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# Ethernet Switching Feature Guide



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*Ethernet Switching Feature Guide*

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- Using the Examples in This Manual on page xi
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- Documentation Feedback on page xv
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## Documentation and Release Notes

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

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## Using the Examples in This Manual

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

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

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

## Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

## Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

```
[edit]
```

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

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

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

For more information about the **load** command, see [CLI Explorer](#).

## Documentation Conventions

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

Table 1: Notice Icons







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

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

Table 2: Text and Syntax Conventions

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

Table 2: Text and Syntax Conventions (continued)

Convention	Description	Examples
Fixed-width text like this	Represents output that appears on the terminal screen.	<pre>user@host&gt; show chassis alarms</pre> <p>No alarms currently active</p>
<i>Italic text like this</i>	<ul style="list-style-type: none"> <li>Introduces or emphasizes important new terms.</li> <li>Identifies guide names.</li> <li>Identifies RFC and Internet draft titles.</li> </ul>	<ul style="list-style-type: none"> <li>A policy <i>term</i> is a named structure that defines match conditions and actions.</li> <li><i>Junos OS CLI User Guide</i></li> <li>RFC 1997, <i>BGP Communities Attribute</i></li> </ul>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	<p>Configure the machine's domain name:</p> <pre>[edit] root@# set system domain-name domain-name</pre>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> <li>To configure a stub area, include the <b>stub</b> statement at the <code>[edit protocols ospf area area-id]</code> hierarchy level.</li> <li>The console port is labeled <b>CONSOLE</b>.</li> </ul>
< > (angle brackets)	Encloses optional keywords or variables.	<pre>stub &lt;default-metric metric&gt;;</pre>
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	<pre>broadcast   multicast</pre> <p><i>(string1   string2   string3)</i></p>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	<pre>rsvp { # Required for dynamic MPLS only</pre>
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	<pre>community name members [ community-ids ]</pre>
Indentation and braces ( { } )	Identifies a level in the configuration hierarchy.	<pre>[edit] routing-options {   static {     route default {       nexthop address;       retain;     }   } }</pre>
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
<b>GUI Conventions</b>		
<b>Bold text like this</b>	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> <li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li> <li>To cancel the configuration, click <b>Cancel</b>.</li> </ul>

Table 2: Text and Syntax Conventions (continued)

Convention	Description	Examples
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

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- Online feedback rating system—On any page of the Juniper Networks TechLibrary site at <https://www.juniper.net/documentation/index.html>, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at <https://www.juniper.net/documentation/feedback/>.
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- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

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- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>

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

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

## Opening a Case with JTAC

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

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



## PART 1

# Bridging and VLANs

- [Using Bridging and VLANs on page 3](#)



## CHAPTER 1

# Using Bridging and VLANs

- [Overview of Layer 2 Networking on page 3](#)
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## Overview of Layer 2 Networking

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Layer 2, also known as the Data Link Layer, is the second level in the seven-layer OSI reference model for network protocol design. Layer 2 is equivalent to the link layer (the lowest layer) in the TCP/IP network model. Layer 2 is the network layer used to transfer data between adjacent network nodes in a wide area network or between nodes on the same local area network.

A *frame* is a protocol data unit, the smallest unit of bits on a Layer 2 network. Frames are transmitted to and received from devices on the same local area network (LAN). Unlike bits, frames have a defined structure and can be used for error detection, control plane activities and so forth. Not all frames carry user data. The network uses some frames to control the data link itself..

At Layer 2, *unicast* refers to sending frames from one node to a single other node, whereas *multicast* denotes sending traffic from one node to multiple nodes, and *broadcasting* refers to the transmission of frames to all nodes in a network. A *broadcast domain* is a logical division of a network in which all nodes of that network can be reached at Layer 2 by a broadcast.

Segments of a LAN can be linked at the frame level using *bridges*. Bridging creates separate broadcast domains on the LAN, creating VLANs, which are independent logical

networks that group together related devices into separate network segments. The grouping of devices on a VLAN is independent of where the devices are physically located in the LAN. Without bridging and VLANs, all devices on the Ethernet LAN are in a single broadcast domain, and all the devices detect all the packets on the LAN.

*Forwarding* is the relaying of packets from one network segment to another by nodes in the network. On a VLAN, a frame whose origin and destination are in the same VLAN are forwarded only within the local VLAN. A network segment is a portion of a computer network wherein every device communicates using the same physical layer.

Layer 2 contains two sublayers:

- Logical link control (LLC) sublayer, which is responsible for managing communications links and handling frame traffic.
- Media access control (MAC) sublayer, which governs protocol access to the physical network medium. By using the MAC addresses that are assigned to all ports on a switch, multiple devices on the same physical link can uniquely identify one another.

The ports, or interfaces, on a switch operate in either access mode, tagged-access, or trunk mode:

- *Access mode* ports connect to a network device such as a desktop computer, an IP telephone, a printer, a file server, or a security camera. The port itself belongs to a single VLAN. The frames transmitted over an access interface are normal Ethernet frames. By default, all ports on a switch are in access mode.
- *Tagged-Access mode* ports connect to a network device such as a desktop computer, an IP telephone, a printer, a file server, or a security camera. The port itself belongs to a single VLAN. The frames transmitted over an access interface are normal Ethernet frames. By default, all ports on a switch are in access mode. Tagged-access mode accommodates cloud computing, specifically scenarios including virtual machines or virtual computers. Because several virtual computers can be included on one physical server, the packets generated by one server can contain an aggregation of VLAN packets from different virtual machines on that server. To accommodate this situation, tagged-access mode reflects packets back to the physical server on the same downstream port when the destination address of the packet was learned on that downstream port. Packets are also reflected back to the physical server on the downstream port when the destination has not yet been learned. Therefore, the third interface mode, tagged access, has some characteristics of access mode and some characteristics of trunk mode:
- *Trunk mode* ports handle traffic for multiple VLANs, multiplexing the traffic for all those VLANs over the same physical connection. Trunk interfaces are generally used to interconnect switches to other devices or switches.

With native VLAN configured, frames that do not carry VLAN tags are sent over the trunk interface. If you have a situation where packets pass from a device to a switch in access mode, and you want to then send those packets from the switch over a trunk port, use native VLAN mode. Configure the single VLAN on the switch's port (which is in access mode) as a native VLAN. The switch's trunk port will then treat those frames differently than the other tagged packets. For example, if a trunk port has three VLANs, 10, 20, and 30, assigned to it with VLAN 10 being the native VLAN,

frames on VLAN 10 that leave the trunk port on the other end have no 802.1Q header (tag). There is another native VLAN option. You can have the switch add and remove tags for untagged packets. To do this, you first configure the single VLAN as a native VLAN on a port attached to a device on the edge. Then, assign a VLAN ID tag to the single native VLAN on the port connected to a device. Last, add the VLAN ID to the trunk port. Now, when the switch receives the untagged packet, it adds the ID you specified and sends and receives the tagged packets on the trunk port configured to accept that VLAN.

Including the sublayers, Layer 2 on the QFX Series supports the following functionality:

- Unicast, multicast, and broadcast traffic.
- Bridging.
- VLAN 802.1Q—Also known as *VLAN tagging*, this protocol allows multiple bridged networks to transparently share the same physical network link by adding VLAN tags to an Ethernet frame.
- Extension of Layer 2 VLANs across multiple switches using Spanning Tree Protocol (STP) prevents looping across the network.
- *MAC learning*, including per-VLAN MAC learning and Layer 2 learning suppression—This process obtains the MAC addresses of all the nodes on a network
- Link aggregation—This process groups of Ethernet interfaces at the physical layer to form a single link layer interface, also known as a *link aggregation group (LAG)* or LAG bundle



**NOTE:** Link aggregation is not supported on NFX150 devices.

- Storm control on the physical port for unicast, multicast, and broadcast



**NOTE:** Storm control is not supported on NFX150 devices.

- STP support, including 802.1d, RSTP, MSTP, and Root Guard

#### Related Documentation

- [Understanding Bridging and VLANs on Switches on page 9](#)

## Understanding Layer 2 Broadcasting on Switches

In a Layer 2 network, *broadcasting* refers to sending traffic to all nodes on a network.

Layer 2 broadcast traffic stays within a local area network (LAN) boundary; known as the *broadcast domain*. Layer 2 broadcast traffic is sent to the broadcast domain using a MAC address of FF:FF:FF:FF:FF:FF. Every device in the broadcast domain recognizes this MAC address and passes the broadcast traffic on to other devices in the broadcast

domain, if applicable. Broadcasting can be compared to unicasting (sending traffic to a single node) or multicasting (delivering traffic to a group of nodes simultaneously).

Layer 3 broadcast traffic, however, is sent to all devices in a network using a broadcast network address. For example, if your network address is 10.0.0.0, the broadcast network address is 10.255.255.255. In this case, only devices that belong to the 10.0.0.0 network receive the Layer 3 broadcast traffic. Devices that do not belong to this network drop the traffic.

Broadcasting is used in the following situations:

- Address Resolution Protocol (ARP) uses broadcasting to map MAC addresses to IP addresses. ARP dynamically binds the IP address (the logical address) to the correct MAC address. Before IP unicast packets can be sent, ARP discovers the MAC address used by the Ethernet interface where the IP address is configured.
- Dynamic Host Configuration Protocol (DHCP) uses broadcasting to dynamically assign IP addresses to hosts on a network segment or subnet.
- Routing protocols use broadcasting to advertise routes.

Excessive broadcast traffic can sometimes create a broadcast storm. A broadcast storm occurs when messages are broadcast on a network and each message prompts a receiving node to respond by broadcasting its own messages on the network. This, in turn, prompts further responses that create a snowball effect. The LAN is suddenly flooded with packets, creating unnecessary traffic that leads to poor network performance or even a complete loss of network service.

**Related  
Documentation**

- [Overview of Layer 2 Networking on page 3](#)
- [Understanding Storm Control](#)
- [Understanding Bridging and VLANs on Switches on page 9](#)

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## Layer 2 Learning and Forwarding for VLANs Overview

### Understanding Layer 2 Forwarding Tables on Switches, Routers and NFX Series Devices

You can configure Layer 2 MAC address and VLAN learning and forwarding properties in support of Layer 2 bridging. Unicast media access control (MAC) addresses are learned to avoid flooding the packets to all the ports in a VLAN. A source MAC entry is created in its source and destination MAC tables for each MAC address learned from packets received on ports that belong to the VLAN.

When you configure a VLAN, Layer 2 address learning is enabled by default. The VLAN learns unicast media access control (MAC) addresses to avoid flooding the packets to all the ports in the VLAN. Each VLAN creates a source MAC entry in its source and destination MAC tables for each source MAC address learned from packets received on the ports that belong to the VLAN.



**NOTE:** Traffic is not flooded back onto the interface on which it was received. However, because this “split horizon” occurs at a late stage, the packet statistics displayed by commands such as `show interfaces queue` will include flood traffic.

You can optionally disable MAC learning either for the entire device or for a specific VLAN or logical interface. You can also configure the following Layer 2 learning and forwarding properties:

- Timeout interval for MAC entries
- Static MAC entries for logical interfaces only
- Limit to the number of MAC addresses learned from a specific logical interface or from all the logical interfaces in a VLAN
- Size of the MAC address table for the VLAN
- MAC accounting for a VLAN

For more information about how to configure VLANs and virtual switches, see *Configuring a VLAN* and *Configuring a Layer 2 Virtual Switch on an EX Series Switch*.

## Understanding Layer 2 Forwarding Tables on Security Devices

The SRX Series device maintains forwarding tables that contain MAC addresses and associated interfaces for each Layer 2 VLAN. When a packet arrives with a new source MAC address in its frame header, the device adds the MAC address to its forwarding table and tracks the interface at which the packet arrived. The table also contains the corresponding interface through which the device can forward traffic for a particular MAC address.

If the destination MAC address of a packet is unknown to the device (that is, the destination MAC address in the packet does not have an entry in the forwarding table), the device duplicates the packet and floods it on all interfaces in the VLAN other than the interface on which the packet arrived. This is known as *packet flooding* and is the default behavior for the device to determine the outgoing interface for an unknown destination MAC address. Packet flooding is performed at two levels: packets are flooded to different zones as permitted by configured Layer 2 security policies, and packets are also flooded to different interfaces with the same VLAN identifier within the same zone. The device learns the forwarding interface for the MAC address when a reply with that MAC address arrives at one of its interfaces.

You can specify that the SRX Series device use ARP queries and traceroute requests (which are ICMP echo requests with the time-to-live values set to 1) instead of packet flooding to locate an unknown destination MAC address. This method is considered more secure than packet flooding because the device floods ARP queries and traceroute packets—not the initial packet—on all interfaces. When ARP or traceroute flooding is used, the original packet is dropped. The device broadcasts an ARP or ICMP query to all other devices on the same subnetwork, requesting the device at the specified destination

IP address to send back a reply. Only the device with the specified IP address replies, which provides the requestor with the MAC address of the responder.

ARP allows the device to discover the destination MAC address for a unicast packet if the destination IP address is in the same subnet as the ingress IP address. (The ingress IP address refers to the IP address of the last device to send the packet to the device. The device might be the source that sent the packet or a router forwarding the packet.) Traceroute allows the device to discover the destination MAC address even if the destination IP address belongs to a device in a subnet beyond that of the ingress IP address.

When you enable ARP queries to locate an unknown destination MAC address, traceroute requests are also enabled. You can also optionally specify that traceroute requests not be used; however, the device can then discover destination MAC addresses for unicast packets only if the destination IP address is in the same subnet as the ingress IP address.

Whether you enable ARP queries and traceroute requests or ARP-only queries to locate unknown destination MAC addresses, the SRX Series device performs the following series of actions:

1. The device notes the destination MAC address in the initial packet. The device adds the source MAC address and its corresponding interface to its forwarding table, if they are not already there.
2. The device drops the initial packet.
3. The device generates an ARP query packet and optionally a traceroute packet and floods those packets out all interfaces except the interface on which the initial packet arrived.

ARP packets are sent out with the following field values:

- Source IP address set to the IP address of the IRB
- Destination IP address set to the destination IP address of the original packet
- Source MAC address set to the MAC address of the IRB
- Destination MAC address set to the broadcast MAC address (all **0xf**)

Traceroute (ICMP echo request or ping) packets are sent out with the following field values:

- Source IP address set to the IP address of the original packet
- Destination IP address set to the destination IP address of the original packet
- Source MAC address set to the source MAC address of the original packet
- Destination MAC address set to the destination MAC address of the original packet
- Time-to-live (TTL) set to 1



4. Combining the destination MAC address from the initial packet with the interface leading to that MAC address, the device adds a new entry to its forwarding table.
5. The device forwards all subsequent packets it receives for the destination MAC address out the correct interface to the destination.

**Related Documentation**

- [Layer 2 Learning and Forwarding for VLANs Overview on page 6](#)
- [Understanding Layer 2 Transparent Mode on SRX Devices](#)
- [Understanding Integrated Routing and Bridging](#)
- [Example: Configuring an IRB Interface on a Security Device](#)
- [Example: Configuring the Default Learning for Unknown MAC Addresses](#)

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## Understanding Bridging and VLANs on Switches

Network switches use Layer 2 bridging protocols to discover the topology of their LAN and to forward traffic toward destinations on the LAN. This topic explains the following concepts regarding bridging and VLANs:

- [History of VLANs on page 9](#)
- [How Bridging of VLAN Traffic Works on page 10](#)
- [Packets Are Either Tagged or Untagged on page 11](#)
- [Switch Interface Modes—Access, Trunk, or Tagged Access on page 12](#)
- [Additional Advantages of Using VLANs on page 14](#)
- [Maximum VLANs and VLAN Members Per Switch on page 14](#)
- [A Default VLAN Is Configured on Most Switches on page 15](#)
- [Assigning Traffic to VLANs on page 16](#)
- [Forwarding VLAN Traffic on page 17](#)
- [VLANs Communicate with Integrated Routing and Bridging Interfaces or Routed VLAN Interfaces on page 17](#)

### History of VLANs

Ethernet LANs were originally designed for small, simple networks that primarily carried text. However, over time, the type of data carried by LANs grew to include voice, graphics, and video. This more complex data, when combined with the ever-increasing speed of transmission, eventually became too much of a load for the original Ethernet LAN design. Multiple packet collisions were significantly slowing down the larger LANs.

The IEEE 802.1D-2004 standard helped evolve Ethernet LANs to cope with the higher data and transmission requirements by defining the concept of *transparent bridging* (generally called simply *bridging*). Bridging divides a single physical LAN (now called a single *broadcast domain*) into two or more virtual LANs, or VLANs. Each VLAN is a

collection of some of the LAN nodes grouped together to form individual broadcast domains.

When VLANs are grouped logically by function or organization, a significant percentage of data traffic stays within the VLAN. This relieves the load on the LAN because all traffic no longer has to be forwarded to all nodes on the LAN. A VLAN first transmits packets within the VLAN, thereby reducing the number of packets transmitted on the entire LAN. Because packets whose origin and destination are in the same VLAN are forwarded only within the local VLAN, packets that are not destined for the local VLAN are the only ones forwarded to other broadcast domains. This way, bridging and VLANs limit the amount of traffic flowing across the entire LAN by reducing the possible number of collisions and packet retransmissions within VLANs and on the LAN as a whole.

## How Bridging of VLAN Traffic Works

Because the objective of the IEEE 802.1D-2004 standard was to reduce traffic and therefore reduce potential transmission collisions for Ethernet, a system was implemented to reuse information. Instead of having a switch go through a location process every time a frame is sent to a node, the transparent bridging protocol allows a switch to record the location of known nodes. When packets are sent to nodes, those destination node locations are stored in address-lookup tables called *Ethernet switching tables*. Before sending a packet, a switch using bridging first consults the switching tables to see if that node has already been located. If the location of a node is known, the frame is sent directly to that node.

Transparent bridging uses five mechanisms to create and maintain Ethernet switching tables on the switch:

- Learning
- Forwarding
- Flooding
- Filtering
- Aging

The key bridging mechanism used by LANs and VLANs is *learning*. When a switch is first connected to an Ethernet LAN or VLAN, it has no information about other nodes on the network. As packets are sent, the switch learns the embedded MAC addresses of the sending nodes and stores them in the Ethernet switching table, along with two other pieces of information—the interface (or port) on which the traffic was received on the destination node and the time the address was learned.

Learning allows switches to then do *forwarding*. By consulting the Ethernet switching table to see whether the table already contains the frame's destination MAC address, switches save time and resources when forwarding packets to the known MAC addresses. If the Ethernet switching table does not contain an entry for an address, the switch uses flooding to learn that address.

*Flooding* finds a particular destination MAC address without using the Ethernet switching table. When traffic originates on the switch and the Ethernet switching table does not

yet contain the destination MAC address, the switch first floods the traffic to all other interfaces within the VLAN. When the destination node receives the flooded traffic, it can send an acknowledgment packet back to the switch, allowing it to learn the MAC address of the node and add the address to its Ethernet switching table.

*Filtering*, the fourth bridging mechanism, is how broadcast traffic is limited to the local VLAN whenever possible. As the number of entries in the Ethernet switching table grows, the switch pieces together an increasingly complete picture of the VLAN and the larger LAN—it learns which nodes are in the local VLAN and which are on other network segments. The switch uses this information to filter traffic. Specifically, for traffic whose source and destination MAC addresses are in the local VLAN, filtering prevents the switch from forwarding this traffic to other network segments.

To keep entries in the Ethernet switching table current, the switch uses a fifth bridging mechanism, *aging*. Aging is the reason that the Ethernet switching table entries include timestamps. Each time the switch detects traffic from a MAC address, it updates the timestamp. A timer on the switch periodically checks the timestamp, and if it is older than a user-configured value, the switch removes the node's MAC address from the Ethernet switching table. This aging process eventually flushes unavailable network nodes out of the Ethernet switching table.

## Packets Are Either Tagged or Untagged

When an Ethernet LAN is divided into VLANs, each VLAN is identified by a unique 802.1Q ID. The number of available VLANs and VLAN IDs are listed below:

- On a switch running ELS software, you can configure 4093 VLANs using VLAN IDs 1 through 4094, while VLAN IDs 0 and 4095 are reserved by Junos OS and cannot be assigned.
- On a switch running non-ELS software, you can configure 4091 VLANs using VLAN IDs 1-4094.

Ethernet packets include a tag protocol identifier (TPID) EtherType field, which identifies the protocol being transported. When a device within a VLAN generates a packet, this field includes a value of 0x8100, which indicates that the packet is a VLAN-tagged packet. The packet also has a VLAN ID field that includes the unique 802.1Q ID, which identifies the VLAN to which the packet belongs.

Junos OS switches support the TPID value 0x9100 for Q-in-Q on switches. In addition to the TPID EtherType value of 0x8100, EX Series switches that do not support the Enhanced Layer 2 Software (ELS) configuration style also support values of 0x88a8 (Provider Bridging and Shortest Path Bridging) and 0x9100 (Q-in-Q).

For a simple network that has only a single VLAN, all packets include a default 802.1Q tag, which is the only VLAN membership that does not mark the packet as tagged. These packets are untagged packets.



**NOTE:** Q-in-Q tunnelling is not supported on NFX150 devices.

## Switch Interface Modes—Access, Trunk, or Tagged Access

Ports, or interfaces, on a switch operate in one of three modes:

- Access mode
- Trunk mode
- Tagged-access mode

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### Access Mode

An interface in access mode connects a switch to a single network device, such as a desktop computer, an IP telephone, a printer, a file server, or a security camera. Access interfaces accept only untagged packets.

By default, when you boot a switch that runs Junos OS that does not support ELS and use the factory default configuration, or when you boot such a switch and do not explicitly configure a port mode, all interfaces on the switch are in access mode and accept only untagged packets from the VLAN named **default**. You can optionally configure another VLAN and use that VLAN instead of **default**.

On a switch that supports ELS, the VLAN named **default** is not supported. Therefore, on such switches, you must explicitly configure at least one VLAN, even if your network is simple and you want only one broadcast domain to exist. After you assign an interface to a VLAN, the interface functions in access mode.

For switches that run either type of software, you can also configure a trunk port or interface to accept untagged packets from a user-configured VLAN. For details about this concept (native VLAN), see [“Trunk Mode and Native VLAN” on page 13](#).

---

### Trunk Mode

Trunk mode interfaces are generally used to connect switches to one another. Traffic sent between switches can then consist of packets from multiple VLANs, with those packets multiplexed so that they can be sent over the same physical connection. Trunk interfaces usually accept only tagged packets and use the VLAN ID tag to determine both the packets' VLAN origin and VLAN destination.

On a switch that runs software that does not support ELS, an untagged packet is not recognized on a trunk port unless you configure additional settings on that port.

On a switch that runs Junos OS that supports ELS, a trunk port recognizes untagged control packets for protocols such as the Link Aggregation Control Protocol (LACP) and the Link Layer Discovery Protocol (LLDP). However, the trunk port does not recognize untagged data packets unless you configure additional settings on that port.



**NOTE:** LACP is not supported on NFX150 devices.

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In the rare case where you want untagged packets to be recognized by a trunk port on switches that run either type of software, you must configure the single VLAN on a trunk

port as a *native VLAN*. For more information about native VLANs, see [“Trunk Mode and Native VLAN” on page 13](#).

### Trunk Mode and Native VLAN

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On a switch that runs Junos OS that does not support ELS, a trunk port does not recognize packets that do not include VLAN tags, which are also known as untagged packets. On a switch that runs Junos OS that supports ELS, a trunk port recognizes untagged control packets, but it does not recognize untagged data packets. With native VLAN configured, untagged packets that a trunk port normally does not recognize are sent over the trunk interface. In a situation where packets pass from a device, such as an IP phone or printer, to a switch in access mode, and you want those packets sent from the switch over a trunk port, use native VLAN mode. Create a native VLAN by configuring a VLAN ID for it, and specify that the trunk port is a member of the native VLAN.

The switch's trunk port will then treat those packets differently than the other tagged packets. For example, if a trunk port has three VLANs, 10, 20, and 30, assigned to it with VLAN 10 being the native VLAN, packets on VLAN 10 that leave the trunk port on the other end have no 802.1Q header (tag).

There is another native VLAN option for switches that do not support ELS. You can have the switch add and remove tags for untagged packets. To do this, you first configure the single VLAN as a native VLAN on a port attached to a device on the edge. Then, assign a VLAN ID tag to the single native VLAN on the port connected to a device. Last, add the VLAN ID to the trunk port. Now, when the switch receives the untagged packet, it adds the ID you specified and sends and receives the tagged packets on the trunk port configured to accept that VLAN.

### Tagged-Access Mode

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Only switches that run Junos OS not using the ELS configuration style support tagged-access mode. Tagged-access mode accommodates cloud computing, specifically scenarios including virtual machines or virtual computers. Because several virtual computers can be included on one physical server, the packets generated by one server can contain an aggregation of VLAN packets from different virtual machines on that server. To accommodate this situation, tagged-access mode reflects packets back to the physical server on the same downstream port when the destination address of the packet was learned on that downstream port. Packets are also reflected back to the physical server on the downstream port when the destination has not yet been learned. Therefore, the third interface mode, tagged access, has some characteristics of access mode and some characteristics of trunk mode:

- Like access mode, tagged-access mode connects the switch to an access layer device. Unlike access mode, tagged-access mode is capable of accepting VLAN tagged packets.
- Like trunk mode, tagged-access mode accepts VLAN tagged packets from multiple VLANs. Unlike trunk port interfaces, which are connected at the core/distribution layer, tagged-access port interfaces connect devices at the access layer.

Like trunk mode, tagged-access mode also supports native VLAN.



**NOTE:** Control packets are never reflected back on the downstream port.

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## Additional Advantages of Using VLANs

In addition to reducing traffic and thereby speeding up the network, VLANs have the following advantages:

- VLANs provide segmentation services traditionally provided by routers in LAN configurations, thereby reducing hardware equipment costs.
- Packets coupled to a VLAN can be reliably identified and sorted into different domains. You can contain broadcasts within parts of the network, thereby freeing up network resources. For example, when a DHCP server is plugged into a switch and starts broadcasting its presence, you can prevent some hosts from accessing it by using VLANs to split up the network.
- For security issues, VLANs provide granular control of the network because each VLAN is identified by a single IP subnetwork. All packets passing in and out of a VLAN are consistently tagged with the VLAN ID of that VLAN, thereby providing easy identification, because a VLAN ID on a packet cannot be altered. (For a switch that runs Junos OS that does not support ELS, we recommend that you avoid using 1 as a VLAN ID, because that ID is a default value.)
- VLANs react quickly to host relocation—this is also due to the persistent VLAN tag on packets.
- On an Ethernet LAN, all network nodes must be physically connected to the same network. In VLANs, the physical location of nodes is not important—you can group network devices in any way that makes sense for your organization, such as by department or business function, types of network nodes, or physical location.

## Maximum VLANs and VLAN Members Per Switch

The number of VLANs supported per switch varies for each switch. Use the configuration-mode command **set vlans *vlan-name* *vlan-id* ?** to determine the maximum number of VLANs allowed on a switch. You cannot exceed this VLAN limit because you have to assign a specific ID number when you create a VLAN—you could overwrite one of the numbers, but you cannot exceed the limit.

You can, however, exceed the recommended VLAN member maximum for a switch.

On a switch that runs Junos OS that does not support the ELS configuration style, the maximum number of VLAN members allowed on the switch is eight times the maximum number of VLANs that the switch supports ( $\text{vmember limit} = \text{vlan max} * 8$ ). If the configuration of the switch exceeds the recommended VLAN member maximum, a warning message appears when you commit the configuration. If you commit the configuration despite the warning, the commit succeeds, but there is a risk of the Ethernet switching process (eswd) failing as a result of memory allocation failure.

On most switches running Junos OS that supports ELS, the maximum number of VLAN members allowed on the switch is 24 times the maximum number of VLANs that the switch supports ( $\text{vmember limit} = \text{vlan max} * 24$ ). If the configuration of the switch exceeds the recommended VLAN member maximum, a warning message appears in the system log (syslog).

On an EX Series switch that runs Junos OS that supports ELS, the maximum number of VLAN members allowed on the switch is as follows:

- EX4300—24 times the maximum number of VLANs that the switch supports ( $\text{vmember limit} = \text{vlan max} * 24$ )
- EX3400—16 times the maximum number of VLANs that the switch supports ( $\text{vmember limit} = \text{vlan max} * 16$ )
- EX2300—8 times the maximum number of VLANs that the switch supports ( $\text{vmember limit} = \text{vlan max} * 8$ )

A QFabric system supports up to 131,008 VLAN members (vmembers) on a single network node group, server node group, or redundant server node group. The number of vmembers is calculated by multiplying the maximum number of VLANs by 32.

For example, to calculate how many interfaces are required to support 4,000 VLANs, divide the maximum number of vmembers (128,000) by the number of configured VLANs (4,000). In this case, 32 interfaces are required.

On network Node groups and server Node groups, you can configure link aggregation groups (LAGs) across multiple interfaces. Each LAG and VLAN combination is considered a vmember.



**NOTE:** LAG is not supported on NFX150 devices.

A Virtual Chassis Fabric supports up to 512,000 vmembers. The number of vmembers is based on the number of VLANs, and the number of interfaces configured in each VLAN.

## A Default VLAN Is Configured on Most Switches

Some switches running Junos OS that do not support the ELS configuration style are preconfigured with a VLAN named **default** that does not tag packets and operates only with untagged packets. On these switches, each interface already belongs to the VLAN named **default** and all traffic uses this VLAN until you configure more VLANs and assign traffic to those VLANs.

EX Series switches that run Junos OS with the ELS configuration style do not support a default VLAN. The following EX Series switches running Junos OS not supporting the ELS configuration style are not preconfigured to belong to **default** or any other VLAN:

- Modular switches, such as the EX8200 switches and EX6200 switches
- Switches that are part of a Virtual Chassis

The reason that these switches are not preconfigured is that the physical configuration in both situations is flexible. There is no way of knowing which line cards have been inserted in either the EX8200 switch or EX6200 switch. There is also no way of knowing which switches are included in the Virtual Chassis. Switch interfaces in these two cases must first be defined as Ethernet switching interfaces. After an interface is defined as an Ethernet switching interface, the default VLAN appears in the output from the ? help and other commands.



**NOTE:** When a Juniper Networks EX4500 Ethernet Switch, EX4200 Ethernet Switch, EX3300 Ethernet Switch, QFX3500 or QFX3600 switch is interconnected with other switches in a Virtual Chassis configuration, each individual switch that is included as a member of the configuration is identified with a member ID. The member ID functions as an FPC slot number. When you are configuring interfaces for a Virtual Chassis configuration, you specify the appropriate member ID (0 through 9) as the slot element of the interface name. The default factory settings for a Virtual Chassis configuration include FPC 0 as a member of the default VLAN because FPC 0 is configured as part of the ethernet-switching family. In order to include FPC 1 through FPC 9 in the default VLAN, add the ethernet-switching family to the configurations for those interfaces.



**NOTE:** You cannot configure a default VLAN on NFX150 devices.

## Assigning Traffic to VLANs

You can assign traffic on any switch to a particular VLAN by referencing either the interface port of the traffic or the MAC addresses of devices sending traffic.



**NOTE:** Two logical interfaces that are configured on the same physical interface cannot be mapped to the same VLAN.

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### Assign VLAN Traffic According to the Interface Port Source

This method is most commonly used to assign traffic to VLANs. In this case, you specify that all traffic received on a particular switch interface is assigned to a specific VLAN. You configure this VLAN assignment when you configure the switch, by using either the VLAN number (called a VLAN ID) or by using the VLAN name, which the switch then translates into a numeric VLAN ID. This method is referred to simply as creating a VLAN because it is the most commonly used method.

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### Assign VLAN Traffic According to the Source MAC Address

In this case, all traffic received from a specific MAC address is forwarded to a specific egress interface (next hop) on the switch. MAC-based VLANs are either static (named MAC addresses configured one at a time) or dynamic (configured using a RADIUS server).



To configure a static MAC-based VLAN on a switch that supports ELS, see *Adding a Static MAC Address Entry to the Ethernet Switching Table (CLI Procedure)*. To configure a static MAC-based VLAN on a switch that does not support ELS, see *Adding a Static MAC Address Entry to the Ethernet Switching Table (CLI Procedure)*.

For information about using 802.1X authentication to authenticate end devices and allow access to dynamic VLANs configured on a RADIUS server, see *Understanding Dynamic VLAN Assignment Using RADIUS Attributes*. You can optionally implement this feature to offload the manual assignment of VLAN traffic to automated RADIUS server databases.

## Forwarding VLAN Traffic

To pass traffic within a VLAN, the switch uses Layer 2 forwarding protocols, including IEEE 802.1Q spanning-tree protocols.

To pass traffic between two VLANs, the switch uses standard Layer 3 routing protocols, such as static routing, OSPF, and RIP. The same interfaces that support Layer 2 bridging protocols also support Layer 3 routing protocols, providing multilayer switching.

To pass traffic from a single device on an access port to a switch and then pass those packets on a trunk port, use the native mode configuration previously discussed under [“Trunk Mode” on page 12](#).

## VLANs Communicate with Integrated Routing and Bridging Interfaces or Routed VLAN Interfaces

Traditionally, switches sent traffic to hosts that were part of the same broadcast domain (VLAN) but routers were needed to route traffic from one broadcast domain to another. Also, only routers performed other Layer 3 functions such as traffic engineering.

Switches that run Junos OS that supports the ELS configuration style perform inter-VLAN routing functions using an integrated routing and bridging (IRB) interface named `irb`, while switches that run Junos OS that does not support ELS perform these functions using a routed VLAN interface (RVI) named `vlan`. These interfaces detect both MAC addresses and IP addresses and route data to Layer 3 interfaces, thereby frequently eliminating the need to have both a switch and a router.

### Related Documentation

- *Example: Setting Up Basic Bridging and a VLAN on the QFX Series*
- *Understanding FCoE*
- *Interfaces Overview for Switches*
- *Understanding Multiple VLAN Registration Protocol (MVRP)*
- *Understanding Integrated Routing and Bridging*

## Configuring VLANs on Switches with Enhanced Layer 2 Support

Switches use VLANs to make logical groupings of network nodes with their own broadcast domains. You can use VLANs to limit the traffic flowing across the entire LAN and reduce collisions and packet retransmissions.



**NOTE:** This task supports the Enhanced Layer 2 Software (ELS) configuration style. For ELS details, see *Getting Started with Enhanced Layer 2 Software*. If your switch runs software that does not support ELS, see *Configuring VLANs on Switches*.



**NOTE:** Starting with Junos OS Release 17.1R3, on QFX10000 switches, you cannot configure an interface with both **family ethernet-switching** and **flexible-vlan-tagging**. This configuration is not supported, and a warning will be issued if you try to commit this configuration.



**NOTE:** Two logical interfaces that are configured on the same physical interface cannot be mapped to the same VLAN.

For each endpoint on the VLAN, configure the following VLAN parameters on the corresponding interface:

1. Specify the description of the VLAN:

```
[edit interfaces interface-name unit 0]
user@switch# set description vlan-description
```

2. Specify the unique name of the VLAN:



**NOTE:** Switches that run Junos OS with the ELS configuration style do not support a default VLAN. Therefore, on such switches, you must explicitly configure at least one VLAN, even if your network is simple and you want only one broadcast domain to exist.



**NOTE:** On QFX5100 switches running Junos OS Release 14.1X53-D46 or earlier, when you configure an interface under a VLAN but do not specify the name of the VLAN, the system will not issue a commit error.

```
[edit interfaces interface-name unit 0]
user@switch# set family ethernet-switching vlan members vlan-name
```

3. Create the subnet for the VLAN:

```
[edit interfaces]
user@switch# set vlan unit 0 family inet address ip-address
```



**NOTE:** The `family inet` option is not supported on NFX150 devices.

4. Configure the VLAN tag ID or VLAN ID list for the VLAN:

```
[edit vlans]
user@switch# set vlan-name vlan-id vlan-id-number
```

or

```
[edit vlans]
user@switch# set vlan-name vlan-id-list [vlan-ids | vlan-id--vlan-id-]
```

5. Specify a VLAN firewall filter to be applied to incoming or outgoing packets:

```
[edit vlans]
user@switch# set vlan-name filter (input | output) filter-name
```

Release History Table

Release	Description
17.1R3	Starting with Junos OS Release 17.1R3, on QFX10000 switches, you cannot configure an interface with both <b>family ethernet-switching</b> and <b>flexible-vlan-tagging</b> .

**Related  
Documentation**

- [Example: Setting Up Basic Bridging and a VLAN on the QFX Series](#)
- [Configuring IRB Interfaces on Switches](#)
- [Understanding Bridging and VLANs on Switches on page 9](#)

## Configuring the Native VLAN Identifier on Switches With ELS Support (CLI Procedure)



**NOTE:** This task uses Junos OS for EX Series switches and Junos OS for QFX3500 and QFX3600 switches with support for the Enhanced Layer 2 Software (ELS) configuration style. If your switch runs software that does not support ELS, see *Configuring the Native VLAN Identifier (CLI Procedure)*. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

Switches can receive and forward routed or bridged Ethernet frames with 802.1Q VLAN tags. Typically, trunk ports, which connect switches to each other, accept untagged control packets but do not accept untagged data packets. You can enable a trunk port to accept untagged data packets by configuring a native VLAN ID on the interface on which you want the untagged data packets to be received. The logical interface on which untagged packets are to be received must be configured with the same VLAN ID as the native VLAN ID configured on the physical interface.

To configure the native VLAN ID by using the command-line interface (CLI):

1. On the interface on which you want untagged data packets to be received, set the interface mode to **trunk**, which specifies that the interface is in multiple VLANs and can multiplex traffic between different VLANs.:

```
[edit interfaces]
user@switch# set interface-name unit logical-unit-number family
ethernet-switching interface-mode trunk
```

2. Configure the native VLAN ID:

```
[edit interfaces]
user@switch# set interface-name native-vlan-id vlan-id
```

3. Specify that the logical interface that will receive the untagged data packets is a member of the native VLAN:

```
[edit interfaces]
user@switch# set interface-name unit logical-unit-number family
ethernet-switching vlan members vlan-id
```

### Related Documentation

- *Example: Connecting Access Switches to a Distribution Switch*
- *Example: Setting Up Basic Bridging and a VLAN for an EX Series Switch*
- *Example: Setting Up Basic Bridging and a VLAN on the QFX Series*

## Creating a Series of Tagged VLANs on NFX150 Devices

---

When you divide an Ethernet LAN into multiple VLANs, each VLAN is assigned a unique IEEE 802.1Q tag. This tag is associated with each frame in the VLAN, and the network nodes receiving the traffic can use the tag to identify which VLAN a frame is associated with.

Instead of configuring VLANs and 802.1Q tags one at a time for a trunk interface, you can configure a VLAN range to create a series of tagged VLANs.

When an Ethernet LAN is divided into VLANs, each VLAN is identified by a unique 802.1Q tag. The tag is applied to all frames so that the network nodes receiving the frames can detect which VLAN the frames belong to. Trunk ports, which multiplex traffic among a number of VLANs, use the tag to determine the origin of frames and where to forward them.

For example, you could configure the VLAN **employee** and specify a tag range of **10 through 12**. This creates the following VLANs and tags:

- VLAN **employee-10**, tag 10
- VLAN **employee-11**, tag 11
- VLAN **employee-12**, tag 12

Creating tagged VLANs in a series has the following limitations:

- Layer 3 interfaces do not support this feature.
- Because an access interface can only support one VLAN member, access interfaces also do not support this feature.

To configure a series of tagged VLANs using the CLI (here, the VLAN is **employee**):

1. Configure the series (here, a VLAN series from 120 through 130):

```
[edit]
user@switch# set vlans employee vlan-id-list [ 120-130 ]
```

2. Associate a series of tagged VLANs when you configure an interface in one of two ways:

- Include the name of the series:

```
[edit interfaces]
user@switch# set interfaces ge-0/0/0 unit 0 family ethernet-switching vlan members employee
```

- Include the VLAN range:

```
[edit interfaces]
user@switch# set interfaces ge-0/0/0 unit 0 family ethernet-switching vlan members 120-130
```

Associating a series of tagged VLANs to an interface by name or by VLAN range the same result: VLANs **\_\_employee\_120\_\_** through **\_\_employee\_130\_\_** are created.



**NOTE:** When a series of VLANs is created using the `vlan-id-list` command, the VLAN names are preceded and followed by a double underscore.

---

**Related  
Documentation**

- [Configuring VLANs on page 18](#)

## Adding a Static MAC Address Entry to the Ethernet Switching Table on a Switch with ELS Support (CLI Procedure)



**NOTE:** This task uses Junos OS for EX Series switches and Junos OS for QFX3500 and QFX3600 switches with support for the Enhanced Layer 2 Software (ELS) configuration style. If your switch runs software that does not support ELS, see *Adding a Static MAC Address Entry to the Ethernet Switching Table (CLI Procedure)*. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

The Ethernet switching table, also known as the forwarding table, specifies the known locations of VLAN nodes and the addresses of devices within those nodes. There are two ways to populate the Ethernet switching table on a switch. The easiest method is to let the switch update the table with MAC addresses.

The second way to populate the Ethernet switching table is to manually insert addresses into the table. You can do this to reduce flooding and speed up the switch's automatic learning process.

Before configuring a static MAC address, be sure that you have:

- Set up the VLAN. See *Configuring VLANs for EX Series Switches (CLI Procedure)*.

To configure an interface to have a static MAC address:

```
[edit vlans vlan-name switch-options interface interface-name]
user@switch# set static-mac mac-address
```

### Related Documentation

- [Understanding Bridging and VLANs on Switches on page 9](#)

## Configuring Static ARP Entries

You can create static ARP table entries, which are explicit mappings between IP addresses and MAC addresses.

- To configure a static ARP entry:

```
[edit interfaces interface-name unit logical-unit-number family inet address
address]
user@switch# set arp ip-address (mac | multicast-mac) mac-address
```

The IP address that you specify must be part of the subnet defined in the enclosing **address** statement.

To associate a multicast MAC address with a unicast IP address, use the **multicast-mac** statement.

Specify the MAC address as 6 hexadecimal bytes in one of the following formats:  
*nnnn.nnnn.nnnn* or *nn:nn:nn:nn:nn:nn*; for example, 0011.2233.4455 or 00:11:22:33:44:55.

- Related Documentation**
- *Understanding Static ARP Entries*
  - *arp*

---

## Troubleshooting Ethernet Switching

---

**Problem**    **Description:** Sometimes a MAC address entry in the switch's Ethernet switching table is not updated after the device with that MAC address has been moved from one interface to another on the switch. Typically, the switch does not wait for a MAC address expiration when a MAC move operation occurs. As soon as the switch detects the MAC address on the new interface, it immediately updates the table. Many network devices send a gratuitous ARP packet when switching an IP address from one device to another. The switch updates its ARP cache table after receipt of such gratuitous ARP messages, and then it also updates its Ethernet switching table.

Sometimes silent devices, such as syslog servers or SNMP trap receivers that receive UDP traffic but do not return acknowledgment (ACK) messages to the traffic source, fail to send gratuitous ARP packets when a device moves. If such a move occurs when the system administrator is not available to explicitly clear the affected interfaces by issuing the **clear ethernet-switching table** command, the entry for the moved device in the Ethernet switching table is not updated.

**Solution**    Set up the switch to handle unattended MAC address switchovers.

1. Reduce the system-wide ARP aging timer. (By default, the ARP aging timer is set at 20 minutes. The range of the ARP aging timer is from 1 through 240 minutes.)  
  
[edit system arp]  
user@switch# **set aging-timer 3**
2. Set the MAC aging timer to the same value as the ARP timer. (By default, the MAC aging timer is set to 300 seconds. The range is 60 to 1,000,000 seconds.)  
  
[edit protocols 12-learning]  
user@switch# **set global-mac-table-aging-time 180**

The ARP entry and the MAC address entry for the moved device expire within the times specified by the aging timer values. After the entries expire, the switch sends a new ARP message to the IP address of the device. The device responds to the ARP message, thereby refreshing the entries in the switch's ARP cache table and Ethernet switching table.

- Related Documentation**
- *arp*
  - [global-mac-table-aging-time on page 113](#)



## PART 2

# MAC Addresses

- [Using MAC Addresses on page 27](#)



## CHAPTER 2

# Using MAC Addresses

- [Introduction to the Media Access Control \(MAC\) Layer 2 Sublayer on page 27](#)
- [Understanding MAC Learning on page 28](#)
- [Disabling MAC Learning on Devices with ELS Support on page 28](#)
- [Configuring MAC Notification on Switches with ELS Support \(CLI Procedure\) on page 29](#)
- [Verifying That MAC Notification Is Working Properly on page 30](#)
- [Configuring MAC Limiting \(CLI Procedure\) on page 31](#)

### Introduction to the Media Access Control (MAC) Layer 2 Sublayer

This topic provides an introduction to the MAC sublayer of the data link layer (Layer 2).

In Layer 2 of a network, the Media Access Control (MAC) sublayer provides addressing and channel access control mechanisms that enable several terminals or network nodes to communicate in a network.

The MAC sublayer acts as an interface between the logical link control (LLC) Ethernet sublayer and Layer 1 (the physical layer). The MAC sublayer emulates a full-duplex logical communication channel in a multipoint network. This channel may provide unicast, multicast, or broadcast communication service. The MAC sublayer uses MAC protocols to prevent collisions.

In Layer 2, multiple devices on the same physical link can uniquely identify one another at the data link layer, by using the MAC addresses that are assigned to all ports on a switch. A MAC algorithm accepts as input a secret key and an arbitrary-length message to be authenticated, and outputs a MAC address.

A MAC address is a 12-digit hexadecimal number (48 bits in long). MAC addresses are usually written in one of these formats:

- MM:MM:MM:SS:SS:SS
- MM-MM-MM-SS-SS-SS

The first half of a MAC address contains the ID number of the adapter manufacturer. These IDs are regulated by an Internet standards body. The second half of a MAC address represents the serial number assigned to the adapter by the manufacturer.

Contrast MAC addressing, which works at Layer 2, with IP addressing, which runs at Layer 3 (networking and routing). One way to remember the difference is that the MAC addresses apply to a physical or virtual node, whereas IP addresses apply to the software implementation of that node. MAC addresses are typically fixed on a per-node basis, whereas IP addresses change when the node moves from one part of the network to another.

IP networks maintain a mapping between the IP and MAC addresses of a node using the Address Resolution Protocol (ARP) table. DHCP also typically uses MAC addresses when assigning IP addresses to nodes.

- Related Documentation**
- [Overview of Layer 2 Networking on page 3](#)
  - [Understanding MAC Learning on page 28](#)

---

## Understanding MAC Learning

*MAC learning* is the process of obtaining the MAC addresses of all the nodes on a network.

When a node is first connected to an Ethernet LAN or VLAN, it has no information about the other nodes on the network. As data is sent through the network, data packets include a data frame listing their source and destination MAC addresses. The data frame is forwarded to a target port, which is connected to the second device. The MAC address is learned locally at the target port, which facilitates communications for frames that later enter the target port and contain addresses previously learned from a received frame.

By default, MAC learning is enabled on the QFX and NFX Series.

- Related Documentation**
- [Introduction to the Media Access Control \(MAC\) Layer 2 Sublayer on page 27](#)
  - [Overview of Layer 2 Networking on page 3](#)

---

## Disabling MAC Learning on Devices with ELS Support

By default, MAC learning is globally enabled on all node. This topic describes how to disable MAC learning, as well as how to reenable and verify that MAC learning has been enabled or disabled.



**NOTE:** This task supports the Enhanced Layer 2 Software (ELS) configuration style. For ELS details, see *Getting Started with Enhanced Layer 2 Software*. If your switch runs software that does not support ELS, see *Disabling MAC Learning on QFX Switches*.

---

Disabling dynamic MAC learning prevents a node from learning source and destination MAC addresses.

- To disable MAC learning:

```
[edit vlans vlan-name switch-options interface interface-name]
user@switch# set no-mac-learning
```

- To enable MAC learning:

```
[edit vlans vlan-name switch-options interface interface-name]
user@switch# delete no-mac-learning
user@switch# deactivate no-mac-learning
```

- To verify the status of MAC learning, view the Ethernet MAC learning statistics in operational mode.

```
user@switch> show ethernet-switching table
Ethernet-switching table: 2 entries, 1 learned
  VLAN      MAC address      Type      Age Interfaces
  default   *                Flood     - All-members
  default   00:1f:12:39:90:80 Learn     29 xe-/0/0.0
```

#### Related Documentation

- [Understanding MAC Learning on page 28](#)
- [Example: Disabling MAC Learning](#)
- [no-mac-learning](#)

## Configuring MAC Notification on Switches with ELS Support (CLI Procedure)



**NOTE:** This task uses the Enhanced Layer 2 Software (ELS) configuration style. If your switch runs software that does not support ELS, see *Configuring MAC Notification (CLI Procedure)* or *Configuring MAC Notification (CLI Procedure)*. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

When a switch learns or unlearns a MAC address, SNMP notifications can be sent to the network management system at regular intervals to record the addition or removal of the MAC address. This process is known as MAC notification.

The MAC notification interval defines how often Simple Network Management Protocol (SNMP) notifications logging the addition or removal of MAC addresses on the switch are sent to the network management system.

MAC notification is disabled by default. When MAC notification is enabled, the default MAC notification interval is 30 seconds.

To enable or disable MAC notification, or to set the MAC notification interval, perform these tasks:

- [Enabling MAC Notification on page 30](#)
- [Disabling MAC Notification on page 30](#)
- [Setting the MAC Notification Interval on page 30](#)

## Enabling MAC Notification

MAC notification is disabled by default. You need to perform this procedure to enable MAC notification.

To enable MAC notification on the switch with the default MAC notification interval of 30 seconds:

```
[edit switch-options]
user@switch# set mac-notification
```

To enable MAC notification on the switch with any other MAC notification interval (here, the MAC notification interval is set to 60 seconds):

```
[edit switch-options]
user@switch# set mac-notification notification-interval 60
```

## Disabling MAC Notification

MAC notification is disabled by default. Perform this procedure only if MAC notification was previously enabled on your switch.

To disable MAC notification on the switch:

```
[edit switch-options]
user@switch# delete mac-notification
```

To disable MAC notification on a specific interface (here, the interface is ge-0/0/3):

```
[edit switch-options]
user@switch# set interface ge-0/0/3 no-mac-notification
```

## Setting the MAC Notification Interval

The default MAC notification interval is 30 seconds. The procedure to change the MAC notification interval to a different interval is identical to the procedure to enable MAC notification on the switch with a nondefault value for the MAC notification interval.

To set the MAC notification interval on the switch (here, the MAC notification interval is set to 5 seconds):

```
[edit switch-options]
user@switch# set mac-notification notification-interval 5
```

### Related Documentation

- [Verifying That MAC Notification Is Working Properly on page 30](#)

---

## Verifying That MAC Notification Is Working Properly

**Purpose** Verify that MAC notification is enabled or disabled, and that the MAC notification interval is set to the specified value.

