS SECTION

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 MX Series 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 MX Series 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@mx-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@mx-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@mx-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 | 16
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@mx-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@mx-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@mx-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 | 16
Rewriting Packet Headers to Ensure Forwarding Behavior

Configuring CoS Hierarchical Port Scheduling with Enhanced Transmission Selection on Satellite Device Ports

You can configure enhanced transmision selection (ETS) for both extended ports and uplink ports on satellite devices. The configuration is done on the aggregation device. To configure ETS for a satellite device port in Junos Fusion:

1. Define the traffic control profiles.

```
[edit class-of-service]
user@mx-agg-device#set traffic-control-profiles be-tcp-1 scheduler-map be-map-1
user@mx-agg-device#set traffic-control-profiles be-tcp-1 shaping-rate percent 80
user@mx-agg-device#set traffic-control-profiles be-tcp-1 guaranteed-rate 4g
user@mx-agg-device#set traffic-control-profiles be-tcp-3 scheduler-map be-map-3
```

```
user@mx-agg-device#set traffic-control-profiles be-tcp-3 shaping-rate percent 80
user@mx-agg-device#set traffic-control-profiles be-tcp-3 guaranteed-rate 6g
```

2. Define the forwarding class sets.

```
[edit class-of-service]
user@mx-agg-device#set forwarding-class-sets FC-1 class best-effort-1
user@mx-agg-device#set forwarding-class-sets FC-1 class best-effort-2
user@mx-agg-device#set forwarding-class-sets FC-3 class best-effort-3
```

3. Apply the forwarding class sets to a satellite device port.

```
[edit class-of-service]
user@mx-agg-device#set interfaces xe-100/0/26 forwarding-class-set FC-1 output-traffic-control-
profile be-tcp-1
user@mx-agg-device#set interfaces xe-100/0/26 forwarding-class-set FC-3 output-traffic-control-
profile be-tcp-3
```

4. Commit the changes and then confirm the configuration.

```
[edit class-of-service]
user@mx-agg-device# show
traffic-control-profiles {
    be-tcp-1 {
        scheduler-map be-map-1;
        shaping-rate percent 80;
        guaranteed-rate 4g;
    }
    be-tcp-3 {
        scheduler-map be-map-3;
        shaping-rate percent 80;
        guaranteed-rate 6g;
    }
}
forwarding-class-sets {
    FC-1 {
        class best-effort-1;
        class best-effort-2;
    }
    FC-3 {
        class best-effort-3;
```

```
    }
}
interfaces {
    xe-100/0/26 {
        forwarding-class-set {
            FC-1 {
                output-traffic-control-profile be-tcp-1;
        }
            FC-3 {
                output-traffic-control-profile be-tcp-3;
        }
    }
}
```

5. Run **show interfaces queue egress** ***interface name*** to show the statistics of transmitted and dropped packets for each queue on the satellite device port.

```
user@mx-agg-device> show interfaces queue egress xe-100/0/26:0
Physical interface: xe-100/0/26:0 (Extended Port, Enabled, Physical link is Up
  Interface index: 3040, SNMP ifIndex: 1085
Forwarding classes: 16 supported, 4 in use
Egress queues: 8 supported, 4 in use
Queue: 0, Forwarding classes: best-effort-1
  Queued:
    Packets              :                    0                     0 pps
    Bytes                :                    0                     0 bps
  Transmitted:
    Packets              :              7182746                 24998 pps
    Bytes                :           4195267965             116853536 bps
    Tail-dropped packets :                    0                     0 pps
    RL-dropped packets   :                    0                     0 pps
    RL-dropped bytes     :                    0                     0 bps
    RED-dropped packets  :                    0                     0 pps
    RED-dropped bytes    :                    0                     0 bps
Queue: 1, Forwarding classes: best-effort-2
  Queued:
    Packets              :                    0                     0 pps
    Bytes                :                    0                     0 bps
  Transmitted:
    Packets              :                    0                     0 pps
    Bytes                :                    0                     0 bps
    Tail-dropped packets :                    0                     0 pps
```

```
    RL-dropped packets   :                     0                     0 pps
    RL-dropped bytes     :                     0                     0 bps
    RED-dropped packets  :                     0                     0 pps
    RED-dropped bytes    :                     0                     0 bps
Queue: 2, Forwarding classes: best-effort-3
  Queued:
    Packets              :                     0                     0 pps
    Bytes                :                     0                     0 bps
  Transmitted:
    Packets              :                     0                     0 pps
    Bytes                :                     0                     0 bps
    Tail-dropped packets :                     0                     0 pps
    RL-dropped packets   :                     0                     0 pps
    RL-dropped bytes     :                     0                     0 bps
    RED-dropped packets  :                     0                     0 pps
    RED-dropped bytes    :                     0                     0 bps
Queue: 3, Forwarding classes: network-control
  Queued:
    Packets              :                     0                     0 pps
    Bytes                :                     0                     0 bps
  Transmitted:
    Packets              :                 14505                     1 pps
    Bytes                :              11746583                  1448 bps
    Tail-dropped packets :                     0                     0 pps
    RL-dropped packets   :                     0                     0 pps
    RL-dropped bytes     :                     0                     0 bps
    RED-dropped packets  :                     0                     0 pps
    RED-dropped bytes    :                     0                     0 bps
```

NOTE: Queued statistics for each queue are not available for satellite device ports and will always show **0**.

SEE ALSO

Understanding CoS Hierarchical Port Scheduling (ETS)

CoS on Virtual Chassis Fabric (VCF) EX4300 Leaf Devices (Mixed Mode)

Example: Configuring CoS Hierarchical Port Scheduling (ETS)

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@mx-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@mx-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@mx-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@mx-agg-device#set schedulers AF_SCH_CORE transmit-rate percent 40
user@mx-agg-device#set schedulers AF_SCH_CORE buffer-size percent 40
user@mx-agg-device#set schedulers AF_SCH_CORE priority medium-high
user@mx-agg-device#set schedulers BE_SCH_CORE transmit-rate percent 10
user@mx-agg-device#set schedulers BE_SCH_CORE buffer-size percent 10
user@mx-agg-device#set schedulers BE_SCH_CORE priority low
user@mx-agg-device#set schedulers EF_SCH_CORE transmit-rate percent 40
user@mx-agg-device#set schedulers EF_SCH_CORE buffer-size percent 40
user@mx-agg-device#set schedulers EF_SCH_CORE priority medium-low
user@mx-agg-device#set schedulers NC_SCH_CORE transmit-rate percent 10
user@mx-agg-device#set schedulers NC_SCH_CORE buffer-size percent 10
user@mx-agg-device#set schedulers NC_SCH_CORE priority high
```

2. Create a scheduler map.

```
[edit class-of-service]
user@mx-agg-device#set scheduler-maps CORE_SCHED_MAP forwarding-class BE scheduler
BE_SCH_CORE
user@mx-agg-device#set scheduler-maps CORE_SCHED_MAP forwarding-class EF scheduler
```

```
EF_SCH_CORE
user@mx-agg-device#set scheduler-maps CORE_SCHED_MAP forwarding-class AF scheduler
AF_SCH_CORE
user@mx-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@mx-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@mx-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@mx-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@mx-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 on an MX Series Aggregation Device in Junos Fusion Provider Edge | 930