**Action** To verify that MAC notification is enabled or disabled on a QFX Series switch or an EX4600, and also to verify the MAC notification interval setting:

```
user@switch> show ethernet-switching mac-notification
Notification Status: Enabled
Notification Interval: 60
Notifications Sent      : 0
Notifications Table Maxsize : 256
```

The output in the **Notification Status** field shows that MAC notification is enabled. The output in the **Notification Status** field would display **Disabled** if MAC notification was disabled.

The **Notification Interval** field output shows that the MAC notification interval is set to 60 seconds.

To verify that MAC notification is enabled on an EX Series switch while also verifying the MAC notification interval setting:

```
user@switch> show ethernet-switching mac-notification
Notification Status: Enabled
Notification Interval: 30
```

The output in the **Notification Status** field shows that MAC notification is enabled. The output in the **Notification Status** field would display **Disabled** if MAC notification was disabled.

The **Notification Interval** field output shows that the MAC notification interval is set to 30 seconds.

- Related Documentation**
- [Configuring MAC Notification \(CLI Procedure\)](#)
  - [Configuring MAC Notification on Switches with ELS Support \(CLI Procedure\) on page 29](#)

## Configuring MAC Limiting (CLI Procedure)



**NOTE:** This task uses Junos OS for EX Series switches and QFX3500 and QFX3600 switches with support for the Enhanced Layer 2 Software (ELS) configuration style. If your switch runs software that does not support ELS, see *Configuring MAC Limiting (CLI Procedure)*. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

This topic describes various ways of configuring a limitation on MAC addresses in packets that are received and forwarded by the switch.

For information on configuring an interface to automatically recover from a shutdown caused by MAC limiting, see *Configuring Autorecovery from the Disabled State on Secure or Storm Control Interfaces (CLI Procedure)*. If you do not configure the switch for

autorecovery from the disabled condition, you can bring up the disabled interfaces by running the `clear ethernet-switching recovery-timeout` command.

The different ways of setting a MAC limit are described in the following sections:

- [Limiting the Number of MAC Addresses Learned by an Interface on page 32](#)
- [Limiting the Number of MAC Addresses Learned by a VLAN on page 32](#)

## Limiting the Number of MAC Addresses Learned by an Interface

To secure a port, you can set the maximum number of MAC addresses that can be learned by an interface:

- Set the MAC limit on an interface, and specify an action that the switch takes after the specified limit is exceeded:

```
[edit switch-options]
user@switch# set interface interface-name interface-mac-limit limit packet-action
action
```

After you set a new MAC limit for the interface, the system clears existing entries in the MAC address forwarding table associated with the interface.

## Limiting the Number of MAC Addresses Learned by a VLAN

To limit the number of MAC addresses learned by a VLAN, perform both of the following steps:

1. Set the maximum number of MAC addresses that can be learned by a VLAN, and specify an action that the switch takes after the specified limit is exceeded:

```
[edit vlans]
user@switch# set vlan-name switch-options mac-table-size limit packet-action
action
```

2. Set the maximum number of MAC addresses that can be learned by one *or* all interfaces in the VLAN, and specify an action that the switch takes after the specified limit is exceeded:



**NOTE:** If you specify a MAC limit and packet action for all interfaces in the VLAN *and* a specific interface in the VLAN, the MAC limit and packet action specified at the specific interface level takes precedence. Also, at the VLAN interface level, only the drop and drop-and-log options are supported.

```
[edit vlans]
user@switch# set vlan-name switch-options interface interface-name
interface-mac-limit limit packet-action action
```

```
[edit vlans]
user@switch# set vlan-name switch-options interface-mac-limit limit packet-action
action
```



After you set new MAC limits for a VLAN by using the **mac-table-size** statement or for interfaces associated with a VLAN by using the **interface-mac-limit** statement, the system clears the corresponding existing entries in the MAC address forwarding table.



**NOTE:** On a QFX Series Virtual Chassis, if you include the shutdown option at the [edit vlans *vlan-name* switch-options interface *interface-name* interface-mac-limit packet-action] hierarchy level and issue the commit operation, the system generates a commit error. The system does not generate an error if you include the shutdown option at the [edit switch-options interface *interface-name* interface-mac-limit packet-action] hierarchy level.

**Related  
Documentation**

- *Configuring Autorecovery from the Disabled State on Secure or Storm Control Interfaces (CLI Procedure)*
- *Configuring Persistent MAC Learning (CLI Procedure)*



## PART 3

# Spanning Trees

- [Using Spanning Trees on page 37](#)



## CHAPTER 3

# Using Spanning Trees

- Overview of Spanning-Tree Protocols on page 38
- Understanding RSTP on page 39
- Example: Configuring Faster Convergence and Improved Network Stability on Switches with RSTP on page 40
- Configuring RSTP on EX Series Switches (CLI Procedure) on page 59
- Understanding VSTP on page 60
- Configuring VSTP (CLI Procedure) on page 61
- Example: Configuring BPDU Protection on Switch Edge Interfaces to Prevent STP Miscalculations on page 63
- Configuring BPDU Protection on Switch Spanning Tree Interfaces on page 68
- Unblocking a Switch Interface That Receives BPDUs in Error (CLI Procedure) on page 69

## Overview of Spanning-Tree Protocols

---

QFX Series switches provide Layer 2 loop prevention through Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), Multiple Spanning Tree Protocol (MSTP), and VLAN Spanning Tree Protocol (VSTP). The default spanning-tree protocol on the QFX Series is RSTP. RSTP provides faster convergence times than STP. However, some legacy networks require the slower convergence times of basic STP.



**NOTE:** If you are configuring an interface for any spanning tree protocol (STP, MSTP, RSTP, and VSTP), the `interface all`, `vlan all`, and `vlan-group` options are not available when you configure an interface with the `flexible-vlan-tagging` family option.

The STP support provided for the QFX Series includes:

- IEEE 802.1d
- 802.1w RSTP
- 802.1s MSTP

If your network includes IEEE 802.1D 1998 bridges, you can remove RSTP and explicitly configure STP. When you explicitly configure STP, the QFX Series products use the IEEE 802.1D 2004 specification, force version 0. This configuration runs a version of RSTP that is compatible with the classic, basic STP. If you use virtual LANs (VLANs), you should enable VSTP and use it on your network. See [“Understanding VSTP” on page 60](#).

You can use the same operational commands (**`show spanning-tree bridge`** and **`show spanning-tree interface`**) to check the status of your spanning-tree configuration, regardless of which spanning-tree protocol has been configured.

STP uses bridge protocol data unit (BPDU) packets to exchange information with other switches. BPDUs send hello packets out at regular intervals to exchange information across bridges and detect loops in a network topology. There are two types of BPDUs:

- Configuration BPDUs—These BPDUs contain configuration information about the transmitting switch and its ports, including switch and port MAC addresses, switch priority, port priority, and port cost.
- Topology change notification (TCN) BPDUs—When a bridge needs to signal a topology change, it starts to send TCNs on its root port. The designated bridge receives the TCN, acknowledges it, and generates another one for its own root port. The process continues until the TCN reaches the root bridge.

STP uses the information provided by the BPDUs to elect a root bridge, identify root ports for each switch, identify designated ports for each physical LAN segment, and prune specific redundant links to create a loop-free tree topology. All leaf devices calculate the best path to the root device and place their ports in blocking or forwarding states based on the best path to the root. The resulting tree topology provides a single active Layer 2 data path between any two end stations.

## Understanding Spanning Tree Protocols on a QFabric System

Although there is no need to run STP in a QFabric system, you can connect a QFabric system to another Layer 2 device and use STP. STP traffic can only be processed on network Node groups. Other Node groups, such as redundant server Node groups and server Node groups, discard the STP bridge protocol data units (BPDUs) traffic and disable the interface automatically. Server Node groups only process host-facing protocols, whereas Network Node groups process all supported protocols.

### Related Documentation

- [Understanding BPDUs Protection for STP, RSTP, and MSTP](#)
- [Understanding MSTP](#)
- [Understanding RSTP on page 39](#)
- [Understanding VSTP on page 60](#)

---

## Understanding RSTP

Juniper Networks QFX Series products use Rapid Spanning Tree Protocol (RSTP) on the network side of the QFX Series to provide quicker convergence time than the base Spanning Tree Protocol (STP) does. RSTP identifies certain links as point-to-point. When a point-to-point link fails, the alternate link can transition to the forwarding state, which speeds up convergence.

Although STP provides basic loop prevention functionality, it does not provide fast network convergence when there are topology changes. The STP process to determine network state transitions is slower than the RSTP process because it is timer-based. A device must reinitialize every time a topology change occurs. The device must start in the listening state and transition to the learning state and eventually to a forwarding or blocking state. When default values are used for the maximum age (20 seconds) and forward delay (15 seconds), it takes 50 seconds for the device to converge. RSTP converges faster because it uses a handshake mechanism based on point-to-point links instead of the timer-based process used by STP.

For networks with virtual LANs (VLANs), you can use VLAN Spanning Tree Protocol (VSTP), which takes the paths of each VLAN into account when calculating routes. VSTP uses RSTP by default.

An RSTP domain running from the edge outward on a QFX Series product has the following components:

- A *root port*, which is the “best path” to the root device.
- A *designated port*, which indicates that the switch is the designated bridge for the other switch connecting to this port.
- An *alternate port*, which provides an alternate root port.
- A *backup port*, which provides an alternate designated port.

Port assignments change through messages exchanged throughout the domain. An RSTP device generates configuration messages once per hello time interval. If an RSTP device does not receive a configuration message from its neighbor after an interval of three hello times, it determines that the connection with the neighbor is lost. When a *root port* or a *designated port* fails on a device, the device generates a configuration message with the proposal bit set. Once its neighbor device receives this message, it verifies that this configuration message is valid for that port and starts a *synchronizing* operation to ensure that all of its ports are in sync with the new information.

Similar sets of messages propagate through the network, restoring the connectivity very quickly after a topology change (in a well-designed network that uses RSTP, network convergence can take as little as 0.5 seconds). If a device does not receive an agreement to a proposal message it has sent, it returns to the original IEEE 802.D convention.

RSTP was originally defined in the IEEE 802.1w draft specification and later incorporated into the IEEE 802.1D-2004 specification.

VSTP and RSTP can be configured at the same time. If you configure VSTP and RSTP at the same time and the switch has more than 253 VLANs, VSTP is configured only for the first 253 VLANs. For the remaining VLANs, only RSTP is configured. RSTP and VSTP are the only spanning-tree protocols that can be configured at the same time on the QFX Series.



**NOTE:** Using the same VLAN for RSTP and VSTP is not supported. For example, if you are configuring a VLAN under VSTP, configuring RSTP with an interface that contains the same VLAN is not supported.

---

**Related Documentation**

- [Overview of Spanning-Tree Protocols on page 38](#)
- [Understanding MSTP](#)
- [Understanding VSTP on page 60](#)
- [Example: Configuring Faster Convergence and Improving Network Stability with RSTP](#)
- [Example: Configuring Faster Convergence and Improved Network Stability with RSTP on page 40](#)
- [Configuring RSTP on EX Series Switches \(CLI Procedure\) on page 59](#)

---

## Example: Configuring Faster Convergence and Improved Network Stability on Switches with RSTP

---



**NOTE:** This example uses Junos OS for EX Series switches with support for the Enhanced Layer 2 Software (ELS) configuration style. If your switch runs software that does not support ELS, see *Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches*. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

---



EX Series switches use Rapid Spanning Tree Protocol (RSTP) by default to provide a loop-free topology.

When switches that support redundant Routing Engines use RSTP, it is important to keep RSTP synchronized on both Routing Engines so that no loss of service occurs after a Routing Engine switchover. Nonstop bridging protocol keeps Routing Engines synchronized.

This example describes how to configure RSTP and NSB on four EX Series switches:

- [Requirements on page 41](#)
- [Overview and Topology on page 41](#)
- [Configuring RSTP and Nonstop Bridging on Switch 1 on page 43](#)
- [Configuring RSTP and Nonstop Bridging on Switch 2 on page 47](#)
- [Configuring RSTP and Nonstop Bridging on Switch 3 on page 50](#)
- [Configuring RSTP and Nonstop Bridging on Switch 4 on page 53](#)
- [Verification on page 56](#)

## Requirements

This example uses the following software and hardware components:

- Junos OS Release 15.1 or later or later for EX Series switches
- Four EX Series switches

Before you configure the switches for RSTP, be sure you have:

- Installed and connected the four switches. See the hardware documentation for your switch.
- Performed the initial software configuration on all switches. See *Connecting and Configuring an EX Series Switch (CLI Procedure)* or *Connecting and Configuring an EX Series Switch (J-Web Procedure)*.

## Overview and Topology

RSTP works by identifying certain links as point to point links and blocking other possible paths. When one of the point-to-point links fails, a designated alternate link transitions to the forwarding state and take over. Configuring nonstop bridging (NSB) on a switch with redundant Routing Engines keeps RSTP synchronized on both Routing Engines. This way, RSTP remains active immediately after a switchover because it is already synchronized to the backup Routing Engine. RSTP does not have to reconverge after a Routing Engine switchover when NSB is enabled because the neighbor devices do not detect an RSTP change on the switch. In this example, four EX Series switches are connected in the topology displayed in [Figure 1 on page 42](#) to create a loop-free topology with NSB applied to switches with dual Routing Engines.

Figure 1: Network Topology for RSTP

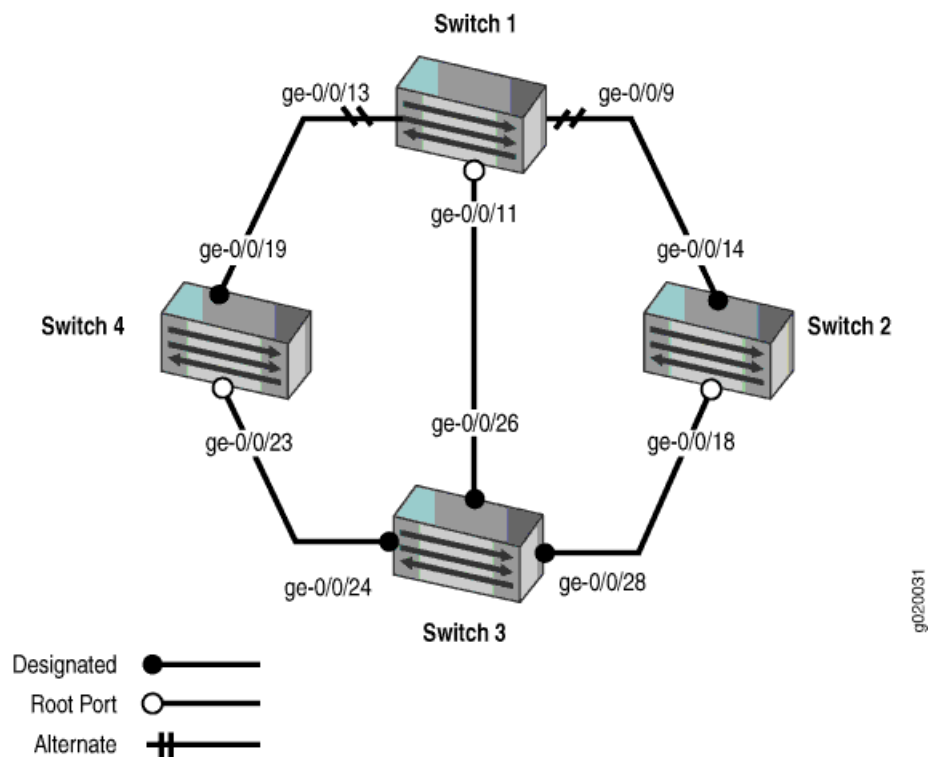


Table 3 on page 42 shows the components of the topology for this example.



**NOTE:** You can configure RSTP only on physical interfaces, not on logical interfaces.

Table 3: Components of the Topology for Configuring RSTP

Property	Settings
Switch 1	<p>The following interfaces on Switch 1 are connected in this way:</p> <ul style="list-style-type: none"> <li>• <b>ge-0/0/9</b> is connected to Switch 2</li> <li>• <b>ge-0/0/13</b> is connected to Switch 4</li> <li>• <b>ge-0/0/11</b> is connected to Switch 3</li> </ul>
Switch 2	<p>The following interfaces on Switch 2 are connected in this way:</p> <ul style="list-style-type: none"> <li>• <b>ge-0/0/14</b> is connected to Switch 1</li> <li>• <b>ge-0/0/18</b> is connected to Switch 3</li> </ul>
Switch 3	<p>The following interfaces on Switch 3 are connected in this way:</p> <ul style="list-style-type: none"> <li>• <b>ge-0/0/26</b> is connected to Switch 1</li> <li>• <b>ge-0/0/28</b> is connected to Switch 2</li> <li>• <b>ge-0/0/24</b> is connected to Switch 4</li> </ul>

Table 3: Components of the Topology for Configuring RSTP (continued)

Property	Settings
Switch 4	<p>The following interfaces on Switch 4 are connected in this way:</p> <ul style="list-style-type: none"> <li>• <code>ge-0/0/19</code> is connected to Switch 1</li> <li>• <code>ge-0/0/23</code> is connected to Switch 3</li> </ul>
VLAN names and tag IDs	<p>voice-vlan, tag 10  employee-vlan, tag 20  guest-vlan, tag 30  camera-vlan, tag 40</p>

This configuration example creates a loop-free topology between four EX Series switches using RSTP.

An RSTP topology contains ports that have specific roles:

- The *root port* is responsible for forwarding data to the root bridge.
- The *alternate port* is a standby port for the root port. When a root port goes down, the alternate port becomes the active root port.
- The *designated port* forwards data to the downstream network segment or device.
- The *backup port* is a backup port for the designated port. When a designated port goes down, the backup port becomes the active designated port and starts forwarding data.



**NOTE:** You also can create a loop-free topology between the aggregation layer and the distribution layer using redundant trunk links. For more information about configuring redundant trunk links, see *Example: Configuring Redundant Trunk Links for Faster Recovery on Devices with ELS Support*.

## Configuring RSTP and Nonstop Bridging on Switch 1

**CLI Quick Configuration** To quickly configure RSTP and nonstop bridging on Switch 1, copy the following commands and paste them into the switch terminal window:

```
[edit]
set vlans voice-vlan description "Voice VLAN"
set vlans voice-vlan vlan-id 10
set vlans employee-vlan description "Employee VLAN"
set vlans employee-vlan vlan-id 20
set vlans guest-vlan description "Guest VLAN"
set vlans guest-vlan vlan-id 30
set vlans camera-vlan description "Camera VLAN"
set vlans camera-vlan vlan-id 40
set interfaces ge-0/0/13 unit 0 family ethernet-switching vlan members [10 20 30 40]
set interfaces ge-0/0/9 unit 0 family ethernet-switching vlan members [10 20 30 40]
set interfaces ge-0/0/11 unit 0 family ethernet-switching vlan members [10 20 30 40]
set interfaces ge-0/0/13 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-0/0/9 unit 0 family ethernet-switching interface-mode trunk
```

```

set interfaces ge-0/0/11 unit 0 family ethernet-switching interface-mode trunk
set protocols rstp bridge-priority 16k
set protocols rstp interface all cost 1000
set protocols rstp interface all mode point-to-point

```

If Switch 1 includes dual Routing Engines, configure NSB. To quickly configure nonstop bridging on Switch 1, copy the following commands and paste them into the switch terminal window:

```

set chassis redundancy graceful switchover
set system commit synchronize
set protocols layer2-control nonstop-bridging

```



**NOTE:** NFX150 devices support only a single Routing Engine.

#### Step-by-Step Procedure

To configure RSTP and nonstop bridging on Switch 1:

1. Configure the VLANs **voice-vlan**, **employee-vlan**, **guest-vlan**, and **camera-vlan**:

```

[edit vlans]
user@switch1# set voice-vlan description "Voice VLAN"
user@switch1# set voice-vlan vlan-id 10
user@switch1# set employee-vlan description "Employee VLAN"
user@switch1# set employee-vlan vlan-id 20
user@switch1# set guest-vlan description "Guest VLAN"
user@switch1# set guest-vlan vlan-id 30
user@switch1# set camera-vlan description "Camera VLAN"
user@switch1# set camera-vlan vlan-id 40

```

2. Configure the VLANs on the interfaces, including support for the Ethernet switching protocol:

```

[edit interfaces]
user@switch1# set ge-0/0/13 unit 0 family ethernet-switching vlan members [10 20 30 40]
user@switch1# set ge-0/0/9 unit 0 family ethernet-switching vlan members [10 20 30 40]
user@switch1# set ge-0/0/11 unit 0 family ethernet-switching vlan members [10 20 30 40]

```

3. Configure the port mode for the interfaces:

```

[edit interfaces]
user@switch1# set ge-0/0/13 unit 0 family ethernet-switching interface-mode trunk
user@switch1# set ge-0/0/9 unit 0 family ethernet-switching interface-mode trunk
user@switch1# set ge-0/0/11 unit 0 family ethernet-switching interface-mode trunk

```

4. Configure RSTP on the switch:

```

[edit protocols]
user@switch1# rstp bridge-priority 16k
user@switch1# rstp interface all cost 1000
user@switch1# rstp interface all mode point-to-point

```

**Step-by-Step Procedure** If Switch 1 includes dual Routing Engines, configure nonstop bridging. To configure NSB on Switch 1:

1. Enable graceful Routing Engine switchover (GRES):

```
[edit chassis redundancy]
user@switch1# set graceful-switchover
```

2. Configure the switch to always synchronize configuration changes between the Routing Engines:

```
[edit system]
user@switch1# set commit synchronize
```

If you try to commit a configuration in which nonstop bridging is configured but synchronization of configuration changes is not configured, the configuration is not committed.

3. Enable nonstop bridging:

```
[edit protocols layer2-control]
user@switch1# set nonstop-bridging
```



**NOTE:** This process enables NSB for all NSB-supported Layer 2 protocols on the switch, including RSTP.

**Results** Check the results of the configuration:

```
user@switch1> show configuration
interfaces {
  ge-0/0/13 {
    unit 0 {
      family ethernet-switching {
        interface-mode trunk;
        vlan {
          members [10 20 30 40];
        }
      }
    }
  }
  ge-0/0/9 {
    unit 0 {
      family ethernet-switching {
        interface-mode trunk;
        vlan {
          members [10 20 30 40];
        }
      }
    }
  }
}
```

```
}
ge-0/0/11 {
  unit 0 {
    family ethernet-switching {
      interface-mode trunk;
      vlan {
        members [10 20 30 40];
      }
    }
  }
}
protocols {
  layer2-control {
    nonstop-bridging;
  }
  rstp {
    bridge-priority 16k;
    interface ge-0/0/13 {
      cost 1000;
      mode point-to-point;
    }
    interface ge-0/0/9 {
      cost 1000;
      mode point-to-point;
    }
    interface ge-0/0/11 {
      cost 1000;
      mode point-to-point;
    }
  }
}
vlands {
  voice-vlan {
    vlan-id 10;
  }
  employee-vlan {
    vlan-id 20;
  }
  guest-vlan {
    vlan-id 30;
  }
  camera-vlan {
    vlan-id 40;
  }
}
system {
  commit synchronize;
}
chassis {
  redundancy {
    graceful-switchover;
  }
}
```

## Configuring RSTP and Nonstop Bridging on Switch 2

**CLI Quick Configuration** To quickly configure RSTP and nonstop bridging on Switch 2, copy the following commands and paste them into the switch terminal window:

```
[edit]
set vlans voice-vlan description "Voice VLAN"
set vlans voice-vlan vlan-id 10
set vlans employee-vlan description "Employee VLAN"
set vlans employee-vlan vlan-id 20
set vlans guest-vlan description "Guest VLAN"
set vlans guest-vlan vlan-id 30
set vlans camera-vlan description "Camera VLAN"
set vlans camera-vlan vlan-id 40
set interfaces ge-0/0/14 unit 0 family ethernet-switching vlan members [10 20 30 40]
set interfaces ge-0/0/18 unit 0 family ethernet-switching vlan members [10 20 30 40]
set interfaces ge-0/0/14 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-0/0/18 unit 0 family ethernet-switching interface-mode trunk
set protocols rstp bridge-priority 32k
set protocols rstp interface ge-0/0/14 cost 1000
set protocols rstp interface ge-0/0/14 mode point-to-point
set protocols rstp interface ge-0/0/18 cost 1000
set protocols rstp interface ge-0/0/18 mode point-to-point
```



**NOTE:** Starting with Junos OS Release 15.1 for EX Series and QFX Series switches with support for the Enhanced Layer 2 Software (ELS) configuration style, you can configure spanning tree parameters globally on all spanning tree interfaces. See [“Configuring RSTP on EX Series Switches \(CLI Procedure\)” on page 59](#) for additional information.

If Switch 2 includes dual Routing Engines, configure NSB. To quickly configure nonstop bridging on Switch 2, copy the following commands and paste them into the switch terminal window:

```
set chassis redundancy graceful switchover
set system commit synchronize
set protocols layer2-control nonstop-bridging
```

**Step-by-Step Procedure** To configure RSTP and nonstop bridging on Switch 2:

1. Configure the VLANs **voice-vlan**, **employee-vlan**, **guest-vlan**, and **camera-vlan**:

```
[edit vlans]
user@switch2# set voice-vlan description "Voice VLAN"
user@switch2# set voice-vlan vlan-id 10
user@switch2# set employee-vlan description "Employee VLAN"
user@switch2# set employee-vlan vlan-id 20
user@switch2# set guest-vlan description "Guest VLAN"
user@switch2# set guest-vlan vlan-id 30
user@switch2# set camera-vlan description "Camera VLAN"
user@switch2# set camera-vlan vlan-id 40
```

2. Configure the VLANs on the interfaces, including support for the Ethernet switching protocol:

```
[edit interfaces]
user@switch2# set ge-0/0/14 unit 0 family ethernet-switching vlan members [10 20 30 40]
user@switch2# set ge-0/0/18 unit 0 family ethernet-switching vlan members [10 20 30 40]
```

3. Configure the port mode for the interfaces:

```
[edit interfaces]
user@switch2# set ge-0/0/14 unit 0 family ethernet-switching interface-mode trunk
user@switch2# set ge-0/0/18 unit 0 family ethernet-switching interface-mode trunk
```

4. Configure RSTP on the switch:

```
[edit protocols]
user@switch2# rstp bridge-priority 32k
user@switch2# rstp interface ge-0/0/14 cost 1000
user@switch2# rstp interface ge-0/0/14 mode point-to-point
user@switch2# rstp interface ge-0/0/18 cost 1000
user@switch2# rstp interface ge-0/0/18 mode point-to-point
```

**Step-by-Step Procedure** If Switch 2 includes dual Routing Engines, configure nonstop bridging. To configure NSB on Switch 2:

1. Enable graceful Routing Engine switchover (GRES):

```
[edit chassis redundancy]
user@switch2# set graceful-switchover
```

2. Configure the switch to always synchronize configuration changes between the Routing Engines:

```
[edit system]
user@switch2# set commit synchronize
```

If you try to commit a configuration in which nonstop bridging is configured but synchronization of configuration changes is not configured, the configuration is not committed.

3. Enable nonstop bridging:

```
[edit protocols layer2-control]
user@switch2# set nonstop-bridging
```



**NOTE:** This process enables NSB for all NSB-supported Layer 2 protocols on the switch, including RSTP.

---



**Results** Check the results of the configuration:

```
user@switch2> show configuration
interfaces {
  ge-0/0/14 {
    unit 0 {
      family ethernet-switching {
        interface-mode trunk;
        vlan {
          members [10 20 30 40];
        }
      }
    }
  }
  ge-0/0/18 {
    unit 0 {
      family ethernet-switching {
        interface-mode trunk;
        vlan {
          members [10 20 30 40];
        }
      }
    }
  }
}
protocols {
  layer2-control {
    nonstop-bridging;
  }
  rstp {
    bridge-priority 32k;
    interface ge-0/0/14 {
      cost 1000;
      mode point-to-point;
    }
    interface ge-0/0/18 {
      cost 1000;
      mode point-to-point;
    }
  }
}
vlands {
  voice-vlan {
    vlan-id 10;
  }
  employee-vlan {
    vlan-id 20;
  }
  guest-vlan {
    vlan-id 30;
  }
  camera-vlan {
    vlan-id 40;
  }
}
```

```
system {
    commit synchronize;
}
chassis {
    redundancy {
        graceful-switchover;
    }
}
```

## Configuring RSTP and Nonstop Bridging on Switch 3

**CLI Quick Configuration** To quickly configure RSTP and nonstop bridging on Switch 3, copy the following commands and paste them into the switch terminal window:

```
[edit]
set vlans voice-vlan description "Voice VLAN"
set vlans voice-vlan vlan-id 10
set vlans employee-vlan description "Employee VLAN"
set vlans employee-vlan vlan-id 20
set vlans guest-vlan description "Guest VLAN"
set vlans guest-vlan vlan-id 30
set vlans camera-vlan description "Camera VLAN"
set vlans camera-vlan vlan-id 40
set interfaces ge-0/0/26 unit 0 family ethernet-switching vlan members [10 20 30 40]
set interfaces ge-0/0/28 unit 0 family ethernet-switching vlan members [10 20 30 40]
set interfaces ge-0/0/24 unit 0 family ethernet-switching vlan members [10 20 30 40]
set interfaces ge-0/0/26 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-0/0/28 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-0/0/24 unit 0 family ethernet-switching interface-mode trunk
set protocols rstp bridge-priority 8k
set protocols rstp interface ge-0/0/26 cost 1000
set protocols rstp interface ge-0/0/26 mode point-to-point
set protocols rstp interface ge-0/0/28 cost 1000
set protocols rstp interface ge-0/0/28 mode point-to-point
set protocols rstp interface ge-0/0/24 cost 1000
set protocols rstp interface ge-0/0/24 mode point-to-point
```

If Switch 3 includes dual Routing Engines, configure NSB. To quickly configure nonstop bridging on Switch 3, copy the following commands and paste them into the switch terminal window:

```
set chassis redundancy graceful switchover
set system commit synchronize
set protocols layer2-control nonstop-bridging
```

**Step-by-Step Procedure** To configure RSTP and nonstop bridging on Switch 3:

1. Configure the VLANs `voice-vlan`, `employee-vlan`, `guest-vlan`, and `camera-vlan`:

```
[edit vlans]
user@switch3# set voice-vlan description "Voice VLAN"
user@switch3# set voice-vlan vlan-id 10
user@switch3# set employee-vlan description "Employee VLAN"
user@switch3# set employee-vlan vlan-id 20
user@switch3# set guest-vlan description "Guest VLAN"
user@switch3# set guest-vlan vlan-id 30
user@switch3# set camera-vlan description "Camera VLAN"
user@switch3# set camera-vlan vlan-id 40
```

2. Configure the VLANs on the interfaces, including support for the Ethernet switching protocol:

```
[edit interfaces]
user@switch3# set ge-0/0/26 unit 0 family ethernet-switching vlan members [10 20 30 40]
user@switch3# set ge-0/0/28 unit 0 family ethernet-switching vlan members [10 20 30 40]
user@switch3# set ge-0/0/24 unit 0 family ethernet-switching vlan members [10 20 30 40]
```

3. Configure the port mode for the interfaces:

```
[edit interfaces]
user@switch3# set ge-0/0/26 unit 0 family ethernet-switching interface-mode trunk
user@switch3# set ge-0/0/28 unit 0 family ethernet-switching interface-mode trunk
user@switch3# set ge-0/0/24 unit 0 family ethernet-switching interface-mode trunk
```

4. Configure RSTP on the switch:

```
[edit protocols]
user@switch3# rstp bridge-priority 8k
user@switch3# rstp interface ge-0/0/26 cost 1000
user@switch3# rstp interface ge-0/0/26 mode point-to-point
user@switch3# rstp interface ge-0/0/28 cost 1000
user@switch3# rstp interface ge-0/0/28 mode point-to-point
user@switch3# rstp interface ge-0/0/24 cost 1000
user@switch3# rstp interface ge-0/0/24 mode point-to-point
```

**Step-by-Step Procedure** If Switch 3 includes dual Routing Engines, configure nonstop bridging. To configure NSB on Switch 3:

1. Enable graceful Routing Engine switchover (GRES):

```
[edit chassis redundancy]
user@switch3# set graceful-switchover
```

2. Configure the switch to always synchronize configuration changes between the Routing Engines:

```
[edit system]
```

```
user@switch3# set commit synchronize
```

If you try to commit a configuration in which nonstop bridging is configured but synchronization of configuration changes is not configured, the configuration is not committed.

3. Enable nonstop bridging:

```
[edit protocols layer2-control]  
user@switch3# set nonstop-bridging
```



**NOTE:** This process enables NSB for all NSB-supported Layer 2 protocols on the switch, including RSTP.

**Results** Check the results of the configuration:

```
user@switch3> show configuration  
interfaces {  
  ge-0/0/26 {  
    unit 0 {  
      family ethernet-switching {  
        interface-mode trunk;  
        vlan {  
          members [10 20 30 40];  
        }  
      }  
    }  
  }  
  ge-0/0/28 {  
    unit 0 {  
      family ethernet-switching {  
        interface-mode trunk;  
        vlan {  
          members [10 20 30 40];  
        }  
      }  
    }  
  }  
  ge-0/0/24 {  
    unit 0 {  
      family ethernet-switching {  
        interface-mode trunk;  
        vlan {  
          members [10 20 30 40];  
        }  
      }  
    }  
  }  
}
```

```

protocols {
  layer2-control {
    nonstop-bridging;
  }
  rstp {
    bridge-priority 8k;
    interface ge-0/0/26 {
      cost 1000;
      mode point-to-point;
    }
    interface ge-0/0/28 {
      cost 1000;
      mode point-to-point;
    }
    interface ge-0/0/24 {
      cost 1000;
      mode point-to-point;
    }
  }
  bridge-priority 8k;
}
}
vpls {
  voice-vlan {
    vlan-id 10;
  }
  employee-vlan {
    vlan-id 20;
  }
  guest-vlan {
    vlan-id 30;
  }
  camera-vlan {
    vlan-id 40;
  }
}
system {
  commit synchronize;
}
chassis {
  redundancy {
    graceful-switchover;
  }
}

```

## Configuring RSTP and Nonstop Bridging on Switch 4

**CLI Quick Configuration** To quickly configure RSTP and nonstop bridging on Switch 4, copy the following commands and paste them into the switch terminal window:

```

[edit]
set vpls voice-vlan description "Voice VLAN"
set vpls voice-vlan vlan-id 10
set vpls employee-vlan description "Employee VLAN"

```

```
set vlans employee-vlan vlan-id 20
set vlans guest-vlan description "Guest VLAN"
set vlans guest-vlan vlan-id 30
set vlans camera-vlan description "Camera VLAN"
set vlans camera-vlan vlan-id 40
set interfaces ge-0/0/23 unit 0 family ethernet-switching vlan members [10 20 30 40]
set interfaces ge-0/0/19 unit 0 family ethernet-switching vlan members [10 20 30 40]
set interfaces ge-0/0/23 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-0/0/19 unit 0 family ethernet-switching interface-mode trunk
set protocols rstp bridge-priority 16k
set protocols rstp interface ge-0/0/23 cost 1000
set protocols rstp interface ge-0/0/23 mode point-to-point
set protocols rstp interface ge-0/0/19 cost 1000
set protocols rstp interface ge-0/0/19 mode point-to-point
```

If Switch 4 includes dual Routing Engines, configure NSB. To quickly configure nonstop bridging on Switch 4, copy the following commands and paste them into the switch terminal window:

```
set chassis redundancy graceful switchover
set system commit synchronize
set protocols layer2-control nonstop-bridging
```

#### Step-by-Step Procedure

To configure RSTP and nonstop bridging on Switch 4:

1. Configure the VLANs **voice-vlan**, **employee-vlan**, **guest-vlan**, and **camera-vlan**:

```
[edit vlans]
user@switch4# set voice-vlan description "Voice VLAN"
user@switch4# set voice-vlan vlan-id 10
user@switch4# set employee-vlan description "Employee VLAN"
user@switch4# set employee-vlan vlan-id 20
user@switch4# set guest-vlan description "Guest VLAN"
user@switch4# set guest-vlan vlan-id 30
user@switch4# set camera-vlan description "Camera VLAN"
user@switch4# set camera-vlan vlan-id 40
```

2. Configure the VLANs on the interfaces, including support for the Ethernet switching protocol:

```
[edit interfaces]
user@switch4# set ge-0/0/23 unit 0 family ethernet-switching vlan members [10 20 30 40]
user@switch4# set ge-0/0/19 unit 0 family ethernet-switching vlan members [10 20 30 40]
```

3. Configure the port mode for the interfaces:

```
[edit interfaces]
user@switch4# set ge-0/0/23 unit 0 family ethernet-switching interface-mode trunk
user@switch4# set ge-0/0/19 unit 0 family ethernet-switching interface-mode trunk
```

4. Configure RSTP on the switch:

```
[edit protocols]
user@switch4# rstp bridge-priority 16k
```

```

user@switch4# rstp interface ge-0/0/23 cost 1000
user@switch4# rstp interface ge-0/0/23 mode point-to-point
user@switch4# rstp interface ge-0/0/19 cost 1000
user@switch4# rstp interface ge-0/0/19 mode point-to-point

```

**Step-by-Step Procedure** If Switch 4 includes dual Routing Engines, configure nonstop bridging. To configure NSB on Switch 4:

1. Enable graceful Routing Engine switchover (GRES):

```

[edit chassis redundancy]
user@switch4# set graceful-switchover

```

2. Configure the switch to always synchronize configuration changes between the Routing Engines:

```

[edit system]
user@switch4# set commit synchronize

```

If you try to commit a configuration in which nonstop bridging is configured but synchronization of configuration changes is not configured, the configuration is not committed.

3. Enable nonstop bridging:

```

[edit protocols layer2-control]
user@switch4# set nonstop-bridging

```



**NOTE:** This process enables NSB for all NSB-supported Layer 2 protocols on the switch, including RSTP.

**Results** Check the results of the configuration:

```

user@switch4> show configuration
interfaces {
  ge-0/0/23 {
    unit 0 {
      family ethernet-switching {
        interface-mode trunk;
        vlan {
          members [10 20 30 40];
        }
      }
    }
  }
  ge-0/0/19 {
    unit 0 {
      family ethernet-switching {

```

```
        interface-mode trunk;
        vlan {
            members [10 20 30 40];
        }
    }
}
protocols {
    layer2-control {
        nonstop-bridging;
    }
    rstp {
        bridge-priority 16k;
        interface ge-0/0/23 {
            cost 1000;
            mode point-to-point;
        }
        interface ge-0/0/19 {
            cost 1000;
            mode point-to-point;
        }
    }
}
vpls {
    voice-vlan {
        vlan-id 10;
    }
    employee-vlan {
        vlan-id 20;
    }
    guest-vlan {
        vlan-id 30;
    }
    camera-vlan {
        vlan-id 40;
    }
}
system {
    commit synchronize;
}
chassis {
    redundancy {
        graceful-switchover;
    }
}
```

## Verification

To confirm that the configuration is working properly, perform these tasks on both Routing Engines:

- [Verifying RSTP Configuration on Switch 1 on page 57](#)
- [Verifying RSTP Configuration on Switch 2 on page 57](#)



- [Verifying RSTP Configuration on Switch 3 on page 57](#)
- [Verifying RSTP Configuration on Switch 4 on page 58](#)

### Verifying RSTP Configuration on Switch 1

**Purpose** Verify the RSTP configuration on Switch 1.

**Action** Use the operational mode command:

```
user@switch1> show spanning-tree interface
```

Spanning tree interface parameters for instance 0

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ge-0/0/13	128:526	128:526	16384.0019e25040e0	1000	BLK	ALT
ge-0/0/9	128:522	128:522	32768.0019e2503d20	1000	BLK	ALT
ge-0/0/11	128:524	128:524	8192.0019e25051e0	1000	FWD	ROOT

**Meaning** Refer to the topology in [Figure 1 on page 42](#). The operational mode command **show spanning-tree interface** shows that **ge-0/0/13** is in a forwarding state. The other interfaces on Switch 1 are blocking.

### Verifying RSTP Configuration on Switch 2

**Purpose** Use this procedure to verify the RSTP configuration on both Switch 2 Routing Engines.

**Action** Use the operational mode command:

```
user@switch2> show spanning-tree interface
```

Spanning tree interface parameters for instance 0

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ge-0/0/14	128:527	128:527	32768.0019e2503d20	1000	FWD	DESG
ge-0/0/18	128:529	128:529	8192.0019e25051e0	1000	FWD	ROOT

**Meaning** Refer to the topology in [Figure 1 on page 42](#). The operational mode command **show spanning-tree interface** shows that **ge-0/0/18** is in a forwarding state and is the root port.

### Verifying RSTP Configuration on Switch 3

**Purpose** Use this procedure to verify the RSTP configuration on both Switch 3 Routing Engines.

**Action** Use the operational mode commands:

```
user@switch3> show spanning-tree interface
```

Spanning tree interface parameters for instance 0

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ge-0/0/26	128:539	128:539	8192.0019e25051e0	1000	FWD	DESG
ge-0/0/28	128:541	128:541	8192.0019e25051e0	1000	FWD	DESG
ge-0/0/24	128:537	128:537	8192.0019e25051e0	1000	FWD	DESG

**Meaning** Refer to the topology in [Figure 1 on page 42](#). The operational mode command **show spanning-tree interface** shows that no interface is the root interface.

### Verifying RSTP Configuration on Switch 4

**Purpose** Use this procedure to verify the RSTP configuration on both Switch 4 Routing Engines.

**Action** Use the operational mode commands:

```
user@switch4> show spanning-tree interface
```

Spanning tree interface parameters for instance 0

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ge-0/0/23	128:536	128:536	8192.0019e25051e0	1000	FWD	ROOT
ge-0/0/19	128:532	128:532	16384.0019e25040e0	1000	FWD	DESG

**Meaning** Refer to the topology in [Figure 1 on page 42](#). The operational mode command **show spanning-tree interface** shows that interface **ge-0/0/23** is the root interface and forwarding.

### Release History Table

Release	Description
15.1	Starting with Junos OS Release 15.1 for EX Series and QFX Series switches with support for the Enhanced Layer 2 Software (ELS) configuration style, you can configure spanning tree parameters globally on all spanning tree interfaces.

### Related Documentation

- [Configuring RSTP on EX Series Switches \(CLI Procedure\) on page 59](#)
- [Understanding RSTP for EX Series and QFX Series Switches](#)

## Configuring RSTP on EX Series Switches (CLI Procedure)

The default spanning-tree protocol for EX Series switches is Rapid Spanning Tree Protocol (RSTP). RSTP provides faster convergence times than the original Spanning Tree Protocol (STP). Because RSTP is configured by default, you only need to use this procedure if another spanning-tree protocol has been configured. In that case, you can reconfigure RSTP.

To enable RSTP:

1. Disable the other configured spanning-tree protocol (MSTP):

- To disable MSTP:

```
[edit protocols]
user@switch# set mstp disable
```

2. Configure RSTP

- To enable RSTP on a specific interface:

```
[edit protocols]
user@switch# set rstp interface interface-name
```

- To disable RSTP on a specific interface:

```
[edit protocols]
user@switch# set rstp interface interface-name disable
```

- To enable RSTP on a range of interfaces:

```
[edit protocols]
user@switch# set rstp interface interface-range-name
```

- To enable RSTP on all interfaces:

```
[edit protocols]
user@switch# set rstp interface all
```

### Related Documentation

- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)
- *Understanding RSTP for EX Series and QFX Series Switches*

## Understanding VSTP

---

VLAN Spanning Tree Protocol (VSTP) enables Juniper Networks switches to run one or more Spanning Tree Protocol (STP) or Rapid Spanning Tree Protocol (RSTP) instances for each VLAN on which VSTP is enabled. For networks with multiple VLANs, VSTP improves intelligent tree spanning by defining best paths within the VLANs instead of within the entire network.

You can configure VSTP for a maximum of 509 VLANs.

VSTP and RSTP can be configured at the same time. If you configure VSTP and RSTP at the same time and the switch has more than 253 VLANs, VSTP is configured only for the first 253 VLANs. For the remaining VLANs, only RSTP is configured. RSTP and VSTP are the only spanning-tree protocols that can be configured at the same time on a switch.



**NOTE:** We recommend that you enable VSTP on all VLANs that could receive VSTP bridge protocol data units (BPDUs).



**NOTE:** Using the same VLAN for RSTP and VSTP is not supported. For example, if you are configuring a VLAN under VSTP, configuring RSTP with an interface that contains the same VLAN is not supported.

### Related Documentation

- [Example: Configuring VSTP on QFX Series Switches and EX4600 Switches](#)
- [Overview of Spanning-Tree Protocols on page 38](#)
- [Understanding RSTP on page 39](#)
- [Configuring VSTP \(CLI Procedure\) on page 61](#)
- [Configuring VLAN SpanningTree Protocol](#)

## Configuring VSTP (CLI Procedure)



**NOTE:** This topic applies to Junos OS for EX Series and QFX switches with support for the Enhanced Layer 2 Software (ELS) configuration style. If your switch runs software that does not support ELS, see *Configuring VSTP (CLI Procedure)*. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

The default spanning-tree protocol for EX Series switches is Rapid Spanning Tree Protocol (RSTP). VLAN Spanning Tree Protocol (VSTP) is an alternate protocol that allows EX Series switches to run one or more Spanning Tree Protocol (STP) or RSTP instances for each VLAN on which VSTP is enabled. For networks with multiple VLANs, VSTP improves intelligent tree spanning by defining best paths within the VLANs instead of within the entire network.



**NOTE:** On EX Series (other than EX9200) and QFX switches running Junos OS that supports ELS—VSTP can support up to 510 VLANs. However, on EX9200 switches, VSTP can support only up to 253 VLANs.

You can configure VSTP at the global level:

- For all interfaces on the switch
- For all interfaces within all VLANs
- For all interfaces within a specified VLAN
- For all interfaces within a specified VLAN group

You can configure or disable VSTP for a specific interface:

- For a specific interface on the switch
- For a specific interface within all VLANs
- For a specific interface within a specified VLAN
- For a specific interface within a specified VLAN group



**NOTE:**

- If you configure VSTP on an interface at both the global and the specific VLAN level, the interface configuration that is defined at the specific VLAN level overrides the interface configuration that is defined at the global level.
- If you specify VSTP to be configured on an interface that is not configured to belong to the VLAN (or VLANs), an error message is displayed.

To configure VSTP:

- For all interfaces within any of the following scopes:

- For all interfaces on the switch:

```
[edit protocols vstp]
user@switch# set interface all
```

- For all interfaces within all VLANs:

```
[edit protocols vstp]
user@switch# set vlan all interface all
```

- For all interfaces within a specified VLAN:

```
[edit protocols vstp]
user@switch# set vlan (vlan-id |vlan-range |open-set-of-values) interface all interface
all
```

- For all interfaces within a specified VLAN group:

```
[edit protocols vstp]
user@switch# set vlan-group vlan-group-name vlan (vlan-id |vlan-range |open-set-of-values)
interface all
```

- On a specific interface within any of the following scopes:

- For a specific interface on the switch:

```
[edit protocols vstp]
user@switch# set interface interface-name
```

- For a specific interface within all VLANs:

```
[edit protocols vstp]
user@switch# set vlan all interface interface-name
```



**CAUTION:** Ensure that the interface is a member of all VLANs before you add the interface to the VSTP configuration. If the interface is not a member of all VLANs, this VSTP configuration will fail when you try to commit it.

---

- For a specific interface within a specified VLAN:

```
[edit protocols vstp]
user@switch# set vlan vlan-id-or-vlan-range interface interface-name
```

- For a specific interface within a specified VLAN group:

```
[edit protocols vstp]
user@switch# set vlan-group vlan-group-name vlan (vlan-id |vlan-range |open-set-of-values)
interface interface-name
```

- Related Documentation**
- [show spanning-tree bridge on page 255](#)
  - [show spanning-tree interface on page 260](#)
  - *Understanding VSTP for EX Series Switches and QFX Series Switches*

## Example: Configuring BPDU Protection on Switch Edge Interfaces to Prevent STP Miscalculations

EX Series and QFX Series switches provide Layer 2 loop prevention through Rapid Spanning Tree protocol (RSTP) and Multiple Spanning Tree Protocol (MSTP). All spanning-tree protocols use a special type of frame called a bridge protocol data unit (BPDU) to communicate. Other devices—PC bridging applications, for example, also use BPDUs and generate their own BPDUs. These different BPDUs are not compatible. When BPDUs generated by spanning-tree protocols are transmitted to a device that uses another type of BPDU, they can cause problems on the device. Similarly, if switches within a spanning-tree topology receive BPDUs from other devices, network outages can occur because of STP miscalculations.

This example configures BPDU protection on an EX Series switch that uses RSTP. The upstream configuration is done on the edge interfaces, where outside BPDUs are often received from other devices:

- [Requirements on page 63](#)
- [Overview and Topology on page 63](#)
- [Configuration on page 65](#)
- [Verification on page 66](#)

### Requirements

This example uses the following software and hardware components:

- Two EX Series switches in an RSTP topology
- Junos OS Release 13.2X50-D10 or later or later for EX Series or QFX Series switches

Before you configure the interfaces on Switch 2 for BPDU protection, be sure you have:

- RSTP enabled on the switches.



**NOTE:** By default, RSTP is enabled on all EX Series switches.

### Overview and Topology

The switches, being in an RSTP topology, support a loop-free network through the exchange of BPDUs. Receipt of outside BPDUs in an RSTP or MSTP topology, however, can lead to network outages by triggering an STP misconfiguration. To prevent such outages, enable BPDU protection on spanning tree interfaces that could receive outside

BPDUs. If an outside BPDU is received on a BPDU-protected interface, the interface shuts down to prevent the outside BPDU from accessing the spanning tree interface.

Figure 2 on page 64 shows the topology for this example. In this example, Switch 1 and Switch 2 are configured for RSTP and create a loop-free topology. The interfaces on Switch 2 are edge access ports—edge access ports frequently receive outside BPDUs generated by PC applications.

This example configures interface **ge-0/0/5** and interface **ge-0/0/6** as edge ports on Switch 2, and then configures BPDU protection on those ports. With BPDU protection enabled, these interfaces shut down when they encounter an outside BPDU sent by the PCs connected to Switch 2.

Figure 2: BPDU Protection Topology

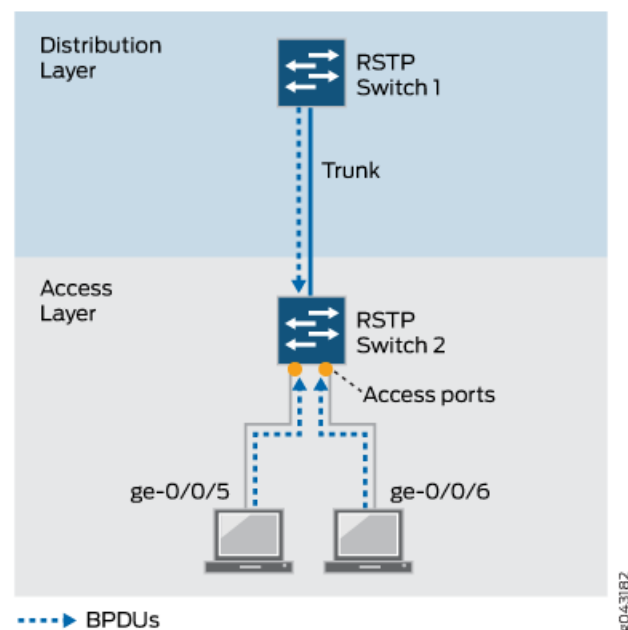


Table 4 on page 64 shows the components that will be configured for BPDU protection.

Table 4: Components of the Topology for Configuring BPDU Protection on EX Series Switches

Property	Settings
Switch 1 (Distribution Layer)	Switch 1 is connected to Switch 2 on a trunk interface.
Switch 2 (Access Layer)	Switch 2 has these access ports that require BPDU protection: <ul style="list-style-type: none"> <li>• <b>ge-0/0/5</b></li> <li>• <b>ge-0/0/6</b></li> </ul>

This configuration example uses RSTP topology. You also can configure BPDU protection for MSTP topologies at the `[edit protocols mstp]` hierarchy level.



## Configuration

To configure BPDU protection on two access interfaces:

**CLI Quick Configuration** Quickly configure RSTP on the two Switch 2 interfaces, and then configure BPDU protection on all edge ports on Switch 2 by copying the following commands and pasting them into the switch terminal window:



**NOTE:** This example configures BPDU protection on specific interfaces. Starting with Junos OS Release 15.1 for EX Series and QFX Series switches with support for the Enhanced Layer 2 Software (ELS) configuration style, you can also configure BPDU protection globally on all spanning tree interfaces. See [“Configuring BPDU Protection on Spanning Tree Interfaces” on page 68](#) for additional information.

```
[edit]
set protocols rstp interface ge-0/0/5 edge
set protocols rstp interface ge-0/0/6 edge
set protocols rstp bpd-block-on-edge
```

**Step-by-Step Procedure** To configure RSTP on the two Switch 2 interfaces, and then configure BPDU protection:

1. Configure RSTP on interface **ge-0/0/5** and interface **ge-0/0/6**, and configure them as edge ports:

```
[edit protocols rstp]
user@switch# set interface ge-0/0/5 edge
user@switch# set interface ge-0/0/6 edge
```

2. Configure BPDU protection on all edge ports on this switch:

```
[edit protocols rstp]
user@switch# set bpd-block-on-edge
```

**Results** Check the results of the configuration:

```
user@switch> show configuration protocols rstp
interface ge-0/0/5 {
  edge;
}
interface ge-0/0/6 {
  edge;
}
bpd-block-on-edge;
```

## Verification

To confirm that the configuration is working properly:

- [Displaying the Interface State Before BPDU Protection Is Triggered on page 66](#)
- [Verifying That BPDU Protection Is Working Correctly on page 66](#)

### [Displaying the Interface State Before BPDU Protection Is Triggered](#)

---

**Purpose** Before BPDUs can be received from PCs connected to interface **ge-0/0/5** and interface **ge-0/0/6**, confirm the interface state.

**Action** Use the operational mode command:

```
user@switch> show spanning-tree interface
```

```
Spanning tree interface parameters for instance 0
```

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ge-0/0/0	128:513	128:513	32768.0019e2503f00	20000	BLK	DIS
ge-0/0/1	128:514	128:514	32768.0019e2503f00	20000	BLK	DIS
ge-0/0/2	128:515	128:515	32768.0019e2503f00	20000	BLK	DIS
ge-0/0/3	128:516	128:516	32768.0019e2503f00	20000	FWD	DESG
ge-0/0/4	128:517	128:517	32768.0019e2503f00	20000	FWD	DESG
ge-0/0/5	128:518	128:518	32768.0019e2503f00	20000	FWD	DESG
ge-0/0/6	128:519	128:519	32768.0019e2503f00	20000	FWD	DESG

[output truncated]

**Meaning** The output from the operational mode command **show spanning-tree interface** shows that **ge-0/0/5** and interface **ge-0/0/6** are ports in a forwarding state.

### [Verifying That BPDU Protection Is Working Correctly](#)

---

**Purpose** In this example, the PCs connected to Switch 2 start sending BPDUs to interface **ge-0/0/5** and interface **ge-0/0/6**. Verify that BPDU protection is working on the interfaces.

**Action** Use the operational mode command:

```
user@switch> show spanning-tree interface
```

Spanning tree interface parameters for instance 0

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ge-0/0/0	128:513	128:513	32768.0019e2503f00	20000	BLK	DIS
ge-0/0/1	128:514	128:514	32768.0019e2503f00	20000	BLK	DIS
ge-0/0/2	128:515	128:515	32768.0019e2503f00	20000	BLK	DIS
ge-0/0/3	128:516	128:516	32768.0019e2503f00	20000	FWD	DESG
ge-0/0/4	128:517	128:517	32768.0019e2503f00	20000	FWD	DESG
ge-0/0/5	128:518	128:518	32768.0019e2503f00	20000	BLK	DIS
(Bpdu-Incon)						
ge-0/0/6	128:519	128:519	32768.0019e2503f00	20000	BLK	DIS
(Bpdu-Incon)						
ge-0/0/7	128:520	128:1	16384.00aabbcc0348	20000	FWD	ROOT
ge-0/0/8	128:521	128:521	32768.0019e2503f00	20000	FWD	DESG

[output truncated]

**Meaning** When BPDUs are sent from the PCs to interface **ge-0/0/5** and interface **ge-0/0/6** on Switch 2, the output from the operational mode command **show spanning-tree interface** shows that the interfaces have transitioned to a BPDU inconsistent state. The BPDU inconsistent state causes the interfaces to shut down.

Disabling the BPDU protection configuration on an interface does not automatically reenables the interface. However, if the **disable-timeout** statement has been included in the BPDU configuration, the interface does return to service after the timer expires. Otherwise, you must use the operational mode command **clear error bpdu** to unblock and reenables the interface.

If the PCs connected to Switch 2 send BPDUs to the interfaces again, BPDU protection is triggered once more and the interfaces transition back to the BPDU inconsistent state, causing them to shut down. In such cases, you need to find and repair the misconfiguration on the PCs that is sending BPDUs to Switch 2.

#### Release History Table

Release	Description
15.1	Starting with Junos OS Release 15.1 for EX Series and QFX Series switches with support for the Enhanced Layer 2 Software (ELS) configuration style, you can also configure BPDU protection globally on all spanning tree interfaces.

#### Related Documentation

- *Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches*
- *Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches*
- *Example: Configuring BPDU Protection on Interfaces to Prevent STP Miscalculations on EX Series Switches*

- *Example: Configuring Loop Protection to Prevent Interfaces from Transitioning from Blocking to Forwarding in a Spanning Tree on EX Series Switches*
- *Example: Configuring Root Protection to Enforce Root Bridge Placement in Spanning Trees on EX Series Switches*

## Configuring BPDU Protection on Switch Spanning Tree Interfaces



**NOTE:** This topic applies to Junos OS for EX Series and QFX switches with support for the Enhanced Layer 2 Software (ELS) configuration style. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

You can configure BPDU protection to ignore BPDU received on interfaces where none should be expected. If a BPDU is received on a blocked interface, the interface is disabled and stops forwarding frames. By default, all BPDUs are accepted and processed on all interfaces.

To configure BPDU protection for spanning-tree instance interfaces:

- On a specific spanning-tree interface:
  1. To enable BPDU protection on a specified spanning-tree interface:

```
[edit protocols layer2-control bpd-block ]
user@switch# set interface (aex | (ge-fpc/pic/port | xe-fpc/pic/port)
```

If a BPDU is received on the interface, the system will disable the interface and stop forwarding frames out the interface until the bridging process is restarted.

2. (Optional) Configure the amount of time the system waits before *automatically* unblocking this interface after it has received a BPDU.

```
[edit protocols layer2-control bpd-block interface interface-name]
user@switch# set disable-timeout seconds
```

The range of the *seconds* option value is from 10 through 3600 seconds (one hour). A *seconds* option value of 0 is allowed, but this results in the default behavior (the interface is blocked until the interface is cleared).

- To disable BPDU protection for a specific spanning-tree interface

```
[edit protocols layer2-control bpd-block interface interface-name]
user@switch# set disable-timeout seconds
```

### Related Documentation

- *Understanding BPDU Protection for Spanning-Tree Instance Interfaces*
- *BPDU Protection for Individual Spanning-Tree Instance Interfaces*
- *clear error bpd interface*

## Unblocking a Switch Interface That Receives BPDUs in Error (CLI Procedure)

EX Series and QFX Series switches use bridge protocol data unit (BPDU) protection on interfaces to prevent them from receiving BPDUs that could trigger a spanning-tree misconfiguration. If BPDUs are received on a BPDU-protected interface, the interface either shuts down or transitions to a blocking state and stops forwarding frames. In the latter scenario, after the misconfiguration that triggered the BPDUs being sent to an interface is fixed in the topology, the interface can be unblocked and returned to service.

To unblock an interface and return it to service using the CLI:

- Automatically unblock an interface by configuring a timer that expires:

```
[edit protocol layer 2]
user@switch# set protocols layer2-control bpdu-block disable-timeout 30
```

All interfaces on the switch will be reenabled (unblocked) after the timer expires. However, once an interface on the switch receives a new spanning-tree protocol BPDU, the interface returns to the blocked state.

- Manually unblock an interface using the operational mode command:

```
user@switch> clear error bpdu interface ge-0/0/6
```

This command will only reenable an interface but the BPDU configuration for the interface will continue to exist unless you remove the BPDU configuration explicitly.

### Related Documentation

- [Example: Configuring BPDU Protection on Edge Interfaces to Prevent STP Miscalculations on page 63](#)
- Example: Configuring BPDU Protection on Interfaces to Prevent STP Miscalculations on EX Series Switches*
- Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches*



## PART 4

# Configuration Statements and Operational Commands

- [VLAN Configuration Statements on page 73](#)
- [MAC Address Configuration Statements on page 113](#)
- [STP Configuration Statements on page 121](#)
- [Bridging and VLANs Monitoring Commands on page 185](#)
- [MAC Address Operational Commands on page 241](#)
- [Spanning Tree Monitoring Commands on page 251](#)





## CHAPTER 4

# VLAN Configuration Statements

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- [dhcp-relay on page 75](#)
- [filter \(VLANs\) on page 80](#)
- [forwarding-options on page 81](#)
- [interface \(VLANs\) on page 86](#)
- [interface-mac-limit on page 87](#)
- [interface-mode on page 89](#)
- [mac \(Static MAC-Based VLANs\) on page 90](#)
- [members on page 91](#)
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- [vlan-tagging on page 110](#)
- [vlan-tags on page 112](#)

## description (VLAN)

---

<b>Syntax</b>	<code>description <i>text-description</i>;</code>
<b>Hierarchy Level</b>	[edit vlans <i>vlan-name</i> ]
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Option <b>text-description</b> enhanced from supporting up to 128 characters to supporting up to 256 characters in Junos OS Release 10.2 for EX Series switches.</p>
<b>Description</b>	Provide a textual description for the VLAN. The text has no effect on the operation of the VLAN or switch.
<b>Options</b>	<b><i>text-description</i></b> —Text to describe the interface. It can contain letters, numbers, and hyphens (-) and can be up to 255 characters long. If the text includes spaces, enclose the entire text in quotation marks.
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p> <p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Understanding Bridging and VLANs on Switches on page 9</a></li><li>• <a href="#">Understanding Bridging and VLANs on Switches on page 9</a></li><li>• <i>Example: Setting Up Basic Bridging and a VLAN on the QFX Series</i></li><li>• <i>Example: Setting Up Basic Bridging and a VLAN for an EX Series Switch</i></li><li>• <i>Example: Setting Up Basic Bridging and a VLAN for an EX Series Switch</i></li><li>• <a href="#">show vlans on page 220</a></li></ul>

## dhcp-relay

```
Syntax  dhcp-relay {
    active-server-group server-group-name;
    authentication {
        password password-string;
        username-include {
            circuit-type;
            delimiter delimiter-character;
            domain-name domain-name-string;
            interface-name;
            logical-system-name;
            mac-address;
            option-60;
            option-82 <circuit-id> <remote-id>;
            routing-instance-name;
            user-prefix user-prefix-string;
        }
    }
    dhcpv6 {
        active-server-group server-group-name;
        authentication {
            password password-string;
            username-include {
                circuit-type;
                client-id;
                delimiter delimiter-character;
                domain-name domain-name-string;
                interface-name;
                logical-system-name;
                relay-agent-interface-id;
                relay-agent-remote-id;
                relay-agent-subscriber-id;
                routing-instance-name;
                user-prefix user-prefix-string;
            }
        }
        dynamic-profile profile-name {
            aggregate-clients (merge | replace);
            use-primary primary-profile-name;
        }
    }
}

group group-name {
    active-server-group server-group-name;
    authentication {
        ...
    }
    dynamic-profile profile-name {
        ...
    }
    interface interface-name {
        exclude;
        liveness-detection {
            failure-action (clear-binding | clear-binding-if-interface-up | log-only);
        }
    }
}
```

```
method {
  bfd {
    version (0 | 1 | automatic);
    minimum-interval milliseconds;
    minimum-receive-interval milliseconds;
    multiplier number;
    no-adaptation;
    transmit-interval {
      minimum-interval milliseconds;
      threshold milliseconds;
    }
    detection-time {
      threshold milliseconds;
    }
    session-mode(automatic | multihop | singlehop);
    holddown-interval milliseconds;
  }
}
overrides {
  ...
}
service-profile dynamic-profile-name;
trace;
upto upto-interface-name;
}
service-profile dynamic-profile-name;
}
overrides {
  ...
}
relay-agent-interface-id {
  ...
}
service-profile dynamic-profile-name;
liveness-detection {
  failure-action (clear-binding | clear-binding-if-interface-up | log-only);
  method {
    bfd {
      version (0 | 1 | automatic);
      minimum-interval milliseconds;
      minimum-receive-interval milliseconds;
      multiplier number;
      no-adaptation;
      transmit-interval {
        minimum-interval milliseconds;
        threshold milliseconds;
      }
      detection-time {
        threshold milliseconds;
      }
      session-mode(automatic | multihop | singlehop);
      holddown-interval milliseconds;
    }
  }
}
```

```

overrides {
    allow-snooped-clients;
    interface-client-limit number;
    no-allow-snooped-clients;
    no-bind-on-request;
    send-release-on-delete;
}
relay-agent-interface-id {
    prefix prefix;
    use-interface-description (logical | device);
}
server-group {
    server-group-name {
        server-ip-address;
    }
}
dynamic-profile profile-name {
    aggregate-clients (merge | replace);
    use-primary primary-profile-name;
}
forward-snooped-clients (all-interfaces | configured-interfaces |
    non-configured-interfaces);
group group-name {
    active-server-group server-group-name;
    authentication {
        ...
    }
}
dynamic-profile profile-name {
    ...
}
interface interface-name {
    exclude;
    liveness-detection {
        failure-action (clear-binding | clear-binding-if-interface-up | log-only);
        method {
            bfd {
                version (0 | 1 | automatic);
                minimum-interval milliseconds;
                minimum-receive-interval milliseconds;
                multiplier number;
                no-adaptation;
                transmit-interval {
                    minimum-interval milliseconds;
                    threshold milliseconds;
                }
                detection-time {
                    threshold milliseconds;
                }
                session-mode (automatic | multihop | singlehop);
                holddown-interval milliseconds;
            }
        }
    }
}
overrides {
    ...
}

```

```
    service-profile dynamic-profile-name;  
    trace;  
    upto upto-interface-name;  
  }  
  overrides {  
    ...  
  }  
  relay-option-82 {  
    ...  
  }  
  service-profile dynamic-profile-name;  
}  
liveness-detection {  
  failure-action (clear-binding | clear-binding-if-interface-up | log-only);  
  method {  
    bfd {  
      version (0 | 1 | automatic);  
      minimum-interval milliseconds;  
      minimum-receive-interval milliseconds;  
      multiplier number;  
      no-adaptation;  
      transmit-interval {  
        minimum-interval milliseconds;  
        threshold milliseconds;  
      }  
      detection-time {  
        threshold milliseconds;  
      }  
      session-mode(automatic | multihop | singlehop);  
      holddown-interval milliseconds;  
    }  
  }  
}  
overrides {  
  allow-snooped-clients;  
  always-write-giaddr;  
  always-write-option-82;  
  client-discover-match <option60-and-option82>;  
  disable-relay;  
  interface-client-limit number;  
  layer2-unicast-replies;  
  no-allow-snooped-clients;  
  no-bind-on-request;  
  proxy-mode;  
  replace-ip-source-with;  
  send-release-on-delete;  
  trust-option-82;  
}  
relay-option-82 {  
  circuit-id {  
    prefix prefix;  
    use-interface-description (logical | device);  
  }  
}  
server-group {  
  server-group-name {
```

```

        server-ip-address;
    }
}
service-profile dynamic-profile-name;
}

```

**Hierarchy Level** [edit forwarding-options],  
[edit vlans forwarding-options]

**Release Information** Statement introduced in Junos OS Release 11.3 for the QFX Series.

**Description** Configure extended Dynamic Host Configuration Protocol (DHCP) relay and DHCPv6 relay options on the switch and enable the switch to function as a DHCP relay agent. A DHCP relay agent forwards DHCP request and reply packets between a DHCP client and a DHCP server.

DHCP relay supports the attachment of dynamic profiles and also interacts with the local AAA Service Framework to use back-end authentication servers, such as RADIUS, to provide subscriber authentication. You can attach dynamic profiles and configure authentication support on a global basis or for a specific group of interfaces.

The extended DHCP and DHCPv6 relay agent options configured with the **dhcp-relay** and **dhcpv6** statements are incompatible with the DHCP/BOOTP relay agent options configured with the **bootp** statement. As a result, the extended DHCP or DHCPv6 relay agent and the DHCP/BOOTP relay agent cannot both be enabled on the router at the same time.

The remaining statements are explained separately.

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

**Related Documentation**

- *Configuring DHCP and BOOTP*

## filter (VLANs)

---

<b>Syntax</b>	<code>filter (input   output) <i>filter-name</i>;</code>
<b>Hierarchy Level</b>	<code>[edit vlans <i>vlan-name</i>]</code> <code>[edit vlans <i>vlan-name</i> forwarding-options]</code>
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.
<b>Description</b>	Apply a firewall filter to traffic entering or exiting a VLAN.
<b>Default</b>	All incoming traffic is accepted unmodified to the VLAN, and all outgoing traffic is sent unmodified from the VLAN.
<b>Options</b>	<b><i>filter-name</i></b> —Name of a firewall filter defined in a <b>filter</b> statement. <ul style="list-style-type: none"><li>• <b>input</b>—Apply a firewall filter to VLAN ingress traffic.</li><li>• <b>output</b>—Apply a firewall filter to VLAN egress traffic.</li></ul>
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration. interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Example: Configuring Firewall Filters for Port, VLAN, and Router Traffic on EX Series Switches</i></li><li>• <i>Configuring Firewall Filters</i></li><li>• <i>Configuring Firewall Filters (CLI Procedure)</i></li><li>• <i>Overview of Firewall Filters</i></li><li>• <i>Firewall Filters for EX Series Switches Overview</i></li><li>• <i>Configuring VLANs for EX Series Switches (CLI Procedure)</i></li></ul>



## forwarding-options

```
Syntax forwarding-options {
  dhcp-relay {
    active-server-group server-group-name;
    authentication {
      password password-string;
      username-include {
        circuit-type;
        delimiter delimiter-character;
        domain-name domain-name-string;
        interface-name;
        logical-system-name;
        mac-address;
        option-60;
        option-82 <circuit-id> <remote-id>;
        routing-instance-name;
        user-prefix user-prefix-string;
      }
    }
  }
  dhcpv6 {
    active-server-group server-group-name;
    authentication {
      password password-string;
      username-include {
        circuit-type;
        client-id;
        delimiter delimiter-character;
        domain-name domain-name-string;
        interface-name;
        logical-system-name;
        relay-agent-interface-id;
        relay-agent-remote-id;
        relay-agent-subscriber-id;
        routing-instance-name;
        user-prefix user-prefix-string;
      }
    }
  }
  dynamic-profile profile-name {
    aggregate-clients (merge | replace);
    use-primary primary-profile-name;
  }
  group group-name {
    active-server-group server-group-name;
    authentication {
      ...
    }
    dynamic-profile profile-name {
      ...
    }
  }
  interface interface-name {
    exclude;
    liveness-detection {
      failure-action (clear-binding | clear-binding-if-interface-up | log-only);
    }
  }
}
```

```

method {
  bfd {
    version (0 | 1 | automatic);
    minimum-interval milliseconds;
    minimum-receive-interval milliseconds;
    multiplier number;
    no-adaptation;
    transmit-interval {
      minimum-interval milliseconds;
      threshold milliseconds;
    }
    detection-time {
      threshold milliseconds;
    }
    session-mode(automatic | multihop | singlehop);
    holddown-interval milliseconds;
  }
}
overrides {
  ...
}
service-profile dynamic-profile-name;
trace;
upto upto-interface-name;
}
service-profile dynamic-profile-name;
}
overrides {
  ...
}
relay-agent-interface-id {
  ...
}
service-profile dynamic-profile-name;
liveness-detection {
  failure-action (clear-binding | clear-binding-if-interface-up | log-only);
  method {
    bfd {
      version (0 | 1 | automatic);
      minimum-interval milliseconds;
      minimum-receive-interval milliseconds;
      multiplier number;
      no-adaptation;
      transmit-interval {
        minimum-interval milliseconds;
        threshold milliseconds;
      }
      detection-time {
        threshold milliseconds;
      }
      session-mode(automatic | multihop | singlehop);
      holddown-interval milliseconds;
    }
  }
}
}

```

```

overrides {
    allow-snooped-clients;
    interface-client-limit number;
    no-allow-snooped-clients;
    no-bind-on-request;
    send-release-on-delete;
}
relay-agent-interface-id {
    prefix prefix;
    use-interface-description (logical | device);
}
server-group {
    server-group-name {
        server-ip-address;
    }
}
dynamic-profile profile-name {
    aggregate-clients (merge | replace);
    use-primary primary-profile-name;
}
forward-snooped-clients (all-interfaces | configured-interfaces |
non-configured-interfaces);
group group-name {
    active-server-group server-group-name;
    authentication {
        ...
    }
    dynamic-profile profile-name {
        ...
    }
}
interface interface-name {
    exclude;
    liveness-detection {
        failure-action (clear-binding | clear-binding-if-interface-up | log-only);
        method {
            bfd {
                version (0 | 1 | automatic);
                minimum-interval milliseconds;
                minimum-receive-interval milliseconds;
                multiplier number;
                no-adaptation;
                transmit-interval {
                    minimum-interval milliseconds;
                    threshold milliseconds;
                }
                detection-time {
                    threshold milliseconds;
                }
            }
            session-mode (automatic | multihop | singlehop);
            holddown-interval milliseconds;
        }
    }
}
overrides {
    ...
}

```

```
    service-profile dynamic-profile-name;  
    trace;  
    upto upto-interface-name;  
  }  
  overrides {  
    ...  
  }  
  relay-option-60 {  
    ...  
  }  
  relay-option-82 {  
    ...  
  }  
  service-profile dynamic-profile-name;  
}  
liveness-detection {  
  failure-action (clear-binding | clear-binding-if-interface-up | log-only);  
  method {  
    bfd {  
      version (0 | 1 | automatic);  
      minimum-interval milliseconds;  
      minimum-receive-interval milliseconds;  
      multiplier number;  
      no-adaptation;  
      transmit-interval {  
        minimum-interval milliseconds;  
        threshold milliseconds;  
      }  
      detection-time {  
        threshold milliseconds;  
      }  
      session-mode (automatic | multihop | singlehop);  
      holddown-interval milliseconds;  
    }  
  }  
}  
overrides {  
  allow-snooped-clients;  
  always-write-giaddr;  
  always-write-option-82;  
  client-discover-match <option60-and-option82>;  
  disable-relay;  
  interface-client-limit number;  
  layer2-unicast-replies;  
  no-allow-snooped-clients;  
  no-bind-on-request;  
  proxy-mode;  
  replace-ip-source-with;  
  send-release-on-delete;  
  trust-option-82;  
}  
relay-option-82 {  
  circuit-id {  
    prefix prefix;  
    use-interface-description (logical | device);  
  }  
}
```

```

    }
    server-group {
        server-group-name {
            server-ip-address;
        }
    }
    service-profile dynamic-profile-name;
}
dhcp-security {
    arp-inspection;
    group group-name {
        interface interface-name {
            static-ip ip-address {
                mac mac-address;
            }
        }
        overrides {
            no-option82;
            trusted;
            untrusted;
        }
    }
}
ip-source-guard;
no-dhcp-snooping;
option-82 {
    circuit-id {
        prefix {
            host-name;
            logical-system-name;
            routing-instance-name;
        }
        use-interface-description (device | logical);
        use-vlan-id;
    }
    remote-id {
        host-name hostname;
        use-interface-description (device | logical);
        use-string string;
    }
    vendor-id {
        use-string string;
    }
}
}
fip-security {
    examine-vn2vf {
    }
    examine-vn2vn {
        beacon-period milliseconds;
    }
    fc-map fc-map-value;
    interface interface-name {
        (fcoe-trusted | no-fcoe-trusted;)
    }
}
}
}

```

<b>Hierarchy Level</b>	[edit] [edit vlans]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 11.3 for QFX Series switches.
<b>Description</b>	Configure traffic forwarding.  The remaining statements are explained separately. See <a href="#">CLI Explorer</a> .
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.

---

## interface (VLANs)

---

<b>Syntax</b>	interface <i>interface-name</i> { mapping (native (push   swap)   tag (push   swap)); }
<b>Hierarchy Level</b>	[edit vlans <i>vlan-name</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 11.1 for the QFX Series.
<b>Description</b>	For a specific VLAN, configure an interface.
<b>Options</b>	<i>interface-name</i> —Name of the interface.  The remaining statement is explained separately. See <a href="#">CLI Explorer</a> .
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Example: Setting Up Basic Bridging and a VLAN on the QFX Series</i></li><li>• <i>Configuring VLANs on Switches</i></li></ul>

## interface-mac-limit

<b>Syntax</b>	<pre> interface-mac-limit {     limit     disable;     packet-action ; } </pre>
<b>Hierarchy Level</b>	<p>[edit bridge-domains <i>bridge-domain-name</i> bridge-options],</p> <p>[edit bridge-domains <i>bridge-domain-name</i> bridge-options interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options],</p> <p>[edit logical-systems <i>logical-system-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> switch-options],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> switch-options interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> switch-options],</p> <p>[edit logical-systems <i>logical-system-name</i> switch-options interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> switch-options],</p> <p>[edit routing-instances <i>routing-instance-name</i> switch-options interface <i>interface-name</i>],</p> <p>[edit switch-options],</p> <p>[edit switch-options interface <i>interface-name</i>],</p> <p>[edit switch-options interface <i>interface-name</i>],</p> <p>[edit vlans <i>vlan-name</i> switch-options],</p> <p>[edit vlans <i>vlan-name</i> switch-options interface <i>interface-name</i>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Support for the <b>switch-options</b> statement added in Junos OS Release 9.2.</p> <p>Support for top-level configuration for the <b>virtual-switch</b> type of routing instance added in Junos OS Release 9.2. In Junos OS Release 9.1 and earlier, the routing instances hierarchy supported this statement only for a VPLS instance or a bridge domain configured within a virtual switch.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>[edit switch-options], [edit switch-options interface <i>interface-name</i>], [edit vlans <i>vlan-name</i> switch-options], and [edit vlans <i>vlan-name</i> switch-options interface <i>interface-name</i>] hierarchy levels introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
<b>Description</b>	<p>Configure a limit to the number of MAC addresses that can be learned from a bridge domain, VLAN, virtual switch, or set of bridge domains or VLANs.</p>



**NOTE:** For multichassis link aggregation (MC-LAG) peers in active-active mode, configuring the `interface-mac-limit` statement or changing the `interface-mac-limit` configuration when traffic is flowing can cause the MAC entries to be out of synchronization between the two MC-LAG peers, which might result in flooding. To avoid flooding, you must either halt traffic forwarding and then configure the `interface-mac-limit` statement or use the `commit at configuration` statement to commit the changes at the same time in both the peer nodes.

Alternatively, if flooding does occur, you can clear the bridge MAC table on both the routers or switches by using the `clear bridge mac-table` command. Running this command ensures that the MAC entries are re-learned and in synchronization between both the peers.

---

<b>Default</b>	The default MAC limit varies with the platform.
<b>Options</b>	<p><b>disable</b>—Disables the global interface-mac-limit configuration on an interface and sets the maximum interface-mac-limit that is permitted on the device.</p> <p><b>limit</b>—Sets the maximum number of MAC addresses learned from an interface.</p> <p><b>Range:</b> 1 through &lt;default MAC limit&gt; MAC addresses per interface. Range is platform specific.</p> <p>If you configure both <b>disable</b> and <b>limit</b>, disable takes precedence and packet-action is set to <b>none</b>. The remaining statement is explained separately.</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Layer 2 Learning and Forwarding for Bridge Domains Overview</a></li><li>• <a href="#">Layer 2 Learning and Forwarding for VLANs Overview on page 6</a></li><li>• <a href="#">Layer 2 Learning and Forwarding for Bridge Domains Functioning as Switches with Layer 2 Trunk Ports</a></li><li>• <a href="#">Layer 2 Learning and Forwarding for VLANs Acting as a Switch for a Layer 2 Trunk Port</a></li></ul>



## interface-mode

<b>Syntax</b>	<code>interface-mode (access   trunk &lt;inter-switch-link&gt;);</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family bridge], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family ethernet-switching], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family bridge]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.2. Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches. Statement introduced in Junos OS Release 13.2 for the QFX Series. Statement introduced in Junos OS Release 15.1. <b>inter-switch-link</b> option introduced in Junos OS Release 14.2 for MX240, MX480, and MX960 routers in enhanced LAN mode.

### Description



**NOTE:** This statement supports the Enhanced Layer 2 Software (ELS) configuration style. If your switch runs software that does not support ELS, see [port-mode](#). For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

QFX3500 and QFX3600 standalone switches—Determine whether the logical interface accepts or discards packets based on VLAN tags. Specify the **trunk** option to accept packets with a VLAN ID that matches the list of VLAN IDs specified in the **vlan-id** or **vlan-id-list** statement, then forward the packet within the bridge domain or VLAN configured with the matching VLAN ID. Specify the **access** option to accept packets with no VLAN ID, then forward the packet within the bridge domain or VLAN configured with the VLAN ID that matches the VLAN ID specified in the **vlan-id** statement.



**NOTE:** On MX Series routers, if you want IGMP snooping to be functional for a bridge domain, then you should not configure **interface-mode** and **irb** for that bridge. Such a configuration commit succeeds, but IGMP snooping is not functional, and a message informing the same is displayed. For more information, see *Configuring a Trunk Interface on a Bridge Network*.

<b>Options</b>	<p><b>access</b>—Configure a logical interface to accept untagged packets. Specify the VLAN to which this interface belongs using the <b>vlan-id</b> statement.</p> <p><b>trunk</b>—Configure a single logical interface to accept packets tagged with any VLAN ID specified with the <b>vlan-id</b> or <b>vlan-id-list</b> statement.</p> <p><b>trunk inter-switch-link</b>—For a private VLAN, configure the InterSwitch Link protocol (ISL) on a trunk port of the primary VLAN in order to connect the switches composing the</p>
----------------	---

PVLAN to each other. You do not need to configure an ISL when a PVLAN is configured on a single switch. This configuration specifies whether the particular interface assumes the role of interswitch link for the PVLAN domains of which it is a member. This option is supported only on MX240, MX480, and MX960 routers in enhanced LAN mode.

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

**Related Documentation**

- *Configuring Access Mode on a Logical Interface*
- *Configuring a Logical Interface for Trunk Mode*
- *Example: Connecting Access Switches to a Distribution Switch*
- *Tunnel Services Overview*
- *Tunnel Interface Configuration on MX Series Routers Overview*

---

## mac (Static MAC-Based VLANs)

---

**Syntax** `mac mac-address {  
          next-hop interface-name;  
          }`

**Hierarchy Level** [edit ethernet-switching-options static vlan *vlan-name*]

**Description** Specify the MAC address to add to the Ethernet switching table.  
  
The remaining statement is explained separately. See [CLI Explorer](#).

**Options** *mac-address*—MAC address

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

**Related Documentation**

- *Adding a Static MAC Address Entry to the Ethernet Switching Table (CLI Procedure)*

## members

**Syntax** `members [(all | names | vlan-ids)];`

**Hierarchy Level** [edit interfaces (QFX Series) *interface-name* unit 0 family ethernet-switching vlan]

**Release Information** Statement introduced in Junos OS Release 9.0 for EX Series switches.  
Statement updated with enhanced ? (CLI completion feature) functionality in Junos OS Release 9.5 for EX Series switches.  
Statement introduced in Junos OS Release 11.1 for the QFX Series.

**Description** For trunk interfaces, configure the VLANs for which the interface can carry traffic.



**TIP:** To display a list of all configured VLANs on the system, including VLANs that are configured but not committed, type ? after `vlan` or `vlangs` in your configuration mode command line. Note that only one VLAN is displayed for a VLAN range.



**NOTE:** The number of VLANs supported per switch varies for each model. Use the configuration-mode command `set vlans id vlan-id ?` to determine the maximum number of VLANs allowed on a switch. You cannot exceed this VLAN limit because each VLAN is assigned an ID number when it is created. You can, however, exceed the recommended VLAN member maximum.

On an EX Series switch that runs Junos OS that does not support the Enhanced Layer 2 Software (ELS) configuration style, the maximum number of VLAN members allowed on the switch is 8 times the maximum number of VLANs the switch supports (`vmember limit = vlan max * 8`). If the switch configuration exceeds the recommended VLAN member maximum, you see a warning message when you commit the configuration. If you ignore the warning and commit such a configuration, the configuration succeeds but you run the risk of crashing the Ethernet switching process (`eswd`) due to memory allocation failure.

On an EX Series switch that runs Junos OS that supports ELS, the maximum number of VLAN members allowed on the switch is 24 times the maximum number of VLANs the switch supports (`vmember limit = vlan max * 24`). If the configuration of one of these switches exceeds the recommended VLAN member maximum, a warning message appears in the system log (`syslog`).

**Options** `all`—Specifies that this trunk interface is a member of all VLANs that are configured on this switch. When a new VLAN is configured on the switch, this trunk interface automatically becomes a member of the VLAN.



**NOTE:** Since VLAN members are limited, specifying all could cause the number of VLAN members to exceed the limit at some point.



**NOTE:** Each VLAN that is configured must have a specified VLAN ID when you attempt to commit the configuration; otherwise, the configuration commit fails. Also, all cannot be the name of a VLAN on the switch.

**names**—Name of one or more VLANs. VLAN IDs are applied automatically in this case.

**vlan-ids**—Numeric identifier of one or more VLANs. For a series of tagged VLANs, specify a range; for example, **10–20** or **10–20 23 27–30**.



**NOTE:** Each configured VLAN must have a specified VLAN ID to successfully commit the configuration; otherwise, the configuration commit fails.

**Required Privilege Level**

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

**Related Documentation**

- [Configuring Gigabit Ethernet Interfaces \(CLI Procedure\)](#)
- [Configuring Gigabit Ethernet Interfaces \(CLI Procedure\) for EX Series Switches with ELS support](#)
- [Configuring Gigabit Ethernet Interfaces \(J-Web Procedure\)](#)
- [Configuring VLANs for EX Series Switches \(CLI Procedure\)](#)
- [Configuring VLANs for EX Series Switches \(CLI Procedure\)](#)
- [Example: Setting Up Basic Bridging and a VLAN on the QFX Series](#)
- [Understanding Bridging and VLANs on Switches on page 9](#)
- [show ethernet-switching interfaces on page 188](#)
- [show vlans on page 220](#)

## native-vlan-id

<b>Syntax</b>	<code>native-vlan-id <i>vlan-id</i>;</code>
<b>Hierarchy Level</b>	<p>For platforms without ELS:</p> <p>[edit interfaces (QFX Series) <i>interface-name</i> unit 0 family ethernet-switching],</p> <p>For platforms with ELS:</p> <p>[edit interfaces (QFX Series) <i>interface-name</i>]</p>
<b>Release Information</b>	Statement introduced in Junos OS Release 11.1 for the QFX Series.
<b>Description</b>	<p>Configure the VLAN identifier to associate with untagged packets received on the interface. The logical interface on which untagged packets are received must be configured with the same VLAN ID as the native VLAN ID configured on the physical interface. To configure the logical interface, include the <b>vlan-id</b> statement (matching the <b>native-vlan-id</b> statement on the physical interface) at the [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] hierarchy level.</p> <p>When the <b>native-vlan-id</b> statement is combined with the <b>interface-mode</b> statement, untagged packets are accepted and forwarded within the bridge domain or VLAN that is configured with the matching VLAN ID.</p> <p>When the <b>native-vlan-id</b> statement is combined with the <i>flexible-vlan-tagging</i> statement, untagged packets are accepted on the interfaces that are configured for Q-in-Q tunneling.</p> <p>.</p>
<b>Options</b>	<p><b>vlan-id</b>—Numeric identifier of the VLAN.</p> <p><b>Range:</b> 1 through 4094</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Junos OS Network Interfaces Configuration Guide</a></li> <li>• <a href="#">show ethernet-switching interfaces on page 188</a></li> <li>• <a href="#">show vlans on page 220</a></li> </ul>

## packet-action

**Syntax** `packet-action action;`

**Hierarchy Level** [edit bridge-domains *bridge-domain-name* bridge-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit bridge-domains *bridge-domain-name* bridge-options **interface-mac-limit** *limit*],  
 [edit logical-systems *logical-system-name* bridge-domains *bridge-domain-name* bridge-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit logical-systems *logical-system-name* bridge-domains *bridge-domain-name* bridge-options **interface-mac-limit** *limit*],  
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* bridge-domains *bridge-domain-name* bridge-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* bridge-domains *bridge-domain-name* bridge-options **interface-mac-limit** *limit*],  
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* switch-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* switch-options **interface-mac-limit** *limit*],  
 [edit logical-systems *logical-system-name* switch-options **interface-mac-limit** *limit*],  
 [edit protocols l2-learning global-mac-limit *limit*],  
 [edit routing-instances *routing-instance-name* bridge-domains *bridge-domain-name* bridge-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit routing-instances *routing-instance-name* bridge-domains *bridge-domain-name* bridge-options **interface-mac-limit** *limit*],  
 [edit routing-instances *routing-instance-name* protocols evpn interface-mac-limit (VPLS)],  
 [edit routing-instances *routing-instance-name* protocols evpn interface *interface-name* interface-mac-limit (VPLS)],  
 [edit routing-instances *routing-instance-name* protocols evpn mac-table-size *limit*],  
 [edit routing-instances *routing-instance-name* switch-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit routing-instances *routing-instance-name* switch-options **interface-mac-limit** *limit*],  
 [edit switch-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit switch-options **interface-mac-limit** *limit*],  
 [edit switch-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit switch-options **interface-mac-limit** *limit*],  
 [edit switch-options **mac-table-size** *limit*],  
 [edit switch-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit vlans *vlan-name* switch-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit vlans *vlan-name* switch-options **interface-mac-limit** *limit*],  
 [edit vlans *vlan-name* switch-options **mac-table-size** *limit*],  
 [edit vlans *vlan-name* switch-options **interface-mac-limit** *limit*],  
 [edit vlans *vlan-name* switch-options interface *interface-name* **interface-mac-limit** *limit*],  
 [edit vlans *vlan-name* switch-options **mac-table-size** *limit*]

**Release Information** Statement introduced in Junos OS Release 8.4.  
 Support for the **switch-options** statement added in Junos OS Release 9.2.  
 Support for top-level configuration for the **virtual-switch** type of routing instance added in Junos OS Release 9.2. In Junos OS Release 9.1 and earlier, the routing instances hierarchy

supported this statement only for a VPLS instance or a bridge domain configured within a virtual switch.

Support for logical systems added in Junos OS Release 9.6.

[edit switch-options interface *interface-name* interface-mac-limit *limit*], [edit switch-options interface-mac-limit *limit*], [edit switch-options mac-table-size *limit*], [edit vlans *vlan-name* switch-options interface *interface-name* interface-mac-limit *limit*], [edit vlans *vlan-name* switch-options interface-mac-limit *limit*], and [edit vlans *vlan-name* switch-options mac-table-size *limit*] hierarchy levels introduced in Junos OS Release 12.3R2 for EX Series switches.

Support for EVPNs introduced in Junos OS Release 13.2 on MX Series 3D Universal Edge Routers.

Support at the [edit switch-options interface *interface-name* interface-mac-limit *limit*] hierarchy level and hierarchy levels under [edit vlans *vlan-name*] introduced in Junos OS Release 13.2X50-D10 for EX Series switches and Junos OS Release 13.2 for the QFX Series.

**Description** Specify the action taken when packets with new source MAC addresses are received after the MAC address limit is reached. If this statement is not configured, packets with new source MAC addresses are forwarded by default.



**NOTE:** The `packet-action` statement is not supported on the QFX10002-60C switch.

**Default**



**NOTE:** On a QFX Series Virtual Chassis, if you include the shutdown option at the [edit vlans *vlan-name* switch-options interface *interface-name* interface-mac-limit packet-action] hierarchy level and issue the commit operation, the system generates a commit error. The system does not generate an error if you include the shutdown option at the [edit switch-options interface *interface-name* interface-mac-limit packet-action] hierarchy level.

Disabled. The default is for packets for new source MAC addresses to be forwarded after the MAC address limit is reached.

**Options**    **drop**—Drop packets with new source MAC addresses, and do not learn the new source MAC addresses.



**NOTE:** On QFX10000 switches, if you include the drop option, you cannot configure unicast reverse-path forwarding (URFP) on integrated routing and bridging (IRB) and MAC limiting on the same interface. If you have an MC-LAG configuration, you cannot configure MAC limiting on the interchassis link (ICL) interface.

**drop-and-log**—(EX Series switches and QFX Series only) Drop packets with new source MAC addresses, and generate an alarm, an SNMP trap, or a system log entry.

**log**—(EX Series switches and QFX Series only) Hold packets with new source MAC addresses, and generate an alarm, an SNMP trap, or a system log entry.

**none**—(EX Series switches and QFX Series only) Forward packets with new source MAC addresses, and learn the new source MAC address.



**shutdown**—(EX Series switches and QFX Series only) Disable the specified interface, and generate an alarm, an SNMP trap, or a system log entry.

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

- Related Documentation**
- *Configuring EVPN Routing Instances*
  - *Configuring EVPN Routing Instances on EX9200 Switches*
  - [Configuring MAC Limiting \(CLI Procedure\) on page 31](#)
  - *Configuring Persistent MAC Learning (CLI Procedure)*
  - *Layer 2 Learning and Forwarding for Bridge Domains Overview*
  - [Layer 2 Learning and Forwarding for VLANs Overview on page 6](#)
  - *Layer 2 Learning and Forwarding for Bridge Domains Functioning as Switches with Layer 2 Trunk Ports*
  - [Layer 2 Learning and Forwarding for VLANs Overview on page 6](#)
  - *Layer 2 Learning and Forwarding for VLANs Acting as a Switch for a Layer 2 Trunk Port*



## port-mode

<b>Syntax</b>	<code>port-mode (access   tagged-access   trunk);</code>
<b>Hierarchy Level</b>	[edit interfaces (QFX Series) <i>interface-name</i> unit <i>logical-unit-number</i> family ethernet-switching]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series.
<b>Description</b>	<p> <b>NOTE:</b> This statement does not support the Enhanced Layer 2 Software (ELS) configuration style. If your switch runs software that supports ELS, see <a href="#">interface-mode</a>. For ELS details, see <i>Getting Started with Enhanced Layer 2 Software</i>.</p> <p>Configure whether an interface on the switch operates in access, tagged access, or trunk mode.</p>
<b>Default</b>	All switch interfaces are in access mode.
<b>Options</b>	<p><b>access</b>—Have the interface operate in access mode. In this mode, the interface can be in a single VLAN only. Access interfaces typically connect to network devices, such as PCs, printers, IP telephones, and IP cameras.</p> <p><b>tagged-access</b>—Have the interface operate in tagged-access mode. In this mode, the interface can be in multiple VLANs. Tagged access interfaces typically connect to network devices, such as PCs, printers, IP telephones, and IP cameras.</p> <p><b>trunk</b>—Have the interface operate in trunk mode. In this mode, the interface can be in multiple VLANs and can multiplex traffic between different VLANs. Trunk interfaces typically connect to other switches and to routers on the LAN.</p>
	<p> <b>NOTE:</b> The number of VLANs supported per switch varies for each model. Use the configuration-mode command <code>set vlans id vlan-id ?</code> to determine the maximum number of VLANs allowed on a switch. You cannot exceed this VLAN limit because each VLAN is assigned an ID number when it is created. You can, however, exceed the recommended VLAN member maximum. To determine the maximum number of VLAN members allowed on a switch, multiply the VLAN maximum for the switch times 8 (<math>\text{vmember limit} = \text{vlan max} * 8</math>).</p> <p>If a switch configuration exceeds the recommended VLAN member maximum, you see a warning message when you commit the configuration. If you ignore the warning and commit such a configuration, the configuration succeeds</p>

but you run the risk of crashing the Ethernet switching process (`eswd`) due to memory allocation failure.

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

**Related Documentation**

- *Example: Connecting an Access Switch to a Distribution Switch*
- *Configuring Gigabit Ethernet Interfaces (CLI Procedure)*
- *Configuring VLANs for EX Series Switches (CLI Procedure)*
- [Junos OS Ethernet Interfaces Configuration Guide](#)

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## service-id

<b>Syntax</b>	<code>service-id number;</code>
<b>Hierarchy Level</b>	[edit switch-options] [edit vlans <i>vlan-name</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 12.3R2 for EX Series switches and MX Series routers. Statement introduced in Junos OS Release 13.2 for the QFX Series.
<b>Description</b>	Specify a service identifier for each multichassis aggregated Ethernet interface that belongs to a link aggregation group (LAG).
<b>Options</b>	<b>number</b> —A number that identifies a particular service. <b>Range:</b> 1 through 65535
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system control—To add this statement to the configuration.

## switch-options (VLANs)

<b>List of Syntax</b>	<a href="#">Syntax (EX Series, MX Series, QFX Series and NFX Series) on page 99</a> <a href="#">Syntax (SRX Series) on page 99</a>
<b>Syntax (EX Series, MX Series, QFX Series and NFX Series)</b>	<pre> switch-options {   interface <i>interface-name</i> {     <b>interface-mac-limit</b> <i>limit</i> {       <b>packet-action</b> drop;     }     mac-pinning     no-mac-learning;     <b>static-mac</b> <i>static-mac-address</i> {       vlan-id <i>number</i>;     }   }   <b>interface-mac-limit</b> <i>limit</i> {     <b>packet-action</b> drop;   }   <b>mac-statistics</b>;   mac-ip-table-size <i>number</i>;   <b>mac-table-size</b> <i>limit</i> {     <b>packet-action</b> drop;   }   no-mac-learning;   <b>service-id</b> <i>number</i>;   vtep-source-interface } </pre>
<b>Syntax (SRX Series)</b>	<pre> switch-options {   interface <i>interface-name</i> {     encapsulation-type;     ignore-encapsulation-mismatch;     pseudowire-status-tlv;     static-mac <i>mac-address</i> {       vlan-id <i>vlan-id</i>;     }   }   mac-table-aging-time <i>seconds</i>;   mac-table-size {     <i>number</i>;     <b>packet-action</b> drop;   } } </pre>
<b>EX Series, MX Series, QFX Series and NFX Series</b>	<pre> [edit ], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> vlans <i>vlan-name</i>], [edit routing-instances <i>routing-instance-name</i> vlans <i>vlan-name</i>], [edit vlans <i>vlan-name</i>] </pre>
<b>SRX Series</b>	<pre> [edit vlans <i>vlans-name</i>] </pre>

<b>Release Information</b>	<p>Statement modified in Junos OS Release 9.5.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches and MX Series routers.</p> <p>Statement introduced in Junos OS Release 13.2 for the QFX Series.</p> <p>Statement (mac-pinning) introduced in Junos OS 16.2 for MX Series routers.</p> <p><b>mac-ip-table-size</b> statement introduced in Junos OS 17.4 Release for MX Series routers and EX9200 switches.</p>
<b>Description</b>	<p>Configure Layer 2 learning and forwarding properties for a VLAN or a virtual switch.</p> <p>The remaining statements are explained separately. See <a href="#">CLI Explorer</a>.</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Ethernet Switching and Layer 2 Transparent Mode Overview</i></li></ul>

## static-mac

<b>Syntax</b>	<pre>static-mac <i>mac-address</i>; static-mac <i>mac-address</i> {     <i>vlan-id</i> <i>number</i>; }</pre>
<b>Hierarchy Level</b>	<p>[edit vlans <i>vlan-name</i> switch-options interface <i>interface-name</i>]</p> <p>[edit bridge-domains <i>bridge-domain-name</i> bridge-options interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options interface <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options interface <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols evpn interface <i>interface-name</i>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement modified in Junos OS Release 9.5.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>[edit vlans <i>vlan-name</i> switch-options interface <i>interface name</i>] hierarchy level introduced in Junos OS Release 12.3R2 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 13.2 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 13.2 for the QFX Series.</p> <p>Support for EVPNs added in Junos OS Release 13.2 for MX 3D Series routers. The <b>vlan-id</b> option is not available for EVPNs.</p> <p>[edit vlans <i>vlan-name</i> switch-options interface <i>interface name</i>] hierarchy level introduced in Junos OS Release 13.2 for the QFX Series.</p>
<b>Description</b>	<p>Configure a static MAC address for a logical interface in a bridge domain or VLAN.</p> <p>The <b>vlan-id</b> option can be specified for <b>static-macs</b> only if <b>vlan-id all</b> is configured for the bridging domain or VLAN.</p>
<b>Options</b>	<p><b><i>mac-address</i></b>—MAC address</p> <p><b><i>vlan-id number</i></b>—(Optional) VLAN identifier to associate with static MAC address.</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring EVPN Routing Instances</a></li> <li>• <a href="#">Layer 2 Learning and Forwarding for Bridge Domains Overview</a></li> <li>• <a href="#">Layer 2 Learning and Forwarding for VLANs Overview on page 6</a></li> </ul>

- [Adding a Static MAC Address Entry to the Ethernet Switching Table on a Switch with ELS Support \(CLI Procedure\) on page 23](#)
- *Understanding VLANs on Security Devices*

## vlan-id

<b>Syntax</b>	<code>vlan-id (all   none   <i>number</i>);</code>
<b>VLANs and Bridge Domain VLANs</b>	<p>For platforms without ELS:</p> <pre>[edit vlans <i>vlan-name</i> vlan-range]</pre> <p>For platforms without ELS and with ELS:</p> <pre>[edit vlans <i>vlan-name</i>]</pre> <p>For ELS platforms only:</p> <pre>[edit interfaces <i>interface-name</i> unit <i>number</i>] [edit vlans <i>vlan-name</i> vlan-id-list]  [edit vlans <i>vlan-name</i>], [edit logical-systems <i>logical-system-name</i> vlans<i>vlan-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i>   vlans<i>vlan-name</i>], [edit routing-instances <i>routing-instance-name</i> vlans <i>vlan--name</i>]</pre>
<b>802.1Q Tagging</b>	<pre>[edit vlans <i>vlan-name</i>]</pre>
<b>VLAN ID to Rewrite</b>	<pre>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> input-vlan-map], [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> output-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>   input-vlan-map], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>   output-vlan-map]</pre>
<b>VLAN Tagging and Layer 3 Subinterfaces</b>	<pre>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</pre>
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 9.2 for EX Series switches VLAN tagging and Layer 3 subinterfaces.</p> <p>Support for Layer 2 trunk ports added in Junos OS Release 9.2.</p> <p>Support for SRX 5600, and SRX 5800 devices added in Junos OS Release 9.6.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
<b>Description</b>	For VLANs, specify a VLAN identifier (VID) to include in the packets sent to and from the VLAN, or a VPLS routing instance.



**NOTE:** When configuring a VLAN identifier for provider backbone bridge (PBB) routing instances, dual-tagged VLANs and the none option are not permitted.

For 802.1Q tagging, configure an 802.1Q tag to apply to all traffic that originates on the VLAN.

The number zero is reserved for priority tagging and the number 4095 is also reserved.

For VLAN ID to Rewrite Gigabit Ethernet IQ and 10-Gigabit Ethernet IQ2, 10-Gigabit Ethernet LAN/WAN PIC, and IQ2-E interfaces and aggregated Ethernet using Gigabit Ethernet IQ interfaces, specify the line VLAN identifiers to be rewritten at the input or output interface.

You cannot include the **vlan-id** statement with the **swap** statement, **swap-push** statement, **push-push** statement, or **push-swap** statement at the **[edit interfaces *interface-name* unit *logical-unit-number* output-vlan-map]** hierarchy level. If you include any of those statements in the output VLAN map, the VLAN ID in the outgoing frame is rewritten to the **vlan-id** statement that you include at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level.



**Default** For 802.1Q Tagging on EX Series and SRX Series, If you use the default factory configuration, all traffic originating on the VLAN is untagged and has a VLAN identifier of 1.

For VLANs on a QFX3500 and QFX3500 switch, if you use the default factory configuration, all traffic originating on the VLAN is untagged and has a VLAN identifier of 1. The number zero is reserved for priority tagging and the number 4093 is also reserved.

On a QFX5100 switch, if you use the default factory configuration, all traffic originating on the VLAN is untagged and has a VLAN identifier of 1. The number zero is reserved for priority tagging and the number 4093 is also reserved.



**NOTE:** You can only create up to 4090 VLANs on a QFX5100 switch. If you create more than 4090 VLANs, the interfaces associated with the extra VLANs are not displayed in the `show vlans` command output. For example, if you create 4094 VLANs, the extra VLANs will not have interfaces associated with the VLANs. The order in which you configure the extra VLANs determines which interfaces are missing from the `show vlans` command output.

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For VLAN tagging and Layer 3 subinterfaces, bind an 802.1Q VLAN tag ID to a logical interface.



**NOTE:** The VLAN tag ID cannot be configured on logical interface unit 0. The logical unit number must be 1 or higher.

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**Options** For VLANs:

**number**—A valid VLAN identifier. If you configure multiple VLANs with a valid VLAN identifier, you must specify a unique VLAN identifier for each. However, you can use the same VLAN identifier for VLANs that belong to different virtual switches. Use this option to send single tagged frames with the specified VLAN identifier over VPLS VT interfaces.



**NOTE:** If you specify a VLAN identifier, you cannot also use the **all** option. They are mutually exclusive.

**all**—Specify that the VLAN spans all the VLAN identifiers configured on the member logical interfaces.



**NOTE:** You cannot specify the **all** option if you include a routing interface in the VLAN.

**none**—Specify to enable shared VLAN learning or to send untagged frames over VPLS VT interfaces.



**NOTE:** Multichassis link aggregation (MC-LAG) does not support the **none** option with the **vlan-id** statement with VLANs.

For 802.1Q Tagging:

**number** —VLAN tag identifier

**Range:**

- 1 through 4094 (all switches except EX8200 Virtual Chassis)
- 1 through 4092 (EX8200 Virtual Chassis only)

**Default:** 1

**Required Privilege Level**

routing—To view this statement in the configuration.

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

system—To view this statement in the configuration.

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

interface—To view this statement in the configuration.

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

**Related Documentation**

- *Example: Connecting Access Switches to a Distribution Switch*
- *Example: Configuring a Private VLAN on a Single Switch with ELS Support*
- *Creating a Private VLAN on a Single Switch with ELS Support (CLI Procedure)*
- *Creating a Private VLAN Spanning Multiple EX Series Switches (CLI Procedure)*
- *Example: Configuring VLANs on Security Devices*
- *Example: Configuring Interfaces and Routing Instances for a User Logical System*
- *Rewriting the VLAN Tag on Tagged Frames*
- *Binding VLAN IDs to Logical Interfaces*
- [vlan-tagging on page 110](#)
- *Example: Configuring Layer 3 Subinterfaces for a Distribution Switch and an Access Switch*
- *Configuring Gigabit Ethernet Interfaces (CLI Procedure)*
- *Configuring Gigabit Ethernet Interfaces (CLI Procedure) for EX Series Switches with ELS support*
- *Configuring Gigabit Ethernet Interfaces (J-Web Procedure)*
- *Configuring a Layer 3 Subinterface (CLI Procedure)*
- *Configuring Q-in-Q Tunneling (CLI Procedure)*
- [Junos OS Ethernet Interfaces Configuration Guide](#)

## vlan-id-list

**Syntax** `vlan-id-list [ vlan-id-numbers ];`

**Hierarchy Level** [edit bridge-domains *bridge-domain-name*],  
[edit logical-systems *logical-system-name* bridge-domains *bridge-domain-name*],  
[edit logical-systems *logical-system-name* routing-instances *routing-instance-name*  
bridge-domains *bridge-domain-name*],  
[edit routing-instances *routing-instance-name* bridge-domains *bridge-domain-name*],  
[edit interfaces *interface-name* unit 0],  
[edit interfaces *interface-name* unit *logical-unit-number*],  
[edit vlans *vlan-name*]

**Release Information** Statement introduced in Junos OS Release 9.4.  
Support for logical systems added in Junos OS Release 9.6.  
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.  
Statement introduced in Junos OS Release 13.2 for the QFX Series.

**Description** Specify a VLAN identifier list to use for a bridge domain or VLAN in trunk mode.

Specify the **trunk** option in the **interface-mode** statement to accept packets with a VLAN ID that matches the list of VLAN IDs specified in the **vlan-id-list** statement to forward the packet within the bridge domain or VLAN configured with the matching VLAN ID. Specify the **access** option to accept packets with no VLAN ID to forward the packet within the bridge domain or VLAN configured with the VLAN ID that matches the VLAN ID specified in the **vlan-id** statement.

This statement also enables you to bind a logical interface to a list of VLAN IDs, thereby configuring the logical interface to receive and forward a frame with a tag that matches the specified VLAN ID list.



**WARNING:** On some EX and QFX Series switches, you can apply no more than eight VLAN identifier lists to a physical interface.

**Options** *vlan-id-numbers*—Valid VLAN identifiers. You can combine individual numbers with range lists by including a hyphen.

**Range:** 0 through 4095



**NOTE:** On EX Series switches and the QFX Series, the range is 0 through 4094.

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

**Related Documentation**

- *Configuring a Bridge Domain*
- *Configuring a VLAN*
- *Configuring VLAN Identifiers for Bridge Domains and VPLS Routing Instances*
- *Configuring VLAN Identifiers for VLANs and VPLS Routing Instances*

## vlan-rewrite

**Syntax** `vlan-rewrite translate (200 500 | 201 501)`

**Hierarchy Level** [edit interfaces *interface-name* unit *number* family bridge interface-mode trunk]  
[edit interfaces *interface-name* unit *number* family ethernet-switching interface-mode trunk]

**Release Information** Statement introduced in Junos OS Release 9.4.  
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

**Description** Translates an incoming VLAN to a bridge-domain VLAN, corresponding counter translation at egress. Supports translation of VLAN 200 to VLAN 500 and VLAN 201 to VLAN 501. Other valid VLANs pass through without translation.


**Options** `translate 200 500`—Translates incoming packets with VLAN 200 to 500.  
`translate 201 501`—Translates incoming packets with VLAN 201 to 501.  
`translate 202 502`—Translates incoming packets with VLAN 202 to 502.

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

**Related Documentation**

- *Rewriting a VLAN Tag and Adding a New Tag*

## vlan-tagging

<b>Syntax</b>	vlan-tagging;
<b>Syntax (QFX Series, NFX Series, and EX4600)</b>	vlan-tagging;
<b>Syntax (SRX Series Interfaces)</b>	vlan-tagging native-vlan-id <i>vlan-id</i> ;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> ]
<b>QFX Series, NFX Series, and EX4600 Interfaces</b>	[edit interfaces (QFX Series) <i>interface-name</i> ] [edit interfaces (QFX Series) interface-range <i>interface-range-name</i> ]
<b>SRX Series Interfaces</b>	[edit interfaces <i>interface</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Statement introduced in Junos OS Release 9.5. Statement introduced in Junos OS Release 11.3 for the QFX Series. Statement introduced in Junos OS Release 12.2 for ACX Series Universal Metro Routers. Statement introduced in Junos OS Release 13.2 for PTX Series Routers. Statement introduced in Junos OS Release 14.1X53-D10 for the QFX Series.
<b>Description</b>	For Fast Ethernet and Gigabit Ethernet interfaces, aggregated Ethernet interfaces configured for VPLS, and pseudowire subscriber interfaces, enable the reception and transmission of 802.1Q VLAN-tagged frames on the interface.
<div>  <p><b>NOTE:</b> For QFX Series configure VLAN identifier for untagged packets received on the physical interface of a trunk mode interface. Enable VLAN tagging. The platform receives and forwards single-tag frames with 802.1Q VLAN tags.</p> <p>On EX Series switches except for EX4300 and EX9200 switches, the <code>vlan-tagging</code> and <code>family ethernet-switching</code> statements cannot be configured on the same interface. Interfaces on EX2200, EX3200, EX3300, EX4200, and EX4500 switches are set to <code>family ethernet-switching</code> by the default factory configuration. EX6200 and EX8200 switch interfaces do not have a default family setting.</p> </div>	
<b>Default</b>	VLAN tagging is disabled by default.

**Options**    **native-vlan-id**— (SRX Series) Configures a VLAN identifier for untagged packets. Enter a number from 0 through 4094.



**NOTE:** The **native-vlan-id** can be configured only when either **flexible-vlan-tagging** mode or **interface-mode trunk** is configured.

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

- Related Documentation**
- *802.1Q VLANs Overview*
  - *Configuring a Layer 3 Subinterface (CLI Procedure)*
  - *Configuring Tagged Aggregated Ethernet Interfaces*
  - *Example: Configuring Layer 3 Subinterfaces for a Distribution Switch and an Access Switch*
  - *vlan-id*
  - *Configuring a Layer 3 Logical Interface*
  - *Configuring VLAN Tagging*

## vlan-tags

---

<b>Syntax</b>	<code>vlan-tags outer <i>number</i> inner <i>number</i>;</code>
<b>Hierarchy Level</b>	<code>[edit bridge-domains <i>bridge-domain-name</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> bridge-domains <i>bridge-domain-name</i>],</code> <code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i></code> <code>bridge-domains <i>bridge-domain-name</i>],</code> <code>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i>]</code> <code>[edit vlans <i>vlan-name</i>]</code>
<b>Release Information</b>	Statement introduced in Junos OS Release 8.4. Support for logical systems added in Junos OS Release 9.6. Statement introduced in Junos OS Release 12.3R2 for EX Series switches. Statement introduced in Junos OS Release 13.2X51-D10 for QFX Series switches.
<b>Description</b>	Specify dual VLAN identifier tags for a bridge domain, VLAN, or VPLS routing instance.
<b>Options</b>	<b>outer <i>number</i></b> —A valid VLAN identifier.  <b>inner <i>number</i></b> —A valid VLAN identifier.
<b>Required Privilege Level</b>	<code>routing</code> —To view this statement in the configuration. <code>routing-control</code> —To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring a Bridge Domain</i></li><li>• <i>Configuring a VLAN</i></li><li>• <i>Configuring VLAN Identifiers for Bridge Domains and VPLS Routing Instances</i></li><li>• <i>Configuring VLAN Identifiers for VLANs and VPLS Routing Instances</i></li><li>• <i>Configuring a Layer 2 Virtual Switch</i> .</li><li>• <i>Configuring a Layer 2 Virtual Switch on an EX Series Switch</i></li></ul>



## CHAPTER 5

# MAC Address Configuration Statements

- [global-mac-table-aging-time](#) on page 113
- [mac-limit](#) on page 114
- [mac-notification](#) on page 115
- [mac-statistics](#) on page 116
- [mac-table-size](#) on page 118
- [notification-interval](#) on page 120

### [global-mac-table-aging-time](#)

---

<b>Syntax</b>	<code>global-mac-table-aging-time seconds;</code>
<b>Hierarchy Level</b>	[edit protocols l2-learning]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.2. Statement modified in Junos OS Release 9.5. Support for logical systems added in Junos OS Release 9.6.
<b>Description</b>	Configure the timeout interval for entries in the MAC table.
<b>Default</b>	300 seconds
<b>Options</b>	<b>seconds</b> —Time elapsed before MAC table entries are timed out and entries are deleted from the table. <b>Range:</b> For MX Series routers: 10 through 1 million; for EX Series and QFX Series switches: 60 through 1 million; for SRX devices: 10 through 64,000 seconds
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring the MAC Table Timeout Interval</i></li><li>• <i>Configuring MAC Table Aging on Switches</i></li><li>• <i>Example: Configuring VLANs on Security Devices</i></li></ul>

## mac-limit

---

<b>Syntax</b>	<code>mac-limit <i>number</i>;</code>
<b>Hierarchy Level</b>	<code>[edit vlans <i>vlan-name</i>]</code>
<b>Release Information</b>	Statement introduced in Junos OS Release 11.1 for the QFX Series.
<b>Description</b>	Configure the number of MAC addresses allowed on a VLAN.
<b>Default</b>	MAC limit is disabled.
<b>Options</b>	<i>number</i> —Maximum number of MAC addresses. <b>Range:</b> 1 through 32768



**NOTE:** This statement is not supported on QFabric systems.

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<b>Required Privilege</b>	routing—To view this statement in the configuration.
<b>Level</b>	routing-control—To add this statement to the configuration.

- |                              |  |
|------------------------------|--|
| <b>Related Documentation</b> | <ul style="list-style-type: none"><li>• <a href="#">show vlans on page 220</a></li><li>• <i>Example: Setting Up Basic Bridging and a VLAN on the QFX Series</i></li><li>• <i>Configuring MAC Table Aging on Switches</i></li></ul> |
|------------------------------|--|

## mac-notification

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<b>Syntax</b>	<pre>mac-notification {   notification-interval seconds; }</pre>
<b>Hierarchy Level</b>	[edit ethernet-switching-options] [edit switch-options]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Hierarchy level <b>[edit switch-options]</b> added in Junos OS Release 14.1X53-D10 for EX Series and QFX Series.
<b>Description</b>	<p>Enable MAC notification for a switch. If you configure this statement without setting a notification interval, MAC notification is enabled with the default MAC notification interval of 30 seconds.</p> <p>The remaining statement is explained separately. See <a href="#">CLI Explorer</a>.</p>
<b>Default</b>	MAC notification is disabled by default.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration. routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Configuring MAC Notification (CLI Procedure)</i></li> <li>• <a href="#">Configuring MAC Notification on Switches with ELS Support (CLI Procedure) on page 29</a></li> </ul>

## mac-statistics

<b>Syntax</b>	mac-statistics;
<b>Hierarchy Level</b>	<p>[edit bridge-domains <i>bridge-domain-name</i> bridge-options],</p> <p>[edit logical-systems <i>logical-system-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> switch-options],</p> <p>[edit logical-systems <i>logical-system-name</i> switch-options],</p> <p>[edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options],</p> <p>[edit routing-instances <i>routing-instance-name</i> switch-options],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols evpn],</p> <p>[edit switch-options],</p> <p>[edit switch-options],</p> <p>[edit vlans <i>vlan-name</i> switch-options]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Support for the <b>switch-options</b> statement added in Junos OS Release 9.2.</p> <p>Support for top-level configuration for the <b>virtual-switch</b> type of routing instance added in Junos OS Release 9.2. In Junos OS Release 9.1 and earlier, the routing instances hierarchy supported this statement only for a VPLS instance or a bridge domain configured within a virtual switch.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>[edit switch-options] and [edit vlans <i>vlan-name</i> switch-options] hierarchy levels introduced in Junos OS Release 12.3R2 for EX Series switches.</p> <p>Support for EVPNs added in Junos OS Release 13.2 for MX 3D Series routers.</p> <p>[edit switch-options] and [edit vlans <i>vlan-name</i> switch-options] hierarchy levels introduced in Junos OS Release 13.2 for the QFX Series.</p>
<b>Description</b>	(MX Series routers, EX Series switches, and QFX Series only) For bridge domains or VLANs, enable MAC accounting either for a specific bridge domain or VLAN, or for a set of bridge domains or VLANs associated with a Layer 2 trunk port.
<b>Default</b>	disabled
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Layer 2 Learning and Forwarding for Bridge Domains Overview</a></li> <li>• <a href="#">Layer 2 Learning and Forwarding for VLANs Overview on page 6</a></li> <li>• <a href="#">Layer 2 Learning and Forwarding for Bridge Domains Functioning as Switches with Layer 2 Trunk Ports</a></li> </ul>

- *Layer 2 Learning and Forwarding for VLANs Acting as a Switch for a Layer 2 Trunk Port*
- *Configuring EVPN Routing Instances*
- *Configuring EVPN Routing Instances on EX9200 Switches*

## mac-table-size

<b>Syntax</b>	<pre>mac-table-size limit {     packet-action drop; }</pre>
<b>Hierarchy Level</b>	<p>[edit bridge-domains <i>bridge-domain-name</i> bridge-options],          [edit logical-systems <i>logical-system-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options],          [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options],          [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> switch-options],          [edit logical-systems <i>logical-system-name</i> switch-options],          [edit routing-instances <i>routing-instance-name</i> bridge-domains <i>bridge-domain-name</i> bridge-options],          [edit routing-instances <i>routing-instance-name</i> switch-options],          [edit switch-options],          [edit switch-options],          [edit vlans <i>vlan-name</i> switch-options]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Support for the <b>switch-options</b> statement added in Junos OS Release 9.2.</p> <p>Support for top-level configuration for the <b>virtual-switch</b> type of routing instance added in Junos OS Release 9.2. In Junos OS Release 9.1 and earlier, the routing instances hierarchy supported this statement only for a VPLS instance or a bridge domain configured within a virtual switch.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p><b>[edit switch-options]</b> and <b>[edit vlans <i>vlan-name</i> switch-options]</b> hierarchy levels introduced in Junos OS Release 12.3R2 for EX Series switches.</p> <p>Support at the <b>[edit vlans <i>vlan-name</i> switch-options]</b> hierarchy level introduced in Junos OS Release 13.2 for the QFX Series.</p>
<b>Description</b>	<p>Modify the size of the MAC address table for the bridge domain or VLAN, a set of bridge domains or VLANs associated with a trunk port, or a virtual switch. The default is 5120 MAC addresses.</p>



**NOTE:** For multichassis link aggregation (MC-LAG) peers in active-active mode, configuring the **mac-table-size** statement or changing the **mac-table-size** configuration when traffic is flowing can cause the MAC entries to be out of synchronization between the two MC-LAG peers, which might result in flooding. To avoid flooding, you must either halt traffic forwarding and then configure the **mac-table-size** statement or use the **commit at** configuration statement to commit the changes at the same time in both the peer nodes.

Alternatively, if flooding does occur, you can clear the bridge MAC table on both the routers by using the **clear bridge mac-table** command. Running this

command ensures that the MAC entries are re-learned and in synchronization between both the peers.

.....

**Options**    *limit*—Specify the maximum number of addresses in the MAC address table.  
**Range:** 16 through 1,048,575 MAC addresses  
**Default:** 5120 MAC addresses There is no default MAC address limit for the **mac-table-size** statement at the **[edit switch-options]** hierarchy level. The number of MAC addresses that can be learned is only limited by the platform, 65,535 MAC addresses for EX Series switches and 1,048,575 MAC addresses for other devices.

The remaining statement is explained separately. See [CLI Explorer](#).

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

**Related Documentation**

- *Layer 2 Learning and Forwarding for Bridge Domains Overview*
- [Layer 2 Learning and Forwarding for VLANs Overview on page 6](#)
- *Layer 2 Learning and Forwarding for Bridge Domains Functioning as Switches with Layer 2 Trunk Ports*
- *Layer 2 Learning and Forwarding for VLANs Acting as a Switch for a Layer 2 Trunk Port*

## notification-interval

---

<b>Syntax</b>	notification-interval <i>seconds</i> ;
<b>Hierarchy Level</b>	[edit ethernet-switching-options <a href="#">mac-notification</a> ] [edit switch-options <a href="#">mac-notification</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6 for EX Series switches. Statement introduced in Junos OS Release 11.1 for the QFX Series. Hierarchy level <a href="#">[edit switch-options]</a> added in Junos OS Release 14.1X53-D10 for EX Series and QFX Series.
<b>Description</b>	<p>Configure the MAC notification interval for a switch.</p> <p>The MAC notification interval is the amount of time the switch waits before sending learned or unlearned MAC address SNMP notifications to the network management server. For instance, if the MAC notification interval is set to 10, all of the MAC address addition and removal SNMP notifications will be sent to the network management system every 10 seconds.</p>
<b>Options</b>	<p><b>seconds</b>—The MAC notification interval, in seconds.</p> <p><b>Range:</b> 1 through 60</p> <p><b>Default:</b> 30</p>
<b>Required Privilege Level</b>	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p> <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring MAC Notification (CLI Procedure)</a></li><li>• <a href="#">Configuring MAC Notification (CLI Procedure)</a></li><li>• <a href="#">Configuring MAC Notification on Switches with ELS Support (CLI Procedure) on page 29</a></li></ul>



## CHAPTER 6

# STP Configuration Statements

- [bpdu-block on page 123](#)
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- [vstp on page 180](#)

## bpdu-block

<b>Syntax</b>	<pre>bpdu-block {   interface (<i>interface-name</i> disable   all);   <b>disable-timeout</b> <i>seconds</i>; }</pre>
<b>Hierarchy Level</b>	<p>[edit protocols layer2-control ]</p> <p>[edit ethernet-switching-options]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 9.1 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	<p>Configures bridge protocol data unit (BPDU) protection on a specified interface or on all interfaces. If the interface receives incompatible BPDUs, it is disabled.</p> <p>If the <b>disable-timeout</b> statement is included in the BPDU configuration, the interface is automatically reenabled after the timer expires. Otherwise, you must use the operational mode command <b>clear bpdu-error</b> to unblock and reenable the interface.</p> <p>The remaining statements are explained separately. See <a href="#">CLI Explorer</a>.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding BPDU Protection for Spanning-Tree Instance Interfaces</i></li> <li>• <i>BPDU Protection for Individual Spanning-Tree Instance Interfaces</i></li> <li>• <i>Configuring BPDU Protection for Spanning-Tree Instance Interfaces</i></li> <li>• <i>Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches</i></li> <li>• <i>Example: Configuring BPDU Protection on Interfaces to Prevent STP Miscalculations on EX Series Switches</i></li> <li>• <i>Unblocking an Interface That Receives BPDUs in Error (CLI Procedure)</i></li> <li>• <i>Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches</i></li> <li>• <a href="#">show spanning-tree bridge on page 255</a></li> <li>• <a href="#">show spanning-tree interface on page 260</a></li> <li>• <i>clear bpdu-error</i></li> </ul>

## bpdu-block-on-edge

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<b>Syntax</b>	bpdu-block-on-edge;
<b>Hierarchy Level</b>	[edit logical-systems <i>logical-system-name</i> protocols (mstp   <a href="#">rstp</a>   <a href="#">vstp</a> )], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <a href="#">rstp</a>   <a href="#">vstp</a> )], [edit protocols ( mstp   rstp  vstp )], [edit routing-instances <i>routing-instance-name</i> protocols (mstp   <a href="#">rstp</a>   <a href="#">vstp</a> )]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.1 for EX Series switches. Statement introduced in Junos OS Release 9.4 for additional devices. Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support. Statement updated in Junos OS Release 11.1 for EX Series switches to change blocking behavior to port shutdown. Support for logical systems added in Junos OS Release 9.6. Statement introduced in Junos OS Release 17.1 for ACX Series routers.
<b>Description</b>	<p>Configure bridge protocol data unit (BPDU) protection on all edge ports of a switch. When the <b>bpdu-block-on-edge</b> statement is configured and the interface encounters an incompatible BPDU, the interface shuts down.</p> <p>If the <a href="#">disable-timeout</a> statement is included in the BPDU configuration, the interface is automatically reenabled after the timer expires. Otherwise, you must use the operational mode command <b>clear bpdu-error</b> to unblock and reenable the interface.</p>
<b>Default</b>	Not enabled.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Understanding BPDU Protection for Spanning-Tree Instance Interfaces</i></li><li>• <i>Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches</i></li><li>• <i>BPDU Protection on All Edge Ports of the Bridge</i></li><li>• <i>Configuring BPDU Protection on All Edge Ports</i></li><li>• <a href="#">Configuring BPDU Protection on Spanning Tree Interfaces on page 68</a></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li><li>• <i>Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches</i></li><li>• <i>Example: Configuring BPDU Protection on Edge Interfaces to Prevent STP Miscalculations on EX Series Switches</i></li><li>• <a href="#">rstp on page 168</a></li><li>• <i>mstp</i></li></ul>

- [vstp on page 180](#)
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)
- *clear bpd-error*

## bpdu-timeout-action

<b>Syntax</b>	bpdu-timeout-action { block; log; }
<b>Hierarchy Level</b>	[edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b> )], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b> )],
<b>Switches supporting ELS</b>	[edit protocols mstp interface (all   <i>interface-name</i> )], [edit protocols mstp interface (all   <i>interface-name</i> ) arp-on-stp], [edit protocols <b>rstp</b> interface (all   <i>interface-name</i> )], [edit protocols <b>rstp</b> interface (all   <i>interface-name</i> ) arp-on-stp], [edit protocols stp interface (all   <i>interface-name</i> )], [edit protocols stp interface (all   <i>interface-name</i> ) arp-on-stp], [edit protocols <b>vstp</b> vlan <i>vlan-id</i> interface (all   <i>interface-name</i> )], [edit protocols <b>vstp</b> vlan <i>vlan-id</i> interface (all   <i>interface-name</i> ) arp-on-stp]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.1 for EX Series switches. Statement introduced in Junos OS Release 9.4 for other devices. Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support. Support for logical systems added in Junos OS Release 9.6. Statement introduced in Junos OS Release 17.1 for ACX Series routers.
<b>Description</b>	Provide STP loop protection for a given STP family protocol interface. Configure the BPDU timeout action on a specific interface. You must configure at least one action ( <b>log</b> , <b>block</b> , or both).  The remaining statements are explained separately. See <a href="#">CLI Explorer</a> .
<b>Default</b>	If the <b>bpdu-timeout-action</b> statement is not configured, an interface that stops receiving BPDUs will transition to the designated port (forwarding) state, creating a potential loop.
<b>Options</b>	<b>log</b> —The interface logs the fact that it has not received BPDUs during the timeout interval.  <b>block</b> —The interface is blocked and the fact that the interface has not received BPDUs during the timeout interval is logged.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding Loop Protection for Spanning-Tree Instance Interfaces</i></li> <li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li> <li>• <i>Configuring Loop Protection for a Spanning-Tree Instance Interface</i></li> </ul>

- *Example: Enabling Loop Protection for Spanning-Tree Protocols*
- *Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches*
- *Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches*
- *Example: Configuring Loop Protection to Prevent Interfaces from Transitioning from Blocking to Forwarding in a Spanning Tree on EX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)
- [rstp on page 168](#)
- *mstp*
- [vstp on page 180](#)

## bridge-priority

<b>Syntax</b>	<code>bridge-priority <i>priority</i>;</code>
<b>Hierarchy Level</b>	<pre> [edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>)], [edit logical-systems <i>logical-system-name</i> protocols mstp <b>msti</b> <i>msti-id</i>], [edit logical-systems <i>logical-system-name</i> protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols   (mstp   <b>rstp</b>)], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i>   protocols mstp <b>msti</b> <i>msti-id</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols   <b>vstp</b> <i>vlan</i> <i>vlan-id</i>],  [edit routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>)], [edit routing-instances <i>routing-instance-name</i> protocols mstp <b>msti</b> <i>msti-id</i>], [edit routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>]  [edit protocols mstp], [edit protocols mstp <b>msti</b> <i>msti-id</i>], [edit protocols <b>rstp</b>], [edit protocols stp], [edit protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>] </pre>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	<p>Configures the bridge priority, which determines which bridge is elected as the root bridge. If two bridges have the same path cost to the root bridge, the bridge priority determines which bridge becomes the designated bridge for a LAN segment.</p>
<b>Default</b>	32,768
<b>Options</b>	<p><b>priority</b>—The bridge priority can be set only in increments of 4096.</p> <p><b>Range:</b> 0 through 61,440</p> <p><b>Default:</b> 32,768</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li> <li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li> <li>• <i>Understanding Bridge Priority for Election of Root Bridge and Designated Bridge</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li> </ul>



- *Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

## configuration-name


<b>Syntax</b>	configuration-name <i>configuration-name</i> ;
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols mstp],          [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols mstp],          [edit protocols mstp],          [edit routing-instances <i>routing-instance-name</i> protocols mstp]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.          Statement introduced in Junos OS Release 9.0 for EX Series switches.          Support for logical systems added in Junos OS Release 9.6.          Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	Specify the configuration name, which is the MSTP region name carried in the MSTP BPDUs.
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.          routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li> <li>• <i>Understanding BPDUs Used for Exchanging Information Among Bridges</i></li> <li>• <i>Configuring Multiple Spanning Tree Protocol</i></li> <li>• <i>Configuring MSTP</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li> <li>• <i>Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches</i></li> <li>• <a href="#">show spanning-tree bridge on page 255</a></li> <li>• <a href="#">show spanning-tree interface on page 260</a></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li> <li>• <a href="#">Example: Configuring Faster Convergence and Improved Network Stability with RSTP on page 40</a></li> <li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li> </ul>

## cost

<b>Syntax</b>	<code>cost cost;</code>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p>
<b>Description</b>	For Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), VLAN Spanning Tree Protocol (VSTP), or Multiple Spanning Tree Protocol (MSTP), configure the link cost to control which bridge is the designated bridge and which interface is the designated interface.
<b>Default</b>	The link cost is determined by the link speed.
<b>Options</b>	<p><b>cost</b>—(Optional) Link cost associated with the port.</p> <p><b>Range:</b> 1 through 200,000,000</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Understanding Spanning-Tree Instance Interface</li> <li>Understanding Spanning-Tree Instance Interface Cost</li> </ul>

- *Understanding STP for EX Series Switches*
- *Understanding RSTP for EX Series and QFX Series Switches*
- *Understanding MSTP for EX Series and QFX Series Switches*
- *Understanding VSTP for EX Series Switches and QFX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

## disable

<b>Syntax</b>	disable;
<b>Hierarchy Level</b>	<pre> [edit logical-systems <i>logical-system-name</i> protocols mstp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i>   protocols mstp],  [edit protocols mpls], [edit protocols mpls interface (all   <i>interface-name</i>)],  [edit protocols mstp], [edit protocols mstp (all   <i>interface-name</i>)], [edit protocols mstp (all   <i>interface-name</i>) arp-on-stp], [edit protocols mstp <i>msti</i> <i>msti-id</i> <i>vlan</i> (<i>vlan-id</i>   <i>vlan-name</i>) interface (all   <i>interface-name</i>)], [edit protocols mstp <i>msti</i> <i>msti-id</i> <i>vlan</i> (<i>vlan-id</i>   <i>vlan-name</i>) interface <i>interface-name</i>   arp-on-stp], [edit protocols <i>rstp</i>], [edit protocols <i>rstp</i> interface (all   <i>interface-name</i>)], [edit protocols <i>rstp</i> interface (all   <i>interface-name</i>) arp-on-stp], [edit protocols stp], [edit protocols stp interface (all   <i>interface-name</i>)], [edit protocols stp interface (all   <i>interface-name</i>) arp-on-stp], [edit protocols <i>vstp</i>], [edit protocols <i>vstp</i> <i>vlan</i> <i>vlan-id</i> interface (all   <i>interface-name</i>)], [edit protocols <i>vstp</i> <i>vlan</i> <i>vlan-id</i> interface (all   <i>interface-name</i>) arp-on-stp], [edit protocols mstp interface <i>interface-name</i>, [edit protocols mstp <i>msti</i> <i>msti-id</i> <i>vlan</i> (all <i>vlan-id</i>   <i>vlan-name</i>) interface <i>interface-name</i>], [edit protocols <i>rstp</i> interface <i>interface-name</i>], [edit protocols <i>vstp</i> <i>vlan</i> <i>vlan-id</i> interface <i>interface-name</i>]  [edit routing-instances <i>routing-instance-name</i> protocols mstp] [edit ethernet-switching-options <i>bpd</i><i>u-block</i> interface]</pre>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Statement introduced in Junos OS Release 12.2 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement updated in Junos OS Release 15.1 for EX Series switches.</p>
<b>Description</b>	Disable the entire MSTP, RSTP, or VSTP instance on a specific interface.
	<div>  <p><b>NOTE:</b> You cannot disable spanning tree parameters for all interfaces.</p> </div>
<b>Default</b>	Not enabled

<b>Required Privilege</b>	routing—To view this statement in the configuration.
<b>Level</b>	routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Understanding RSTP for EX Series and QFX Series Switches</i></li><li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li><li>• <i>Configuring Multiple Spanning Tree Protocol</i></li><li>• <i>Configuring VLAN Spanning Tree Protocol</i></li><li>• <a href="#">Configuring RSTP on EX Series Switches (CLI Procedure) on page 59</a></li><li>• <i>Configuring MSTP</i></li><li>• <i>Disabling MSTP</i></li><li>• <i>Example: Configuring BPDU Protection on Interfaces to Prevent STP Miscalculations on EX Series Switches</i></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li><li>• <a href="#">Example: Configuring Faster Convergence and Improved Network Stability with RSTP on page 40</a></li><li>• <i>interface</i></li><li>• <a href="#">show spanning-tree bridge on page 255</a></li><li>• <a href="#">show spanning-tree interface on page 260</a></li></ul>

## bpdu-block

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<b>Syntax</b>	<pre>bpdu-block {     interface (<i>interface-name</i> disable   all);     disable-timeout <i>seconds</i>; }</pre>
<b>Hierarchy Level</b>	<pre>[edit protocols layer2-control ] [edit ethernet-switching-options]</pre>
<b>Release Information</b>	Statement introduced in Junos OS Release 9.1 for EX Series switches. Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.
<b>Description</b>	<p>Configures bridge protocol data unit (BPDU) protection on a specified interface or on all interfaces. If the interface receives incompatible BPDUs, it is disabled.</p> <p>If the <b>disable-timeout</b> statement is included in the BPDU configuration, the interface is automatically reenabled after the timer expires. Otherwise, you must use the operational mode command <b>clear bpdu-error</b> to unblock and reenable the interface.</p> <p>The remaining statements are explained separately. See <a href="#">CLI Explorer</a>.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Understanding BPDU Protection for Spanning-Tree Instance Interfaces</i></li><li>• <i>BPDU Protection for Individual Spanning-Tree Instance Interfaces</i></li><li>• <i>Configuring BPDU Protection for Spanning-Tree Instance Interfaces</i></li><li>• <i>Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches</i></li><li>• <i>Example: Configuring BPDU Protection on Interfaces to Prevent STP Miscalculations on EX Series Switches</i></li><li>• <i>Unblocking an Interface That Receives BPDUs in Error (CLI Procedure)</i></li><li>• <i>Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches</i></li><li>• <a href="#">show spanning-tree bridge on page 255</a></li><li>• <a href="#">show spanning-tree interface on page 260</a></li><li>• <i>clear bpdu-error</i></li></ul>

## bpdu-block-on-edge

<b>Syntax</b>	<code>bpdu-block-on-edge;</code>
<b>Hierarchy Level</b>	<code>[edit logical-systems <i>logical-system-name</i> protocols (mstp   <a href="#">rstp</a>   <a href="#">vstp</a>)],</code> <code>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols</code> <code>(mstp   <a href="#">rstp</a>   <a href="#">vstp</a>)],</code> <code>[edit protocols ( mstp   rstp  vstp )],</code> <code>[edit routing-instances <i>routing-instance-name</i> protocols (mstp   <a href="#">rstp</a>   <a href="#">vstp</a>)]</code>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 9.1 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 9.4 for additional devices.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Statement updated in Junos OS Release 11.1 for EX Series switches to change blocking behavior to port shutdown.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 17.1 for ACX Series routers.</p>
<b>Description</b>	<p>Configure bridge protocol data unit (BPDU) protection on all edge ports of a switch. When the <b>bpdu-block-on-edge</b> statement is configured and the interface encounters an incompatible BPDU, the interface shuts down.</p> <p>If the <a href="#">disable-timeout</a> statement is included in the BPDU configuration, the interface is automatically reenabled after the timer expires. Otherwise, you must use the operational mode command <b>clear bpdu-error</b> to unblock and reenable the interface.</p>
<b>Default</b>	Not enabled.
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding BPDU Protection for Spanning-Tree Instance Interfaces</i></li> <li>• <i>Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches</i></li> <li>• <i>BPDU Protection on All Edge Ports of the Bridge</i></li> <li>• <i>Configuring BPDU Protection on All Edge Ports</i></li> <li>• <a href="#">Configuring BPDU Protection on Spanning Tree Interfaces on page 68</a></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li> <li>• <i>Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches</i></li> <li>• <i>Example: Configuring BPDU Protection on Edge Interfaces to Prevent STP Miscalculations on EX Series Switches</i></li> <li>• <a href="#">rstp on page 168</a></li> <li>• <i>mstp</i></li> </ul>

- [vstp on page 180](#)
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)
- *clear bpd-error*



## bpdu-timeout-action

<b>Syntax</b>	bpdu-timeout-action { block; log; }
<b>Hierarchy Level</b>	[edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b> )], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b> )],
<b>Switches supporting</b>	[edit protocols mstp interface (all   <i>interface-name</i> )],
<b>ELS</b>	[edit protocols mstp interface (all   <i>interface-name</i> ) arp-on-stp], [edit protocols <b>rstp</b> interface (all   <i>interface-name</i> )], [edit protocols <b>rstp</b> interface (all   <i>interface-name</i> ) arp-on-stp], [edit protocols stp interface (all   <i>interface-name</i> )], [edit protocols stp interface (all   <i>interface-name</i> ) arp-on-stp], [edit protocols <b>vstp</b> vlan <i>vlan-id</i> interface (all   <i>interface-name</i> )], [edit protocols <b>vstp</b> vlan <i>vlan-id</i> interface (all   <i>interface-name</i> ) arp-on-stp]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.1 for EX Series switches. Statement introduced in Junos OS Release 9.4 for other devices. Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support. Support for logical systems added in Junos OS Release 9.6. Statement introduced in Junos OS Release 17.1 for ACX Series routers.
<b>Description</b>	Provide STP loop protection for a given STP family protocol interface. Configure the BPDU timeout action on a specific interface. You must configure at least one action ( <b>log</b> , <b>block</b> , or both).  The remaining statements are explained separately. See <a href="#">CLI Explorer</a> .
<b>Default</b>	If the <b>bpdu-timeout-action</b> statement is not configured, an interface that stops receiving BPDUs will transition to the designated port (forwarding) state, creating a potential loop.
<b>Options</b>	<b>log</b> —The interface logs the fact that it has not received BPDUs during the timeout interval.  <b>block</b> —The interface is blocked and the fact that the interface has not received BPDUs during the timeout interval is logged.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding Loop Protection for Spanning-Tree Instance Interfaces</i></li> <li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li> <li>• <i>Configuring Loop Protection for a Spanning-Tree Instance Interface</i></li> </ul>

- *Example: Enabling Loop Protection for Spanning-Tree Protocols*
- *Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches*
- *Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches*
- *Example: Configuring Loop Protection to Prevent Interfaces from Transitioning from Blocking to Forwarding in a Spanning Tree on EX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)
- [rstp on page 168](#)
- *mstp*
- [vstp on page 180](#)

## bridge-priority

<b>Syntax</b>	<code>bridge-priority <i>priority</i>;</code>
<b>Hierarchy Level</b>	<pre>[edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>)], [edit logical-systems <i>logical-system-name</i> protocols mstp <b>msti</b> <i>msti-id</i>], [edit logical-systems <i>logical-system-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols   (mstp   <b>rstp</b>)], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i>   protocols mstp <b>msti</b> <i>msti-id</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols   <b>vstp</b> <b>vlan</b> <i>vlan-id</i>],  [edit routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>)], [edit routing-instances <i>routing-instance-name</i> protocols mstp <b>msti</b> <i>msti-id</i>], [edit routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i>]  [edit protocols mstp], [edit protocols mstp <b>msti</b> <i>msti-id</i>], [edit protocols <b>rstp</b>], [edit protocols stp], [edit protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i>]</pre>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	<p>Configures the bridge priority, which determines which bridge is elected as the root bridge. If two bridges have the same path cost to the root bridge, the bridge priority determines which bridge becomes the designated bridge for a LAN segment.</p>
<b>Default</b>	32,768
<b>Options</b>	<p><b><i>priority</i></b>—The bridge priority can be set only in increments of 4096.</p> <p><b>Range:</b> 0 through 61,440</p> <p><b>Default:</b> 32,768</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li> <li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li> <li>• <i>Understanding Bridge Priority for Election of Root Bridge and Designated Bridge</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li> </ul>

- *Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

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## configuration-name

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<b>Syntax</b>	configuration-name <i>configuration-name</i> ;
<b>Hierarchy Level</b>	[edit logical-systems <i>logical-system-name</i> protocols mstp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols mstp], [edit protocols mstp], [edit routing-instances <i>routing-instance-name</i> protocols mstp]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.4. Statement introduced in Junos OS Release 9.0 for EX Series switches. Support for logical systems added in Junos OS Release 9.6. Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.
<b>Description</b>	Specify the configuration name, which is the MSTP region name carried in the MSTP BPDUs.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li><li>• <i>Understanding BPDUs Used for Exchanging Information Among Bridges</i></li><li>• <i>Configuring Multiple Spanning Tree Protocol</i></li><li>• <i>Configuring MSTP</i></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li><li>• <i>Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches</i></li><li>• <a href="#">show spanning-tree bridge on page 255</a></li><li>• <a href="#">show spanning-tree interface on page 260</a></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li><li>• <a href="#">Example: Configuring Faster Convergence and Improved Network Stability with RSTP on page 40</a></li><li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li></ul>

## cost

<b>Syntax</b>	<code>cost cost;</code>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p>
<b>Description</b>	For Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), VLAN Spanning Tree Protocol (VSTP), or Multiple Spanning Tree Protocol (MSTP), configure the link cost to control which bridge is the designated bridge and which interface is the designated interface.
<b>Default</b>	The link cost is determined by the link speed.
<b>Options</b>	<p><b>cost</b>—(Optional) Link cost associated with the port.</p> <p><b>Range:</b> 1 through 200,000,000</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding Spanning-Tree Instance Interface</i></li> <li>• <i>Understanding Spanning-Tree Instance Interface Cost</i></li> </ul>

- *Understanding STP for EX Series Switches*
- *Understanding RSTP for EX Series and QFX Series Switches*
- *Understanding MSTP for EX Series and QFX Series Switches*
- *Understanding VSTP for EX Series Switches and QFX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

## disable

<b>Syntax</b>	disable;
<b>Hierarchy Level</b>	<pre> [edit logical-systems <i>logical-system-name</i> protocols mstp], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i>   protocols mstp],  [edit protocols mpls], [edit protocols mpls interface (all   <i>interface-name</i>)],  [edit protocols mstp], [edit protocols mstp (all   <i>interface-name</i>)], [edit protocols mstp (all   <i>interface-name</i>) arp-on-stp], [edit protocols mstp <i>msti</i> <i>msti-id</i> <i>vlan</i> (<i>vlan-id</i>   <i>vlan-name</i>) interface (all   <i>interface-name</i>)], [edit protocols mstp <i>msti</i> <i>msti-id</i> <i>vlan</i> (<i>vlan-id</i>   <i>vlan-name</i>) interface <i>interface-name</i>   arp-on-stp], [edit protocols <i>rstp</i>], [edit protocols <i>rstp</i> interface (all   <i>interface-name</i>)], [edit protocols <i>rstp</i> interface (all   <i>interface-name</i>) arp-on-stp], [edit protocols stp], [edit protocols stp interface (all   <i>interface-name</i>)], [edit protocols stp interface (all   <i>interface-name</i>) arp-on-stp], [edit protocols <i>vstp</i>], [edit protocols <i>vstp</i> <i>vlan</i> <i>vlan-id</i> interface (all   <i>interface-name</i>)], [edit protocols <i>vstp</i> <i>vlan</i> <i>vlan-id</i> interface (all   <i>interface-name</i>) arp-on-stp], [edit protocols mstp interface <i>interface-name</i>, [edit protocols mstp <i>msti</i> <i>msti-id</i> <i>vlan</i> (all <i>vlan-id</i>   <i>vlan-name</i>) interface <i>interface-name</i>], [edit protocols <i>rstp</i> interface <i>interface-name</i>], [edit protocols <i>vstp</i> <i>vlan</i> <i>vlan-id</i> interface <i>interface-name</i>]  [edit routing-instances <i>routing-instance-name</i> protocols mstp] [edit ethernet-switching-options <i>bpd</i><i>u</i>-<i>block</i> interface]</pre>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Statement introduced in Junos OS Release 12.2 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement updated in Junos OS Release 15.1 for EX Series switches.</p>
<b>Description</b>	Disable the entire MSTP, RSTP, or VSTP instance on a specific interface.
	<div>  <p><b>NOTE:</b> You cannot disable spanning tree parameters for all interfaces.</p> </div>
<b>Default</b>	Not enabled

<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Understanding RSTP for EX Series and QFX Series Switches</i></li><li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li><li>• <i>Configuring Multiple Spanning Tree Protocol</i></li><li>• <i>Configuring VLAN Spanning Tree Protocol</i></li><li>• <a href="#">Configuring RSTP on EX Series Switches (CLI Procedure) on page 59</a></li><li>• <i>Configuring MSTP</i></li><li>• <i>Disabling MSTP</i></li><li>• <i>Example: Configuring BPDU Protection on Interfaces to Prevent STP Miscalculations on EX Series Switches</i></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li><li>• <a href="#">Example: Configuring Faster Convergence and Improved Network Stability with RSTP on page 40</a></li><li>• <i>interface</i></li><li>• <a href="#">show spanning-tree bridge on page 255</a></li><li>• <a href="#">show spanning-tree interface on page 260</a></li></ul>



## disable-timeout

<b>Syntax</b>	<code>disable-timeout seconds;</code>
<b>Hierarchy Level</b>	<p>[edit protocols layer2-control <a href="#">bpdu-block</a>]</p> <p>[edit ethernet-switching-options <a href="#">bpdu-block</a>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 9.1 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 9.4.</p>
<b>Description</b>	<p>For interfaces configured for BPDU protection, specify the amount of time an interface receiving BPDUs is disabled.</p> <p>Configure the timeout value to periodically check to see if an interface is still disabled with BPDU blocking. If this option is not configured, the interface is not periodically checked and remains disabled.</p>
<b>Default</b>	The disable timeout is not enabled.
<b>Options</b>	<p><b>seconds</b>—Amount of time, in seconds, the interface receiving BPDUs is disabled. Once the timeout expires, the interface is brought back into service.</p> <p><b>Range:</b> 10 through 3600</p> <p><b>Default:</b> If this option is not configured, the interface is not periodically checked and remains disabled.</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p> <p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding BPDU Protection for Spanning-Tree Instance Interfaces</i></li> <li>• <i>Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches</i></li> <li>• <i>BPDU Protection for Individual Spanning-Tree Instance Interfaces</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li> <li>• <i>Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches</i></li> <li>• <i>Example: Configuring BPDU Protection on Interfaces to Prevent STP Miscalculations on EX Series Switches</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li> <li>• <a href="#">Example: Configuring BPDU Protection on Edge Interfaces to Prevent STP Miscalculations on page 63</a></li> </ul>

- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

## edge

**Syntax** `edge;`

**Hierarchy Level** [edit logical-systems *logical-system-name* protocols (mstp | **rstp** | **vstp**) **interface** *interface-name*],  
 [edit logical-systems *logical-system-name* protocols mstp **msti** *msti-id* **interface** *interface-name*],  
 [edit logical-systems *logical-system-name* protocols **vstp** **vlan** *vlan-id* **interface** *interface-name*],  
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols (mstp | **rstp** | **vstp**) **interface** *interface-name*],  
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols mstp **msti** *msti-id* **interface** *interface-name*],  
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols **vstp** **vlan** *vlan-id* **interface** *interface-name*],  
  
 [edit protocols (mstp | **rstp** | **vstp**) **interface** (all | *interface-name*)], )arp-on-stp],  
 [edit protocols mstp **msti** *msti-id* **interface** (all | *interface-name*)], )arp-on-stp],  
 [edit protocols **vstp** **vlan** *vlan-id* **interface** (all | *interface-name*)], )arp-on-stp],  
  
 [edit routing-instances *routing-instance-name* protocols (mstp | **rstp** | **vstp**) **interface** *interface-name*]  
 [edit routing-instances *routing-instance-name* protocols mstp **msti** *msti-id* **interface** *interface-name*],  
 [edit routing-instances *routing-instance-name* protocols **vstp** **vlan** *vlan-id* **interface** *interface-name*]

**Release Information** Statement introduced in Junos OS Release 8.4.  
 Statement introduced in Junos OS Release 9.0 for EX Series switches.  
 Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.  
 Support for logical systems added in Junos OS Release 9.6.  
 Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.

**Description** For Rapid Spanning Tree Protocol (RSTP), VLAN Spanning Tree Protocol (VSTP), or Multiple Spanning Tree Protocol (MSTP), configure interfaces as edge ports or edge interfaces. Edge ports do not expect to receive BPDUs. If a BPDU is received, the port becomes a nonedge port and the Edge interfaces immediately transition to a forwarding state.



**NOTE:** Although the edge configuration statement appears in the [edit protocols stp interface (all | *interface-name*)] or [edit protocols rstp force-version stp interface (all | *interface-name*)] hierarchy on the switch, this statement has no effect on the switch operation if you configure it.

**Default** Edge interfaces are not enabled.

<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Understanding STP for EX Series Switches</i></li><li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li><li>• <i>Understanding Spanning-Tree Instance Interface</i></li><li>• <i>Configuring a Spanning-Tree Instance Interface as an Edge Port for Faster Convergence</i></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li><li>• <a href="#">Example: Configuring Faster Convergence and Improved Network Stability with RSTP on page 40</a></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li><li>• <i>Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches</i></li><li>• <a href="#">show spanning-tree bridge on page 255</a></li><li>• <a href="#">show spanning-tree interface on page 260</a></li></ul>

## force-version (IEEE 802.1D STP)

<b>Syntax</b>	force-version stp;
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols (<a href="#">rstp</a>   <a href="#">vstp</a>)],  [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (<a href="#">rstp</a>   <a href="#">vstp</a>)],  [edit protocols (<a href="#">rstp</a>   <a href="#">vstp</a>)],  [edit routing-instances <i>routing-instance-name</i> protocols (<a href="#">rstp</a>   <a href="#">vstp</a>)]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.  Statement introduced in Junos OS Release 9.4 for EX Series switches.  Support for logical systems added in Junos OS Release 9.6.  Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.  Support for logical systems added in Junos OS Release 9.6.</p>
<b>Description</b>	Forces the spanning-tree version to be the original IEEE 803.1D STP protocol.
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.  routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>RSTP or VSTP Forced to Run as IEEE 802.1D STP</i></li> <li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li> <li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li> <li>• <i>Reverting to RSTP or VSTP from Forced IEEE 802.1D STP</i></li> <li>• <a href="#">show spanning-tree bridge on page 255</a></li> <li>• <a href="#">show spanning-tree interface on page 260</a></li> </ul>

## forward-delay

<b>Syntax</b>	<code>forward-delay seconds;</code>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>)],  [edit logical-systems <i>logical-system-name</i> protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>],  [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>)],  [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>],</p> <p>[edit protocols (mstp   <b>rstp</b>)],  [edit protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>],  [edit routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>)],  [edit routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	For Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), VLAN Spanning Tree Protocol (VSTP), or Multiple Spanning Tree Protocol (MSTP), specifies the length of time an STP bridge port remains in the listening and learning states before transitioning to the forwarding state.
<b>Options</b>	<p><b>seconds</b>—(Optional) Number of seconds the bridge port remains in the listening and learning states.</p> <p><b>Range:</b> 4 through 30</p> <p><b>Default:</b> 15 seconds</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding Forward Delay Before Ports Transition to Forwarding State</i></li> <li>• <i>Understanding STP for EX Series Switches</i></li> <li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li> <li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li> <li>• <a href="#">Example: Configuring Faster Convergence and Improved Network Stability with RSTP on page 40</a></li> <li>• <i>Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches</i></li> </ul>

- *Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

## hello-time

<b>Syntax</b>	<code>hello-time seconds;</code>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>)],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>)],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>],</p> <p>[edit protocols (mstp   <b>rstp</b>)],</p> <p>[edit protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>)],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <i>vlan</i> <i>vlan-id</i>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p>
<b>Description</b>	For Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), VLAN Spanning Tree Protocol (VSTP), or Multiple Spanning Tree Protocol (MSTP), specifies the number of seconds between transmissions of configuration BPDUs by the root bridge.
<b>Default</b>	2 seconds
<b>Options</b>	<p><b>seconds</b>—(Optional) Number of seconds between transmissions of configuration BPDUs.</p> <p><b>Range:</b> 1 through 10</p> <p><b>Default:</b> 2 seconds</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Understanding Hello Time for Root Bridge to Transmit Hello BPDUs</a></li> <li>• <a href="#">Understanding MSTP for EX Series and QFX Series Switches</a></li> <li>• <a href="#">Understanding VSTP for EX Series Switches and QFX Series Switches</a></li> <li>• <a href="#">Example: Configuring Network Regions for VLANs with MSTP</a></li> <li>• <a href="#">Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</a></li> <li>• <a href="#">Example: Configuring Faster Convergence and Improved Network Stability with RSTP on page 40</a></li> </ul>



- *Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

## interface (BPDU)

<b>Syntax</b>	<code>interface (all   [<i>interface-name</i>]) {     drop; }</code>
<b>Hierarchy Level</b>	<ul style="list-style-type: none"> <li>• For platforms with ELS CLI:     [edit protocols layer2-control]</li> <li>• For platforms with Original CLI:     [edit ethernet-switching-options]</li> </ul>
<b>Release Information</b>	Statement introduced in Junos OS Release 11.1 for the QFX Series.
<b>Description</b>	Apply BPDU protection to all interfaces or one or more interfaces.
<b>Options</b>	<p><b>all</b>—All interfaces.</p> <p><b><i>interface-name</i></b>—Name of the interface.</p> <p><b>drop</b>—Drops xSTP BPDUs.</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li> <li>• <i>Example: Configuring Faster Convergence and Improving Network Stability with RSTP</i></li> <li>• <i>Understanding BPDU Protection for STP, RSTP, and MSTP</i></li> <li>• <a href="#">show spanning-tree bridge on page 255</a></li> <li>• <a href="#">show spanning-tree interface on page 260</a></li> </ul>

## interface (Spanning Tree)

---

**Syntax**    interface *interface-name* {  
              **bpdu-timeout-action** {  
                  alarm;  
                  block;  
              }  
              **cost** *cost*;  
              **edge**;  
              **mode** (p2p | shared);  
              **no-root-port**;  
              **priority** *interface-priority*;  
          }

**Syntax**    interface *interface-name* {  
              arp-on-stp;  
              **bpdu-timeout-action**  
                  block;  
                  log;  
              **cost** *cost*;  
              **disable**;  
              **edge**;  
              **mode** *mode*;  
              **no-root-port**;  
              **priority** *priority*;  
          }

**Hierarchy Level**    [edit logical-systems *logical-system-name* protocols (mstp | **rstp** | **vstp**)],  
                          [edit logical-systems *logical-system-name* protocols **vstp** *vlan* *vlan-id*],  
                          [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols  
                              (mstp | **rstp** | **vstp**)],  
                          [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols  
                              **vstp** *vlan* *vlan-id*],  
  
                          [edit protocols (mstp | **rstp** | **vstp**)],  
                          [edit protocols **vstp** *vlan* *vlan-id*],  
  
                          [edit protocols (mstp | **rstp** | **vstp**)],  
                          [edit protocols **vstp** *vlan* *vlan-id*],  
                          [edit protocols **vstp** *vlan-group* group *group-name* *vlan* (*vlan-id* | *vlan-range*  
                              |open-set-of-values)  
  
                          [edit routing-instances *routing-instance-name* protocols (mstp | **rstp** | **vstp**)],  
                          [edit routing-instances *routing-instance-name* protocols **vstp** *vlan* *vlan-id*]

**Release Information**    Statement introduced in Junos OS Release 8.4.  
                              Statement introduced in Junos OS Release 9.0 for EX Series switches.  
                              Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.  
                              Support for logical systems added in Junos OS Release 9.6.  
                              Statement introduced in Junos OS Release 11.1 for the QFX Series.  
                              Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.  
                              Statement updated in Junos OS Release 15.1 for EX Series switches to support  
                              configuration of spanning tree parameters globally on all interfaces.



**NOTE:** You cannot disable spanning tree parameters globally on all interfaces.

<b>Description</b>	<p>Configures the interface to participate in the RSTP, MSTP, or VSTP instance.</p> <p>The <b>edge</b>, <b>mode</b>, and <b>no-root-port</b> options are not available at the <code>[edit protocols mstp msti <i>msti-id</i>]</code> hierarchy level.</p>
<b>Options</b>	<p><b><i>interface-name</i></b>—Name of a Gigabit Ethernet or 10-Gigabit Ethernet interface.</p> <p>The remaining statements are explained separately. See <a href="#">CLI Explorer</a>.</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding Spanning-Tree Instance Interface</i></li> <li>• <i>Understanding RSTP for EX Series and QFX Series Switches</i></li> <li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li> <li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li> <li>• <a href="#">Configuring RSTP on EX Series Switches (CLI Procedure) on page 59</a></li> <li>• <i>Configuring MSTP</i></li> <li>• <i>Configuring VLAN Spanning Tree Protocol</i></li> <li>• <i>Configuring VSTP (CLI Procedure)</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li> <li>• <i>Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches</i></li> <li>• <a href="#">show spanning-tree bridge on page 255</a></li> <li>• <a href="#">show spanning-tree interface on page 260</a></li> </ul>

## max-age


<b>Syntax</b>	<code>max-age seconds;</code>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols (mstp   rstp)],          [edit logical-systems <i>logical-system-name</i> protocols vstp vlan <i>vlan-id</i>],          [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   rstp)],          [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols vstp vlan <i>vlan-id</i>],</p> <p>[edit protocols mstp],          [edit protocols rstp],          [edit protocols stp],          [edit protocols vstp vlan <i>vlan-id</i>]</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols (mstp   rstp)],          [edit routing-instances <i>routing-instance-name</i> protocols vstp vlan <i>vlan-id</i>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	For Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), VLAN Spanning Tree Protocol (VSTP), or Multiple Spanning Tree Protocol (MSTP), specifies the maximum expected arrival time of hello BPDUs.
<b>Default</b>	20 seconds
<b>Options</b>	<p><b>seconds</b>—(Optional) Number of seconds expected between hello BPDUs.</p> <p><b>seconds</b>—The maximum age of received protocol BPDUs.</p> <p><b>Range:</b> 6 through 40</p> <p><b>Default:</b> 20 seconds</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding Maximum Age for Awaiting Arrival of Hello BPDUs</i></li> <li>• <i>Understanding STP for EX Series Switches</i></li> <li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li> <li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li> </ul>

- *Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches*
- [Example: Configuring Faster Convergence and Improved Network Stability with RSTP on page 40](#)
- *Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

## max-hops

<b>Syntax</b>	<code>max-hops hops;</code>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols mstp],          [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols mstp],          [edit protocols mstp],          [edit routing-instances <i>routing-instance-name</i> protocols mstp]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.          Statement introduced in Junos OS Release 9.0 for EX Series switches.          Support for logical systems added in Junos OS Release 9.6.          Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	Configure the maximum number of hops a BPDU can be forwarded in the MSTP region.
<b>Options</b>	<p><b>hops</b>—(Optional) Number of hops the BPDU can be forwarded.  <b>Range:</b> 1 through 255  <b>Default:</b> 19 hops</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.          routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li> <li>• <i>Configuring Multiple Spanning Tree Protocol</i></li> <li>• <i>Configuring MSTP</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li> <li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li> <li>• <a href="#">show spanning-tree bridge on page 255</a></li> <li>• <a href="#">show spanning-tree interface on page 260</a></li> </ul>

## mode

<b>Syntax</b>	<code>mode (p2p   shared);</code>
<b>Hierarchy Level</b>	<pre> [edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],  [edit protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>], [edit protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>], [edit protocols mstp <b>interface</b> (all   <i>interface-name</i>) arp-on-stp], [edit protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>) arp-on-stp], [edit protocols <b>rstp</b> <b>interface</b> (all   <i>interface-name</i>) arp-on-stp],  [edit routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>], [edit routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>], [edit protocols stp <b>interface</b> (all   (all   <i>interface-name</i>))], [edit protocols stp <b>interface</b> (all   <i>interface-name</i>) arp-on-stp], [edit protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> (all   <i>interface-name</i>) arp-on-stp]</pre>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	For Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), VLAN Spanning Tree Protocol (VSTP), or Multiple Spanning Tree Protocol (MSTP), configures the link mode to identify point-to-point links.
<b>Default</b>	When the link is configured as full-duplex, the default link mode is <b>p2p</b> . When the link is configured half-duplex, the default link mode is <b>shared</b> .
<div>  <b>NOTE:</b> For EX4300 switches, the interfaces operate in full-duplex mode only. </div>	
<b>Options</b>	<p><b>p2p</b>—The link is point to point.</p> <p><b>shared</b>—The link is shared media.</p>

<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Understanding Spanning-Tree Instance Interface</i></li><li>• <i>Understanding Spanning-Tree Instance Interface Point-to-Point Link Mode</i></li><li>• <i>Understanding STP for EX Series Switches</i></li><li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li><li>• <a href="#">Example: Configuring Faster Convergence and Improved Network Stability with RSTP on page 40</a></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li><li>• <i>Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches</i></li><li>• <a href="#">show spanning-tree bridge on page 255</a></li><li>• <a href="#">show spanning-tree interface on page 260</a></li></ul>

## msti

**Syntax** `msti msti-id {  
     bridge-priority priority;  
     vlan (vlan-id | vlan-range | open-set-of-values);  
     interface (interface-name | all) {  
         cost cost;  
         edge;  
         priority interface-priority;  
     }  
}`

**Syntax** `msti msti-id {  
     vlan (vlan-id | vlan-name);  
     interface interface-name {  
         disable-timeout;  
         cost cost;  
         priority priority;  
     }  
}`

**Hierarchy Level** [edit logical-systems *logical-system-name* protocols mstp],  
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols mstp],  
 [edit protocols mstp],  
 [edit routing-instances *routing-instance-name* protocols mstp]

**Release Information** Statement introduced in Junos OS Release 8.4.  
 Statement introduced in Junos OS Release 9.0 for EX Series switches.  
 Support for logical systems added in Junos OS Release 9.6.  
 Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.  
 Statement updated in Junos OS Release 15.1 for EX Series switches to support configuration of spanning tree parameters globally on all interfaces.



**NOTE:** You cannot disable spanning tree parameters globally on all interfaces.

**Description** Configures the Multiple Spanning Tree Instance (MSTI) identifier for Multiple Spanning Tree Protocol (MSTP). MSTI IDs are local to each region, so you can reuse the same MSTI ID in different regions.

**Default** MSTI is disabled.

**Options** *msti-id*—MSTI instance identifier.  
**Range:** 1 through 64



**Range:** 1 through 4094. The Common Instance Spanning Tree (CIST) is always MSTI 0.

The remaining statements are explained separately. See [CLI Explorer](#).

<b>Required Privilege</b>	routing—To view this statement in the configuration.
<b>Level</b>	routing-control—To add this statement to the configuration.

- |                              |  |
|------------------------------|--|
| <b>Related Documentation</b> | <ul style="list-style-type: none"><li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li><li>• <i>Configuring Multiple Spanning Tree Protocol</i></li><li>• <i>Configuring MSTP</i></li><li>• <i>Configuring MST Instances on a Physical Interface</i></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li><li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li><li>• <a href="#">show spanning-tree bridge on page 255</a></li><li>• <a href="#">show spanning-tree interface on page 260</a></li></ul> |
|------------------------------|--|

## no-root-port

<b>Syntax</b>	no-root-port;
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols mstp <b>interface</b> (all   <i>interface-name</i>) arp-on-stp],</p> <p>[edit protocols <b>rstp</b> <b>interface</b> (all   <i>interface-name</i>) arp-on-stp],</p> <p>[edit protocols stp <b>interface</b> (all   <i>interface-name</i>) arp-on-stp],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>]</p> <p>[edit protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> (all   <i>interface-name</i>) arp-on-stp]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 9.1.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 17.1 for ACX Series routers.</p>
<b>Description</b>	Configures an interface to be a spanning-tree designated port. If the bridge receives superior STP bridge protocol data units (BPDUs) on a root-protected interface, that interface transitions to a root-prevented STP state (inconsistency state) and the interface is blocked. This blocking prevents a bridge from being elected the root bridge. When the bridge stops receiving superior STP BPDUs on the root-protected interface, interface traffic is no longer blocked.
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li> <li>• <i>Understanding Root Protection for Spanning-Tree Instance Interfaces in a Layer 2 Switched Network</i></li> <li>• <i>Enabling Root Protection for a Spanning-Tree Instance Interface</i></li> <li>• <i>Example: Configuring Root Protection to Enforce Root Bridge Placement in Spanning Trees on EX Series Switches</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li> </ul>

- *Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

## priority (Protocols STP)

<b>Syntax</b>	<code>priority interface-priority;</code>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols <b>vstp</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit protocols mstp ;<b>interface</b> (all   <i>interface-name</i>) arp-on-stp],</p> <p>[edit protocols mstp<b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i> arp-on-stp],</p> <p>[edit protocols <b>rstp</b> <b>interface</b> (all   <i>interface-name</i>) arp-on-stp],</p> <p>[edit protocols stp <b>interface</b> (all   <i>interface-name</i>) arp-on-stp],</p> <p>[edit protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> (all   <i>interface-name</i>) arp-on-stp]</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>) <b>interface</b> <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols mstp <b>msti</b> <i>msti-id</i> <b>interface</b> <i>interface-name</i>],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols <b>vstp</b> <b>vlan</b> <i>vlan-id</i> <b>interface</b> <i>interface-name</i>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	For Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), VLAN Spanning Tree Protocol (VSTP), or Multiple Spanning Tree Protocol (MSTP), specifies the interface priority to control which interface is elected as the root port. The interface priority must be set in increments of 16.
<b>Default</b>	The default value is 128.
<b>Options</b>	<p><b>priority</b>—(Optional) Interface priority. The interface priority must be set in increments of 16.</p> <p><b>Range:</b> 0 through 240</p>

<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Understanding Spanning-Tree Instance Interface</i></li><li>• <i>Understanding Spanning-Tree Instance Interface Priority</i></li><li>• <i>Understanding STP for EX Series Switches</i></li><li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li><li>• <i>Configuring a Spanning-Tree Instance Interface as an Edge Port for Faster Convergence</i></li><li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li><li>• <i>Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches</i></li><li>• <a href="#">show spanning-tree bridge on page 255</a></li><li>• <a href="#">show spanning-tree interface on page 260</a></li></ul>

## protocols (STP Type)

---

<b>Syntax</b>	<pre>protocols {   mstp { ... }   rstp { ... }   vstp { ... } }</pre>
<b>Hierarchy Level</b>	[edit], [edit logical-systems <i>logical-system-name</i> ], [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> ], [edit routing-instances <i>routing-instance-name</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.4. Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches. Support for logical systems added in Junos OS Release 9.6.
<b>Description</b>	Configure the Spanning Tree Protocol type as MSTP, RSTP, or VSTP.
<b>Options</b>	<b>mstp</b> —Configure the protocol as Multiple Spanning Tree.  <b>rstp</b> —Configure the protocol as Rapid Spanning Tree.  <b>vstp</b> —Configure the protocol as VLAN Spanning Tree.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring RSTP on EX Series Switches (CLI Procedure) on page 59</a></li><li>• <i>Configuring MSTP</i></li><li>• <i>Configuring MST Instances on a Physical Interface</i></li><li>• <i>Configuring VLAN Spanning Tree Protocol</i></li><li>• <i>Configuring Rapid Spanning Tree Protocol</i></li><li>• <i>Configuring Multiple Spanning Tree Protocol</i></li><li>• <i>Configuring VLAN SpanningTree Protocol</i></li><li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li></ul>

## revision-level

---

<b>Syntax</b>	<code>revision-level <i>revision-level</i>;</code>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols mstp],          [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols mstp],          [edit protocols mstp],          [edit routing-instances <i>routing-instance-name</i> protocols mstp]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.          Statement introduced in Junos OS Release 9.0 for EX Series switches.          Support for logical systems added in Junos OS Release 9.6.          Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	For Multiple Spanning Tree Protocol (MSTP), set the revision number of the MSTP configuration.
<b>Options</b>	<p><i>revision-level</i>—Configure the revision number of the MSTP region configuration.  <b>Range:</b> 0 through 65,535</p>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.          routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding MSTP for EX Series and QFX Series Switches</i></li> <li>• <i>Configuring Multiple Spanning Tree Protocol</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP</i></li> <li>• <i>Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</i></li> <li>• <a href="#">show spanning-tree bridge on page 255</a></li> <li>• <a href="#">show spanning-tree interface on page 260</a></li> </ul>

## rstp

---

**List of Syntax**    [MX Series on page 168](#)  
                         [EX Series on page 168](#)  
                         [ELS Versions: EX Series, QFX Series, NFX Series on page 169](#)

**MX Series**

```
rstp {  
    bpdu-block-on-edge;  
    bpdu-destination-mac-address provider-bridge-group;  
    bridge-priority priority;  
    extended-system-id;  
    force-version stp;  
    forward-delay seconds;  
    hello-time seconds;  
    max-age seconds;  
    interface interface-name {  
        bpdu-timeout-action {  
            alarm;  
            block;  
        }  
        cost cost;  
        edge;  
        mode (p2p | shared);  
        no-root-port;  
        priority interface-priority;  
    }  
    priority-hold-time seconds;  
    traceoptions {  
        file filename <files number> <size size> <world-readable | no-world-readable>;  
        flag flag <flag-modifier> <disable>;  
    }  
}
```

**EX Series**

```
rstp {  
    bpdu-block-on-edge;  
    bridge-priority priority; priority;  
    disable;  
    forward-delay seconds;  
    hello-time seconds;  
    interface (all | interface-name) {  
        arp-on-stp;  
        bpdu-timeout-action {  
            block;  
            log;  
        }  
        cost cost;  
        edge;  
        mode mode;  
        no-root-port;  
        priority priority;  
    }  
    max-age seconds;  
    traceoptions {
```



```

    file filename <files number > <size size > <no-stamp | no-world-readable |
      world-readable>;
    flag flag;
  }
}

```

ELS Versions: EX Series, QFX Series, NFX Series

```

rstp {
  bpdu-block-on-edge;
  bpdu-destination-mac-address provider-bridge-group;
  bridge-priority priority;
  disable;
  extended-system-id;
  force-version stp;
  forward-delay seconds;
  hello-time seconds;
  max-age seconds;
  priority-hold-time seconds;
  traceoptions {
    file filename <files number > <size size > <world-readable | no-world-readable>;
    flag flag <flag-modifier> <disable>;
  }
}

```

Hierarchy Level [edit logical-systems *logical-system-name* protocols],  
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name* protocols],  
 [edit protocols],  
 [edit routing-instances *routing-instance-name* protocols]

Release Information Statement introduced in Junos OS Release 8.4.  
 Statement introduced in Junos OS Release 9.0 for EX Series switches.  
**bpd~~u~~-block-on-edge** statement added in Junos OS Release 9.4.  
**bpd~~u~~-timeout-action** statement added in Junos OS Release 9.4.  
 Support for logic systems added in Junos OS Release 9.6.  
 Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.  
 Statement updated in Junos OS Release 15.1 for EX Series and QFX Series switches to support configuration of spanning tree parameters globally on all interfaces.



**NOTE:** You cannot disable spanning tree parameters globally on all interfaces.

**Description** Configure Rapid Spanning Tree Protocol (RSTP). RSTP is defined in the IEEE 802.1D-2004 specification and is used to prevent loops in Layer 2 networks, which results in shorter convergence times than those provided by basic Spanning Tree Protocol (STP).

VSTP and RSTP can be configured concurrently. You can selectively configure up to 253 VLANs using VSTP; the remaining VLANs will be configured using RSTP. VSTP and RSTP are the only spanning-tree protocols that can be configured concurrently on the switch. See *Configuring VSTP (CLI Procedure)* for more information on configuring VSTP and RSTP concurrently.



**BEST PRACTICE:** Configure RSTP when you configure VSTP. RSTP overhead is minimal and this configuration ensures that a spanning-tree protocol is running on all VLANs on your switch, even when your switch is supporting more than 253 VLANs.

The remaining statements are explained separately. See [CLI Explorer](#).

**Default** RSTP is enabled on all Ethernet switching interfaces.

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

**Related Documentation**

- *Configuring Rapid Spanning Tree Protocol*
- *Understanding RSTP for EX Series and QFX Series Switches*
- [Configuring RSTP on EX Series Switches \(CLI Procedure\) on page 59](#)
- *Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

## traceoptions (Spanning Tree)

<b>Syntax</b>	<pre> traceoptions {     file <i>filename</i> &lt;files <i>number</i>&gt; &lt;size <i>size</i>&gt; &lt;world-readable   no-world-readable&gt;;     flag <i>flag</i> &lt;flag-modifier&gt; &lt;disable&gt;; } </pre>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>)],</p> <p>[edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>)],</p> <p>[edit protocols (mstp   <b>rstp</b>   <b>vstp</b>   vstp vlan <i>vlan-id</i>)],</p> <p>[edit routing-instances <i>routing-instance-name</i> protocols (mstp   <b>rstp</b>   <b>vstp</b>)]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement updated in Junos OS Release 9.4 for EX Series switches to add VSTP support.</p> <p>Support for logical systems added in Junos OS Release 9.6.</p> <p>Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	Sets protocol-level tracing options for for spanning-tree protocols MPLS, MVRP, STP, RSTP, MSTP, and VSTP.
<b>Default</b>	The default STP protocol-level trace options are inherited from the global <b>traceoptions</b> statement. Traceoptions is disabled.
<b>Options</b>	<p><b>disable</b>—(Optional) Disable the tracing operation. One use of this option is to disable a single operation when you have defined a broad group of tracing operations, such as <b>all</b>.</p> <p><b>file <i>filename</i></b>—Name of the file to receive the output of the tracing operation. Enclose the name in quotation marks. We recommend that you place STP tracing output in the file <b>/var/log/stp-log</b>.</p> <p><b>files <i>number</i></b>—(Optional) Maximum number of trace files. When a trace file named <b>trace-file</b> reaches its maximum size, it is renamed <b>trace-file.0</b>, then <b>trace-file.1</b>, and so on, until the maximum number of trace files is reached. Then, the oldest trace file is overwritten.</p> <p>If you specify a maximum number of files, you must also specify a maximum file size with the <b>size</b> option.</p> <p><b>Range:</b> 2 through 1000 files</p> <p><b>Default:</b> 1 trace file only</p> <p><b>flag</b>—Tracing operation to perform. To specify more than one tracing operation, include multiple <b>flag</b> statements. The following are the STP-specific tracing options:</p> <ul style="list-style-type: none"> <li><b>all</b>—Trace all operations.</li> </ul>

- **all-failures**—Trace all failure conditions.
- **bpdu**—Trace BPDU reception and transmission.
- **bridge-detection-state-machine**—Trace the bridge detection state machine.
- **error**—Trace all failure conditions.
- **events**—Trace events of the protocol state machine.
- **pdu**—Trace PDUs that were received and sent.
- **port-information-state-machine**—Trace the port information state machine.
- **port-migration-state-machine**—Trace the port migration state machine.
- **port-receive-state-machine**—Trace the port receive state machine.
- **port-role-transit-state-machine**—Trace the port role transit state machine.
- **port-role-select-state-machine**—Trace the port role selection state machine.
- **port-state-transit-state-machine**—Trace the port state transit state machine.
- **port-transmit-state-machine**—Trace the port transmit state machine.
- **ppmd**—Trace the state and events for the ppm process.
- **socket**—Trace socket activity.
- **state-machine**—Trace state machine information.
- **state-machine-variables**—Trace when the state machine variables change.
- **timers**—Trace protocol timers.
- **topology-change-state-machine**—Trace the topology change state machine.

The following are the global tracing options:

- **all**—All tracing operations.
- **config-internal**—Trace configuration internals.
- **general**—Trace general events.
- **normal**—All normal events.

**Default:** If you do not specify this option, only unusual or abnormal operations are traced.

- **parse**—Trace configuration parsing.
- **policy**—Trace policy operations and actions.
- **regex-parse**—Trace regular-expression parsing.
- **route**—Trace routing table changes.
- **state**—Trace state transitions.
- **task**—Trace protocol task processing.
- **timer**—Trace protocol task timer processing.

**no-world-readable**—(Optional) Prevent any user from reading the log file.

**replace**—(Optional) Replace an existing trace file if there is one.

**Default:** If you do not include this option, tracing output is appended to an existing trace file.

**size size**—(Optional) Maximum size of each trace file, in kilobytes (KB) or megabytes (MB). When a trace file named **trace-file** reaches this size, it is renamed **trace-file.0**. When the **trace-file** again reaches its maximum size, **trace-file.0** is renamed **trace-file.1** and **trace-file** is renamed **trace-file.0**. This renaming scheme continues until the maximum number of trace files is reached. Then the oldest trace file is overwritten.

If you specify a maximum file size, you must also specify a maximum number of trace files with the **files** option.

**Syntax:** **xk** to specify KB, **xm** to specify MB, or **xg** to specify GB

**Range:** 10 KB through the maximum file size supported on your system

**Default:** 1 MB

**world-readable**—(Optional) Allow any user to read the log file.

<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
---------------------------------	---

**Related  
Documentation**

- *Understanding RSTP for EX Series and QFX Series Switches*
- *Understanding STP for EX Series Switches*
- *Understanding VSTP for EX Series Switches and QFX Series Switches*
- *Understanding Multiple VLAN Registration Protocol (MVRP)*
- *Understanding Spanning-Tree Protocol Trace Options*
- *Tracing Spanning-Tree Operations*
- *Understanding MSTP for EX Series and QFX Series Switches*
- *Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches*
- *Example: Faster Convergence and Improved Network Stability with RSTP on EX Series Switches*
- *Example: Tracing Spanning-Tree Protocol Operations*
- [show spanning-tree bridge on page 255](#)
- [show spanning-tree interface on page 260](#)

## vlan (MSTP)

**Syntax** `vlan vlan-id;`

**EX Series** `vlan (all | vlan-id | vlan-name) {`  
     `bridge-priority priority;`  
     `forward-delay seconds;`  
     `hello-time seconds;`  
     `interface interface-name {`  
         `bpdu-timeout-action {`  
             `block;`  
             `log;`  
         `}`  
         `cost cost;`  
         `disable;`  
         `edge;`  
         `mode mode;`  
         `no-root-port;`  
         `priority priority;`  
     `}`  
     `max-age seconds;`  
     `traceoptions {`  
         `file filename <files number > <size size > <no-stamp | world-readable |`  
             `no-world-readable>;`  
         `flag flag;`  
     `}`  
`}`

**Hierarchy Level** [edit logical-systems *logical-system-name* protocols mstp *msti msti-id*],  
 [edit logical-systems *logical-system-name* routing-instances *routing-instance-name*  
 protocols mstp *msti msti-id*],  
 [edit protocols mstp *msti msti-id*],  
 [edit protocols mstp *msti msti-id*]  
 [edit protocols *vstp*]  
 [edit routing-instances *routing-instance-name* protocols mstp *msti msti-id*]

**Release Information** Statement introduced in Junos OS Release 8.4.  
 Statement introduced in Junos OS Release 9.0 for EX Series switches.  
 Statement updated with enhanced ? (CLI completion feature) functionality in Junos OS Release 9.5 for EX Series switches.  
 Support for logical systems added in Junos OS Release 9.6.  
 Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.

**Description** Configure the VLANs for a Multiple Spanning Tree Instance (MSTI) or VSTP instance.



**NOTE:** When you configure VSTP with the `set protocol vstp vlan all` command, `vlan-id 1` is excluded to be compatible with Cisco PVST+. If you

want vlan-id 1 to be included in VSTP, you must set it separately with the `set protocol vstp vlan 1` command.



**TIP:** To display a list of all configured VLANs on the system, including VLANs that are configured but not committed, type `?` after `vlan` or `vlangs` in your configuration mode command line. Note that only one VLAN is displayed for a VLAN range.

**Options** *vlan-name*—Name of the VLAN.

*vlan-id*—The VLAN identifier associated with the MSTI.

*vlan-id-range*—Range of VLAN identifiers associated with the MSTI in the form *minimum-vlan-id-maximum-vlan-id*. VLAN identifier ranges are not supported for VSTP.

**Range:** 1 through 4096

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

**Related Documentation**

- *Understanding MSTP for EX Series and QFX Series Switches*
- *Understanding VSTP for EX Series Switches and QFX Series Switches*
- *Configuring Multiple Spanning Tree Protocol*
- *Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches*



## vlan (VSTP)

<b>Syntax</b>	<pre> vlan <i>vlan-id</i> {     bridge-priority <i>priority</i>;     forward-delay <i>seconds</i>;     hello-time <i>seconds</i>;     max-age <i>seconds</i>;     interface <i>interface-name</i> {         cost <i>cost</i>;         edge;         mode (p2p   shared);         no-root-port;         priority <i>interface-priority</i>;     } } </pre>
<b>EX Series</b>	<pre> vlan (all   <i>vlan-id</i>   <i>vlan-name</i>) {     bridge-priority <i>priority</i>;     forward-delay <i>seconds</i>;     hello-time <i>seconds</i>;     interface (all   <i>interface-name</i>) {         bpdu-timeout-action {             block;             log;         }         cost <i>cost</i>;         disable;         edge;         mode <i>mode</i>;         no-root-port;         priority <i>priority</i>;     }     max-age <i>seconds</i>;     traceoptions {         file <i>filename</i> &lt;files <i>number</i> &gt; &lt;size <i>size</i> &gt; &lt;no-stamp   world-readable               no-world-readable&gt;;         flag <i>flag</i>;     } } </pre>
<b>Hierarchy Level</b>	<p>[edit logical-systems <i>logical-system-name</i> protocols <b>vstp</b>],  [edit protocols <b>vstp</b>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 9.0.  Statement introduced in Junos OS Release 9.4 for EX Series switches.  Support for logical systems added in Junos OS Release 9.6.  Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.</p>
<b>Description</b>	<p>Configure VSTP VLAN parameters.</p>



**TIP:** To display a list of all configured VLANs on the system, including VLANs that are configured but not committed, type ? after vlan or vlans in your configuration mode command line. Note that only one VLAN is displayed for a VLAN range.

**Options**    **all**—All VLANs.

***vlan-id***—Numeric VLAN identifier.

***vlan-range***—Name of the VLAN range.

The remaining statements are explained separately. See [CLI Explorer](#).

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

**Related Documentation**

- *Understanding VSTP for EX Series Switches and QFX Series Switches*
- *Configuring VLAN SpanningTree Protocol*

## vlan-group

**Syntax** `vlan-group group group-name {  
vlan (vlan-id |vlan-group |all) {  
}`

**Hierarchy Level** [edit protocols [vstp](#)]

**Release Information** Statement introduced in Junos OS Release 15.1 for EX Series switches.

**Description** Configure VLAN group for Spanning Tree Protocol (VSTP). VSTP is used to prevent loops in Layer 2 networks on a per-VLAN basis.



**BEST PRACTICE:** Configure RSTP when you configure VSTP. RSTP overhead is minimal and this configuration ensures that a spanning-tree protocol is running on all VLANs on your switch, even when your switch is supporting more than the maximum number of allowed VSTP VLANs.

The remaining statements are explained separately. See [CLI Explorer](#).

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

- Related Documentation**
- [vstp on page 180](#)
  - [show spanning-tree bridge on page 255](#)
  - [show spanning-tree interface on page 260](#)
  - *Configuring VLAN Spanning Tree Protocol*
  - *Understanding VSTP for EX Series Switches and QFX Series Switches*

## vstp

**List of Syntax**    [MX Series on page 180](#)  
                          [EX Series, QFX Series, QFabric on page 180](#)  
                          [ELS versions: EX Series, QFX Series, NFX Series on page 182](#)

**MX Series**    vstp {  
                     bpdv-block-on-edge;  
                     force-version stp;  
                     interface *interface-name* {  
                         bpdv-timeout-action {  
                             alarm;  
                             block;  
                         }  
                         cost *cost*;  
                         edge;  
                         mode (p2p | shared);  
                         no-root-port;  
                         priority *interface-priority*;  
                     }  
                     priority-hold-time *seconds*;  
                     vlan *vlan-id* {  
                         bridge-priority *priority*;  
                         forward-delay *seconds*;  
                         hello-time *seconds*;  
                         max-age *seconds*;  
                         interface *interface-name* {  
                             access-trunk  
                             bpdv-timeout-action {  
                                 alarm;  
                                 block;  
                             }  
                             cost *cost*;  
                             edge;  
                             mode (p2p | shared);  
                             no-root-port;  
                             priority *interface-priority*;  
                         }  
                     }  
                     traceoptions {  
                         file *filename* <files *number*> <size *size*> <world-readable | no-world-readable>;  
                         flag *flag* <flag-modifier> <disable>;  
                     }  
                   }

**EX Series, QFX Series, QFabric**    vstp {  
                     bpdv-block-on-edge;  
                     disable;  
                     force-version stp;  
                     vlan (all | *vlan-id* | *vlan-name*) {  
                         bridge-priority *priority*;  
                         forward-delay *seconds*;  
                         hello-time *seconds*;  
                     }

```
interface (all | interface-name) {  
  arp-on-stp;  
  bpdu-timeout-action {  
    block;  
    log;  
  }  
  cost cost;  
  disable;  
  edge;  
  mode mode;  
  no-root-port;  
  priority priority;  
}  
max-age seconds;  
traceoptions {  
  file filename <files number > <size size > <no-stamp | no-world-readable |  
    world-readable>;  
  flag flag;  
}  
}  
}
```

ELS versions: EX Series, QFX Series, NFX Series	<pre> vstp {   bpdu-block-on-edge;   disable;   force-version stp;   interface (interface-name disable   interface-range-name   all ){     bpdu-timeout-action {       alarm;       block;     }     cost cost;     edge;     mode (p2p   shared);     no-root-port;     priority interface-priority;   }   priority-hold-time seconds;   vlan (vlan-id   all){     bridge-priority priority;     forward-delay seconds;     hello-time seconds;     max-age seconds;     interface (interface-name disable   interface-range-name   all ){       bpdu-timeout-action {         alarm;         block;       }       cost cost;       edge;       mode (p2p   shared);       no-root-port;       priority interface-priority;     }   }   traceoptions {     file filename &lt;files number&gt; &lt;size size&gt; &lt;world-readable   no-world-readable&gt;;     flag flag &lt;flag-modifier&gt; &lt;disable&gt;;   }   vlan-group group group-name {     vlansvlan-name (vlan-id  vlan-range   open-set-of-values) {       interface all;       interface interface-name {         disable;       }     }   } } </pre>
Hierarchy Level	<pre> [edit protocols]  [edit logical-systems logical-system-name protocols], [edit logical-systems logical-system-name routing-instances routing-instance-name protocols],  [edit protocols],  [edit routing-instances routing-instance-name protocols] </pre>

**Release Information** Statement introduced in Junos OS Release 9.0.  
 Statement introduced in Junos OS Release 9.4 for EX Series switches.  
**bpdud-block-on-edge** statement added in Junos OS Release 9.4.  
**bpdud-timeout-action** statement added in Junos OS Release 9.4.  
 Support for logical systems added in Junos OS Release 9.6.  
 Statement introduced in Junos OS Release 13.2X50-D10 for EX Series switches.  
 Statement updated in Junos OS Release 15.1 for EX Series switches to support configuration of spanning tree parameters globally on all interfaces.



**NOTE:** You cannot disable spanning tree parameters globally on all interfaces.

**Description** Configures VLAN Spanning Tree Protocol (VSTP). VSTP is used to prevent loops in Layer 2 networks on a per-VLAN basis.

You can have a maximum of 253 VSTP VLANs per switch.

If the number of VLANs on your switch exceeds the VSTP VLAN limit, you must use the **vlan** statement to specify which VLANs or VLAN groups use VSTP. You also cannot use the **vlan all** option to configure VSTP when your switch has more than the maximum allowed VSTP VLANs. To ensure all VLANs are running a spanning-tree protocol, run RSTP for networks with large numbers of VLANs.



**NOTE:** When you configure VSTP with the **set protocol vstp vlan all** command, VLAN ID 1 is not set; it is excluded so that the configuration is compatible with Cisco PVST+. If you want VLAN ID 1 to be included in the VSTP configuration on your switch, you must set it separately with the **set protocol vstp vlan 1** command.



**NOTE:** Option **vlan all** is not supported in Junos OS Release 13.2X50.



**BEST PRACTICE:** Configure RSTP when you configure VSTP. RSTP overhead is minimal and this configuration ensures that some spanning tree protocol is running on all VLANs on your switch, even when your switch has more than the maximum number of allowed VSTP VLANs.

The remaining statements are explained separately. See [CLI Explorer](#).

**Default** VSTP is not enabled by default.

<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Understanding VSTP for EX Series Switches and QFX Series Switches</i></li><li>• <i>Configuring VLAN SpanningTree Protocol</i></li><li>• <i>Configuring VSTP (CLI Procedure)</i></li><li>• <a href="#">Configuring VSTP (CLI Procedure) on page 61</a></li><li>• <i>Example: Configuring VSTP on QFX Series Switches and EX4600 Switches</i></li><li>• <a href="#">show spanning-tree bridge on page 255</a></li><li>• <a href="#">show spanning-tree interface on page 260</a></li></ul>



## CHAPTER 7

# Bridging and VLANs Monitoring Commands

- `clear ethernet-switching table`
- `show ethernet-switching interfaces`
- `show ethernet-switching table`
- `show system statistics arp`
- `show vlans`

## clear ethernet-switching table

**Syntax** clear ethernet-switching table  
 <interface *interface-name*>  
 <mac *mac-address*>  
 <management-vlan>  
 <persistent-mac <*interface* | *mac-address*>>  
 <vlan *vlan-name*>

**Syntax (QFX Series)** clear ethernet-switching table  
 <interface *interface-name*>  
 <mac *mac-address*>  
 <persistent-mac <*interface* | *mac-address*>>  
 <vlan *vlan-name*>

**Release Information** Command introduced in Junos OS Release 9.3 for EX Series switches.  
 Command introduced in Junos OS Release 11.1 for the QFX Series.

### Description



**NOTE:** On a QFabric system, using this command on an FCoE-enabled VLAN when FCoE sessions are active can cause traffic flooding and FCoE traffic drop. The FCoE sessions are not terminated and the traffic reconverges after a short period of time.

Clear learned entries, which are media access control (MAC) addresses, in the Ethernet switching table (also called the forwarding database table).

**Options** **none**—Clear learned entries in the Ethernet switching table, except for persistent MAC addresses.

**interface *interface-name***—(Optional) Clear all learned MAC addresses for the specified interface from the Ethernet switching table.

**mac *mac-address***—(Optional) Clear the specified learned MAC address from the Ethernet switching table.

**management-vlan**—(Optional) Clear all MAC addresses learned for the management VLAN from the Ethernet switching table. Note that you do not specify a VLAN name because only one management VLAN exists.

**persistent-mac <*interface* | *mac-address*>**—(Optional) Clear all MAC addresses, including persistent MAC addresses. Use the **interface** option to clear all MAC addresses on an interface, or use the **mac-address** option to clear all entries for a specific MAC address.

Use this command whenever you move a device in your network that has a persistent MAC address on the switch. If you move the device to another port on the switch and do not clear the persistent MAC address from the original port it was learned

on, then the new port will not learn the MAC address and the device will not be able to connect. If the original port is down when you move the device, then the new port will learn the MAC address and the device can connect—however, unless you cleared the MAC address on the original port, when the port comes back up, the system reinstalls the persistent MAC address in the forwarding table for that port. If this occurs, the address is removed from the new port and the device loses connectivity.

**vlan *vlan-name***—(Optional) Clear all MAC addresses learned for the specified VLAN from the Ethernet switching table.

**Required Privilege Level**

view

**Related Documentation**

- [show ethernet-switching table on page 195](#)

**List of Sample Output**    [clear ethernet-switching table on page 187](#)

**Output Fields**    This command produces no output.

## Sample Output

[clear ethernet-switching table](#)

```
user@switch> clear ethernet-switching table
```

## show ethernet-switching interfaces

---

<b>Syntax</b>	<code>show ethernet-switching interfaces</code> <code>&lt;brief   detail   summary&gt;</code> <code>&lt;interface <i>interface-name</i>&gt;</code>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>In Junos OS Release 9.6 for EX Series switches, the following updates were made:</p> <ul style="list-style-type: none"><li>• <b>Blocking</b> field output was updated.</li><li>• The default view was updated to include information about 802.1Q tags.</li><li>• The <b>detail</b> view was updated to include information on VLAN mapping.</li></ul> <p>Command introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>In Junos OS Release 11.1 for EX Series switches, the <b>detail</b> view was updated to include reflective relay information.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for OCX Series switches.</p>
<b>Description</b>	Display information about switched Ethernet interfaces.
<b>Options</b>	<p><b>none</b>—(Optional) Display brief information for Ethernet-switching interfaces.</p> <p><b>brief   detail   summary</b>—(Optional) Display the specified level of output.</p> <p><b>interface <i>interface-name</i></b>—(Optional) Display Ethernet-switching information for a specific interface.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Troubleshooting Ethernet Switching on page 24</a><a href="#">Understanding Bridging and VLANs on Switches on page 9</a></li><li>• <i>Example: Setting Up Basic Bridging and a VLAN on the QFX Series</i></li><li>• <i>Example: Setting Up Bridging with Multiple VLANs</i></li><li>• <i>Understanding FCoE</i></li><li>• <i>Interfaces Overview for Switches</i></li><li>• <a href="#">show ethernet-switching mac-learning-log on page 242</a></li><li>• <a href="#">show ethernet-switching table on page 195</a></li><li>• <i>Configuring Autorecovery From the Disabled State on Secure or Storm Control Interfaces (CLI Procedure)</i></li></ul>
<b>List of Sample Output</b>	<a href="#">show ethernet-switching interfaces on page 191</a> <a href="#">show ethernet-switching interfaces summary on page 192</a>

[show ethernet-switching interfaces brief on page 192](#)  
[show ethernet-switching interfaces detail on page 192](#)  
[show ethernet-switching interfaces interface-name on page 193](#)  
[show ethernet-switching interfaces on page 193](#)  
[show ethernet-switching interfaces ge-0/0/15 brief on page 193](#)  
[show ethernet-switching interfaces ge-0/0/2 detail \(Blocked by RTG rtggroup\) on page 194](#)  
[show ethernet-switching interfaces ge-0/0/15 detail \(Blocked by STP\) on page 194](#)  
[show ethernet-switching interfaces ge-0/0/17 detail \(Disabled by bpdu-control\) on page 194](#)  
[show ethernet-switching interfaces detail \(C-VLAN to S-VLAN Mapping\) on page 194](#)  
[show ethernet-switching interfaces detail \(Reflective Relay Is Configured\) on page 194](#)

**Output Fields** For QFX Series, QFabric, NFX Series, EX4600 and OCX1100:

Table 5 on page 189 lists the output fields for the **show ethernet-switching interfaces** command on QFX Series, QFabric, NFX Series, EX4600 and OCX1100. Output fields are listed in the approximate order in which they appear.

*Table 5: show ethernet-switching interfaces Output Fields*

Field Name	Field Description	Level of Output
<b>Interface</b>	Name of a switching interface.	All levels
<b>State</b>	Interface state. Values are <b>up</b> or <b>down</b> .	none, <b>brief</b> , <b>detail</b> , <b>summary</b>
<b>VLAN members</b>	Name of a VLAN.	none, <b>brief</b> , <b>detail</b> , <b>summary</b>
<b>Blocking</b>	Forwarding state of the interface: <ul style="list-style-type: none"> <li>• <b>blocked</b>—Traffic is not being forwarded on the interface.</li> <li>• <b>unblocked</b>—Traffic is forwarded on the interface.</li> <li>• <b>MAC limit exceeded</b>—The interface is temporarily disabled because of a MAC limiting error. The disabled interface is automatically restored to service when the disable timeout expires.</li> <li>• <b>MAC move limit exceeded</b>—The interface is temporarily disabled because of a MAC move limiting error. The disabled interface is automatically restored to service when the disable timeout expires.</li> <li>• <b>Storm control in effect</b> —The interface is temporarily disabled because of a storm control error. The disabled interface is automatically restored to service when the disable timeout expires.</li> <li>• <b>Storm control shutdown in effect</b> —The interface is temporarily disabled because of a storm control shutdown error. The disabled interface is automatically restored to service when the disable timeout expires.</li> </ul>	none, <b>brief</b> , <b>detail</b> , <b>summary</b>
<b>Index</b>	VLAN index internal to Junos OS software.	<b>detail</b>
<b>untagged   tagged</b>	Specifies whether the interface forwards IEEE802.1Q-tagged or untagged traffic.	<b>detail</b>

Output fields for EX Series:

Table 6 on page 190 lists the output fields for the **show ethernet-switching interfaces** command on EX Series switches. Output fields are listed in the approximate order in which they appear.

*Table 6: show ethernet-switching interfaces Output Fields*

Field Name	Field Description	Level of Output
<b>Interface</b>	Name of a switching interface.	none, <b>brief</b> , <b>detail</b> , <b>summary</b>
<b>Index</b>	VLAN index internal to Junos OS.	<b>detail</b>
<b>State</b>	Interface state. Values are <b>up</b> and <b>down</b> .	none, <b>brief</b> , <b>detail</b>
<b>Port mode</b>	The <b>access</b> mode is the port mode default and works with a single VLAN. Port mode can also be <b>trunk</b> , which accepts tagged packets from multiple VLANs on other switches. The third port mode value is <b>tagged-access</b> , which accepts tagged packets from access devices.	<b>detail</b>
<b>Reflective Relay Status</b>	Reflective relay allows packets to use the same interface for both upstream and downstream traffic. When reflective relay has been configured, the status displayed is always <b>enabled</b> . When reflective relay is not configured, this entry does not appear in the command output.	<b>detail</b>
<b>Ether type for the interface</b>	Ether type is a two-octet field in an Ethernet frame used to indicate which protocol is encapsulated in the payload of an incoming Ethernet packet. Both 802.1Q packets and Q-in-Q packets use this field. The output displayed for this particular field indicates the interface's Ether type, which is used to match the Ether type of incoming 802.1Q packets and Q-in-Q packets. The indicated Ether type field is also added to the interface's outgoing 802.1Q and Q-in-Q packets.	<b>detail</b>
<b>VLAN membership</b>	Names of VLANs that belong to this interface.	none, <b>brief</b> , <b>detail</b> ,
<b>Tag</b>	Number of the 802.1Q tag.	none, <b>brief</b> , <b>detail</b> ,
<b>Tagging</b>	Specifies whether the interface forwards 802.1Q <b>tagged</b> or <b>untagged</b> traffic.	none, <b>brief</b> , <b>detail</b> ,

Table 6: show ethernet-switching interfaces Output Fields (continued)

Field Name	Field Description	Level of Output
<b>Blocking</b>	<p>The forwarding state of the interface:</p> <ul style="list-style-type: none"> <li>• <b>unblocked</b>—Traffic is forwarded on the interface.</li> <li>• <b>blocked</b>—Traffic is not being forwarded on the interface.</li> <li>• <b>Disabled by bpdu control</b>—The interface is disabled due to receiving BPDUs on a protected interface. If the <b>disable-timeout</b> statement has been included in the BPDU configuration, the interface automatically returns to service after the timer expires.</li> <li>• <b>blocked by RTG</b>—The specified redundant trunk group is disabled.</li> <li>• <b>blocked by STP</b>—The interface is disabled due to a spanning-tree protocol error.</li> <li>• <b>MAC limit exceeded</b>—The interface is temporarily disabled due to a MAC limit error. The disabled interface is automatically restored to service when the disable timeout expires.</li> <li>• <b>MAC move limit exceeded</b>—The interface is temporarily disabled due to a MAC move limit error. The disabled interface is automatically restored to service when the disable timeout expires.</li> <li>• <b>Storm control in effect</b>—The interface is temporarily disabled due to a storm control error. The disabled interface is automatically restored to service when the disable timeout expires.</li> </ul>	none, <b>brief</b> , <b>detail</b> ,
<b>Number of MACs learned on IFL</b>	Number of MAC addresses learned by this interface.	<b>detail</b>
<b>mapping</b>	<p>When mapping is configured, the status is one of the following C-VLAN to S-VLAN mapping types:</p> <ul style="list-style-type: none"> <li>• <b>dot1q-tunneled</b>—The interface maps all traffic to the S-VLAN (all-in-one bundling).</li> <li>• <b>native</b>—The interface maps untagged and priority tagged packets to the S-VLAN.</li> <li>• <b>push</b>—The interface maps packets to a firewall filter to an S-VLAN.</li> <li>• <b>policy-mapped</b>—The interface maps packets to a specifically defined S-VLAN.</li> <li>• <b>integer</b>—The interface maps packets to the specified S-VLAN.</li> </ul> <p>When mapping is not configured, this entry does not appear in the command output.</p>	<b>detail</b>

## Sample Output for QFX Series Switches, QFabric, NFX Series, EX4600 and OCX1100

### show ethernet-switching interfaces

```
user@switch> show ethernet-switching interfaces
```

Interface	State	VLAN members	Blocking
xe-0/0/0.0	up	T1122	unblocked
xe-0/0/1.0	down	default	– MAC limit exceeded
xe-0/0/2.0	down	default	– MAC move limit exceeded
xe-0/0/3.0	down	default	– Storm control in effect
xe-0/0/4.0	down	default	unblocked
xe-0/0/5.0	down	default	unblocked

xe-0/0/6.0	down	default	unblocked
xe-0/0/7.0	down	default	unblocked
xe-0/0/8.0	down	default	unblocked
xe-0/0/9.0	up	T111	unblocked
xe-0/0/10.0	down	default	unblocked
xe-0/0/11.0	down	default	unblocked
xe-0/0/12.0	down	default	unblocked
xe-0/0/13.0	down	default	unblocked
xe-0/0/14.0	down	default	unblocked
xe-0/0/15.0	down	default	unblocked
xe-0/0/16.0	down	default	unblocked
xe-0/0/17.0	down	default	unblocked
xe-0/0/18.0	down	default	unblocked
xe-0/0/19.0	up	T111	unblocked
xe-0/1/0.0	down	default	unblocked
xe-0/1/1.0	down	default	unblocked
xe-0/1/2.0	down	default	unblocked
xe-0/1/3.0	down	default	unblocked

#### show ethernet-switching interfaces summary

```
user@switch> show ethernet-switching interfaces summary
xe-0/0/0.0
xe-0/0/1.0
xe-0/0/2.0
xe-0/0/3.0
xe-0/0/8.0
xe-0/0/10.0
xe-0/0/11.0
```

#### show ethernet-switching interfaces brief

```
user@switch> show ethernet-switching interfaces brief
Interface  State  VLAN members  Blocking
xe-0/0/0.0  down  default        unblocked
xe-0/0/1.0  down  employee-vlan  unblocked
xe-0/0/2.0  down  employee-vlan  unblocked
xe-0/0/3.0  down  employee-vlan  unblocked
xe-0/0/8.0  down  employee-vlan  unblocked
xe-0/0/10.0 down  default        unblocked
xe-0/0/11.0 down  employee-vlan  unblocked
```

#### show ethernet-switching interfaces detail

```
user@switch> show ethernet-switching interfaces detail
Interface: xe-0/0/0.0 Index: 65
State: down
VLANs:
    default                untagged    unblocked

Interface: xe-0/0/1.0 Index: 66
State: down
VLANs:
    employee-vlan          untagged    unblocked

Interface: xe-0/0/2.0 Index: 67
State: down
VLANs:
    employee-vlan          untagged    unblocked
```



```

Interface: xe-0/0/3.0 Index: 68
State: down
VLANs:
  employee-vlan          untagged    unblocked

Interface: xe-0/0/8.0 Index: 69
State: down
VLANs:
  employee-vlan          untagged    unblocked

Interface: xe-0/0/10.0 Index: 70
State: down
VLANs:
  default                untagged    unblocked

Interface: xe-0/0/11.0 Index: 71
State: down
VLANs:
  employee-vlan          tagged      unblocked

```

### show ethernet-switching interfaces interface-name

```

user@switch> show ethernet-switching interfaces xe-0/0/0.0
Interface  State  VLAN members  Blocking
xe-0/0/0.0  down   default       unblocked

```

## Sample Output for EX Series Switches

### show ethernet-switching interfaces

```

user@switch> show ethernet-switching interfaces

Interface  State  VLAN members  Tag  Tagging  Blocking
-----
ae0.0      up     default              300  untagged unblocked
ge-0/0/2.0 up     vlan300              300  untagged blocked by RTG (rtggroup)
ge-0/0/3.0 up     default              300  untagged blocked by STP
ge-0/0/4.0 down   default              300  untagged MAC limit exceeded
ge-0/0/5.0 down   default              300  untagged MAC move limit exceeded
ge-0/0/6.0 down   default              300  untagged Storm control in effect
ge-0/0/7.0 down   default              300  untagged unblocked
ge-0/0/13.0 up     default              300  untagged unblocked
ge-0/0/14.0 up     vlan100              100  tagged   unblocked
              vlan200              200  tagged   unblocked
ge-0/0/15.0 up     vlan100              100  tagged   blocked by STP
              vlan200              200  tagged   blocked by STP
ge-0/0/16.0 down   default              300  untagged unblocked
ge-0/0/17.0 down   vlan100              100  tagged   Disabled by bpdu-control
              vlan200              200  tagged   Disabled by bpdu-control

```

### show ethernet-switching interfaces ge-0/0/15 brief

```

user@switch> show ethernet-switching interfaces ge-0/0/15 brief
Interface  State  VLAN members  Tag  Tagging  Blocking
-----
ge-0/0/15.0 up     vlan100      100  tagged   blocked by STP
              vlan200      200  tagged   blocked by STP

```

#### show ethernet-switching interfaces ge-0/0/2 detail (Blocked by RTG rtggroup)

```
user@switch> show ethernet-switching interfaces ge-0/0/2 detail

Interface: ge-0/0/2.0, Index: 65, State: up, Port mode: Access
Ether type for the interface: 0X8100
VLAN membership:
    vlan300, 802.1Q Tag: 300, untagged, msti-id: 0, blocked by RTG(rtggroup)
Number of MACs learned on IFL: 0
```

#### show ethernet-switching interfaces ge-0/0/15 detail (Blocked by STP)

```
user@switch> show ethernet-switching interfaces ge-0/0/15 detail

Interface: ge-0/0/15.0, Index: 70, State: up, Port mode: Trunk
Ether type for the interface: 0X8100
VLAN membership:
    vlan100, 802.1Q Tag: 100, tagged, msti-id: 0, blocked by STP
    vlan200, 802.1Q Tag: 200, tagged, msti-id: 0, blocked by STP

Number of MACs learned on IFL: 0
```

#### show ethernet-switching interfaces ge-0/0/17 detail (Disabled by bpdu-control)

```
user@switch> show ethernet-switching interfaces ge-0/0/17 detail

Interface: ge-0/0/17.0, Index: 71, State: down, Port mode: Trunk
Ether type for the interface: 0X8100
VLAN membership:
    vlan100, 802.1Q Tag: 100, tagged, msti-id: 1, Disabled by bpdu-control
    vlan200, 802.1Q Tag: 200, tagged, msti-id: 2, Disabled by bpdu-control
Number of MACs learned on IFL: 0
```

#### show ethernet-switching interfaces detail (C-VLAN to S-VLAN Mapping)

```
user@switch> show ethernet-switching interfaces ge-0/0/6.0 detail
Interface: ge-0/0/6.0, Index: 73, State: up, Port mode: Access
Ether type for the interface: 0X8100
VLAN membership:
    map, 802.1Q Tag: 134, Mapped Tag: native, push, dot1q-tunneled, unblocked
    map, 802.1Q Tag: 134, Mapped Tag: 20, push, dot1q-tunneled, unblocked
```

#### show ethernet-switching interfaces detail (Reflective Relay Is Configured)

```
user@switch1> show ethernet-switching interfaces ge-7/0/2 detail
Interface: ge-7/0/2, Index: 66, State: down, Port mode: Tagged-access
Ether type for the interface: 0X8100
Reflective Relay Status: Enabled
Ether type for the interface: 0x8100
VLAN membership:
    VLAN_Purple VLAN_Orange VLAN_Blue, 802.1Q Tag: 450, tagged, unblocked
Number of MACs learned on IFL: 0
```

## show ethernet-switching table

<b>List of Syntax</b>	<a href="#">Syntax (QFX Series, QFabric, NFX Series and EX4600) on page 195</a> <a href="#">Syntax (EX Series) on page 195</a> <a href="#">Syntax (EX Series, MX Series and QFX Series) on page 195</a> <a href="#">Syntax (SRX Series) on page 195</a>
<b>Syntax (QFX Series, QFabric, NFX Series and EX4600)</b>	<pre>show ethernet-switching table &lt;brief   detail   extensive   summary&gt; &lt;interface <i>interface-name</i>&gt; &lt;management-vlan&gt; &lt;sort-by (<i>name</i>   <i>tag</i>)&gt; &lt;vlan <i>vlan-name</i>&gt;</pre>
<b>Syntax (EX Series)</b>	<pre>show ethernet-switching table &lt;brief   detail   extensive   summary&gt; &lt;interface <i>interface-name</i>&gt; &lt;management-vlan&gt; &lt;persistent-mac &lt;interface <i>interface-name</i>&gt;&gt; &lt;sort-by (<i>name</i>   <i>tag</i>)&gt; &lt;vlan <i>vlan-name</i>&gt;</pre>
<b>Syntax (EX Series, MX Series and QFX Series)</b>	<pre>show ethernet-switching table &lt;brief   count   detail   extensive   summary&gt; &lt;address&gt; &lt;instance <i>instance-name</i>&gt; &lt;interface <i>interface-name</i>&gt; isis <i>isid</i> &lt;logical-system <i>logical-system-name</i>&gt; &lt;persistent-learning (interface <i>interface-name</i>   mac <i>mac-address</i>)&gt; &lt;address&gt; &lt;vlan-id (all-vlan   <i>vlan-id</i>)&gt; &lt;vlan-name (all   <i>vlan-name</i>)&gt;</pre>
<b>Syntax (SRX Series)</b>	<pre>show ethernet-switching table (brief   detail   extensive) interface <i>interface-name</i></pre>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 9.5 for SRX Series.</p> <p>Options <b>summary</b>, <b>management-vlan</b>, and <b>vlan <i>vlan-name</i></b> introduced in Junos OS Release 9.6 for EX Series switches.</p> <p>Option <b>sort-by</b> and field name <b>tag</b> introduced in Junos OS Release 10.1 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Output for private VLANs introduced in Junos OS Release 12.1 for the QFX Series.</p> <p>Option <b>persistent-mac</b> introduced in Junos OS Release 11.4 for EX Series switches.</p> <p>Command introduced in Junos OS Release 12.3R2.</p> <p>Command introduced in Junos OS Release 12.3R2 for EX Series switches.</p> <p>Options <b>logical-system</b>, <b>persistent-learning</b>, and <b>summary</b> introduced in Junos OS Release 13.2X50-D10 (ELS).</p>

**Description** Displays the Ethernet switching table.

(MX Series routers, EX Series switches only) Displays Layer 2 MAC address information.

**Options** For QFX Series, QFabric, NFX Series and EX4600:

**none**—(Optional) Display brief information about the Ethernet switching table.

**brief | detail | extensive | summary**—(Optional) Display the specified level of output.

**interface *interface-name***—(Optional) Display the Ethernet switching table for a specific interface.

**management-vlan**—(Optional) Display the Ethernet switching table for a management VLAN.

**persistent-mac <interface *interface-name*>**—(Optional) Display the persistent MAC addresses learned for all interfaces or a specified interface. You can use this command to view entries that you want to clear for an interface that you intentionally disabled.

**sort-by (*name* | *tag*)**—(Optional) Display VLANs in ascending order of VLAN IDs or VLAN names.

**vlan *vlan-name***—(Optional) Display the Ethernet switching table for a specific VLAN.

For EX Series, MX Series and QFX Series:

**none**—Display all learned Layer 2 MAC address information.

**brief | count | detail | extensive | summary**—(Optional) Display the specified level of output.

**address**—(Optional) Display the specified learned Layer 2 MAC address information.

**instance *instance-name***—(Optional) Display learned Layer 2 MAC addresses for the specified routing instance.

**interface *interface-name***—(Optional) Display learned Layer 2 MAC addresses for the specified interface.

**isid *isid***—(Optional) Display learned Layer 2 MAC addresses for the specified ISID.

**logical-system *logical-system-name***—(Optional) Display Ethernet-switching statistics information for the specified logical system.

**persistent-learning (interface *interface-name* | mac *mac-address*)**—(Optional) Display dynamically learned MAC addresses that are retained despite device restarts and interface failures for a specified interface, or information about a specified MAC address.

**vlan-id (all-vlan | *vlan-id*)**—(Optional) Display learned Layer 2 MAC addresses for all VLANs or for the specified VLAN.

**vlan-name (all | *vlan-name*)**—(Optional) Display learned Layer 2 MAC addresses for all VLANs or for the specified VLAN.

For SRX Series:

- **none**—(Optional) Display brief information about the Ethernet switching table.
- **brief | detail | extensive**—(Optional) Display the specified level of output.
- **interface-name**—(Optional) Display the Ethernet switching table for a specific interface.

**Additional Information** When Layer 2 protocol tunneling is enabled, the tunneling MAC address 01:00:0c:cd:cd:d0 is installed in the MAC table. When the Cisco Discovery Protocol (CDP), Spanning Tree Protocol (STP), or VLAN Trunk Protocol (VTP) is configured for Layer 2 protocol tunneling on an interface, the corresponding protocol MAC address is installed in the MAC table.

**Required Privilege Level** view

**Related Documentation**

- *Example: Setting Up Basic Bridging and a VLAN on the QFX Series*
- *Example: Setting Up Bridging with Multiple VLANs*
- *Example: Setting Up Basic Bridging and a VLAN for an EX Series Switch*
- *Example: Setting Up Bridging with Multiple VLANs for EX Series Switches*
- *Example: Setting Up Q-in-Q Tunneling on EX Series Switches*
- [clear ethernet-switching table on page 186](#)
- [show ethernet-switching mac-learning-log on page 242](#)

**List of Sample Output** [show ethernet-switching table \(Enhanced Layer 2 Software on QFX Series, QFabric, NFX Series and EX460\) on page 201](#)  
[show ethernet-switching table \(QFX Series, QFabric, NFX Series and EX460\) on page 202](#)  
[show ethernet-switching table \(Private VLANs on QFX Series, QFabric, NFX Series and EX460\) on page 203](#)  
[show ethernet-switching table \(Junos Fusion Data Center with EVPN on QFX Series switches\) on page 203](#)  
[show ethernet-switching table brief \(QFX Series, QFabric, NFX Series and EX460\) on page 204](#)  
[show ethernet-switching table detail \(QFX Series, QFabric, NFX Series and EX460\) on page 205](#)  
[show ethernet-switching table extensive \(QFX Series, QFabric, NFX Series and EX460\) on page 206](#)  
[show ethernet-switching table interface \(QFX Series, QFabric, NFX Series and EX460\) on page 208](#)  
[show ethernet-switching table \(EX Series switches\) on page 208](#)  
[show ethernet-switching table brief \(EX Series switches\) on page 208](#)  
[show ethernet-switching table detail \(EX Series switches\) on page 209](#)

[show ethernet-switching table extensive \(EX Series switches\) on page 210](#)  
[show ethernet-switching table persistent-mac \(EX Series switches\) on page 210](#)  
[show ethernet-switching table persistent-mac interface ge-0/0/16.0 \(EX Series switches\) on page 210](#)  
[show ethernet-switching table \(EX Series, MX Series and QFX Series\) on page 210](#)  
[show ethernet-switching table brief on page 212](#)  
[show ethernet-switching table count on page 213](#)  
[show ethernet-switching table extensive on page 214](#)  
[show ethernet-switching table detail \(SRX Series\) on page 215](#)  
[show ethernet-switching table extensive \(SRX Series\) on page 216](#)  
[show ethernet-switching table interface ge-0/0/1 \(SRX Series\) on page 217](#)

**Output Fields** For QFX Series, QFabric, NFX Series and EX4600:

The following table lists the output fields for the **show ethernet-switching table** command on QFX Series, QFabric, NFX Series and EX4600. Output fields are listed in the approximate order in which they appear.

*Table 7: show ethernet-switching table Output Fields*

Field Name	Field Description	Level of Output
<b>VLAN</b>	Name of a VLAN.	All levels
<b>MAC address</b>	MAC address associated with the VLAN.	All levels
<b>Type</b>	Type of MAC address: <ul style="list-style-type: none"> <li>• <b>static</b>—The MAC address is manually created.</li> <li>• <b>learn</b>—The MAC address is learned dynamically from a packet's source MAC address.</li> <li>• <b>flood</b>—The MAC address is unknown and flooded to all members.</li> </ul>	All levels
<b>Age</b>	Time remaining before the entry ages out and is removed from the Ethernet switching table.	All levels
<b>Interfaces</b>	Interface associated with learned MAC addresses or with the <b>All-members</b> option (flood entry).	All levels
<b>Learned</b>	For learned entries, the time at which the entry was added to the Ethernet switching table.	<b>detail, extensive</b>

For EX Series switches:

The following table lists the output fields for the **show ethernet-switching table** command on EX Series switches. Output fields are listed in the approximate order in which they appear.

Table 8: show ethernet-switching table Output Fields

Field Name	Field Description	Level of Output
<b>VLAN</b>	The name of a VLAN.	All levels
<b>Tag</b>	The VLAN ID tag name or number.	<b>extensive</b>
<b>MAC or MAC address</b>	The MAC address associated with the VLAN.	All levels
<b>Type</b>	The type of MAC address. Values are: <ul style="list-style-type: none"> <li>• <b>static</b>—The MAC address is manually created.</li> <li>• <b>learn</b>—The MAC address is learned dynamically from a packet's source MAC address.</li> <li>• <b>flood</b>—The MAC address is unknown and flooded to all members.</li> <li>• <b>persistent</b>—The learned MAC addresses that will persist across restarts of the switch or interface-down events.</li> </ul>	All levels except <b>persistent-mac</b>
<b>Type</b>	The type of MAC address. Values are: <ul style="list-style-type: none"> <li>• <b>installed</b>—addresses that are in the Ethernet switching table.</li> <li>• <b>uninstalled</b>—addresses that could not be installed in the table or were uninstalled in an interface-down event and will be reinstalled in the table when the interface comes back up.</li> </ul>	<b>persistent-mac</b>
<b>Age</b>	The time remaining before the entry ages out and is removed from the Ethernet switching table.	All levels
<b>Interfaces</b>	Interface associated with learned MAC addresses or <b>All-members</b> (flood entry).	All levels
<b>Learned</b>	For learned entries, the time which the entry was added to the Ethernet switching table.	<b>detail, extensive</b>
<b>Nexthop index</b>	The next-hop index number.	<b>detail, extensive</b>
<b>persistent-mac</b>	<b>installed</b> indicates MAC addresses that are in the Ethernet switching table and <b>uninstalled</b> indicates MAC addresses that could not be installed in the table or were uninstalled in an interface-down event (and will be reinstalled in the table when the interface comes back up).	

For EX Series, MX Series and QFX Series:

The table describes the output fields for the **show ethernet-switching table** command on EX Series, MX Series and QFX Series. Output fields are listed in the approximate order in which they appear.

Table 9: show ethernet-switching table Output fields

Field Name	Field Description
<b>Routing instance</b>	Name of the routing instance.
<b>VLAN name</b>	Name of the VLAN.

*Table 9: show ethernet-switching table Output fields (continued)*

Field Name	Field Description
<b>MAC address</b>	MAC address or addresses learned on a logical interface.
<b>MAC flags</b>	Status of MAC address learning properties for each interface: <ul style="list-style-type: none"> <li>• <b>S</b>—Static MAC address is configured.</li> <li>• <b>D</b>—Dynamic MAC address is configured.</li> <li>• <b>L</b>—Locally learned MAC address is configured.</li> <li>• <b>SE</b>—MAC accounting is enabled.</li> <li>• <b>NM</b>—Non-configured MAC.</li> <li>• <b>R</b>—Locally learned MAC address is configured.</li> </ul>
<b>Age</b>	This field is not supported.
<b>Logical interface</b>	Name of the logical interface.
<b>Active source</b>	IP address of remote entity on which MAC address is learned.
<b>MAC count</b>	Number of MAC addresses learned on the specific routing instance or interface.
<b>Learning interface</b>	Name of the logical interface on which the MAC address was learned.
<b>Learning VLAN</b>	VLAN ID of the routing instance or VLAN in which the MAC address was learned.
<b>Layer 2 flags</b>	Debugging flags signifying that the MAC address is present in various lists.
<b>Epoch</b>	Spanning-tree-protocol epoch number identifying when the MAC address was learned. Used for debugging.
<b>Sequence number</b>	Sequence number assigned to this MAC address. Used for debugging.
<b>Learning mask</b>	Mask of the Packet Forwarding Engines where this MAC address was learned. Used for debugging.
<b>IPC generation</b>	Creation time of the logical interface when this MAC address was learned. Used for debugging.

For SRX Series:

[Table 10 on page 200](#) lists the output fields for the **show ethernet-switching table** command. Output fields are listed in the approximate order in which they appear.

*Table 10: show ethernet-switching table Output Fields*

Field Name	Field Description
<b>VLAN</b>	The name of a VLAN.



Table 10: show ethernet-switching table Output Fields (continued)

Field Name	Field Description
<b>MAC address</b>	The MAC address associated with the VLAN.
<b>Type</b>	The type of MAC address. Values are: <ul style="list-style-type: none"> <li>static—The MAC address is manually created.</li> <li>learn—The MAC address is learned dynamically from a packet's source MAC address.</li> <li>flood—The MAC address is unknown and flooded to all members.</li> </ul>
<b>Age</b>	The time remaining before the entry ages out and is removed from the Ethernet switching table.
<b>Interfaces</b>	Interface associated with learned MAC addresses or All-members (flood entry).
<b>Learned</b>	For learned entries, the time which the entry was added to the Ethernet switching table.

## Sample Output

### show ethernet-switching table (Enhanced Layer 2 Software on QFX Series, QFabric, NFX Series and EX460)

```
user@switch> show ethernet-switching table
MAC flags (S - static MAC, D - dynamic MAC, L - locally learned, P - Persistent
static
          SE - statistics enabled, NM - non configured MAC, R - remote PE MAC,
0 - ovsdb MAC)
```

```
Ethernet switching table : 2 entries, 2 learned
```

```
Routing instance : default-switch
```

Vlan name	MAC address	MAC flags	Age	Logical interface
vlan1	b0:c6:9a:ca:3c:01	D	-	ae1.0
vlan1	b0:c6:9a:ca:3c:03	D	-	ae1.0

```
MAC flags (S - static MAC, D - dynamic MAC, L - locally learned, P - Persistent
static
```

```
          SE - statistics enabled, NM - non configured MAC, R - remote PE MAC,
0 - ovsdb MAC)
```

```
Ethernet switching table : 2 entries, 2 learned
```

```
Routing instance : default-switch
```

Vlan name	MAC address	MAC flags	Age	Logical interface
vlan10	b0:c6:9a:ca:3c:01	D	-	ae1.0
vlan10	b0:c6:9a:ca:3c:03	D	-	ae1.0

```
MAC flags (S - static MAC, D - dynamic MAC, L - locally learned, P - Persistent
static
```

```
          SE - statistics enabled, NM - non configured MAC, R - remote PE MAC,
```

0 - ovsdb MAC)

Ethernet switching table : 2 entries, 2 learned

Routing instance : default-switch

Vlan name	MAC address	MAC flags	Age	Logical interface
vlan2	b0:c6:9a:ca:3c:01	D	-	ae1.0
vlan2	b0:c6:9a:ca:3c:03	D	-	ae1.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned, P - Persistent static

SE - statistics enabled, NM - non configured MAC, R - remote PE MAC,  
0 - ovsdb MAC)

Ethernet switching table : 2 entries, 2 learned

Routing instance : default-switch

Vlan name	MAC address	MAC flags	Age	Logical interface
vlan3	b0:c6:9a:ca:3c:01	D	-	ae1.0
vlan3	b0:c6:9a:ca:3c:03	D	-	ae1.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned, P - Persistent static

SE - statistics enabled, NM - non configured MAC, R - remote PE MAC,  
0 - ovsdb MAC)

Ethernet switching table : 2 entries, 2 learned

Routing instance : default-switch

Vlan name	MAC address	MAC flags	Age	Logical interface
vlan4	b0:c6:9a:ca:3c:01	D	-	ae1.0
vlan4	b0:c6:9a:ca:3c:03	D	-	ae1.0

### show ethernet-switching table (QFX Series, QFabric, NFX Series and EX460)

user@switch> show ethernet-switching table

Ethernet-switching table: 57 entries, 17 learned

VLAN	MAC address	Type	Age	Interfaces
F2	*	Flood	-	All-members
F2	00:00:05:00:00:03	Learn	0	xe-0/0/44.0
F2	00:19:e2:50:7d:e0	Static	-	Router
Linux	*	Flood	-	All-members
Linux	00:19:e2:50:7d:e0	Static	-	Router
Linux	00:30:48:90:54:89	Learn	0	xe-0/0/47.0
T1	*	Flood	-	All-members
T1	00:00:05:00:00:01	Learn	0	xe-0/0/46.0
T1	00:00:5e:00:01:00	Static	-	Router
T1	00:19:e2:50:63:e0	Learn	0	xe-0/0/46.0
T1	00:19:e2:50:7d:e0	Static	-	Router
T10	*	Flood	-	All-members
T10	00:00:5e:00:01:09	Static	-	Router
T10	00:19:e2:50:63:e0	Learn	0	xe-0/0/46.0
T10	00:19:e2:50:7d:e0	Static	-	Router

```

T111      *      Flood      - All-members
T111      00:19:e2:50:63:e0 Learn      0 xe-0/0/15.0
T111      00:19:e2:50:7d:e0 Static     - Router
T111      00:19:e2:50:ac:00 Learn      0 xe-0/0/15.0
T2        *      Flood      - All-members
T2        00:00:5e:00:01:01 Static     - Router
T2        00:19:e2:50:63:e0 Learn      0 xe-0/0/46.0
T2        00:19:e2:50:7d:e0 Static     - Router
T3        *      Flood      - All-members
T3        00:00:5e:00:01:02 Static     - Router
T3        00:19:e2:50:63:e0 Learn      0 xe-0/0/46.0
T3        00:19:e2:50:7d:e0 Static     - Router
T4        *      Flood      - All-members
T4        00:00:5e:00:01:03 Static     - Router
T4        00:19:e2:50:63:e0 Learn      0 xe-0/0/46.0
[output truncated]

```

#### show ethernet-switching table (Private VLANs on QFX Series, QFabric, NFX Series and EX460)

```

user@switch> show ethernet-switching table
Ethernet-switching table: 10 entries, 3 learned
VLAN      MAC address      Type      Age Interfaces
pvlan     *      Flood      - All-members
pvlan     00:10:94:00:00:02 Replicated - xe-0/0/28.0
pvlan     00:10:94:00:00:35 Replicated - xe-0/0/46.0
pvlan     00:10:94:00:00:46 Replicated - xe-0/0/4.0
c2        *      Flood      - All-members
c2        00:10:94:00:00:02 Learn      0 xe-0/0/28.0
c1        *      Flood      - All-members
c1        00:10:94:00:00:46 Learn      0 xe-0/0/4.0
__pvlan_pvlan_xe-0/0/46.0__ *      Flood      - All-members
__pvlan_pvlan_xe-0/0/46.0__ 00:10:94:00:00:35 Learn      0 xe-0/0/46.0

```

#### show ethernet-switching table (Junos Fusion Data Center with EVPN on QFX Series switches)

```

user@switch> show ethernet-switching table
MAC flags (S - static MAC, D - dynamic MAC, L - locally learned, P - Persistent
static
          SE - statistics enabled, NM - non configured MAC, R - remote PE MAC,
O - ovsdb MAC)

Ethernet switching table : 30 entries, 30 learned
Routing instance : default-switch
Vlan      MAC      MAC      Logical      Active
name      address    flags    interface    source
v100      00:31:46:e8:f9:d6 D      vtep.32768
192.168.2.22
v100      7c:e2:ca:e2:75:7c D      vtep.32771
192.168.4.44
v100      7c:e2:ca:e4:05:9a D      vtep.32770
192.168.3.33
v101      00:31:46:e8:f9:d6 D      vtep.32768
192.168.2.22
v101      7c:e2:ca:e2:75:7c D      vtep.32771
192.168.4.44
v101      7c:e2:ca:e4:05:9a D      vtep.32770
192.168.3.33
v102      00:31:46:e8:f9:d6 D      vtep.32768

```

192.168.2.22	v102	7c:e2:ca:e2:75:7c	D	vtep.32771
192.168.4.44	v102	7c:e2:ca:e4:05:9a	D	vtep.32770
192.168.3.33	v103	00:31:46:e8:f9:d6	D	vtep.32768
192.168.2.22	v103	7c:e2:ca:e2:75:7c	D	vtep.32771
192.168.4.44	v103	7c:e2:ca:e4:05:9a	D	vtep.32770
192.168.3.33	v3001	00:31:46:e8:f9:d6	D	vtep.32768
192.168.2.22	v3001	28:c0:da:6a:9f:c2	DL	ae11.0
	v3001	7c:e2:ca:e2:75:7c	D	vtep.32771
192.168.4.44	v3001	7c:e2:ca:e4:05:9a	D	vtep.32770
192.168.3.33	v3002	00:31:46:e8:f9:d6	D	vtep.32768
192.168.2.22	v3002	7c:e2:ca:e2:75:7c	D	vtep.32771
192.168.4.44	v3002	7c:e2:ca:e4:05:9a	D	vtep.32770
192.168.3.33	v3003	00:31:46:e8:f9:d6	D	vtep.32768
192.168.2.22	v3003	28:c0:da:6a:9f:c2	DL	ae11.0
	v3003	7c:e2:ca:e2:75:7c	D	vtep.32771
192.168.4.44	v3003	7c:e2:ca:e4:05:9a	D	vtep.32770
192.168.3.33	v3004	00:31:46:e8:f9:d6	D	vtep.32768
192.168.2.22	v3004	7c:e2:ca:e2:75:7c	D	vtep.32771
192.168.4.44	v3004	7c:e2:ca:e4:05:9a	D	vtep.32770
192.168.3.33	v3005	00:31:46:e8:f9:d6	D	vtep.32768
192.168.2.22	v3005	28:c0:da:6a:9f:c2	DL	ae11.0
	v3005	7c:e2:ca:e2:75:7c	D	vtep.32771
192.168.4.44	v3005	7c:e2:ca:e4:05:9a	D	vtep.32770
192.168.3.33				

#### show ethernet-switching table brief (QFX Series, QFabric, NFX Series and EX460)

```

user@switch> show ethernet-switching table brief
Ethernet-switching table: 57 entries, 17 learned

```

VLAN	MAC address	Type	Age	Interfaces
F2	*	Flood		- All-members
F2	00:00:05:00:00:03	Learn	0	xe-0/0/44.0
F2	00:19:e2:50:7d:e0	Static		- Router
Linux	*	Flood		- All-members
Linux	00:19:e2:50:7d:e0	Static		- Router
Linux	00:30:48:90:54:89	Learn	0	xe-0/0/47.0
T1	*	Flood		- All-members
T1	00:00:05:00:00:01	Learn	0	xe-0/0/46.0
T1	00:00:5e:00:01:00	Static		- Router
T1	00:19:e2:50:63:e0	Learn	0	xe-0/0/46.0
T1	00:19:e2:50:7d:e0	Static		- Router

```

T10          *          Flood          - All-members
T10          00:00:5e:00:01:09 Static    - Router
T10          00:19:e2:50:63:e0 Learn     0 xe-0/0/46.0
T10          00:19:e2:50:7d:e0 Static    - Router
T111         *          Flood          - All-members
T111         00:19:e2:50:63:e0 Learn     0 xe-0/0/15.0
T111         00:19:e2:50:7d:e0 Static    - Router
T111         00:19:e2:50:ac:00 Learn     0 xe-0/0/15.0
T2           *          Flood          - All-members
T2           00:00:5e:00:01:01 Static    - Router
T2           00:19:e2:50:63:e0 Learn     0 xe-0/0/46.0
T2           00:19:e2:50:7d:e0 Static    - Router
T3           *          Flood          - All-members
T3           00:00:5e:00:01:02 Static    - Router
T3           00:19:e2:50:63:e0 Learn     0 xe-0/0/46.0
T3           00:19:e2:50:7d:e0 Static    - Router
T4           *          Flood          - All-members
T4           00:00:5e:00:01:03 Static    - Router
T4           00:19:e2:50:63:e0 Learn     0 xe-0/0/46.0

```

[output truncated]

#### show ethernet-switching table detail (QFX Series, QFabric, NFX Series and EX460)

```

user@switch> show ethernet-switching table detail
Ethernet-switching table: 57 entries, 17 learned
F2, *
  Interface(s): xe-0/0/44.0
  Type: Flood
  Nexthop index: 0

F2, 00:00:05:00:00:03
  Interface(s): xe-0/0/44.0
  Type: Learn, Age: 0, Learned: 2:03:09
  Nexthop index: 0

F2, 00:19:e2:50:7d:e0
  Interface(s): Router
  Type: Static
  Nexthop index: 0

Linux, *
  Interface(s): xe-0/0/47.0
  Type: Flood
  Nexthop index: 0

Linux, 00:19:e2:50:7d:e0
  Interface(s): Router
  Type: Static
  Nexthop index: 0

Linux, 00:30:48:90:54:89
  Interface(s): xe-0/0/47.0
  Type: Learn, Age: 0, Learned: 2:03:08
  Nexthop index: 0

T1, *
  Interface(s): xe-0/0/46.0
  Type: Flood
  Nexthop index: 0

T1, 00:00:05:00:00:01

```

```
Interface(s): xe-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:07
Nexthop index: 0

T1, 00:00:5e:00:01:00
Interface(s): Router
Type: Static
Nexthop index: 0

T1, 00:19:e2:50:63:e0
Interface(s): xe-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:07
Nexthop index: 0

T1, 00:19:e2:50:7d:e0
Interface(s): Router
Type: Static
Nexthop index: 0

T10, *
Interface(s): xe-0/0/46.0
Type: Flood
Nexthop index: 0

T10, 00:00:5e:00:01:09
Interface(s): Router
Type: Static
Nexthop index: 0

T10, 00:19:e2:50:63:e0
Interface(s): xe-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:08
Nexthop index: 0

T10, 00:19:e2:50:7d:e0
Interface(s): Router
Type: Static
Nexthop index: 0

T111, *
Interface(s): xe-0/0/15.0
Type: Flood
Nexthop index: 0
[output truncated]
```

#### show ethernet-switching table extensive (QFX Series, QFabric, NFX Series and EX460)

```
user@switch> show ethernet-switching table extensive
Ethernet-switching table: 57 entries, 17 learned
F2, *
Interface(s): xe-0/0/44.0
Type: Flood
Nexthop index: 0

F2, 00:00:05:00:00:03
Interface(s): xe-0/0/44.0
Type: Learn, Age: 0, Learned: 2:03:09
Nexthop index: 0

F2, 00:19:e2:50:7d:e0
Interface(s): Router
```

```
Type: Static
Nexthop index: 0

Linux, *
Interface(s): xe-0/0/47.0
Type: Flood
Nexthop index: 0

Linux, 00:19:e2:50:7d:e0
Interface(s): Router
Type: Static
Nexthop index: 0

Linux, 00:30:48:90:54:89
Interface(s): xe-0/0/47.0
Type: Learn, Age: 0, Learned: 2:03:08
Nexthop index: 0

T1, *
Interface(s): xe-0/0/46.0
Type: Flood
Nexthop index: 0

T1, 00:00:05:00:00:01
Interface(s): xe-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:07
Nexthop index: 0

T1, 00:00:5e:00:01:00
Interface(s): Router
Type: Static
Nexthop index: 0

T1, 00:19:e2:50:63:e0
Interface(s): xe-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:07
Nexthop index: 0

T1, 00:19:e2:50:7d:e0
Interface(s): Router
Type: Static
Nexthop index: 0

T10, *
Interface(s): xe-0/0/46.0
Type: Flood
Nexthop index: 0

T10, 00:00:5e:00:01:09
Interface(s): Router
Type: Static
Nexthop index: 0

T10, 00:19:e2:50:63:e0
Interface(s): xe-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:08
Nexthop index: 0

T10, 00:19:e2:50:7d:e0
Interface(s): Router
Type: Static
```

```

    Nexthop index: 0

T111, *
  Interface(s): xe-0/0/15.0
  Type: Flood
  Nexthop index: 0
[output truncated]

```

### show ethernet-switching table interface (QFX Series, QFabric, NFX Series and EX460)

```

user@switch> show ethernet-switching table interface xe-0/0/1
Ethernet-switching table: 1 unicast entries

```

VLAN	MAC address	Type	Age	Interfaces
V1	*	Flood		- All-members
V1	00:00:05:00:00:05	Learn	0	xe-0/0/1.0

### show ethernet-switching table (EX Series switches)

```

user@switch> show ethernet-switching table
Ethernet-switching table: 57 entries, 15 learned, 2 persistent

```

VLAN	MAC address	Type	Age	Interfaces
F2	*	Flood		- All-members
F2	00:00:05:00:00:03	Learn	0	ge-0/0/44.0
F2	00:19:e2:50:7d:e0	Static		- Router
Linux	*	Flood		- All-members
Linux	00:19:e2:50:7d:e0	Static		- Router
Linux	00:30:48:90:54:89	Learn	0	ge-0/0/47.0
T1	*	Flood		- All-members
T1	00:00:05:00:00:01	Persistent	0	ge-0/0/46.0
T1	00:00:5e:00:01:00	Static		- Router
T1	00:19:e2:50:63:e0	Persistent	0	ge-0/0/46.0
T1	00:19:e2:50:7d:e0	Static		- Router
T10	*	Flood		- All-members
T10	00:00:5e:00:01:09	Static		- Router
T10	00:19:e2:50:63:e0	Learn	0	ge-0/0/46.0
T10	00:19:e2:50:7d:e0	Static		- Router
T111	*	Flood		- All-members
T111	00:19:e2:50:63:e0	Learn	0	ge-0/0/15.0
T111	00:19:e2:50:7d:e0	Static		- Router
T111	00:19:e2:50:ac:00	Learn	0	ge-0/0/15.0
T2	*	Flood		- All-members
T2	00:00:5e:00:01:01	Static		- Router
T2	00:19:e2:50:63:e0	Learn	0	ge-0/0/46.0
T2	00:19:e2:50:7d:e0	Static		- Router
T3	*	Flood		- All-members
T3	00:00:5e:00:01:02	Static		- Router
T3	00:19:e2:50:63:e0	Learn	0	ge-0/0/46.0
T3	00:19:e2:50:7d:e0	Static		- Router
T4	*	Flood		- All-members
T4	00:00:5e:00:01:03	Static		- Router
T4	00:19:e2:50:63:e0	Learn	0	ge-0/0/46.0

[output truncated]

### show ethernet-switching table brief (EX Series switches)

```

user@switch> show ethernet-switching table brief
Ethernet-switching table: 57 entries, 15 learned, 2 persistent entries

```

VLAN	MAC address	Type	Age	Interfaces
F2	*	Flood		- All-members
F2	00:00:05:00:00:03	Learn	0	ge-0/0/44.0



```

F2          00:19:e2:50:7d:e0 Static      - Router
Linux       *          Flood          - All-members
Linux       00:19:e2:50:7d:e0 Static      - Router
Linux       00:30:48:90:54:89 Learn       0 ge-0/0/47.0
T1          *          Flood          - All-members
T1          00:00:05:00:00:01 Persistent  0 ge-0/0/46.0
T1          00:00:5e:00:01:00 Static      - Router
T1          00:19:e2:50:63:e0 Persistent  0 ge-0/0/46.0
T1          00:19:e2:50:7d:e0 Static      - Router
T10         *          Flood          - All-members
T10         00:00:5e:00:01:09 Static      - Router
T10         00:19:e2:50:63:e0 Learn       0 ge-0/0/46.0
T10         00:19:e2:50:7d:e0 Static      - Router
T111        *          Flood          - All-members
T111        00:19:e2:50:63:e0 Learn       0 ge-0/0/15.0
T111        00:19:e2:50:7d:e0 Static      - Router
T111        00:19:e2:50:ac:00 Learn       0 ge-0/0/15.0
T2          *          Flood          - All-members
T2          00:00:5e:00:01:01 Static      - Router
T2          00:19:e2:50:63:e0 Learn       0 ge-0/0/46.0
T2          00:19:e2:50:7d:e0 Static      - Router
T3          *          Flood          - All-members
T3          00:00:5e:00:01:02 Static      - Router
T3          00:19:e2:50:63:e0 Learn       0 ge-0/0/46.0
T3          00:19:e2:50:7d:e0 Static      - Router
T4          *          Flood          - All-members
T4          00:00:5e:00:01:03 Static      - Router
T4          00:19:e2:50:63:e0 Learn       0 ge-0/0/46.0
[output truncated]

```

### show ethernet-switching table detail (EX Series switches)

```

user@switch> show ethernet-switching table detail
Ethernet-switching table: 5 entries, 2 learned entries
VLAN: default, Tag: 0, MAC: *, Interface: All-members
Interfaces:
  ge-0/0/11.0, ge-0/0/20.0, ge-0/0/30.0, ge-0/0/36.0, ge-0/0/3.0
Type: Flood
Nexthop index: 1307

VLAN: default, Tag: 0, MAC: 00:1f:12:30:b8:83, Interface: ge-0/0/3.0
Type: Learn, Age: 0, Learned: 20:09:26
Nexthop index: 1315

VLAN: v1, Tag: 101, MAC: *, Interface: All-members
Interfaces:
  ge-0/0/31.0
Type: Flood
Nexthop index: 1313

VLAN: v1, Tag: 101, MAC: 00:1f:12:30:b8:89, Interface: ge-0/0/31.0
Type: Learn, Age: 0, Learned: 20:09:25
Nexthop index: 1312

VLAN: v2, Tag: 102, MAC: *, Interface: All-members
Interfaces:
  ae0.0
Type: Flood
Nexthop index: 1317

```

**show ethernet-switching table extensive (EX Series switches)**

```

user@switch> show ethernet-switching table extensive
Ethernet-switching table: 3 entries, 1 learned, 5 persistent entries

VLAN: v1, Tag: 10, MAC: *, Interface: All-members
Interfaces:
    ge-0/0/14.0, ge-0/0/1.0, ge-0/0/2.0, ge-0/0/3.0, ge-0/0/4.0,
    ge-0/0/5.0, ge-0/0/6.0, ge-0/0/7.0, ge-0/0/8.0, ge-0/0/10.0,
    ge-0/0/0.0
Type: Flood
Nexthop index: 567

VLAN: v1, Tag: 10, MAC: 00:21:59:c6:93:22, Interface: Router
Type: Static
Nexthop index: 0

VLAN: v1, Tag: 10, MAC: 00:21:59:c9:9a:4e, Interface: ge-0/0/14.0
Type: Learn, Age: 0, Learned: 18:40:50
Nexthop index: 564

```

**show ethernet-switching table persistent-mac (EX Series switches)**

```

user@switch> show ethernet-switching table persistent-mac
VLAN      MAC address      Type      Interface
default   00:10:94:00:00:02 installed      ge-0/0/42.0
default   00:10:94:00:00:03 installed      ge-0/0/42.0
default   00:10:94:00:00:04 installed      ge-0/0/42.0
default   00:10:94:00:00:05 installed      ge-0/0/42.0
default   00:10:94:00:00:06 installed      ge-0/0/42.0
default   00:10:94:00:05:02 uninstalled   ge-0/0/16.0
default   00:10:94:00:06:03 uninstalled   ge-0/0/16.0
default   00:10:94:00:07:04 uninstalled   ge-0/0/16.0

```

**show ethernet-switching table persistent-mac interface ge-0/0/16.0 (EX Series switches)**

```

VLAN      MAC address      Type      Interface
default   00:10:94:00:05:02 uninstalled   ge-0/0/16.0
default   00:10:94:00:06:03 uninstalled   ge-0/0/16.0
default   00:10:94:00:07:04 uninstalled   ge-0/0/16.0

```

**show ethernet-switching table (EX Series, MX Series and QFX Series)**

```

user@host> show ethernet-switching table
MAC flags (S - static MAC, D - dynamic MAC, L - locally learned
          SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch
  Vlan      MAC      MAC      Age      Logical
  name      address   flags    -        interface
  VLAN101   88:e0:f3:bb:07:f0  D        -        ae20.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned
          SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch
  Vlan      MAC      MAC      Age      Logical
  name      address   flags    -        interface
  VLAN102   88:e0:f3:bb:07:f0  D        -        ae20.0

```

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan name	MAC address	MAC flags	Age	Logical interface
VLAN103	88:e0:f3:bb:07:f0	D	-	ae20.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan name	MAC address	MAC flags	Age	Logical interface
VLAN104	88:e0:f3:bb:07:f0	D	-	ae20.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan name	MAC address	MAC flags	Age	Logical interface
VLAN1101	00:1f:12:32:f5:c1	D	-	ae0.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan name	MAC address	MAC flags	Age	Logical interface
VLAN1102	00:1f:12:32:f5:c1	D	-	ae0.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan name	MAC address	MAC flags	Age	Logical interface
VLAN1103	00:1f:12:32:f5:c1	D	-	ae0.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan name	MAC address	MAC flags	Age	Logical interface
VLAN1104	00:1f:12:32:f5:c1	D	-	ae0.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan	MAC	MAC	Age	Logical
------	-----	-----	-----	---------

name	address	flags	interface
VLAN1105	00:1f:12:32:f5:c1	D	- ae0.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan	MAC	MAC	Age	Logical
name	address	flags		interface
VLAN1106	00:1f:12:32:f5:c1	D	-	ae0.0

[...output truncated...]

### show ethernet-switching table brief

user@host> show ethernet-switching table brief

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan	MAC	MAC	Age	Logical
name	address	flags		interface
VLAN101	88:e0:f3:bb:07:f0	D	-	ae20.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan	MAC	MAC	Age	Logical
name	address	flags		interface
VLAN102	88:e0:f3:bb:07:f0	D	-	ae20.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan	MAC	MAC	Age	Logical
name	address	flags		interface
VLAN103	88:e0:f3:bb:07:f0	D	-	ae20.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan	MAC	MAC	Age	Logical
name	address	flags		interface
VLAN104	88:e0:f3:bb:07:f0	D	-	ae20.0

MAC flags (S - static MAC, D - dynamic MAC, L - locally learned  
SE - statistics enabled, NM - non configured MAC, R - remote PE MAC)

Routing instance : default-switch

Vlan	MAC	MAC	Age	Logical
name	address	flags		interface
VLAN1101	00:1f:12:32:f5:c1	D	-	ae0.0

[...output truncated...]

**show ethernet-switching table count**

```

user@host> show ethernet-switching table count
0 MAC address learned in routing instance default-switch VLAN VLAN1000
ae26.0:1000

1 MAC address learned in routing instance default-switch VLAN VLAN101
ae20.0:101

MAC address count per learn VLAN within routing instance:
  Learn VLAN ID      MAC count      Static MAC count
      101              1              0

1 MAC address learned in routing instance default-switch VLAN VLAN102
ae20.0:102

MAC address count per learn VLAN within routing instance:
  Learn VLAN ID      MAC count      Static MAC count
      102              1              0

1 MAC address learned in routing instance default-switch VLAN VLAN103
ae20.0:103

MAC address count per learn VLAN within routing instance:
  Learn VLAN ID      MAC count      Static MAC count
      103              1              0

1 MAC address learned in routing instance default-switch VLAN VLAN104
ae20.0:104

MAC address count per learn VLAN within routing instance:
  Learn VLAN ID      MAC count      Static MAC count
      104              1              0

0 MAC address learned in routing instance default-switch VLAN VLAN105
ae20.0:105

0 MAC address learned in routing instance default-switch VLAN VLAN106
ae20.0:106

0 MAC address learned in routing instance default-switch VLAN VLAN107
ae20.0:107

0 MAC address learned in routing instance default-switch VLAN VLAN108
ae20.0:108

0 MAC address learned in routing instance default-switch VLAN VLAN109
ae20.0:109

0 MAC address learned in routing instance default-switch VLAN VLAN110
ae20.0:110

1 MAC address learned in routing instance default-switch VLAN VLAN1101
ae0.0:1101

MAC address count per learn VLAN within routing instance:
  Learn VLAN ID      MAC count      Static MAC count
      1101              1              0

1 MAC address learned in routing instance default-switch VLAN VLAN1102

```

ae0.0:1102

MAC address count per learn VLAN within routing instance:

Learn VLAN ID	MAC count	Static MAC count
1102	1	0

[...output truncated...]

### show ethernet-switching table extensive

user@host> show ethernet-switching table extensive

MAC address: 88:e0:f3:bb:07:f0  
Routing instance: default-switch  
VLAN ID: 101  
Learning interface: ae20.0  
Layer 2 flags: in\_hash,in\_ifd,in\_ifl,in\_vlan,in\_rtt,kernel,in\_ifbd  
Epoch: 0 Sequence number: 2  
Learning mask: 0x00000008

MAC address: 88:e0:f3:bb:07:f0  
Routing instance: default-switch  
VLAN ID: 102  
Learning interface: ae20.0  
Layer 2 flags: in\_hash,in\_ifd,in\_ifl,in\_vlan,in\_rtt,kernel,in\_ifbd  
Epoch: 0 Sequence number: 2  
Learning mask: 0x00000008

MAC address: 88:e0:f3:bb:07:f0  
Routing instance: default-switch  
VLAN ID: 103  
Learning interface: ae20.0  
Layer 2 flags: in\_hash,in\_ifd,in\_ifl,in\_vlan,in\_rtt,kernel,in\_ifbd  
Epoch: 0 Sequence number: 2  
Learning mask: 0x00000008

MAC address: 88:e0:f3:bb:07:f0  
Routing instance: default-switch  
VLAN ID: 104  
Learning interface: ae20.0  
Layer 2 flags: in\_hash,in\_ifd,in\_ifl,in\_vlan,in\_rtt,kernel,in\_ifbd  
Epoch: 0 Sequence number: 2  
Learning mask: 0x00000008

MAC address: 00:1f:12:32:f5:c1  
Routing instance: default-switch  
VLAN ID: 1101  
Learning interface: ae0.0  
Layer 2 flags: in\_hash,in\_ifd,in\_ifl,in\_vlan,in\_rtt,kernel,in\_ifbd  
Epoch: 0 Sequence number: 2  
Learning mask: 0x00000008

MAC address: 00:1f:12:32:f5:c1  
Routing instance: default-switch  
VLAN ID: 1102  
Learning interface: ae0.0  
Layer 2 flags: in\_hash,in\_ifd,in\_ifl,in\_vlan,in\_rtt,kernel,in\_ifbd  
Epoch: 0 Sequence number: 2  
Learning mask: 0x00000008

MAC address: 00:1f:12:32:f5:c1  
Routing instance: default-switch

```

VLAN ID: 1103
  Learning interface: ae0.0
  Layer 2 flags: in_hash,in_ifd,in_ifl,in_vlan,in_rtt,kernel,in_ifbd
  Epoch: 0                               Sequence number: 2
  Learning mask: 0x00000008

MAC address: 00:1f:12:32:f5:c1
  Routing instance: default-switch
VLAN ID: 1104
  Learning interface: ae0.0
  Layer 2 flags: in_hash,in_ifd,in_ifl,in_vlan,in_rtt,kernel,in_ifbd
  Epoch: 0                               Sequence number: 2
  Learning mask: 0x00000008

```

## Sample Output

### show ethernet-switching table detail (SRX Series)

```

user@host> show ethernet-switching table detail
Ethernet-switching table: 57 entries, 17 learned
F2, *
Interface(s): ge-0/0/44.0
Type: Flood
F2, 00:00:5E:00:53:AC
Interface(s): ge-0/0/44.0
Type: Learn, Age: 0, Learned: 2:03:09
F2, 00:00:5E:00:53:AA
Interface(s): Router
Type: Static
Linux, *
Interface(s): ge-0/0/47.0
Type: Flood
Linux, 00:00:5E:00:53:AB
Interface(s): Router
Type: Static
Linux, 00:00:5E:00:53:AC
Interface(s): ge-0/0/47.0
Type: Learn, Age: 0, Learned: 2:03:08
T1, *
Interface(s): ge-0/0/46.0
Type: Flood
T1, 00:00:5E:00:53:AD
Interface(s): ge-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:07
T1, 00:00:5E:00:53:AE
Interface(s): Router
Type: Static
T1, 00:00:5E:00:53:AF
Interface(s): ge-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:07
T1, 00:00:5E:00:53:AG
Interface(s): Router
Type: Static
T10, *
Interface(s): ge-0/0/46.0
Type: Flood
T10, 00:00:5E:00:53:AH
Interface(s): Router
Type: Static
T10, 00:00:5E:00:53:AI
Interface(s): ge-0/0/46.0

```

```
Type: Learn, Age: 0, Learned: 2:03:08
T10, 00:00:5E:00:53:AJ
Interface(s): Router
Type: Static
T111, *
Interface(s): ge-0/0/15.0
Type: Flood
[output truncated]
```

## Sample Output

### show ethernet-switching table extensive (SRX Series)

```
user@host> show ethernet-switching table extensive
Ethernet-switching table: 57 entries, 17 learned
F2, *
Interface(s): ge-0/0/44.0
Type: Flood
F2, 00:00:5E:00:53:AC
Interface(s): ge-0/0/44.0
Type: Learn, Age: 0, Learned: 2:03:09
F2, 00:00:5E:00:53:AA
Interface(s): Router
Type: Static
Linux, *
Interface(s): ge-0/0/47.0
Type: Flood
Linux, 00:00:5E:00:53:AB
Interface(s): Router
Type: Static
Linux, 00:00:5E:00:53:AC
Interface(s): ge-0/0/47.0
Type: Learn, Age: 0, Learned: 2:03:08
T1, *
Interface(s): ge-0/0/46.0
Type: Flood
T1, 00:00:5E:00:53:AD
Interface(s): ge-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:07
T1, 00:00:5E:00:53:AE
Interface(s): Router
Type: Static
T1, 00:00:5E:00:53:AF
Interface(s): ge-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:07
T1, 00:00:5E:00:53:AG
Interface(s): Router
Type: Static
T10, *
Interface(s): ge-0/0/46.0
Type: Flood
T10, 00:00:5E:00:53:AH
Interface(s): Router
Type: Static
T10, 00:00:5E:00:53:AI
Interface(s): ge-0/0/46.0
Type: Learn, Age: 0, Learned: 2:03:08
T10, 00:00:5E:00:53:AJ
Interface(s): Router
Type: Static
T111, *
```



```
Interface(s): ge-0/0/15.0
Type: Flood
[output truncated]
```

## Sample Output

### show ethernet-switching table interface ge-0/0/1 (SRX Series)

```
user@host> show ethernet-switching table interface ge-0/0/1
Ethernet-switching table: 1 unicast entries
VLAN      MAC address      Type      Age Interfaces
V1        *                Flood     - All-members
V1        00:00:5E:00:53:AF Learn      0 ge-0/0/1.0
```

## show system statistics arp

---

<b>Syntax</b>	show system statistics arp
<b>Release Information</b>	Command introduced in Junos OS Release 9.6 for EX Series switches.
<b>Description</b>	Display system-wide Address Resolution Protocol (ARP) statistics.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Example: Configuring Proxy ARP on an EX Series Switch</i></li><li>• <i>Verifying That Proxy ARP Is Working Correctly</i></li></ul>

## show system statistics arp

```
user@switch> show system statistics arp
arp:
  90060 datagrams received
  34 ARP requests received
  610 ARP replies received
  0 resolution request received
  0 unrestricted proxy requests
  0 restricted proxy requests
  0 received proxy requests
  0 unrestricted proxy requests not proxied
  0 restricted proxy requests not proxied
  0 datagrams with bogus interface
  0 datagrams with incorrect length
  0 datagrams for non-IP protocol
  0 datagrams with unsupported op code
  0 datagrams with bad protocol address length
  0 datagrams with bad hardware address length
  0 datagrams with multicast source address
  0 datagrams with multicast target address
  0 datagrams with my own hardware address
  0 datagrams for an address not on the interface
  0 datagrams with a broadcast source address
  294 datagrams with source address duplicate to mine
  89113 datagrams which were not for me
  0 packets discarded waiting for resolution
  0 packets sent after waiting for resolution
  309 ARP requests sent
  35 ARP replies sent
  0 requests for memory denied
  0 requests dropped on entry
  0 requests dropped during retry
  0 requests dropped due to interface deletion
  0 requests on unnumbered interfaces
  0 new requests on unnumbered interfaces
  0 replies for from unnumbered interfaces
  0 requests on unnumbered interface with non-subnetted donor
  0 replies from unnumbered interface with non-subnetted donor
```



## show vlans

<b>List of Syntax</b>	<a href="#">Syntax (EX Series and QFX Series Switches) on page 220</a> <a href="#">Syntax (EX Series with ELS Switches and MX Routers) on page 220</a> <a href="#">Syntax (SRX Devices) on page 220</a>
<b>Syntax (EX Series and QFX Series Switches)</b>	<pre>show vlans &lt;brief   detail   extensive&gt; &lt;dot1q-tunneling&gt; &lt;management-vlan&gt; &lt;sort-by (tag   name)&gt; &lt;vlan-range-name&gt; &lt;summary&gt; &lt;vlan-name&gt; &lt;vlan-range-name&gt;</pre>
<b>Syntax (EX Series with ELS Switches and MX Routers)</b>	<pre>show vlans &lt;brief   detail   extensive&gt; &lt;instance instance-name&gt; &lt;logical-system logical-system-name&gt; &lt;operational&gt; &lt;vlan-name&gt; &lt;interface interface-name&gt;</pre>
<b>Syntax (SRX Devices)</b>	<pre>show vlans &lt;brief   detail   extensive&gt; &lt;interface interface-name&gt; &lt;logical-system (logical-system   all)&gt; &lt;operational&gt;</pre>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 8.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Option <b>dot1q-tunneling</b> added in Junos OS Release 12.1 for the QFX Series.</p> <p>Command introduced in Junos OS Release 12.3R2 for EX Series switches.</p> <p>Option <b>interface</b> introduced in Junos OS Release 13.2X50-D10 (ELS).</p>
<b>Description</b>	<p>Display information about VLANs configured on bridged Ethernet interfaces. For interfaces configured to support a VoIP VLAN and a data VLAN, the <b>show vlans</b> command displays both tagged and untagged membership for those VLANs.</p>



**NOTE:** When a series of VLANs is created using the **vlan-range** statement, such VLAN names are preceded and followed by a double underscore. For example, a series of VLANs using the VLAN range 1 through 3 and the base VLAN name **marketing** would be displayed as **\_\_marketing\_1\_\_**, **\_\_marketing\_2\_\_**, and **\_\_marketing\_3\_\_**.



**NOTE:** To display an 802.1X supplicant successfully authenticated in multiple-supplicant mode with dynamic VLAN movement, use the `show vlans vlan-name extensive` operational mode command, where *vlan-name* is the dynamic VLAN.

**Options** For EX Series and QFX Series switches:

**none**—Display information for all VLANs. VLAN information is displayed by VLAN name in ascending order.

**brief | detail | extensive**—(Optional) Display the specified level of output.

**dot1q-tunneling**—(Optional) Display VLANs with the Q-in-Q tunneling feature enabled.

**management-vlan**—(Optional) Display management VLANs.

**sort-by (tag | name)**—(Optional) Display VLANs in ascending order of VLAN IDs or VLAN names.

**vlan-range-name**—(Optional) Display VLANs in ascending order of VLAN range names.

**summary**—(Optional) Display the total number of VLANs and counts of VLANs by type—for example, the number of dynamic, 802.1Q-tagged, and Q-in-Q tunneled VLANs.

**vlan-range-name**—(Optional) Display information for the specified VLAN range. To display information for all members of the VLAN range, specify the base VLAN name—for example, **employee** for a VLAN range that includes **\_\_employee\_1\_\_** through **\_\_employee\_10\_\_**.

For EX Series with ELS Switches and MX Routers:

**none**—Display information for all VLANs.

**brief | detail | extensive**—(Optional) Display the specified level of output.

**instance *instance-name***—(Optional) Display information for the specified routing instance.

**logical-system *logical-system-name***—(Optional) Display Ethernet-switching statistics information for the specified logical system.

**operational**—(Optional) Display information for the operational routing instances.

***vlan-name***— (Optional) Display information about the specified VLAN.

**interface *interface-name***—(Optional) Display information about the specified interface.

For SRX devices:

**none**—Display information for all VLANs.

**brief | detail | extensive**—(Optional) Display the specified level of output.

**interface *interface-name***— (Optional) Display information about a specific interface.

**logical system**—(Optional) Display name of the logical system or all.

**operational**—(Optional) Display information for the operational switching instances.

**Required Privilege  
Level**

view

**Related  
Documentation**

- *Example: Setting Up Basic Bridging and a VLAN on the QFX Series*
- *Example: Setting Up Bridging with Multiple VLANs*
- *Example: Setting Up Basic Bridging and a VLAN for an EX Series Switch*
- *Example: Setting Up Bridging with Multiple VLANs for EX Series Switches*
- *Example: Configuring a Private VLAN on a Single EX Series Switch*
- *Example: Configuring a Private VLAN Spanning Multiple EX Series Switches*
- *Example: Setting Up Q-in-Q Tunneling on EX Series Switches*
- [Understanding Bridging and VLANs on Switches on page 9](#)
- [show ethernet-switching interfaces on page 188](#)

**List of Sample Output**

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[show vlans \(Private VLANs on EX and QFX Series\) on page 225](#)  
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[show vlans \(Q-in-Q Tunneling on EX Series and QFX Series\) on page 230](#)  
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[show vlans \(SRX devices\) on page 238](#)  
[show vlans brief \(SRX devices\) on page 239](#)  
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**Output Fields** Table 11 on page 223 lists the output fields for the **show vlans** command. Output fields are listed in the approximate order in which they appear.

*Table 11: show vlans Output Fields*

Field Name	Field Description	Level of Output
<b>Name</b>	Name of a VLAN.	none, <b>brief</b>
<b>Tag</b>	802.1Q tag applied to this VLAN. If <b>none</b> is displayed, no tag is applied.	All levels
<b>Interfaces</b>	Interface associated with learned MAC addresses or <b>All-members</b> option (flood entry). An asterisk (*) beside the interface indicates that the interface is <b>UP</b> .	All levels
<b>Address</b>	IP address.	none, <b>brief</b>
<b>Ports Active /Total</b>	Number of interfaces associated with a VLAN: <b>Active</b> indicates interfaces that are <b>UP</b> , and <b>Total</b> indicates interfaces that are active and inactive.	<b>brief</b>
<b>VLAN</b>	Name of a VLAN.	<b>detail, extensive</b>
<b>Admin state</b>	State of the interface. Values are:  <b>enabled</b> —The interface is turned on, and the physical link is operational and can pass packets.	<b>detail,extensive</b>
<b>MAC learning Status</b>	Indicates if MAC learning is disabled.	<b>detail, extensive</b>
<b>Description</b>	Description for the VLAN.	<b>detail,extensive</b>
<b>Primary IP</b>	Primary IP address associated with a VLAN.	<b>detail</b>
<b>Number of interfaces</b>	Number of interfaces associated with a VLAN. Both the total number of interfaces and the number of active interfaces associated with a VLAN are displayed.	<b>detail, extensive</b>
<b>STP</b>	Spanning tree associated with a VLAN.	<b>detail,extensive</b>
<b>Tagged interfaces</b>	Tagged interfaces with which a VLAN is associated.	<b>detail,extensive</b>
<b>Untagged interfaces</b>	Untagged interfaces with which a VLAN is associated.	<b>detail. extensive</b>
<b>Dot1q Tunneling Status</b>	Indicates if Q-in-Q tunneling is enabled.	<b>extensive</b>
<b>Customer VLAN ranges</b>	List of customer VLAN (C-VLAN) ranges associated with this service VLAN (S-VLAN).	<b>extensive</b>

Table 11: show vlans Output Fields (continued)

Field Name	Field Description	Level of Output
<b>Private VLAN Mode</b>	The private VLAN mode for this VLAN. Values include <b>Primary</b> , <b>Isolated</b> , and <b>Community</b> .	<b>extensive</b>
<b>Primary VLAN</b>	Primary VLAN tag for this secondary VLAN.	<b>extensive</b>
<b>Internal Index</b>	VLAN index internal to Junos OS software.	<b>extensive</b>
<b>Origin</b>	Manner in which the VLAN was created: <b>static</b> or <b>learn</b> .	<b>extensive</b>
<b>Protocol</b>	Port-based VLAN or MAC-based VLAN. MAC-based protocol is displayed when VLAN assignment is done either statically or dynamically through 802.1X,	<b>extensive</b>
<b>IP addresses</b>	IP address associated with a VLAN.	<b>extensive</b>
<b>Number of MAC entries</b>	For MAC-based VLANs created either statically or dynamically, the MAC addresses associated with an interface.	<b>extensive</b>
<b>Number of mapping rules</b>	Number of mapping rules for Q-in-Q tunneling ( <b>Push</b> ) and VLAN translation ( <b>Swap</b> ).	
<b>Secondary VLANs</b>	Secondary VLANs associated with a primary VLAN.	<b>extensive</b>
<b>Isolated VLANs</b>	Isolated VLANs associated with a primary VLAN.	<b>extensive</b>
<b>Community VLANs</b>	Community VLANs associated with a primary VLAN.	<b>extensive</b>
<b>VLANs summary</b>	VLAN counts: <ul style="list-style-type: none"> <li>• <b>Total</b>—Total number of VLANs on the switch.</li> <li>• <b>Configured VLANs</b>—Number of VLANs that are based on user-configured settings.</li> <li>• <b>Internal VLANs</b>—Number of VLANs created by the system with no explicit configuration or protocol—for example, the <b>default</b> VLAN and the VLAN created when a trunk interface is not configured with native VLAN membership.</li> <li>• <b>Temporary VLANs</b>—Number of VLANs from the previous configuration that the system retains for a limited time after restart. Temporary VLANs are converted into one of the other types of VLAN, or are removed from the system if the current configuration does not require them.</li> </ul>	All levels



Table 11: show vlans Output Fields (continued)

Field Name	Field Description	Level of Output
<b>Dot1q VLANs summary</b>	802.1Q VLAN counts: <ul style="list-style-type: none"> <li>• <b>Total</b>—Total number of 802.1Q-tagged and untagged VLANs on the switch.</li> <li>• <b>Tagged VLANs</b>—Number of 802.1Q-tagged VLANs.</li> <li>• <b>Untagged VLANs</b>—Number of untagged 802.1Q VLANs.</li> <li>• <b>Private VLAN</b>—Counts of the following kinds of 802.1Q private VLANs (PVLANS):               <ul style="list-style-type: none"> <li>• <b>Primary VLANs</b>—Number of primary forwarding private VLANs.</li> <li>• <b>Community VLANs</b>—Number of community transporting and forwarding private VLANs.</li> <li>• <b>Isolated VLANs</b>—Number of isolated receiving and forwarding private VLANs.</li> <li>• <b>Inter-switch-isolated VLANs</b>—Number of inter-switch isolated receiving and forwarding private VLANs.</li> </ul> </li> </ul>	All levels
<b>Dot1q Tunneled VLANs summary</b>	Q-in-Q-tunneled VLAN counts: <ul style="list-style-type: none"> <li>• <b>Total</b>—Total number of Q-in-Q-tunneled VLANs on the switch.</li> <li>• <b>Private VLAN</b>—Counts of primary, community, and isolated Q-in-Q-tunneled private VLANs (PVLANS).</li> </ul>	All levels

## Sample Output (EX Series and QFX Series Switches)

### show vlans (EX Series and QFX Series)

```
user@switch> show vlans
```

Name	Tag	Interfaces
default	None	xe-0/0/34.0, xe-0/0/33.0, xe-0/0/32.0, xe-0/0/31.0, xe-0/0/30.0, xe-0/0/29.0, xe-0/0/28.0, xe-0/0/27.0, xe-0/0/26.0, xe-0/0/25.0, xe-0/0/19.0, xe-0/0/18.0, xe-0/0/17.0, xe-0/0/16.0, xe-0/0/15.0, xe-0/0/14.0, xe-0/0/13.0, xe-0/0/11.0, xe-0/0/9.0, xe-0/0/8.0, xe-0/0/3.0, xe-0/0/2.0, xe-0/0/1.0
v0001	1	xe-0/0/24.0, xe-0/0/23.0, xe-0/0/22.0, xe-0/0/21.0
v0002	2	None
v0003	3	None
v0004	4	None
v0005	5	None

### show vlans (Private VLANs on EX and QFX Series)

```
user@switch> show vlans
```

Name	Tag	Interfaces
------	-----	------------

```

__pvlan_pvlan_xe-0/0/46.0__
                        xe-0/0/44.0*, xe-0/0/46.0*
c1
                        xe-0/0/4.0*, xe-0/0/44.0*
c2
                        xe-0/0/28.0*, xe-0/0/44.0*
default
                        None
pvlan          500
                        xe-0/0/4.0*, xe-0/0/28.0*, xe-0/0/44.0*, xe-0/0/46.0*

```

### show vlans brief (EX and QFX Series)

```

user@switch> show vlans brief

```

Name	Tag	Address	Ports Active/Total
default	None		0/23
v0001	1		0/4
v0002	2		0/0
v0003	3		0/0
v0004	4		0/0
v0005	5		0/0
v0006	6		0/0
v0007	7		0/0
v0008	8		0/0
v0009	9		0/0
v0010	10		0/2
v0011	11		0/0
v0012	12		0/0
v0013	13		0/0
v0014	14		0/0
v0015	15		0/0
v0016	16		0/0

### show vlans detail (EX Series and QFX Series)

```

user@switch> show vlans detail
VLAN: default, Tag: Untagged, Admin state: Enabled
  Description: None
  Primary IP: None, Number of interfaces: 23 (Active = 0)
  STP: None, RTG: None
  Untagged interfaces: xe-0/0/34.0, xe-0/0/33.0, xe-0/0/32.0, xe-0/0/31.0,
xe-0/0/30.0, xe-0/0/29.0, xe-0/0/28.0, xe-0/0/27.0, xe-0/0/26.0,
xe-0/0/25.0, xe-0/0/19.0, xe-0/0/18.0, xe-0/0/17.0, xe-0/0/16.0,
xe-0/0/15.0, xe-0/0/14.0, xe-0/0/13.0, xe-0/0/11.0, xe-0/0/9.0, xe-0/0/8.0,
xe-0/0/3.0, xe-0/0/2.0, xe-0/0/1.0,
  Tagged interfaces: None

VLAN: v0001, Tag: 802.1Q Tag 1, Admin state: Enabled
  Description: None
  Primary IP: None, Number of interfaces: 4 (Active = 0)
  Dot1q Tunneling Status: Enabled
  STP: None, RTG: None
  Untagged interfaces: None
  Tagged interfaces: xe-0/0/24.0, xe-0/0/23.0, xe-0/0/22.0, xe-0/0/21.0,

VLAN: v0002, Tag: 802.1Q Tag 2, Admin state: Enabled
  Description: None
  Primary IP: None, Number of interfaces: 0 (Active = 0)
  STP: None, RTG: None

```

```

Untagged interfaces: None
Tagged interfaces: None

VLAN: v0003, Tag: 802.1Q Tag 3, Admin state: Enabled
Description: None
Primary IP: None, Number of interfaces: 0 (Active = 0)
STP: None, RTG: None
Untagged interfaces: None
Tagged interfaces: None

VLAN: vlan4000, 802.1Q Tag: Untagged, Admin State: Enabled
MAC learning Status: Disabled
Number of interfaces: 0 (Active = 0)

```

### show vlans extensive (for a PVLAN spanning multiple switches)

```

user@switch> show vlans extensive
VLAN: COM1, Created at: Tue May 11 18:16:05 2010
802.1Q Tag: 100, Internal index: 3, Admin State: Enabled, Origin: Static
Private VLAN Mode: Community, Primary VLAN: primary
Protocol: Port Mode, Mac aging time: 300 seconds
Number of interfaces: Tagged 3 (Active = 3), Untagged 1 (Active = 1)
    ge-0/0/20.0*, tagged, trunk
    ge-0/0/22.0*, tagged, trunk, pvlan-trunk
    ge-0/0/23.0*, tagged, trunk, pvlan-trunk
    ge-0/0/7.0*, untagged, access

VLAN: __pvlan_primary_ge-0/0/0.0__, Created at: Tue May 11 18:16:05 2010
Internal index: 5, Admin State: Enabled, Origin: Static
Private VLAN Mode: Isolated, Primary VLAN: primary
Protocol: Port Mode, Mac aging time: 300 seconds
Number of interfaces: Tagged 3 (Active = 3), Untagged 1 (Active = 1)
    ge-0/0/20.0*, tagged, trunk
    ge-0/0/22.0*, tagged, trunk, pvlan-trunk
    ge-0/0/23.0*, tagged, trunk, pvlan-trunk
    ge-0/0/0.0*, untagged, access

VLAN: __pvlan_primary_ge-0/0/2.0__, Created at: Tue May 11 18:16:05 2010
Internal index: 6, Admin State: Enabled, Origin: Static
Private VLAN Mode: Isolated, Primary VLAN: primary
Protocol: Port Mode, Mac aging time: 300 seconds
Number of interfaces: Tagged 3 (Active = 3), Untagged 1 (Active = 0)
    ge-0/0/20.0*, tagged, trunk
    ge-0/0/22.0*, tagged, trunk, pvlan-trunk
    ge-0/0/23.0*, tagged, trunk, pvlan-trunk
    ge-0/0/2.0, untagged, access

VLAN: __pvlan_primary_isiv__, Created at: Tue May 11 18:16:05 2010
802.1Q Tag: 50, Internal index: 7, Admin State: Enabled, Origin: Static
Private VLAN Mode: Inter-switch-isolated, Primary VLAN: primary
Protocol: Port Mode, Mac aging time: 300 seconds
Number of interfaces: Tagged 3 (Active = 3), Untagged 0 (Active = 0)
    ge-0/0/20.0*, tagged, trunk
    ge-0/0/22.0*, tagged, trunk, pvlan-trunk
    ge-0/0/23.0*, tagged, trunk, pvlan-trunk

VLAN: community2, Created at: Tue May 11 18:16:05 2010
802.1Q Tag: 20, Internal index: 8, Admin State: Enabled, Origin: Static

```

```

Private VLAN Mode: Community, Primary VLAN: primary
Protocol: Port Mode, Mac aging time: 300 seconds
Number of interfaces: Tagged 3 (Active = 3), Untagged 2 (Active = 2)
    ge-0/0/20.0*, tagged, trunk
    ge-0/0/22.0*, tagged, trunk, pvlan-trunk
    ge-0/0/23.0*, tagged, trunk, pvlan-trunk
    ge-0/0/1.0*, untagged, access
    ge-1/0/6.0*, untagged, access

VLAN: primary, Created at: Tue May 11 18:16:05 2010
802.1Q Tag: 10, Internal index: 2, Admin State: Enabled, Origin: Static
Private VLAN Mode: Primary
Protocol: Port Mode, Mac aging time: 300 seconds
Number of interfaces: Tagged 3 (Active = 3), Untagged 5 (Active = 4)
    ge-0/0/20.0*, tagged, trunk
    ge-0/0/22.0*, tagged, trunk, pvlan-trunk
    ge-0/0/23.0*, tagged, trunk, pvlan-trunk
    ge-0/0/0.0*, untagged, access
    ge-0/0/1.0*, untagged, access
    ge-0/0/2.0, untagged, access
    ge-0/0/7.0*, untagged, access
    ge-1/0/6.0*, untagged, access

Secondary VLANs: Isolated 2, Community 2, Inter-switch-isolated 1
Isolated VLANs :
    __pvlan_primary_ge-0/0/0.0__
    __pvlan_primary_ge-0/0/2.0__
Community VLANs :
    COM1
    community2
Inter-switch-isolated VLAN :
    __pvlan_primary_isiv__

```

### show vlans extensive (Port-Based on EX Series and QFX Series)

```

user@switch> show vlans extensive
VLAN: default, created at Mon Feb 4 12:13:47 2008
Tag: None, Internal index: 0, Admin state: Enabled, Origin: static
Description: None
Customer VLAN ranges:
    1-4100
Protocol: Port based
IP addresses: None
STP: None, RTG: None.
Number of interfaces: Tagged 0 (Active = 0), Untagged 23 (Active = 0)
    xe-0/0/34.0 (untagged, access)
    xe-0/0/33.0 (untagged, access)
    xe-0/0/32.0 (untagged, access)
    xe-0/0/31.0 (untagged, access)
    xe-0/0/30.0 (untagged, access)
    xe-0/0/29.0 (untagged, access)
    xe-0/0/28.0 (untagged, access)
    xe-0/0/27.0 (untagged, access)
    xe-0/0/26.0 (untagged, access)
    xe-0/0/25.0 (untagged, access)
    xe-0/0/19.0 (untagged, access)
    xe-0/0/18.0 (untagged, access)
    xe-0/0/17.0 (untagged, access)
    xe-0/0/16.0 (untagged, access)

```

```

xe-0/0/15.0 (untagged, access)
xe-0/0/14.0 (untagged, access)
xe-0/0/13.0 (untagged, access)
xe-0/0/11.0 (untagged, access)
xe-0/0/9.0 (untagged, access)
xe-0/0/8.0 (untagged, access)
xe-0/0/3.0 (untagged, access)
xe-0/0/2.0 (untagged, access)
xe-0/0/1.0 (untagged, access)

```

Secondary VLANs: Isolated 1, Community 1

Isolated VLANs :

\_\_pvlan\_pvlan\_xe-0/0/3.0\_\_

Community VLANs :

comm1

VLAN: v0001, created at Mon Feb 4 12:13:47 2008

Tag: 1, Internal index: 1, Admin state: Enabled, Origin: static

Description: None

Protocol: Port based, Layer 3 interface: None

IP addresses: None

STP: None, RTG: None.

Number of interfaces: Tagged 4 (Active = 0), Untagged 0 (Active = 0)

xe-0/0/24.0 (tagged, trunk)

xe-0/0/23.0 (tagged, trunk)

xe-0/0/22.0 (tagged, trunk)

xe-0/0/21.0 (tagged, trunk)

VLAN: v0002, created at Mon Feb 4 12:13:47 2008

Tag: 2, Internal index: 2, Admin state: Enabled, Origin: static

Description: None

Protocol: Port based, Layer 3 interface: None

IP addresses: None

STP: None, RTG: None.

Number of interfaces: Tagged 0 (Active = 0), Untagged 0 (Active = 0)

None

VLAN: v0003, created at Mon Feb 4 12:13:47 2008

Tag: 3, Internal index: 3, Admin state: Enabled, Origin: static

Description: None

Protocol: Port based, Layer 3 interface: None

IP addresses: None

STP: None, RTG: None.

Number of interfaces: Tagged 0 (Active = 0), Untagged 0 (Active = 0)

None

### show vlans extensive (MAC-based)

user@switch> show vlans extensive

VLAN: default, Created at: Thu May 15 13:43:09 2008

Internal index: 3, Admin State: Enabled, Origin: Static

Protocol: Port Mode, Mac aging time: 300 seconds

Number of interfaces: Tagged 0 (Active = 0), Untagged 2 (Active = 2)

ge-0/0/0.0\*, untagged, access

ge-0/0/14.0\*, untagged, access

VLAN: vlan\_dyn, Created at: Thu May 15 13:43:09 2008

Internal index: 4, Admin State: Enabled, Origin: Static

Protocol: Port Mode

Number of interfaces: Tagged 0 (Active = 0), Untagged 0 (Active = 0)

Protocol: MAC Based

```

Number of MAC entries: 6
  ge-0/0/0.0*
    00:00:00:00:00:02 (untagged)
    00:00:00:00:00:03 (untagged)
    00:00:00:00:00:04 (untagged)
    00:00:00:00:00:05 (untagged)
    00:00:00:00:00:06 (untagged)
    00:00:00:00:00:07 (untagged)

```

### show vlans (Q-in-Q Tunneling on EX Series and QFX Series)

```

user@switch> show vlans dot1q-tunneling
Name      Tag      Interfaces
sv100     100      xe-0/0/4.0*, xe-0/0/15.0*

```

### show vlans extensive (Q-in-Q Tunneling on EX Series and QFX Series)

```

user@switch> show vlans sv100 extensive
VLAN: sv100, Created at: Sat Sep 10 12:53:52 2011
802.1Q Tag: 100, Internal index: 2, Admin State: Enabled, Origin: Static
Dot1q Tunneling Status: Enabled
Customer VLAN ranges:
    10-20
    40-50
Protocol: Port Mode
Number of interfaces: Tagged 1 (Active = 1), Untagged 0 (Active = 0)
    ge-0/0/0.0, tagged, trunk

Number of mapping rules:
    Push 1 (Active = 0), Policy 0 (Active = 0), Swap 0 (Active = 0)

    xe-0/0/3.0*, 300, push

```

### show vlans extensive (Q-in-Q Tunneling and L2TP on EX Series and QFX Series)

```

user@switch> show vlans v1 extensive
VLAN: v1, Created at: Fri Mar 2 05:07:38 2012
802.1Q Tag: 100, Internal index: 4, Admin State: Enabled, Origin: Static
Dot1q Tunneling status: Enabled
Layer2 Protocol Tunneling status: Enabled

```

### show vlans sort-by tag (EX Series and QFX Series)

```

user@switch> show vlans sort-by tag
Name      Tag      Interfaces
default   None
__vlan-x_1__  1      None
__vlan-x_2__  2      None
__vlan-x_3__  3      None
__vlan-x_4__  4      None
__vlan-x_5__  5      None
__vlan-x_6__  6      None
__vlan-x_7__  7      None

```

__vlan-x_8__	8	None
__vlan-x_9__	9	None
__vlan-x_10__	10	None
__vlan-x_11__	11	None
__vlan-x_12__	12	None
__vlan-x_13__	13	None
__vlan-x_14__	14	None
__vlan-x_15__	15	None
__vlan-x_16__	16	None
__vlan-x_17__	17	None
__vlan-x_18__	18	None
__vlan-x_19__	19	None
__vlan-x_20__	20	None

#### show vlans sort-by name (EX Series and QFX Series)

```
user@switch> show vlans sort-by employee
```

Name	Tag	Interfaces
__employee_120__	120	
__employee_121__	121	xe-0/0/22.0*
__employee_122__	122	xe-0/0/22.0*
__employee_123__	123	xe-0/0/22.0*
__employee_124__	124	xe-0/0/22.0*
__employee_125__	125	xe-0/0/22.0*
__employee_126__	126	xe-0/0/22.0*
__employee_127__	127	xe-0/0/22.0*
__employee_128__	128	xe-0/0/22.0*
__employee_129__	129	xe-0/0/22.0*
__employee_130__	130	xe-0/0/22.0*

#### show vlans tag (EX Series and QFX Series)

```
user@switch> show vlans employee
```

Name	Tag	Interfaces
__employee_120__	120	xe-0/0/22.0*
__employee_121__	121	xe-0/0/22.0*
__employee_122__	122	xe-0/0/22.0*
__employee_123__	123	xe-0/0/22.0*
__employee_124__	124	xe-0/0/22.0*
__employee_125__	125	xe-0/0/22.0*
__employee_126__	126	xe-0/0/22.0*
__employee_127__	127	xe-0/0/22.0*
__employee_128__	128	xe-0/0/22.0*
__employee_129__	129	xe-0/0/22.0*
__employee_130__	130	xe-0/0/22.0*

#### show vlans sort-by tag (EX Series)

```
user@switch> show vlans sort-by tag
```

Name	Tag	Interfaces
default		None
__vlan-x_1__	1	None
__vlan-x_2__	2	None
__vlan-x_3__	3	None
__vlan-x_4__	4	None
__vlan-x_5__	5	None
__vlan-x_6__	6	None
__vlan-x_7__	7	None
__vlan-x_8__	8	None
__vlan-x_9__	9	None
__vlan-x_10__	10	None
__vlan-x_11__	11	None
__vlan-x_12__	12	None
__vlan-x_13__	13	None
__vlan-x_14__	14	None
__vlan-x_15__	15	None



__vlan-x_16__	16	None
__vlan-x_17__	17	None
__vlan-x_18__	18	None
__vlan-x_19__	19	None
__vlan-x_20__	20	None

### show vlans employee (vlan-range-name)

```
user@switch> show vlans employee
```

Name	Tag	Interfaces
__employee_120__	120	ge-0/0/22.0*
__employee_121__	121	ge-0/0/22.0*
__employee_122__	122	ge-0/0/22.0*
__employee_123__	123	ge-0/0/22.0*
__employee_124__	124	ge-0/0/22.0*
__employee_125__	125	ge-0/0/22.0*
__employee_126__	126	ge-0/0/22.0*
__employee_127__	127	ge-0/0/22.0*
__employee_128__	128	ge-0/0/22.0*
__employee_129__	129	ge-0/0/22.0*
__employee_130__	130	ge-0/0/22.0*

### show vlans summary (EX Series)

```
user@switch> show vlans summary
```

VLANs summary:

Total: 8, Configured VLANs: 5  
Internal VLANs: 1, Temporary VLANs: 0

Dot1q VLANs summary:

Total: 8, Tagged VLANs: 2, Untagged VLANs: 6  
Private VLAN:  
Primary VLANs: 2, Community VLANs: 2, Isolated VLANs: 3

Dot1q Tunnelled VLANs summary:

Total: 0  
Private VLAN:  
Primary VLANs: 0, Community VLANs: 0, Isolated VLANs: 0

Dynamic VLANs:

Total: 2, Dot1x: 2, MVRP: 0

## Sample Output: EX Series with ELS Switches and MX Routers

### show vlans brief (EX Series Switch)

```

user@switch> show vlans brief
Routing instance  VLAN name      Tag      Interfaces
default-switch   c1                20        ge-0/0/0.0*
                c1                20        ge-1/0/0.0*
                c1                20        ge-2/0/0.0*
default-switch   c2                30        ge-0/0/0.0*
                c2                30        ge-2/0/0.0*
default-switch   default           1         ge-0/0/1.0*
default-switch   iso              10
default-switch   iso1             50        ge-0/0/0.0*
                iso1             50        ge-2/0/0.0*
default-switch   pri              100       ge-0/0/0.0*
                pri              100       ge-1/0/0.0*
                pri              100       ge-2/0/0.0*

```

### show vlans brief (MX Routers)

```

user@host> show vlans brief
Routing instance  VLAN name      Tag      Interfaces
VPLS-1            __VPLS-1__     all       ae1.0
VPLS-2            __VPLS-2__     all       ae3.0
                __VPLS-2__     all       ge-3/1/2.0
                __VPLS-2__     all       vt-3/3/10.1048576
default-switch    VLAN1000        1000      ae26.0
default-switch    VLAN101         101       ae20.0
default-switch    VLAN102         102       ae20.0
default-switch    VLAN103         103       ae20.0
default-switch    VLAN104         104       ae20.0
default-switch    VLAN105         105       ae20.0
default-switch    VLAN106         106       ae20.0
default-switch    VLAN107         107       ae20.0
default-switch    VLAN108         108       ae20.0
[...output truncated...]

```

### show vlans detail (EX Series Switch)

```

user@switch> show vlans detail

```

```

Routing instance: default-switch
  VLAN Name: c1                               State: Active
  Tag: 20
  PVLAN type : Community
  Internal index: 16, Generation Index: 21, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-0/0/0.0*,tagged,trunk
    ge-1/0/0.0*,tagged,trunk
    ge-2/0/0.0*,tagged,trunk
  Number of interfaces: Tagged 3      , Untagged 0
  Total MAC count: 0

```

```

Routing instance: default-switch
  VLAN Name: c2                               State: Active
  Tag: 30
  PVLAN type : Community
  Internal index: 17, Generation Index: 22, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-0/0/0.0*,tagged,trunk
    ge-2/0/0.0*,tagged,trunk
  Number of interfaces: Tagged 2      , Untagged 0
  Total MAC count: 0

```

```

Routing instance: default-switch
  VLAN Name: default                          State: Active
  Tag: 1
  Internal index: 5, Generation Index: 5, Origin: Static
  MAC aging time: 300 seconds
  Number of interfaces: Tagged 0      , Untagged 0
  Total MAC count: 0

```

```

Routing instance: default-switch
  VLAN Name: iso                              State: Active
  Tag: 10
  Internal index: 14, Generation Index: 19, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-0/0/1.0*,untagged,access
  Number of interfaces: Tagged 0      , Untagged 1
  Total MAC count: 0

```

```

Routing instance: default-switch
  VLAN Name: iso1                             State: Active
  Tag: 50
  PVLAN type : Isolated
  Internal index: 15, Generation Index: 20, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-0/0/0.0*,tagged,trunk
    ge-2/0/0.0*,tagged,trunk
  Number of interfaces: Tagged 2      , Untagged 0
  Total MAC count: 0

```

```

Routing instance: default-switch
  VLAN Name: pri                              State: Active
  Tag: 100
  PVLAN type : Primary
  Isolated VLAN :
  vlan-id : 50 vlan name : iso1

```

```
Community VLAN :
vlan-id : 20 vlan name : c1
vlan-id : 30 vlan name : c2
Internal index: 9, Generation Index: 14, Origin: Static
MAC aging time: 300 seconds
Interfaces:
    ge-0/0/0.0*,tagged,trunk
    ge-1/0/0.0*,tagged,trunk
    ge-2/0/0.0*,tagged,trunk
Number of interfaces: Tagged 3      , Untagged 0
Total MAC count: 0
```

### show vlans detail (MX Routers)

```
user@host> show vlans detail
Routing instance: VPLS-1
  VLAN Name: __VPLS-1__                      State: Active
  Tag: all
  Internal index: 2, Generation Index:      , Origin: Dynamic
  Interfaces:
    ae1.0,tagged
  Number of interfaces: Tagged 1      , Untagged 0
  Total MAC count: 0

Routing instance: VPLS-2
  VLAN Name: __VPLS-2__                      State: Active
  Tag: all
  Internal index: 3, Generation Index:      , Origin: Dynamic
  Interfaces:
    ae3.0,tagged
    ge-3/1/2.0,tagged
    vt-3/3/10.1048576,tagged
  Number of interfaces: Tagged 3      , Untagged 0
  Total MAC count: 4

Routing instance: default-switch
  VLAN Name: VLAN1000                      State: Active
  Tag: 1000
  Internal index: 4, Generation Index: 1, Origin: Static
  Layer 3 interface: irb.1000
  Interfaces:
    ae26.0,tagged,trunk
  Number of interfaces: Tagged 1      , Untagged 0
  Total MAC count: 0

Routing instance: default-switch
  VLAN Name: VLAN101                      State: Active
  Tag: 101
  Internal index: 5, Generation Index: 2, Origin: Static
  Layer 3 interface: irb.101
  Interfaces:
    ae20.0,tagged,trunk
  Number of interfaces: Tagged 1      , Untagged 0
  Total MAC count: 1

Routing instance: default-switch
  VLAN Name: VLAN102                      State: Active
  Tag: 102
  Internal index: 6, Generation Index: 3, Origin: Static
  Layer 3 interface: irb.102
```

```

Interfaces:
  ae20.0, tagged, trunk
Number of interfaces: Tagged 1    , Untagged 0
Total MAC count: 1
[...output truncated...]

```

### show vlans extensive (EX Series Switch)

```

user@switch> show vlans extensive
Routing instance: default-switch
  VLAN Name: c1                                State: Active
  Tag: 20
  PVLAN type : Community
  Internal index: 16, Generation Index: 21, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-0/0/0.0*, tagged, trunk
    ge-1/0/0.0*, tagged, trunk
    ge-2/0/0.0*, tagged, trunk
  Number of interfaces: Tagged 3    , Untagged 0
  Total MAC count: 0

Routing instance: default-switch
  VLAN Name: c2                                State: Active
  Tag: 30
  PVLAN type : Community
  Internal index: 17, Generation Index: 22, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-0/0/0.0*, tagged, trunk
    ge-2/0/0.0*, tagged, trunk
  Number of interfaces: Tagged 2    , Untagged 0
  Total MAC count: 0

Routing instance: default-switch
  VLAN Name: default                           State: Active
  Tag: 1
  Internal index: 5, Generation Index: 5, Origin: Static
  MAC aging time: 300 seconds
  Number of interfaces: Tagged 0    , Untagged 0
  Total MAC count: 0

Routing instance: default-switch
  VLAN Name: iso                                State: Active
  Tag: 10
  Internal index: 14, Generation Index: 19, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-0/0/1.0*, untagged, access
  Number of interfaces: Tagged 0    , Untagged 1
  Total MAC count: 0

Routing instance: default-switch
  VLAN Name: iso1                              State: Active
  Tag: 50
  PVLAN type : Isolated
  Internal index: 15, Generation Index: 20, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-0/0/0.0*, tagged, trunk
    ge-2/0/0.0*, tagged, trunk

```

```

Number of interfaces: Tagged 2      , Untagged 0
Total MAC count: 0

Routing instance: default-switch
  VLAN Name: pri                      State: Active
  Tag: 100
  PVLAN type : Primary
  Isolated VLAN :
  vlan-id : 50 vlan name : iso1
  Community VLAN :
  vlan-id : 20 vlan name : c1
  vlan-id : 30 vlan name : c2
  Internal index: 9, Generation Index: 14, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-0/0/0.0*,tagged,trunk
    ge-1/0/0.0*,tagged,trunk
    ge-2/0/0.0*,tagged,trunk
Number of interfaces: Tagged 3      , Untagged 0
Total MAC count: 0

```

#### show vlans extensive (MX Routers)

```

user@host> show vlans extensive
Routing instance: default-switch
  VLAN Name: VLAN_10                      State: Active
  Tag: 10
  Internal index: 2, Generation Index: 1, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-1/0/3.0*,tagged,trunk
Number of interfaces: Tagged 1      , Untagged 0
Total MAC count: 0

Routing instance: default-switch
  VLAN Name: VLAN_20                      State: Active
  Tag: 20
  Internal index: 3, Generation Index: 2, Origin: Static
  MAC aging time: 300 seconds
  Interfaces:
    ge-1/0/3.0*,tagged,trunk
Number of interfaces: Tagged 1      , Untagged 0
Total MAC count: 0

```

#### Sample Output (SRX Devices)

##### show vlans (SRX devices)

```

user@host> show vlans
Routing instance  VLAN name  Tag  Interfaces
default-switch   vlan-22    22
default-switch   vlan-333   333   ge-0/0/3.0*
                                   ge-0/0/4.0*
default-switch   default    1
default-switch   vlan100    100

```

ge-0/0/1.0\*

**show vlans brief (SRX devices)**

```

user@host> show vlans brief
Routing instance  VLAN name      Tag      Interfaces
default-switch   vlan-22          22
default-switch   vlan-333         333      ge-0/0/3.0*
                                                ge-0/0/4.0*
default-switch   default          1
default-switch   vlan100          100      ge-0/0/1.0*

```

**show vlans detail (SRX devices)**

```

user@host> show vlans detail
Routing instance: default-switch
  VLAN Name: vlan-22                      State: Active
  Tag: 22
  Internal index: 2, Generation Index: 1, Origin: Static
  MAC aging time: 300 seconds
  VXLAN Enabled : No
  Number of interfaces: Tagged 0      , Untagged 0
  Total MAC count: 0

Routing instance: default-switch
  VLAN Name: vlan-333                      State: Active
  Tag: 333
  Internal index: 3, Generation Index: 2, Origin: Static
  MAC aging time: 300 seconds
  VXLAN Enabled : No
  Interfaces:
    ge-0/0/3.0*,tagged,trunk
    ge-0/0/4.0*,tagged,trunk
  Number of interfaces: Tagged 2      , Untagged 0
  Total MAC count: 0

```





## CHAPTER 8

# MAC Address Operational Commands

- `show ethernet-switching mac-learning-log`
- `show ethernet-switching statistics mac-learning`

## show ethernet-switching mac-learning-log

<b>Syntax</b>	show ethernet-switching mac-learning-log
<b>Release Information</b>	<p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 9.5 for SRX Series devices.</p> <p>Command introduced in Junos OS Release 11.1 for the QFX Series.</p>
<b>Description</b>	Displays the event log of learned MAC addresses.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show ethernet-switching table on page 195</a></li> <li>• <a href="#">show ethernet-switching interfaces on page 188</a></li> <li>• <a href="#">show ethernet-switching table on page 195</a></li> <li>• <a href="#">show ethernet-switching interfaces on page 188</a></li> <li>• <i>Example: Setting Up Basic Bridging and a VLAN for an EX Series Switch</i></li> <li>• <i>Example: Setting Up Bridging with Multiple VLANs for EX Series Switches</i></li> <li>• <i>Example: Connecting an Access Switch to a Distribution Switch</i></li> </ul>
<b>List of Sample Output</b>	<p><a href="#">show ethernet-switching mac-learning-log (EX Series switch) on page 244</a></p> <p><a href="#">show ethernet-switching mac-learning-log (QFX Series Switches, QFabric, NFX Series Devices and EX4600) on page 244</a></p> <p><a href="#">show ethernet-switching mac-learning-log (SRX Series devices) on page 245</a></p>
<b>Output Fields</b>	<p>Output fields for EX Series switches:</p> <p>The following table lists the output fields for the <b>show ethernet-switching mac-learning-log</b> command. Output fields are listed in the approximate order in which they appear.</p>

Table 12: show ethernet-switching mac-learning-log Output Fields

Field Name	Field Description
Date and Time	Timestamp when the MAC address was added or deleted from the log.
vlan_name	VLAN name. A value defined by the user for all user-configured VLANs.
MAC	Learned MAC address.
Deleted   Added	MAC address deleted or added to the MAC learning log.

*Table 12: show ethernet-switching mac-learning-log Output Fields (continued)*

Field Name	Field Description
<b>Blocking</b>	The forwarding state of the interface: <ul style="list-style-type: none"> <li>• <b>blocked</b>—Traffic is not being forwarded on the interface.</li> <li>• <b>unblocked</b>—Traffic is forwarded on the interface.</li> </ul>
<b>Flags</b>	Displays the MAC address flags in which the MAC event occurred. This option is for debugging purposes.

Output fields for QFX Series switches, QFabric, NFX Series devices and EX4600:

[Table 13 on page 243](#) lists the output fields for the **show ethernet-switching mac-learning-log** command. Output fields are listed in the approximate order in which they appear.

*Table 13: show ethernet-switching mac-learning-log Output Fields*

Field Name	Field Description
<b>Date and Time</b>	Timestamp in UTC when the MAC operation occurred.
<b>vlan_name</b>	VLAN name. A value defined by the user for all user-configured VLANs. The name of the VLAN on which the MAC is learned.
<b>MAC</b>	Learned MAC address.
<b>Event op</b>	MAC address that are added, learned, deleted, changed or moved from one interface to another interface.
<b>Interface Name</b>	The name of the interface on which the MAC address is learned. When a MAC address is moved, there is another field with the name of the interface. The log displays the name of the interface from where the MAC address moved, and the name of the interface to where the MAC address moved.
<b>Flags</b>	Displays the MAC address flags in which the MAC event occurred. This option is for debugging purposes.

Output fields for SRX Series devices:

[Table 14 on page 243](#) lists the output fields for the **show ethernet-switching mac-learning-log** command on SRX Series devices. Output fields are listed in the approximate order in which they appear.

*Table 14: show ethernet-switching-mac-learning-log Output Fields*

Field Name	Field Description
<b>Date and Time</b>	Timestamp when the MAC address was added or deleted from the log.
<b>VLAN-IDX</b>	VLAN index. An internal value assigned by Junos OS for each VLAN.
<b>MAC</b>	Learned MAC address.
<b>Deleted   Added</b>	MAC address deleted or added to the MAC learning log.

Table 14: show ethernet-switching-mac-learning-log Output Fields (continued)

Field Name	Field Description
<b>Blocking</b>	<p>The forwarding state of the interface:</p> <ul style="list-style-type: none"> <li>blocked—Traffic is not being forwarded on the interface.</li> <li>unblocked—Traffic is forwarded on the interface.</li> </ul>

## Sample Output

### show ethernet-switching mac-learning-log (EX Series switch)

```

user@switch> show ethernet-switching mac-learning-log
Mon Feb 25 08:07:05 2008
  vlan_name v1 mac 00:00:00:00:00:00 was deleted
Mon Feb 25 08:07:05 2008
  vlan_name v9 mac 00:00:00:00:00:00 was deleted
Mon Feb 25 08:07:05 2008
  vlan_name HR_vlan mac 00:00:00:00:00:00 was deleted
Mon Feb 25 08:07:05 2008
  vlan_name v3 mac 00:00:00:00:00:00 was deleted
Mon Feb 25 08:07:05 2008
  vlan_name v12 mac 00:00:00:00:00:00 was deleted
Mon Feb 25 08:07:05 2008
  vlan_name v13 mac 00:00:00:00:00:00 was deleted
Mon Feb 25 08:07:05 2008
  vlan_name sales_vlan mac 00:00:00:00:00:00 was deleted
Mon Feb 25 08:07:05 2008
  vlan_name employee1 mac 00:00:00:00:00:00 was deleted
Mon Feb 25 08:07:05 2008
  vlan_name employee2 mac 00:00:00:00:00:00 was deleted
Mon Feb 25 08:07:05 2008
  vlan_name v3 mac 00:00:00:00:00:00 was added
Mon Feb 25 08:07:05 2008
  vlan_name HR_vlan mac 00:00:00:00:00:00 was added
Mon Feb 25 08:07:05 2008
  vlan_name employee2 mac 00:00:00:00:00:00 was added
Mon Feb 25 08:07:05 2008
  vlan_name employee1 mac 00:00:00:00:00:00 was added
Mon Feb 25 08:07:05 2008
  vlan_name employee2 mac 00:00:05:00:00:05 was learned
Mon Feb 25 08:07:05 2008
  vlan_name employee1 mac 00:30:48:90:54:89 was learned
Mon Feb 25 08:07:05 2008
  vlan_name HR_vlan mac 00:00:5e:00:01:00 was learned
Mon Feb 25 08:07:05 2008
  vlan_name sales_vlan mac 00:00:5e:00:01:08 was learned
[output truncated]

```

### show ethernet-switching mac-learning-log (QFX Series Switches, QFabric, NFX Series Devices and EX4600)

```

user@switch> show ethernet-switching mac-learning-log
Mon Jun 30 13:49:49 2014 vlan_name v11+11 mac 00:10:94:00:00:02 was learned on
ge-1/0/22.0 with flags: 0x2001f    << MAC address that as dynamically learned
Mon Jun 30 13:50:29 2014 vlan_name v11+11 mac 00:10:94:00:00:02 was deleted from
ge-1/0/22.0 with flags: 0x1080    << MAC address that was deleted
Mon Jun 30 13:51:28 2014 vlan_name v11+11 mac 00:00:00:01:01:01 was added to
ge-1/0/22.0 with flags: 0x2013f    << Static MAC address that was added

```

```

Mon Jun 30 13:51:46 2014 vlan_name v11+11 mac 00:00:00:01:01:01 was deleted from
ge-1/0/22.0 with flags: 0x1120 << delete of Static MAC address that was deleted
Mon Jun 30 13:52:03 2014 vlan_name v11+11 mac 00:10:94:00:00:02 was learned on
ge-1/0/22.0 with flags: 0x2001f << MAC address that was dynamically learned
Mon Jun 30 13:52:11 2014 vlan_name v11+11 mac 00:10:94:00:00:02 was moved from
ge-1/0/22.0 to ge-1/0/21.0 with flags: 0x2101f << MAC address that was moved
Mon Jun 30 13:54:24 2014 vlan_name v11+11 mac 00:10:94:00:00:02 was changed on
ge-1/0/21.0 with flags: 0x2113f << MAC address that changed from a dynamic
address to a static address

```

### show ethernet-switching mac-learning-log (SRX Series devices)

```

user@host> show ethernet-switching mac-learning-log
Wed Mar 18 08:07:05 2009
vlan_idx 7 mac 00:00:5E:00:53:00 was deleted
Wed Mar 18 08:07:05 2009
vlan_idx 9 mac 00:00:5E:00:53:00 was deleted
Wed Mar 18 08:07:05 2009
vlan_idx 10 mac 00:00:5E:00:53:00 was deleted
Wed Mar 18 08:07:05 2009
vlan_idx 11 mac 00:00:5E:00:53:00 was deleted
Wed Mar 18 08:07:05 2009
vlan_idx 12 mac 00:00:5E:00:53:00 was deleted
Wed Mar 18 08:07:05 2009
vlan_idx 13 mac 00:00:5E:00:53:00 was deleted
Wed Mar 18 08:07:05 2009
vlan_idx 14 mac 00:00:5E:00:53:00 was deleted
Wed Mar 18 08:07:05 2009
vlan_idx 15 mac 00:00:5E:00:53:00 was deleted
Wed Mar 18 08:07:05 2009
vlan_idx 16 mac 00:00:5E:00:53:00 was deleted
Wed Mar 18 08:07:05 2009
vlan_idx 4 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 6 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 7 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 9 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 10 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 11 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 12 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 13 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 14 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 15 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 16 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 5 mac 00:00:5E:00:53:00 was added
Wed Mar 18 08:07:05 2009
vlan_idx 18 mac 00:00:5E:00:53:AA was learned
Wed Mar 18 08:07:05 2009
vlan_idx 5 mac 00:00:5E:00:53:AB was learned
Wed Mar 18 08:07:05 2009
vlan_idx 6 mac 00:00:5E:00:53:AC was learned

```

```
Wed Mar 18 08:07:05 2009
vlan_idx 16 mac 00:00:5E:00:53:AD was learned
Wed Mar 18 08:07:05 2009
vlan_idx 7 mac 00:00:5E:00:53:AE was learned
Wed Mar 18 08:07:05 2009
vlan_idx 8 mac 00:00:5E:00:53:AF was learned
Wed Mar 18 08:07:05 2009
vlan_idx 12 mac 00:00:5E:00:53:AG was learned
[output truncated]
```

## show ethernet-switching statistics mac-learning

<b>Syntax</b>	show ethernet-switching statistics mac-learning <brief   detail> <interface <i>interface-name</i> >
<b>Release Information</b>	Command introduced in Junos OS Release 9.4 for EX Series switches. Command introduced in Junos OS Release 11.1 for the QFX Series.
<b>Description</b>	Display media access control (MAC) learning statistics.
<div>  <b>NOTE:</b> For the QFX Series, this command is not supported in Enhanced Layer 2 Software (ELS). </div>	
<b>Options</b>	<p><b>none</b>—(Optional) Display MAC learning statistics for all interfaces.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output. The default is <b>brief</b>.</p> <p><b>interface <i>interface-name</i></b>—(Optional) Display MAC learning statistics for the specified interface.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show ethernet-switching table on page 195</a></li> <li>• <a href="#">show ethernet-switching interfaces on page 188</a></li> <li>• <a href="#">show ethernet-switching mac-learning-log on page 242</a></li> <li>• <a href="#">show ethernet-switching table on page 195</a></li> <li>• <a href="#">show ethernet-switching interfaces on page 188</a></li> <li>• <a href="#">Example: Setting Up Basic Bridging and a VLAN on the QFX Series</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show ethernet-switching statistics mac-learning on page 248</a> <a href="#">show ethernet-switching statistics mac-learning detail on page 249</a> <a href="#">show ethernet-switching statistics mac-learning interface ge-0/0/28 detail on page 249</a> <a href="#">show ethernet-switching statistics mac-learning interface on page 249</a> <a href="#">show ethernet-switching statistics mac-learning detail (QFX Series) on page 249</a>
<b>Output Fields</b>	Table 15 on page 248 lists the output fields for the <b>show ethernet-switching statistics mac-learning</b> command. Output fields are listed in the approximate order in which they appear.

Table 15: show ethernet-switching statistics mac-learning Output Fields

Field Name	Field Description	Level of Output
<b>Interface</b>	Name of the interface for which statistics are being reported. (Displayed in the output under the heading <b>Interface</b> .)	All levels
<b>Learning message from local packets</b>	MAC learning message generated due to packets coming in on the management interface. (Displayed in the output under the heading <b>Local pkts</b> .)	All levels
<b>Learning message from transit packets</b>	MAC learning message generated due to packets coming in on network interfaces. (Displayed in the output under the heading <b>Transit pkts</b> .)	All levels
<b>Learning message with error</b>	<p>MAC learning messages received with errors (Displayed under the heading <b>Error</b>):</p> <ul style="list-style-type: none"> <li>• <b>Invalid VLAN</b>—The VLAN of the packet does not exist.</li> <li>• <b>Invalid MAC</b>—The MAC address is either NULL or a multicast MAC address.</li> <li>• <b>Security violation</b>—The MAC address is not an allowed MAC address.</li> <li>• <b>Interface down</b>—The MAC address is learned on an interface that is down.</li> <li>• <b>Incorrect membership</b>—The MAC address is learned on an interface that is not a member of the VLAN.</li> <li>• <b>Interface limit</b>—The number of MAC addresses learned on the interface has exceeded the limit.</li> <li>• <b>MAC move limit</b>—This MAC address has moved among multiple interfaces too many times in a given interval.</li> <li>• <b>VLAN limit</b>—The number of MAC addresses learned on the VLAN has exceeded the limit.</li> <li>• <b>VLAN membership limit</b>—The number of MAC addresses learned on the interface as a member of the specified VLAN (VLAN membership MAC limit) has exceeded the limit.</li> <li>• <b>Invalid VLAN index</b>—The VLAN of the packet, although configured, does not yet exist in the kernel.</li> <li>• <b>Interface not learning</b>—The MAC address is learned on an interface that does not yet allow learning—for example, the interface is blocked.</li> <li>• <b>No nexthop</b>—The MAC address is learned on an interface that does not have a unicast next hop.</li> <li>• <b>MAC learning disabled</b>—The MAC address is learned on an interface on which MAC learning has been disabled.</li> <li>• <b>Others</b>—The message contains some other error.</li> </ul>	All levels

## Sample Output

### show ethernet-switching statistics mac-learning

```
user@switch> show ethernet-switching statistics mac-learning
```

```
Learning stats: 0 learn msg rcvd, 0 error
Interface      Local pkts      Transit pkts      Error
ge-0/0/0.0      0                0                0
ge-0/0/1.0      0                0                0
ge-0/0/2.0      0                0                0
ge-0/0/3.0      0                0                0
```



**show ethernet-switching statistics mac-learning detail**

```

user@switch> show ethernet-switching statistics mac-learning detail
Learning stats: 0 learn msg rcvd, 0 error

Interface: ge-0/0/0.0
Learning message from local packets: 0
Learning message from transit packets: 1
Learning message with error: 0
  Invalid VLAN: 0      Invalid MAC: 0
  Security violation: 0    Interface down: 0
  Incorrect membership: 0  Interface limit: 0
  MAC move limit: 0      VLAN limit: 0
  Invalid VLAN index: 0   Interface not learning: 0
  No nexthop: 0          MAC learning disabled: 0
  Others: 0

```

```

Interface: ge-0/0/1.0
Learning message from local packets: 0
Learning message from transit packets: 2
Learning message with error: 0
  Invalid VLAN: 0      Invalid MAC: 0
  Security violation: 0    Interface down: 0
  Incorrect membership: 0  Interface limit: 0
  MAC move limit: 0      VLAN limit: 0
  Invalid VLAN index: 0   Interface not learning: 0
  No nexthop: 0          MAC learning disabled: 0
  Others: 0

```

**show ethernet-switching statistics mac-learning interface ge-0/0/28 detail**

```

user@switch> show ethernet-switching statistics mac-learning interface ge-0/0/28 detail

Interface: ge-0/0/28.0
Learning message from local packets: 0
Learning message from transit packets: 5
Learning message with error: 0
  Invalid VLAN: 0      Invalid MAC: 0
  Security violation: 0    Interface down: 0
  Incorrect membership: 0  Interface limit: 0
  MAC move limit: 0      VLAN limit: 0
                          VLAN membership limit: 20
  Invalid VLAN index: 0   Interface not learning: 0
  No nexthop: 0          MAC learning disabled: 0
  Others: 0

```

**show ethernet-switching statistics mac-learning interface**

```

user@switch> show ethernet-switching statistics mac-learning interface ge-0/0/1

Interface      Local pkts  Transit pkts  Error
ge-0/0/1.0      0           1            1

```

**show ethernet-switching statistics mac-learning detail (QFX Series)**

```

user@switch> show ethernet-switching statistics mac-learning detail
Learning stats: 0 learn msg rcvd, 0 error

Interface: xe-0/0/0.0
Learning message from local packets: 0

```

```
Learning message from transit packets: 1
Learning message with error:          0
  Invalid VLAN:                      0      Invalid MAC:                      0
  Security violation:                 0      Interface down:                      0
  Incorrect membership:               0      Interface limit:                     0
  MAC move limit:                     0      VLAN limit:                          0
  Invalid VLAN index:                 0      Interface not learning:              0
  No nexthop:                         0      MAC learning disabled:               0
  Others:                             0
```

Interface: xe-0/0/1.0

```
Learning message from local packets: 0
Learning message from transit packets: 2
Learning message with error:          0
  Invalid VLAN:                      0      Invalid MAC:                      0
  Security violation:                 0      Interface down:                      0
  Incorrect membership:               0      Interface limit:                     0
  MAC move limit:                     0      VLAN limit:                          0
  Invalid VLAN index:                 0      Interface not learning:              0
  No nexthop:                         0      MAC learning disabled:               0
  Others:                             0
```

## CHAPTER 9

# Spanning Tree Monitoring Commands

- OBSOLETE clear error bpdu interface
- clear spanning-tree statistics
- show spanning-tree bridge
- show spanning-tree interface
- show spanning-tree mstp configuration
- show spanning-tree statistics

## OBSOLETE clear error bpdud interface

---


<b>Syntax</b>	<code>clear error bpdud interface (all   <i>interface-name</i>)</code>
<b>Release Information</b>	Command introduced in Junos OS Release 9.4. Command introduced in Junos OS Release 13.2X50-D10 for EX Series switches. Command supports <b>all</b> option in Junos OS Release 15.1 for EX Series switches.
<b>Description</b>	Clear a bridge protocol data unit (BPDU) error condition caused by the detection of a possible bridging loop from Spanning Tree Protocol (STP) operation.
<b>Required Privilege Level</b>	clear
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring BPDU Protection on Spanning Tree Interfaces on page 68</a></li><li>• <a href="#">Unblocking an Interface That Receives BPDUs in Error (CLI Procedure) on page 69</a></li></ul>
<b>List of Sample Output</b>	<a href="#">clear error bpdud interface on page 252</a>
<b>Output Fields</b>	When you enter this command, you are provided feedback on the status of your request.

### Sample Output

#### clear error bpdud interface

```
user@switch> clear error bpdud interface ge-1/1/1
```

## clear spanning-tree statistics

<b>List of Syntax</b>	<a href="#">Syntax on page 253</a> <a href="#">Syntax (EX Series Switches and the QFX Series) on page 253</a>
<b>Syntax</b>	clear spanning-tree statistics <interface <i>interface-name</i> > <logical-system <i>logical-system-name</i> >
<b>Syntax (EX Series Switches and the QFX Series)</b>	clear spanning-tree statistics <interface <i>interface-name</i> >
<b>Release Information</b>	Command introduced in Junos OS Release 8.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 11.1 for the QFX Series.
<b>Description</b>	Clear Spanning Tree Protocol statistics for all interfaces or a specified interface.
<b>Options</b>	<p><b>none</b>—Reset STP counters for all interfaces for all routing instances.</p> <p><b>interface <i>interface-name</i></b>—(Optional) Clear STP statistics for the specified interface only.</p> <p><b>logical-system <i>logical-system-name</i></b>—(Optional) Clear STP statistics on a particular logical system.</p>
<div>  <b>NOTE:</b> The <b>logical-system</b> option is not available on QFabric systems. </div>	
<b>Required Privilege Level</b>	clear
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Understanding STP for EX Series Switches</a></li> <li>• <a href="#">show spanning-tree statistics on page 272</a></li> <li>• <a href="#">show spanning-tree bridge on page 255</a></li> <li>• <a href="#">show spanning-tree interface on page 260</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">clear spanning-tree statistics on page 254</a>
<b>Output Fields</b>	This command produces no output.

## Sample Output

`clear spanning-tree statistics`

```
user@switch> clear spanning-tree statistics
```

## show spanning-tree bridge

**List of Syntax**    [Syntax on page 255](#)  
                          [Syntax \(QFX Series and EX Series\) on page 255](#)

**Syntax**    show spanning-tree bridge  
                  <brief | detail>  
                  <msti *msti-id*>  
                  <routing-instance *routing-instance-name*>  
                  <vlan-id *vlan-id*>

**Syntax (QFX Series and EX Series)**    show spanning-tree bridge  
                  <brief | detail>  
                  <msti *msti-id*>  
                  <vlan-id *vlan-id*>

**Release Information**    Command introduced in Junos OS Release 8.4.  
                                  Command introduced in Junos OS Release 9.0 for EX Series switches.  
                                  Command introduced in Junos OS Release 11.1 for the QFX Series.

**Description**    Displays the configured or calculated spanning-tree protocol (can be either STP, RSTP, MSTP, or VSTP) parameters.

**Options**    **none**—(Optional) Display brief STP bridge information for all multiple spanning-tree instances (MSTIs).  
                  **brief | detail**—(Optional) Display the specified level of output.  
                  **msti *msti-id***—(Optional) Display spanning-tree protocol bridge information for the specified MSTI or Common and Internal Spanning Tree (CIST). Specify **0** for CIST. Specify a value from **1** through **4094** for an MSTI.  
                  **routing-instance *routing-instance-name***—(Optional) Display STP bridge information for the specified routing instance.  
                  **vlan-id *vlan-id***—(Optional) Display spanning-tree protocol bridge information for the specified VLAN. Specify a VLAN tag identifier from **1** through **4094**.

**Required Privilege Level**    view

**Related Documentation**

- [Understanding STP for EX Series Switches](#)
- [Understanding RSTP for EX Series and QFX Series Switches](#)
- [Understanding VSTP for EX Series Switches and QFX Series Switches](#)
- [Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches](#)
- [show spanning-tree interface on page 260](#)

**List of Sample Output** [show spanning-tree bridge routing-instance on page 257](#)  
[show spanning-tree bridge msti on page 258](#)  
[show spanning-tree bridge vlan-id \(MSTP\) on page 258](#)  
[show spanning-tree bridge \(RSTP\) on page 258](#)  
[show spanning-tree bridge vlan-id \(RSTP\) on page 259](#)

**Output Fields** [Table 16 on page 256](#) lists the output fields for the **show spanning-tree bridge** command. Output fields are listed in the approximate order in which they appear.

*Table 16: show spanning-tree bridge Output Fields*

Field Name	Field Description
Routing instance name	Name of the routing instance under which the bridge is configured.
Enabled protocol	Spanning Tree Protocol type enabled.
Root ID	Bridge ID of the elected spanning-tree root bridge. The bridge ID consists of a configurable bridge priority and the MAC address of the bridge.
Root cost	Calculated cost to reach the root bridge from the bridge where the command is entered.
Root port	Interface that is the current elected root port for this bridge.
CIST regional root	Bridge ID of the elected MSTP regional root bridge.
CIST internal root cost	Calculated cost to reach the regional root bridge from the bridge where the command is entered.
Hello time	Configured number of seconds between transmissions of configuration BPDUs.
Maximum age	Configured maximum expected arrival time of hello bridge protocol data units (BPDUs).
Forward delay	How long an STP bridge port remains in the listening and learning states before transitioning to the forwarding state.
Hop count	Configured maximum number of hops a BPDU can be forwarded in the MSTP region.
Message age	Number of elapsed seconds since the most recent BPDU was received.
Number of topology changes	Total number of STP topology changes detected since the routing device last booted.
Time since last topology change	Number of elapsed seconds since the most recent topology change.



Table 16: show spanning-tree bridge Output Fields (continued)

Field Name	Field Description
Bridge ID (Local)	Locally configured bridge ID. The bridge ID consists of a configurable bridge priority and the MAC address of the bridge.
Extended system ID	System identifier.
MSTI regional root	Bridge ID of the elected MSTP regional root bridge.

## Sample Output

### show spanning-tree bridge routing-instance

```

user@host> show spanning-tree bridge routing-instance vs1 detail
STP bridge parameters
Routing instance name           : vs1
Enabled protocol                : MSTP

STP bridge parameters for CIST
Root ID                        : 32768.00:13:c3:9e:c8:80
Root cost                      : 0
Root port                     : ge-10/2/0
CIST regional root             : 32768.00:13:c3:9e:c8:80
CIST internal root cost       : 22000
Hello time                     : 2 seconds
Maximum age                   : 20 seconds
Forward delay                  : 15 seconds
Hop count                     : 18
Message age                   : 0
Number of topology changes    : 1
Time since last topology change : 1191 seconds
Local parameters
  Bridge ID                    : 32768.00:90:69:0b:7f:d1
  Extended system ID           : 1

STP bridge parameters for MSTI 1
MSTI regional root            : 32769.00:13:c3:9e:c8:80
Root cost                     : 22000
Root port                     : ge-10/2/0
Hello time                    : 2 seconds
Maximum age                   : 20 seconds
Forward delay                  : 15 seconds
Hop count                     : 18
Number of topology changes    : 1
Time since last topology change : 1191 seconds
Local parameters
  Bridge ID                    : 32769.00:90:69:0b:7f:d1
  Extended system ID           : 1

STP bridge parameters for MSTI 2
MSTI regional root            : 32770.00:13:c3:9e:c8:80
Root cost                     : 22000
Root port                     : ge-10/2/0
Hello time                    : 2 seconds
Maximum age                   : 20 seconds
Forward delay                  : 15 seconds

```

```
Hop count                : 18
Number of topology changes : 1
Time since last topology change : 1191 seconds
Local parameters
  Bridge ID                : 32770.00:90:69:0b:7f:d1
  Extended system ID       : 1
```

### show spanning-tree bridge msti

```
user@host> show spanning-tree bridge msti 1 routing-instance vs1 detail
STP bridge parameters
Routing instance name      : vs1
Enabled protocol          : MSTP

STP bridge parameters for MSTI 1
MSTI regional root        : 32769.00:13:c3:9e:c8:80
Root cost                  : 22000
Root port                  : xe-10/2/0
Hello time                 : 2 seconds
Maximum age                : 20 seconds
Forward delay              : 15 seconds
Hop count                  : 18
Number of topology changes : 1
Time since last topology change : 1191 seconds
Local parameters
  Bridge ID                : 32769.00:90:69:0b:7f:d1
  Extended system ID       : 1
```

### show spanning-tree bridge vlan-id (MSTP)

```
user@host> show spanning-tree bridge vlan-id 1 101 routing-instance vs1 detail
STP bridge parameters
Routing instance name      : vs1
Enabled protocol          : MSTP

STP bridge parameters for CIST
Root ID                    : 32768.00:13:c3:9e:c8:80
Root cost                  : 0
Root port                  : xe-10/2/0
CIST regional root        : 32768.00:13:c3:9e:c8:80
CIST internal root cost    : 22000
Hello time                 : 2 seconds
Maximum age                : 20 seconds
Forward delay              : 15 seconds
Hop count                  : 18
Message age                : 0
Number of topology changes : 0
Local parameters
  Bridge ID                : 32768.00:90:69:0b:7f:d1
  Extended system ID       : 1
  Hello time               : 2 seconds
  Maximum age              : 20 seconds
  Forward delay            : 15 seconds
  Path cost method         : 32 bit
  Maximum hop count        : 20
```

### show spanning-tree bridge (RSTP)

```
user@host> show spanning-tree bridge
```

```

STP bridge parameters
Routing instance name      : GLOBAL
Enabled protocol          : RSTP
  Root ID                  : 28672.00:90:69:0b:3f:d0
  Hello time               : 2 seconds
  Maximum age              : 20 seconds
  Forward delay            : 15 seconds
  Message age              : 0
  Number of topology changes : 58
  Time since last topology change : 14127 seconds
Local parameters
  Bridge ID                : 28672.00:90:69:0b:3f:d0
  Extended system ID       : 0

STP bridge parameters for bridge VLAN 10
  Root ID                  : 28672.00:90:69:0b:3f:d0
  Hello time               : 2 seconds
  Maximum age              : 20 seconds
  Forward delay            : 15 seconds
  Message age              : 0
  Number of topology changes : 58
  Time since last topology change : 14127 seconds
Local parameters
  Bridge ID                : 28672.00:90:69:0b:3f:d0
  Extended system ID       : 0

STP bridge parameters for bridge VLAN 20
  Root ID                  : 28672.00:90:69:0b:3f:d0
  Hello time               : 2 seconds
  Maximum age              : 20 seconds
  Forward delay            : 15 seconds
  Message age              : 0
  Number of topology changes : 58
  Time since last topology change : 14127 seconds
Local parameters
  Bridge ID                : 28672.00:90:69:0b:3f:d0
  Extended system ID       : 0

```

### show spanning-tree bridge vlan-id (RSTP)

```

user@host> show spanning-tree bridge vlan-id 10
STP bridge parameters
Routing instance name      : GLOBAL
Enabled protocol          : RSTP

STP bridge parameters for VLAN 10
  Root ID                  : 28672.00:90:69:0b:3f:d0
  Hello time               : 2 seconds
  Maximum age              : 20 seconds
  Forward delay            : 15 seconds
  Message age              : 0
  Number of topology changes : 58
  Time since last topology change : 14127 seconds
Local parameters
  Bridge ID                : 28672.00:90:69:0b:3f:d0
  Extended system ID       : 0

```

## show spanning-tree interface

List of Syntax	<a href="#">Syntax on page 260</a> <a href="#">Syntax (EX Series Switches and QFX Series Switches) on page 260</a> <a href="#">Syntax (EX Series Switches) on page 260</a>
Syntax	<pre>show spanning-tree interface &lt;brief   detail&gt; &lt;msti <i>msti-id</i>&gt; &lt;routing-instance <i>routing-instance-name</i>&gt; &lt;vlan-id <i>vlan-id</i>&gt;</pre>
Syntax (EX Series Switches and QFX Series Switches)	<pre>show spanning-tree interface &lt;brief   detail&gt; &lt;msti <i>msti-id</i>&gt; &lt;vlan-id <i>vlan-id</i>&gt;</pre>
Syntax (EX Series Switches)	<pre>show spanning-tree interface &lt;brief   detail&gt; &lt;interface-name <i>interface-name</i>&gt; &lt;msti <i>msti-id</i>&gt; &lt;vlan-id <i>vlan-id</i>&gt;</pre>
Release Information	Command introduced in Junos OS Release 8.4. Command introduced in Junos OS Release 9.0 for EX Series switches. Command introduced in Junos OS Release 11.1 for the QFX Series.
Description	Display the configured or calculated interface-level spanning-tree protocol (can be either STP, RSTP, or MSTP) parameters. In <b>brief</b> mode, will not display interfaces that are administratively disabled or do not have a physical link.
Options	<p><b>none</b>—Display brief STP interface information.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>interface-name <i>interface-name</i></b>—(Optional) Name of an interface.</p> <p><b>msti <i>msti-id</i></b>—(Optional) Display STP interface information for the specified MST instance.</p> <p><b>routing-instance <i>routing-instance-name</i></b>—(Optional) Display STP interface information for the specified routing instance.</p> <p><b>vlan-id <i>vlan-id</i></b>—(Optional) Display STP interface information for the specified VLAN.</p>
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"><li>• <a href="#">show spanning-tree bridge on page 255</a></li></ul>

- *Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches*
- *Understanding STP for EX Series Switches*
- *Understanding RSTP for EX Series and QFX Series Switches*
- *Understanding MSTP for EX Series and QFX Series Switches*
- *Understanding VSTP for EX Series Switches and QFX Series Switches*

**List of Sample Output**

[show spanning-tree interface on page 262](#)  
[show spanning-tree interface \(QFX Series\) on page 262](#)  
[show spanning-tree interface \(EX Series\) on page 263](#)  
[show spanning-tree interface detail on page 264](#)  
[show spanning-tree interface detail \(EX Series\) on page 265](#)  
[show spanning-tree interface msti on page 267](#)  
[show spanning-tree interface vlan-id on page 267](#)  
[show spanning-tree interface \(VSTP\) on page 267](#)  
[show spanning-tree interface vlan-id \(VSTP\) on page 267](#)  
[show spanning-tree interface brief \(EX Series\) on page 268](#)  
[show spanning-tree interface ge-1/0/0 \(EX Series\) on page 268](#)

**Output Fields**

Table 17 on page 261 lists the output fields for the **show spanning-tree interface** command. Output fields are listed in the approximate order in which they appear.

*Table 17: show spanning-tree Interface Output Fields*

Field Name	Field Description
<b>Interface name</b>	Interface configured to participate in the STP, RSTP, VSTP, or MSTP instance.
<b>Port ID</b>	Logical interface identifier configured to participate in the MSTP or VSTP instance.
<b>Designated port ID</b>	Port ID of the designated port for the LAN segment to which this interface is attached.
<b>Designated bridge ID</b>	Bridge ID of the designated bridge for the LAN segment to which this interface is attached.
<b>Port Cost</b>	Configured cost for the interface.
<b>Port State</b>	STP port state: forwarding ( <b>FWD</b> ), blocking ( <b>BLK</b> ), listening, learning, or disabled.
<b>Port Role</b>	MSTP, VSTP, or RSTP port role: designated ( <b>DESG</b> ), backup ( <b>BKUP</b> ), alternate ( <b>ALT</b> ), ( <b>ROOT</b> ), or Root Prevented ( <b>Root-Prev</b> ).
<b>Link type</b>	MSTP, VSTP, or RSTP link type. Shared or point-to-point (pt-pt) and edge or nonedge.

Table 17: show spanning-tree Interface Output Fields (continued)

Field Name	Field Description
<b>Alternate</b>	Identifies the interface as an MSTP, VSTP, or RSTP alternate root port ( <b>Yes</b> ) or nonalternate root port ( <b>No</b> ).
<b>Boundary Port</b>	Identifies the interface as an MSTP regional boundary port ( <b>Yes</b> ) or nonboundary port ( <b>No</b> ).
<b>Edge delay while expiry count</b>	Number of times the edge delay timer expired on that interface.
<b>Rcvd info while expiry count</b>	Number of times the rcvd info timer expired on that interface.

## Sample Output

### show spanning-tree interface

```
user@host> show spanning-tree interface routing-instance vs1 detail
Spanning tree interface parameters for instance 0
```

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ae1	128:1	128:1	32768.0090690b47d1	1000	FWD	DESG
ge-2/1/2	128:2	128:2	32768.0090690b47d1	20000	FWD	DESG
ge-2/1/5	128:3	128:3	32768.0090690b47d1	29999	FWD	DESG
ge-2/2/1	128:4	128:26	32768.0013c39ec880	20000	FWD	ROOT
xe-9/2/0	128:5	128:5	32768.0090690b47d1	2000	FWD	DESG
xe-9/3/0	128:6	128:6	32768.0090690b47d1	2000	FWD	DESG

```
Spanning tree interface parameters for instance 1
```

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ae1	128:1	128:1	32769.0090690b47d1	1000	FWD	DESG
ge-2/1/2	128:2	128:2	32769.0090690b47d1	20000	FWD	DESG
ge-2/1/5	128:3	128:3	32769.0090690b47d1	29999	FWD	DESG
ge-2/2/1	128:4	128:26	32769.0013c39ec880	20000	FWD	ROOT
xe-9/2/0	128:5	128:5	32769.0090690b47d1	2000	FWD	DESG
xe-9/3/0	128:6	128:6	32769.0090690b47d1	2000	FWD	DESG

```
Spanning tree interface parameters for instance 2
```

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ae1	128:1	128:1	32770.0090690b47d1	1000	FWD	DESG
ge-2/1/2	128:2	128:2	32770.0090690b47d1	20000	FWD	DESG
ge-2/1/5	128:3	128:3	32770.0090690b47d1	29999	FWD	DESG
ge-2/2/1	128:4	128:26	32770.0013c39ec880	20000	FWD	ROOT
xe-9/2/0	128:5	128:5	32770.0090690b47d1	2000	FWD	DESG
xe-9/3/0	128:6	128:6	32770.0090690b47d1	2000	FWD	DESG

### show spanning-tree interface (QFX Series)

```
user@host> show spanning-tree interface routing-instance vs1 detail
```

## Spanning tree interface parameters for instance 0

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ae1	128:1	128:1	32768.0090690b47d1	1000	FWD	DESG
ge-2/1/2	128:2	128:2	32768.0090690b47d1	20000	FWD	DESG
ge-2/1/5	128:3	128:3	32768.0090690b47d1	29999	FWD	DESG
ge-2/2/1	128:4	128:26	32768.0013c39ec880	20000	FWD	ROOT
xe-9/2/0	128:5	128:5	32768.0090690b47d1	2000	FWD	DESG
xe-9/3/0	128:6	128:6	32768.0090690b47d1	2000	FWD	DESG

## Spanning tree interface parameters for instance 1

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ae1	128:1	128:1	32769.0090690b47d1	1000	FWD	DESG
ge-2/1/2	128:2	128:2	32769.0090690b47d1	20000	FWD	DESG
ge-2/1/5	128:3	128:3	32769.0090690b47d1	29999	FWD	DESG
ge-2/2/1	128:4	128:26	32769.0013c39ec880	20000	FWD	ROOT
xe-9/2/0	128:5	128:5	32769.0090690b47d1	2000	FWD	DESG
xe-9/3/0	128:6	128:6	32769.0090690b47d1	2000	FWD	DESG

## Spanning tree interface parameters for instance 2

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ae1	128:1	128:1	32770.0090690b47d1	1000	FWD	DESG
ge-2/1/2	128:2	128:2	32770.0090690b47d1	20000	FWD	DESG
ge-2/1/5	128:3	128:3	32770.0090690b47d1	29999	FWD	DESG
ge-2/2/1	128:4	128:26	32770.0013c39ec880	20000	FWD	ROOT
xe-9/2/0	128:5	128:5	32770.0090690b47d1	2000	FWD	DESG
xe-9/3/0	128:6	128:6	32770.0090690b47d1	2000	FWD	DESG

## show spanning-tree interface (EX Series)

```
user@switch> show spanning-tree interface
```

## Spanning tree interface parameters for instance 0

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ge-0/0/0.0	128:513	128:513	8192.0019e2500340	1000	FWD	DESG
ge-0/0/2.0	128:515	128:515	8192.0019e2500340	1000	BLK	DIS
ge-0/0/4.0	128:517	128:517	8192.0019e2500340	1000	FWD	DESG
ge-0/0/23.0	128:536	128:536	8192.0019e2500340	1000	FWD	DESG

## Spanning tree interface parameters for instance 1

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ge-0/0/0.0	128:513	128:513	8193.0019e2500340	1000	FWD	DESG
ge-0/0/2.0	128:515	128:515	8193.0019e2500340	1000	BLK	DIS
ge-0/0/4.0	128:517	128:517	8193.0019e2500340	1000	FWD	DESG
ge-0/0/23.0	128:536	128:536	8193.0019e2500340	1000	FWD	DESG

## Spanning tree interface parameters for instance 2

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ge-0/0/0.0	128:513	128:1	8194.001b549fd000	1000	FWD	ROOT

```

ge-0/0/2.0 128:515 128:515 32770.0019e2500340 4000 BLK DIS
ge-0/0/4.0 128:517 128:1 16386.001b54013080 1000 BLK ALT
ge-0/0/23.0 128:536 128:536 32770.0019e2500340 1000 FWD DESG

```

### show spanning-tree interface detail

```

user@host> show spanning-tree interface routing-instance vs1 detail
Spanning tree interface parameters for instance 0

```

```

Interface name           : ae1
Port identifier          : 128.1
Designated port ID      : 128.1
Port cost                 : 1000
Port state               : Forwarding
Designated bridge ID     : 32768.00:90:69:0b:47:d1
Port role                : Designated
Link type                : Pt-Pt/NONEDGE
Boundary port            : No

```

```

Interface name           : ge-2/1/2
Port identifier          : 128.2
Designated port ID      : 128.2
Port cost                 : 20000
Port state               : Forwarding
Designated bridge ID     : 32768.00:90:69:0b:47:d1
Port role                : Designated
Link type                : Pt-Pt/NONEDGE
Boundary port            : No

```

```

Interface name           : ge-2/1/5
Port identifier          : 128.3
Designated port ID      : 128.3
Port cost                 : 29999
Port state               : Forwarding
Designated bridge ID     : 32768.00:90:69:0b:47:d1
Port role                : Designated
Link type                : Pt-Pt/NONEDGE
Boundary port            : No

```

```

Interface name           : ge-2/2/1
Port identifier          : 128.4
Designated port ID      : 128.26
Port cost                 : 20000
Port state               : Forwarding
Designated bridge ID     : 32768.00:13:c3:9e:c8:80
Port role                : Root
Link type                : Pt-Pt/NONEDGE
Boundary port            : No

```

```

Interface name           : xe-9/2/0
Port identifier          : 128.5
Designated port ID      : 128.5
Port cost                 : 2000
Port state               : Forwarding
Designated bridge ID     : 32768.00:90:69:0b:47:d1
Port role                : Designated
Link type                : Pt-Pt/NONEDGE
Boundary port            : No

```

```

Interface name           : xe-9/3/0

```



```

Port identifier           : 128.6
Designated port ID       : 128.6
Port cost                 : 2000
Port state                : Forwarding
Designated bridge ID     : 32768.00:90:69:0b:47:d1
Port role                 : Designated
Link type                 : Pt-Pt/NONEDGE
Boundary port             : No

```

#### Spanning tree interface parameters for instance 1

```

Interface name           : ae1
Port identifier           : 128.1
Designated port ID       : 128.1
Port cost                 : 1000
Port state                : Forwarding
Designated bridge ID     : 32768.00:90:69:0b:47:d1
Port role                 : Designated
Link type                 : Pt-Pt/NONEDGE
Boundary port             : No

```

```

Interface name           : ge-2/1/2
Port identifier           : 128.2
Designated port ID       : 128.2
Port cost                 : 20000
Port state                : Forwarding
Designated bridge ID     : 32768.00:90:69:0b:47:d1
Port role                 : Designated
Link type                 : Pt-Pt/NONEDGE
Boundary port             : No

```

```

Interface name           : ge-2/1/5
Port identifier           : 128.3
Designated port ID       : 128.3
Port cost                 : 29999
Port state                : Forwarding
Designated bridge ID     : 32768.00:90:69:0b:47:d1
Port role                 : Designated
Link type                 : Pt-Pt/NONEDGE
Boundary port             : No

```

```

Interface name           : ge-2/2/1
Port identifier           : 128.4
Designated port ID       : 128.26
Port cost                 : 20000
Port state                : Forwarding
Designated bridge ID     : 32768.00:13:c3:9e:c8:80
Port role                 : Root
Link type                 : Pt-Pt/NONEDGE
Boundary port             : No

```

...

#### show spanning-tree interface detail (EX Series)

```

user@switch> show spanning-tree interface detail
Spanning tree interface parameters for instance 0

```

```

Interface name           : ge-1/0/0.0
Port identifier           : 128.625

```

Designated port ID : 128.625  
Port cost : 20000  
Port state : Blocking  
Designated bridge ID : 32768.00:19:e2:50:95:a0  
Port role : Disabled  
Link type : Pt-Pt/EDGE  
Boundary port : NA  
Edge delay while expiry count : 0  
Rcvd info while expiry count : 0

Interface name : ge-1/0/1.0  
Port identifier : 128.626  
Designated port ID : 128.626  
Port cost : 20000  
Port state : Blocking  
Designated bridge ID : 32768.00:19:e2:50:95:a0  
Port role : Disabled  
Link type : Pt-Pt/NONEDGE  
Boundary port : NA  
Edge delay while expiry count : 0  
Rcvd info while expiry count : 0

Interface name : ge-1/0/2.0  
Port identifier : 128.627  
Designated port ID : 128.627  
Port cost : 20000  
Port state : Blocking  
Designated bridge ID : 32768.00:19:e2:50:95:a0  
Port role : Disabled  
Link type : Pt-Pt/NONEDGE  
Boundary port : NA  
Edge delay while expiry count : 0  
Rcvd info while expiry count : 0

Interface name : ge-1/0/10.0  
Port identifier : 128.635  
Designated port ID : 128.635  
Port cost : 20000  
Port state : Blocking  
Designated bridge ID : 32768.00:19:e2:50:95:a0  
Port role : Disabled  
Link type : Pt-Pt/NONEDGE  
Boundary port : NA  
Edge delay while expiry count : 0  
Rcvd info while expiry count : 0

Interface name : ge-1/0/20.0  
Port identifier : 128.645  
Designated port ID : 128.645  
Port cost : 20000  
Port state : Blocking  
Designated bridge ID : 32768.00:19:e2:50:95:a0  
Port role : Disabled  
Link type : Pt-Pt/NONEDGE  
Boundary port : NA  
Edge delay while expiry count : 0  
Rcvd info while expiry count : 0  
[output truncated]

**show spanning-tree interface msti**

```
user@host> show spanning-tree interface msti 1 routing-instance vs1 detail
Spanning tree interface parameters for instance 1
```

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
xe-7/0/0	128:1	128:1	32769.0090690b4fd1	2000	FWD	DESG
ge-5/1/0	128:2	128:2	32769.0090690b4fd1	20000	FWD	DESG
ge-5/1/1	128:3	128:3	32769.0090690b4fd1	20000	FWD	DESG
ae1	128:4	128:1	32769.0090690b47d1	10000	BLK	ALT
ge-5/1/4	128:5	128:3	32769.0090690b47d1	20000	BLK	ALT
xe-7/2/0	128:6	128:6	32769.0090690b47d1	2000	FWD	ROOT

**show spanning-tree interface vlan-id**

```
user@host> show spanning-tree interface vlan-id 101 routing-instance vs1 detail
Spanning tree interface parameters for instance 0
```

Interface	Port ID	Designated port ID	Designated bridge ID	Port Cost	State	Role
ge-11/0/5	128:1	128:1	32768.0090690b7fd1	20000	FWD	DESG
ge-11/0/6	128:2	128:1	32768.0090690b7fd1	20000	BLK	BKUP
ge-11/1/0	128:3	128:2	32768.0090690b4fd1	20000	BLK	ALT
ge-11/1/1	128:4	128:3	32768.0090690b4fd1	20000	BLK	ALT
ge-11/1/4	128:5	128:1	32768.0090690b47d1	20000	BLK	ALT
xe-10/0/0	128:6	128:5	32768.0090690b4fd1	2000	BLK	ALT
xe-10/2/0	128:7	128:4	32768.0090690b47d1	2000	FWD	ROOT

**show spanning-tree interface (VSTP)**

```
user@host> show spanning-tree interface
Spanning tree interface parameters for instance 0
```

Interface	Port ID	Designated port ID	Designated bridge ID	Cost	State	Role
ge-1/0/1	128:1	128:1	28672.0090690b3fe0	20000	FWD	DESG
ge-1/0/2	128:2	128:2	28672.0090690b3fe0	20000	FWD	DESG

```
Spanning tree interface parameters for VLAN 10
```

Interface	Port ID	Designated port ID	Designated bridge ID	Cost	State	Role
ge-1/0/1	128:1	128:1	28672.0090690b3fe0	20000	FWD	DESG
ge-1/0/2	128:2	128:2	28672.0090690b3fe0	20000	FWD	DESG

```
Spanning tree interface parameters for VLAN 20
```

Interface	Port ID	Designated port ID	Designated bridge ID	Cost	State	Role
ge-1/0/1	128:1	128:1	28672.0090690b3fe0	20000	FWD	DESG
ge-1/0/2	128:2	128:2	28672.0090690b3fe0	20000	FWD	DESG

**show spanning-tree interface vlan-id (VSTP)**

```
user@host> show spanning-tree interface vlan-id 10
Spanning tree interface parameters for VLAN 10
```

Interface	Port ID	Designated port ID	Designated bridge ID	Cost	State	Role
-----------	---------	-----------------------	-------------------------	------	-------	------

ge-1/0/1	128:1	128:1	28672.0090690b3fe0	20000	FWD	DESG
ge-1/0/2	128:2	128:2	28672.0090690b3fe0	20000	FWD	DESG

### show spanning-tree interface brief (EX Series)

```
user@switch> show spanning-tree interface brief
Spanning tree interface parameters for instance 0
```

Interface	Port ID	Designated	Designated	Port	State	Role
port ID	bridge ID	Cost				
ge-1/0/0.0	128:625	128:625	32768.0019e25095a0	20000	BLK	DIS
ge-1/0/1.0	128:626	128:626	32768.0019e25095a0	20000	BLK	DIS
ge-1/0/2.0	128:627	128:627	32768.0019e25095a0	20000	BLK	DIS
ge-1/0/10.0	128:635	128:635	32768.0019e25095a0	20000	BLK	DIS
ge-1/0/20.0	128:645	128:645	32768.0019e25095a0	20000	BLK	DIS
ge-1/0/30.0	128:655	128:655	32768.0019e25095a0	20000	BLK	DIS

### show spanning-tree interface ge-1/0/0 (EX Series)

```
user@switch> show spanning-tree interface ge-1/0/0
```

Interface	Port ID	Designated	Designated	Port	State	Role
port ID	bridge ID	Cost				
ge-1/0/0.0	128:625	128:625	32768.0019e25095a0	20000	BLK	DIS

## show spanning-tree mstp configuration

<b>List of Syntax</b>	<a href="#">Syntax on page 269</a> <a href="#">Syntax (EX Series Switch and the QFX Series) on page 269</a>
<b>Syntax</b>	<pre>show spanning-tree mstp configuration &lt;brief   detail&gt; &lt;routing-instance <i>routing-instance-name</i>&gt;</pre>
<b>Syntax (EX Series Switch and the QFX Series)</b>	<pre>show spanning-tree mstp configuration &lt;brief   detail&gt;</pre>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 8.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.1 for the QFX Series.</p>
<b>Description</b>	Display the MSTP configuration.
<b>Options</b>	<p><b>none</b>—Display MSTP configuration information.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>routing-instance <i>routing-instance-name</i></b>—(Optional) Display MSTP configuration information for the specified routing instance.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Understanding MSTP for EX Series and QFX Series Switches</a></li> <li>• <a href="#">Example: Configuring Network Regions for VLANs with MSTP on EX Series Switches</a></li> <li>• <a href="#">show spanning-tree bridge on page 255</a></li> <li>• <a href="#">show spanning-tree statistics on page 272</a></li> <li>• <a href="#">mstp</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show spanning-tree mstp configuration detail on page 270</a> <a href="#">show spanning-tree mstp configuration detail (QFX Series) on page 270</a> <a href="#">show spanning-tree mstp configuration (EX Series) on page 270</a>
<b>Output Fields</b>	<p><a href="#">Table 18 on page 270</a> lists the output fields for the <b>show spanning-tree mstp configuration</b> command. Output fields are listed in the approximate order in which they appear.</p>

Table 18: show spanning-tree mstp configuration Output Fields

Field Name	Field Description
Context id	Internally generated identifier.
Region name	MSTP region name carried in the MSTP BPDUs.
Revision	Revision number of the MSTP configuration.
Configuration digest	Numerical value derived from the VLAN-to-instance mapping table.
MSTI	MST instance identifier.
Member VLANs	VLAN identifiers associated with the MSTI.

## Sample Output

### show spanning-tree mstp configuration detail

```

user@host> show spanning-tree mstp configuration routing-instance vs1 detail
MSTP configuration information
Context identifier      : 1
Region name            : henry
Revision               : 3
Configuration digest    : 0x6da4b5c4fd587757eef35675365e1

MSTI      Member VLANs
0 0-99,101-199,201-4094
1 100
2 200

```

### show spanning-tree mstp configuration detail (QFX Series)

```

user@1f0> show spanning-tree mstp configuration routing-instance vs1 detail
MSTP configuration information
Context identifier      : 1
Region name            : henry
Revision               : 3
Configuration digest    : 0x6da4b5c4fd587757eef35675365e1

MSTI      Member VLANs
0 0-99,101-199,201-4094
1 100
2 200

```

### show spanning-tree mstp configuration (EX Series)

```

user@host> show spanning-tree mstp configuration
MSTP configuration information
Context identifier      : 0
Region name            : region1
Revision               : 0
Configuration digest    : 0xc92e7af9febb44d8df928b87f16b

```

MSTI	Member VLANs
0	0-100,105-4094
1	101-102
2	103-104

## show spanning-tree statistics

<b>List of Syntax</b>	<a href="#">Syntax on page 272</a> <a href="#">Syntax (EX Series and QFX Series) on page 272</a> <a href="#">Syntax (EX Series) on page 272</a>
<b>Syntax</b>	<pre>show spanning-tree statistics &lt;brief   detail&gt; &lt;interface <i>interface-name</i>&gt; &lt;routing-instance <i>routing-instance-name</i>&gt;</pre>
<b>Syntax (EX Series and QFX Series)</b>	<pre>show spanning-tree statistics &lt;brief   detail&gt; &lt;interface <i>interface-name</i>   vlan <i>vlan-id</i>&gt;</pre>
<b>Syntax (EX Series)</b>	<pre>show spanning-tree statistics interface <i>interface-name</i> vlan <i>vlan-id</i> &lt;brief   detail&gt;</pre>
<b>Release Information</b>	<p>Command introduced in Junos OS Release 8.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.1 for QFX Series switches.</p>
<b>Description</b>	Display STP statistics.
<b>Options</b>	<p><b>none</b>—Display brief STP statistics.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>interface <i>interface-name</i></b>—(Optional) Display STP statistics for the specified interface.</p> <p><b>routing-instance <i>routing-instance-name</i></b>—(Optional) Display STP statistics for the specified routing instance.</p>
<b>Required Privilege Level</b>	view
<b>List of Sample Output</b>	<a href="#">show spanning-tree statistics routing-instance on page 273</a> <a href="#">show spanning-tree statistics interface routing-instance detail on page 273</a>
<b>Output Fields</b>	<p><a href="#">Table 19 on page 272</a> lists the output fields for the <b>show spanning-tree statistics</b> command. Output fields are listed in the approximate order in which they appear.</p>

*Table 19: show spanning-tree statistics Output Fields*

Field Name	Field Description
Message type	Type of message being counted.



*Table 19: show spanning-tree statistics Output Fields (continued)*

Field Name	Field Description
<b>BPDUs sent</b>	Total number of BPDUs sent.
<b>BPDUs received</b>	Total number of BPDUs received.
<b>BPDUs sent in last interval</b>	Number of BPDUs sent within a specified interval.
<b>BPDUs received in last interval</b>	Number of BPDUs received within a specified interval.
<b>Interface</b>	Interface for which the statistics are being displayed.
<b>Next BPDU transmission</b>	Number of seconds until the next BPDU is scheduled to be sent.

## Sample Output

### show spanning-tree statistics routing-instance

```

user@host> show spanning-tree statistics routing-instance vs1 detail
Routing instance level STP statistics
Message type           : bpdus
BPDUs sent              : 1396
BPDUs received          : 1027
BPDUs sent in last interval : 5      (duration: 4 sec)
BPDUs received in last interval: 4    (duration: 4 sec)

```

### show spanning-tree statistics interface routing-instance detail

```

user@host> show spanning-tree statistics interface ge-11/1/4 routing-instance vs1 detail
Interface  BPDUs sent  BPDUs received  Next BPDU
              transmission
ge-11/1/4      7           190             0

```

